

Ryan · Hopperus Buma · Beadling · Mozumder
Nott · Rich · Henny · MacGarty *Editors*

Conflict and Catastrophe Medicine

A Practical Guide

Third Edition

 Springer

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Foreword by Larry W. Laughlin

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***To the late Colonel David Graham Burris,
MD, FACS, DMCC, who died in 2010:***

A surgeon, soldier and scientist

We, the editors, dedicate this third edition to our friend and colleague Dr. David Burris who died in 2010. David was professor and chairman at Norman M. Rich Department of Surgery at USUHS. He was co-editor of the second edition of this book and was in the forefront in the development of the Diploma in the Medical Care of Catastrophes (DMCC). Our consulting editor, Dr. Norman Rich, has provided us with his very personal and moving tribute to David, read at his memorial service, and asked if we might include it as our collective tribute. It is a fitting and moving resume of David's life, and an edited version is reproduced herewith.



David Graham Burris (1955–2010)
Memorial Service Church of Christ at
Manor Woods

Remarks by Norman M. Rich

11 August 2010

Having known David for the past 32 years, I knew him, initially, as a medical student. At least two of his classmates from 1982 are with us today, Steve Hetz and his wife, Mary, from El Paso, Texas, and Chris Kaufmann and his wife, Jenny, from Johnson City, Tennessee. We developed an early bond because of our mutual Arizona heritage and because of his early experience in Phoenix as an operating room technician. Although we attended rival Arizona universities, we did have the opportunity to eat tacos together on the Sonoran Desert at a gas station between Tempe and Tucson to put those rivalries in proper perspective. As a fourth-year medical student, David wrote to me 29 years ago about his rotation in surgery at Brooke Army Medical Center in San Antonio, Texas, stating, “I enjoyed an opportunity to speak with Dr. (Dan) Rosenthal who, as always, combined philosophy and wit in discussing his rigorous academic program”. Dr. Rosenthal, who is here with us today, has been David’s faculty representative at Brooke since David became chairman of surgery. Following graduation from the USUHS in 1982, David rose through the military ranks from second lieutenant to Colonel and through the academic ranks from corresponding member of surgery to professor and chairman. I enjoyed periodic exchanges with David during his overseas assignments and

deployments as well as during his training at William Beaumont and Walter Reed Army Medical Centers and the Washington Hospital Center. The last 16 years on active duty, David was assigned to the Department of Surgery at USUHS with deployments to Honduras and Iraq. In October 2002, David and I reversed roles and he became my chairman and I became his deputy. We agreed that he was the exciting future and I was the experienced past. We enjoyed a particularly rewarding personal and professional relationship. When David informed me of his diagnosis in late December 2007, he said,

“I withheld this from you for a few days because I did not want to ruin your holiday with your family. Now, you will have to take care of me when I was supposed to take care of you!” We all know that this is an example of David’s dedication to caring for others. David was recognised widely, both nationally and internationally, for his compassionate concern and care for the battlefield wounded. His contributions in combat casualty care research have been very important and resulted in his receiving the Raymond H. Alexander Award from the Eastern Association for the Surgery of Trauma, the Baron Dominique Jean Larrey Military Surgeons Award for Excellence from the USU Surgical Associates, the Army Surgeon General’s “A” Proficiency Designator in Surgery and numerous military awards including the Defense Meritorious Service Medal. Early this summer, David received singular recognition from the Army Surgeon General, LTG Eric Schoomaker, who

presented him with the Legion of Merit at USUHS, and this was particularly meaningful to David. David was an established principle investigator, working in recent years in telepresence surgery, far forward treatment of hemorrhagic shock and induced hypothermic arrest in traumatic shock. David's contributions to the Refereed Medical and Surgical Literature will maintain his legacy for many years in the future. This is highlighted by remarks from Dr. Ari Leppäniemi from Helsinki, Finland, who worked with David in our research laboratories and wrote, "During our time together at USUHS in the mid-1990s, we did many, many experiments together... and David had a special skill to come up with great ideas in a way that others did not think of, until he said it, then we all said, 'Ah! Of course.' Our work on fluid resuscitation and hemorrhagic shock, for example, gets cited very often". Because of David's valuable contributions, the surgical research laboratories will be named the David G. Burris Surgical Research Laboratories. With the assistance of Mrs. Mary Dix, then USUHS vice president, David redesigned and upgraded our surgical research laboratories. David and I shared interesting military vignettes, including Walter Reed's contributions in territorial Arizona, Henry Shrapnel and his shell, and Halsted-Holman contributions to vascular trauma, published in this month's Journal of Vascular Surgery. David was a proud Fellow of the American College of Surgeons, and he served as chairman of the Military Region, committed to the Advanced Trauma Life Support

Courses taught annually at USUHS and in many military locations around the world. He received the 2009 Advanced Trauma Life Support Meritorious Service Award for his efforts. To show the respect held widely by his peers, Dr. David Hoyt as executive director of the American College of Surgeons and Dr. Michael Rotondo as chairman of the Committee on Trauma of the American College of Surgeons plan to be with us today. Among many other societies, David was also a member of the American Association for the Surgery of Trauma, the Eastern Association for the Surgery of Trauma, the Society of Critical Care Medicine, the Shock Society, the Panamerican Trauma Society, the Christian Medical and Dental Associations, USU Surgical Associates, the Halsted Society, the Society of University Surgeons and the American Surgical Association. The important point to emphasise for all of you is that David's membership in both the Society of University of Surgeons and the American Surgical Association while on active duty is very unique, and there are very few who have achieved singular and academic recognition from peers and from senior civilian academic surgeons. He served in the Department of Defense, Surgical Committee, on the War Surgery Handbook Editorial Board and as president of the Ambroise Paré International Military Surgery Forum. David served his alma mater on all of the important committees, always providing constructive and consensus building contributions. One of our previous highly respected senior surgeons with a World War II British

experience in North Africa and Southern Europe, Charles G. Rob, encouraged all of us to write our own concise one-page autobiographical sketch. We have that from David, providing reassurance that we know what he thought was important to him in his life. The following are a few selected remarks from others around the world who admired and respected David Burris:

Colonel Peter Becker of the German Army, currently in Afghanistan as hospital commander of the combined German-American Hospital, has emphasised his long friendship with David Burris, which I know David cherished. David made a scientific presentation in German to the German Military Medical Society a few years ago, which was greatly appreciated by our allies.

Dr. Donald Jenkins, USUHS Class of 1988, director of trauma at the Mayo Clinic in Rochester, Minnesota, has written that they have laid an engraved brick dedicated to David's memory in the Walk of Remembrance at the Veterans' Memorial in Rochester. LTC Niten Singh, Class of 1997, has emphasised how grateful he is to Professor Burris for his surgical teaching as Dr. Singh has accepted the baton from Dr. Burris to provide leadership in military surgery.

In addition to his compassionate support of combat casualties through his basic research and clinical contributions, David was committed to teaching those who followed him. He always enjoyed his analogy of the military academy at West Point's "Long Gray Line" to the "Long Red Line" in military medicine and surgery. His legacy

will endure for those whom he helped train. Under his leadership, we had 52 of 163 members of the Class of 2010 express an interest in a surgical career, the highest number and the highest percentage in the USUHS experience to date. General Douglas McArthur in his last West Point address stated, “Old soldiers never die – they just fade away”. David was too young to die and he was our future. Nevertheless, we have all benefitted from his commitment, his faith, his friendship, his leadership by example and his love. His legacy will endure.

Foreword to the Third Edition

When the first edition of *Conflict and Catastrophe Medicine: A Practical Guide* was published over a decade ago, it was in reply to a growing realisation that those responding to provide disaster relief needed much more than technical competency in their primary field – health and medicine in our case. Organising, planning, executing and sometimes surviving missions to austere and on occasion hostile environments requires knowledge and skills not acquired during traditional education and practice. The second edition made significant additions and improvements. Our rapidly changing world, increasingly frequent conflicts, and devastating catastrophes are driving forces for this third edition. It provides an extremely valuable updated and expanded source of information for those preparing to participate in disaster response.

This text is appropriate for anyone – civilian or military, experienced or novice – wanting to increase his/her competency. One primary purpose for this text is to prepare candidates for the examination for the Diploma in the Medical Care of Catastrophes, under the auspices of the Society of Apothecaries of London. This widely recognized credential contributes to the global effort to “professionalize” the volunteers responding to natural and man-made disasters, as discussed in Chap. 54.

I am proud that our university, the Uniformed Services University of the Health Sciences, is one of three international sponsors for the DMCC, including the UK, the Netherlands, and the USA. The editors of this edition, under the leadership of Professors Jim Ryan and Norman Rich, reflect strong international representation, which is expanded further by the diverse group of experts contributing as authors. As you go through the Table of Contents, I am confident you will find many chapters relevant to your interests and needs. Our hope is that this book is useful and helpful as you act to reduce human suffering and loss of life.

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Preface to the Third Edition

We are writing this preface in mid-January 2013. Our media are reporting on the latest hostage crisis – on this occasion an unfolding tragedy in an oil and gas facility in eastern Algeria close to the Libyan border. Terrorists have taken hundreds of workers hostage – many have already been killed. A new front in global insurgency seems also to have opened in Mali, with French forces supporting the government in that Saharan state. Both of these events may be linked to the collapse of the Gaddafi regime in Libya. In the past years, Iraq has been invaded, Saddam Hussein deposed and a democratically elected Government installed. Yet, Iraq remains hostile and unstable and ever closer to Iran, which is developing a nuclear capability and threatening to erase Israel from the map. The USA, the UK, and many other Western nations have spent 10 years in Afghanistan in an attempt to destroy the Al Qaeda network and the Taliban and to support the development of the country and ensure a stable government. They will leave Afghanistan in 2015 but with the defeat of the Taliban at best uncertain. The brutal civil war in Syria is perhaps the world's most acute humanitarian crisis with numerous displaced people facing a harsh winter and intense suffering widespread. The eastern area of the Democratic Republic of Congo remains violent and highly unstable with huge mortality from violence and instability. There are other aspects of conflict which concern humanitarians. These include routine violence against women, the proliferation of narcotics, transnational criminal activity, human trafficking, ethnic cleansing and the widespread use of kidnapped children as child soldiers.

Natural disasters are of increasing concern. Disasters have been defined as “a situation or event which overwhelms local capacity, necessitating a request to a national or international level for external assistance” (Centre for Research on the Epidemiology of Disasters – CRED). As we head into the second decade of the twenty-first century, the numbers and scale of disasters facing the world's population are increasing.

The population of the world is growing fast, and ever-increasing numbers of people are forced to live in marginal areas. These may be areas where growing food is difficult due to climate, water shortages, or environment, or they may be areas that are particularly vulnerable to the impacts of sudden impact natural disasters.

Already more than 90 % of those who die in natural disasters live in the developing world, and the economic impact of such disasters is far more serious in deprived countries than in the developed world.

Political and religious extremism is resulting in high levels of social instability in many of those countries that are least able to cope with such situations, as well as in parts of the world that are better developed. This greatly increases the risk of the development of complex emergencies. The UN Inter-Agency Standing Committee defines this type of disaster as “a humanitarian crisis in a country, region, or society where there is total or considerable breakdown of authority resulting from internal or external conflict, and which requires an international response that goes beyond the mandate or capacity of any single agency and/or the on-going United Nations country program”.

Complex emergencies are characterised by extensive violence with large-scale injury and loss of life, extensive damage to societies and their economies, massive population displacement, and mass famine or food shortage. Large-scale humanitarian assistance is needed, but this may be hindered or prevented by military, religious, or political constraints, and significant security risks may face the humanitarian aid workers responding to the crisis.

It seems then that wars, conflicts and humanitarian calamities will be exercising our thoughts for the coming decades at least. The world too has become a dangerous place for humanitarian volunteers who face kidnap and murder by extremists and criminals with little sympathy for humanitarian ideals. The term “failed states” has entered the language of diplomacy, anthropology, politics and the media.

When we edited the first edition in 2002, we knew much of this – what we did not know was how the problem would grow and threaten to engulf us. Never has there been a greater need to prepare and plan for humanitarian interventions in a wide variety of hostile environments. Never has there been a greater need for properly trained humanitarians to work in these challenging environments.

We hope that the third edition of this textbook will play a role in this preparation. This new edition has been configured to tie in with other initiatives, in particular the Diploma of the Medical Care of Catastrophes (DMCC) under the auspices of the Society of Apothecaries of London, which is now examined in the UK, the USA and the Netherlands, and has been evolving over almost 20 years. The editors are examiners for the DMCC and have been involved in developing a new core curriculum and putting together a course of instruction in preparation for the exam. It is intended that this edition should become the course textbook.

It is also aimed at an increasing body of medical students who recognise the need to include this subject into undergraduate medical studies. Many medical schools in the UK now encourage medical students to interrupt their studies to present for an intercalated Bachelor of Science (iBSc) degree, normally after completing the basic medical science component of medical school training. In St George’s University of London, intercalating students may choose a conflict and catastrophe module. The third edition provides a supporting textbook for this module.

As we stated in the preface to the first edition, we hope this work will educate and inform those healthcare workers who now, or in the future, deploy on humanitarian assistance operations, whether civil or military, and in doing so help to improve the standards of healthcare provided to those in desperate need.

London, UK
Rotterdam, The Netherlands
Bethesda, MD, USA
Lichfield, UK
London, UK

James M. Ryan
Adriaan P.C.C. Hopperus Buma
Charles W. Beadling
Aroop Mozumder
David M. Nott

Preface to the Second Edition

Six years have passed since the first edition of *Conflict and Catastrophe Medicine* was published. Those 6 years have not been peaceful: conflict has continued in Iraq, Afghanistan, Africa, and the Middle East.

Terrorist attacks have continued around the world, and London has had its first experience of suicide bombings.

The landscape for humanitarian work is dangerous and challenging.

The aim of this second edition is in line with the first edition: to provide an entry-level resource for people working (or considering work) in a hostile environment.

Contributors with real hard-won practical experience have been invited to share their views, and they do this with raw honesty in a variety of writing styles.

The second edition of *Conflict and Catastrophe Medicine* has benefited from these contributions, and we hope our prospective readers will do so as well.

The book editors are donating their royalties from this book to the charity “Help for Heroes”.

Rotterdam, The Netherlands

Bethesda, MD, USA

Manchester, UK

London, UK

Birmingham, UK

Adriaan P.C.C. Hopperus Buma

David G. Burris

Alan Hawley

James M. Ryan

Peter F. Mahoney

Preface to the First Edition

This work is intended as an *entry-level* text aimed at medical, nursing, and para-medical staff undertaking work in a hostile environment.

It covers aid across a spectrum of hostile environments encompassing natural disasters, man-made disasters, and conflict in all its forms and extending to cover remote areas and austere industrial settings. The common thread in these situations is an increased risk of injury or death, which extends to both the local population and the expatriate workers.

Providing care in these environments needs an understanding of the situation and how this constricts and limits what can be achieved. This understanding bridges the fields of medicine, politics economics, history, and international relations.

Many humanitarian and equivalent organisations have long recognized the difficulties which can be experienced, and run a wide variety of courses, workshops, and exercises to broaden the skill and knowledge of the worker.

We hope this work will help in these endeavours and provide a link to the more specialist texts and training available.

It should give the prospective volunteer a feel for the depth and breadth of the subject and make volunteers realise the importance of external factors which impact upon medical care. It should also heighten their respect and understanding of other professionals in the field, such as engineers and logisticians.

Finally, this work should educate and inform those who now, or in the future, volunteer to deploy into an environment of conflict or austerity.

London, UK
Birmingham, UK
Middlesborough, UK
Southampton, USA

James M. Ryan
Peter F. Mahoney
Ian Greaves
Gavin Bowyer

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Part I

The Disaster and Conflict Environment

Charles W. Beadling

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The aim in this opening section is to give the reader the context in which disaster and conflict medicine is practised.

A number of new and relevant topics are introduced for the first time in this third edition. These include essays on modern terrorism, the place of ethics in the conflict and catastrophe environments, the role of Special Forces, and, controversially, the attempt by private security companies to muscle in on the provision of humanitarian aid.

The deployed environment is a complex blend of:

- *People*: those living within the conflict or disaster zone and those arriving to help or hinder the recovery, as either individuals or organisations.
- *Organisations*: with a vast array of worldviews from media to militias, industry to armies. Organisations become involved in conflict and disaster situations with very different agendas.
- *Constraints*: either climatic, geographic, or man-made.
- *Expectations*: of those involved and of those watching events in the print or broadcast media.

This section provides a sampler of these different factors. The hope is that the reader will start to see the issues when considering how a conflict or disaster is unfolding and what his/her place should be in the process.

The link pieces and personal views show how different individuals came to be in a particular place at a particular time and what they made of their experience.

Chapter 1

New Paradigms: The World in the Twenty-First Century – European Perspective

James M. Ryan and Adriaan P.C.C. Hopperus Buma

Abstract

- To examine the theme from a European perspective and from an American perspective
- To examine the world before and after 9/11
- To describe the failed state and its significance
- To introduce the concepts of globalisation and disintegration
- To suggest means of staying safe in these new environments

Keywords Global paradigms • Twentieth Century • Twenty First Century • Europe • United States • Failed state • Globalization • Disintegration • Complex humanitarian emergencies • Terrorism • Rebellion • Revolution • Natural disasters • Nuclear war • Climate Change • Financial crises • Humanitarians at risk • US Agency for International Development (USAID) • US Office for Foreign Disaster Assistance • National Response Framework • Oslo Guidelines

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Objectives

- To examine the theme from a European perspective and from an American perspective
- To examine the world before and after 9/11
- To describe the failed state and its significance
- To introduce the concepts of globalisation and disintegration
- To suggest means of staying safe in these new environments

Introduction

When the first edition of this book was published in 2002, the world had become a dangerous place. Europeans watched in horror and disbelief as a succession of vicious wars was fought in the former Yugoslavia between 1991 and 1995. These wars were characterised by savage internecine fighting. Ethnic cleansing, deliberate killing of innocent civilians, rape as a weapon of war and, finally, genocide were witnessed and reported in the international media. The conflict reached its nadir at Srebrenica with the massacre by Serbian forces of more than 8,000 men and boys, many under 14 years of age. Women were also raped and murdered. The massacre was a war crime on a scale not seen since World War II. The war appeared to end with the Dayton Accord of December 1995. The optimism that the conflict was truly over has turned to anxiety that little has been solved in the Balkans and that future conflict looms.

Though the wars in Yugoslavia shook European confidence in the future, something far worse was unfolding in Central Africa. What has been called the 2nd Congo war began in 1998 and continues. To date, this has resulted in almost four million deaths and over five million displaced civilians. Like the wars in the former Yugoslavia, this war was characterised by mass rape, kidnap, torture and murder. Europe did not seem to notice.

There followed the new millennium, initially with a sense of optimism that life would be better. However, new wars, conflicts and acts of unbridled terrorism have attended the birth of this new millennium. But, let us take a moment to step back in time. In the second edition of this work, we opened the chapter by stating Confucius's phrase "May you live in interesting times" which can be interpreted equally as a blessing or a curse. When directed at a prospective humanitarian aid volunteer, eager to embark on an overseas mission in the new millennium, the phrase leans more towards the latter.

We do live in interesting times not just because of advent of global terrorism and the radical restructuring of the world political scene that came about in the last quarter of the twentieth century. To improve our understanding, it is useful to look back at a number of historical watersheds.

In 1648, the Treaty of Westphalia was signed, ending the 30 Years War and power of the papacy. The *sovereign, independent state* as a discrete entity was born

and ushered in a period of relative enlightenment, interspersed with wars. These new states embarked on a series of interactions, often resulting in *treaties*, concerning such varied activities as trade, commerce and the conduct of war. This included the treatment of prisoners of war, wounded soldiers and non-combatant civilians. These attempts at reducing the appalling consequences of wars culminated in the next watershed in affairs between states – the establishment of the International Committee of the Red Cross.

In June 1859, the battle of Solferino took place. It resulted in the usual mass slaughter on both sides and the abandonment of the wounded where they fell. The majority would die alone and untreated. A Swiss National, Henri Dunant, witnessed this battle. He was so moved by the plight of the wounded that he organised care for them and in 1862 he published *A Memory of Solferino* recounting these events. Dunant then set in motion initiatives, which resulted in the creation of the *International Committee for Relief to Wounded Soldiers*. As its flag, it adopted the distinctive Red Cross on a white background. The following year, members drawn from 16 states drew up the first Geneva Convention for *the Amelioration of the Condition of the Wounded in Armies in the Field*. In 1880, the name was changed to the International Committee of the Red Cross.

Thus was ushered in a period where the rights of wounded and captured soldiers, civilians and medical aid personnel were enshrined in a variety of treaties and memoranda of understanding. Humanitarian aid organisations, including international governmental organisations (IGOs) and non-governmental organisations (NGOs), concerned with caring for the victims of war and disasters proliferated, particularly in the latter half of the twentieth century. In 1909, there were 37 IGOs and 176 NGOs. By the end of the twentieth century, these numbers had risen to 260 IGOs and a staggering 5,472 NGOs. Two observations can be made on the increase in IGOs and NGOs – the ever-increasing demand and, until recently, their freedom to work in a climate of relative safety. The reasons for this climate of safety are worth noting. Within most nation states, even when at war, there was recognition of the institutions, of law and order, the laws of war, and in addition, there were codes of ethics and morality governing the activities of non-combatants and combatants alike. Although there were notable exceptions, these understandings pertained in most instances.

The World Scene at the End of the Twentieth Century

It is commonplace for writers and commentators to look at the new twenty-first-century world through the prism of the destruction of World Trade Centre and to see the events that followed as directly arising from the attack. While there is no doubt that this event was the greatest ever terrorist attack on continental United States, it was not the cause of radical and convulsive changes that were witnessed post 9/11 and which are continuing. The world had already reshaped and events were in train that would lead inexorably to war/conflict and the rise of global terrorism. In truth,

while 9/11 is a watershed date in global history, the events that reshaped the new paradigms began in the latter quarter of the twentieth century and were well under way before 9/11.

Background to the New Paradigms

The spectacular failure of Marxist-Leninist communism and the rise in nationalism resulted in a convulsive and often violent disintegration of old alliances and power blocks. The implosion of the Soviet Union is the most obvious example, but there are others. Collapse, disintegration and armed conflict have occurred in the Balkans, the Caucasus, North and Central Africa and Asia. The result has been the emergence of dozens of new self-governing entities that have obtained or are still seeking recognition as sovereign independent states. United Nations membership statistics are illuminating. In 1991, the United Nations had 166 member states, and in 1997, this number had increased to 185. Predictions for the future suggest a membership of up to 400; many of these will lack the means to survive independently without international assistance and will fail. The terms *failed state*, *failing state* and *defeated state* have now entered the literature of sociology, politics and journalism. Consensus on definition has yet to be reached. They may be defined in terms of governmental mismanagement resulting in the loss of loyalty of the population and leading to disintegration. Further, they may be defined in terms of economic or political non-viability, following the break-up of a larger state or union of states (parts of the former Yugoslavia are good examples). This definition fits many of the newly emerged states in Africa and Eastern Europe.

Conflict in Failed States

Failed, failing and defeated states are characterised by conflict, which may be internal or external. Conflict from without may be the result of the new state's cleavage from a larger entity. The larger entity may endeavour to ensure the new state's failure to survive, by economic means or direct military intervention. New or newly emerging European states that have suffered in this way include Croatia, Bosnia, Kosovo and Chechnya. We have witnessed conflict from within arising because of ethnic or religious divisions. Examples include Azerbaijan, Armenia and much of Central and West Africa. Some entities are affected by both conflicts from without and within: Bosnia and Kosovo are examples.

These conflicts pose novel threats to the humanitarians. The climate of relative safety for humanitarian volunteers achieved in the late eighteenth and much of the nineteenth centuries is no longer to be taken for granted. The reasons for this are complex; no single factor can be blamed: It is discussed in the closing section of this chapter.

We now turn to other factors, which have had an impact on the world in the new millennium – two of these are globalisation and disintegration.

With the start of the new millennium, the world political scene changed – a process that actually began in the latter half of the last century. Far from looking to a world full of certainty and an end to conflict, the world in the new millennium seems confused. Two distinctive processes can be identified – globalisation and disintegration – resulting in a troubling paradox.

Globalisation

The nature of sovereign independent states is undergoing radical change. States are drawing together over a range of activities including trade, communications and defence. National economies are moving towards integration and increasing political integration seems inevitable (witness the extent and speed of change within the European Union over the last 25 years.) These moves have resulted in a globalised market which is changing forever the way the world functions. This is in a word globalisation. In 1977, the United Nations General Secretary Kofi Annan stated, “Globalisation is a source of new challenges for humanity... Only a global organisation is capable of meeting global challenges... When we act together, we are stronger and less vulnerable to individual calamity.” It is not just the desire by individual states for closer integration that is driving the trend. New hierarchies, the IGOs, are wielding power and influence. World affairs are increasingly influenced if not controlled by IGOs such as the United Nations, the World Trade Organization, International Monetary Fund and the North Atlantic Treaty Organization. Transnational regional organisations also exert influence – notably the European Union and the Organisation of African Unity. Although these organisations are comprised of sovereign national states, the power and influence of the individual states is often subsumed. These networks of international interdependence are concerned with a growing range of global issues. The more important are:

- Defence and disarmament
- Trade and economic development
- Communication and information dissemination
- Humanitarian aid and development
- Human rights
- Health and education
- The environment
- Refugees and internally displaced people (IDPs)

What is clear is that the power of states to act independently is being progressively eroded as the trend towards globalisation develops. While the benefits are enormous, problems lie in the resulting inequality between states and groups of states. Already a backlash is evident.

Disintegration and Backlash

In opposition to moves by many major states towards integration and an acceptance of cultural diversity, other states and groups within states are resisting. The result is widespread instability with increasing threats to world and local peace. This backlash is occurring and gathering pace.

Destructive and disintegrative trends are appearing in parts of the globe. Globalisation and its dependence on communication via the new information highway, the Internet, favours the more developed and wealthier economies, leaving much of the less developed world trailing in its wake. There is an increasing view that territorial conquest by sovereign states is of less importance than economic dominance. This shift is occurring as the primary fault line in international affairs as conflict between communism and capitalism disappears. This change, often described as the end of the bipolar distribution of power, has not resulted in stability or world peace. The rise of nationalism, tribalism, transnational religious movements and racial/ethnic intolerance seems to defy the trend towards globalisation and a toleration of cultural diversity.

The backlash against globalisation is all the more worrying due to the proliferation of weapons, including weapons of mass destruction. The most powerful and lethal weapons are no longer controlled by Great Powers alone. With the collapse of the Warsaw Pact, vast quantities of small arms and explosives and a range of other weapons appeared on the international market at very low cost. Many of these weapons have fallen into the hands of terrorist, extreme nationalist and religious fundamentalist groups. Further, many smaller states have now developed nuclear weapons and the means to deliver them globally. Many of these states and groups are unstable and vehemently opposed to globalisation and integration.

Natural Disasters

Thus far, discussion has been confined to the impact of man-made conflict and disaster. A later chapter discusses natural disasters in detail, but it is appropriate to consider them in relation to this discussion. Whereas the move towards globalisation has great attraction for the developed world, with state stability and growing economies, the move towards disintegration of unstable and economically poor states, while undesirable, seems inevitable. These disintegrating states face double jeopardy. In the last quarter of the twentieth century, natural disasters have resulted in over three million deaths, and one billion people have been affected by their aftermath, by intolerable suffering and by the reversal of years of development. The World Bank, one of the key IGOs, estimates annual losses to be in the region of \$30 billion, while current annual mortality is in the region of 250,000 and is expected to rise. The escalating world population can only lead to further deterioration of this situation, particularly as many of these people will be concentrated in zones, which

are prone to natural hazard. By the year 2100, 17 of the 23 cities estimated to have more than ten million people will be in these areas. The double jeopardy arises from the fact that these are the very centres of population, which face the greatest risk of disintegration and internal conflict.

2000–2012 Europe “in the Firing Line”

In a globalised world, Europe is not immune to events occurring in the far corners of the globe. A myriad of adverse events have occurred across the globe with direct and indirect effects on Europe and its people.

Complex Humanitarian Emergencies (CHEs)

Complex Humanitarian Emergencies (CHEs) are defined by the United Nations as follows:

CHEs are humanitarian crises in a country region or society where there is a total or considerable breakdown of authority resulting from internal or external conflict and which requires an international response that goes beyond the mandate or capacity of any single and/or on-going UN country programme. Those suffering the consequences are primarily civilians (50–90 %) and especially vulnerable populations of that include children, the elderly and the disabled.

CHEs are currently the most common human-generated disasters. They have major political, public health and security features in recent decades and account for more morbidity and mortality than all natural and technological disasters. They are also a fertile nursery for terrorism, both local and international. CHEs have occurred or are ongoing in every continent. Ongoing examples include Afghanistan, Somalia, Sierra Leone, Sudan, Myanmar, Colombia, Haiti and Congo. Countries or regions recovering from such events include the Balkans, the Caucasus, Rwanda, Azerbaijan, Angola, Mozambique and many territories in South East Asia and South America. The implications for Europe are financial, manpower deployment and donations of material aid. These are also dangerous environments for humanitarian volunteers.

The Global Financial Crisis

The global financial crisis began in 2007–2008, probably triggered by the bursting of the US housing bubble. However, its causes are more complex. Whatever the causes, its effects are easily identified – economic and political uncertainty, impoverishment and exclusion of millions of previously employed workers. At the time of writing, collapse of nation states, Greece, for example, remains a distinct

possibility. Such events have enormous political and security threats as witnessed by riots and civil disorder in the United Kingdom, Greece, France and Spain to name but a few.

International Terrorism

The topic is covered in many other parts and sections of this work. Suffice it say here that terrorism has changed and has moved from local or national outrages to a globalised and fully linked network of groups posing a worldwide threat. It represents a major threat to the health and safety of European and international humanitarian volunteers.

Home-Grown Terrorism

While it is easy to point to international groups like al-Qaeda and its affiliates, a closer examination of recent European terrorist events points to culprits closer to home. The London bombings were carried out by a disaffected group of Pakistani origin – but they were British born. The terrorists involved in the Madrid bombings were either Spanish or North African nationals. The Norway massacre by a right-wing fanatic with extreme anti-Islamic and immigration views was carried out July 22, 2011. He mounted a twin attack in Oslo and on a nearby island. He killed 69 people and wounded over 50 others. Most were in their teens and early 20s. These events prove that Europeans need not travel to be in danger of death or injury at the hands of terrorists.

Rebellion and Revolution

These events, sometimes peaceful, other times violent, have occurred in Europe and in states bordering on Europe. In Europe, revolutions overthrew governments in the Balkans, Georgia, Ukraine and Kyrgyzstan. In the Middle East, the world is witnessing the Arab Spring with governments overthrown in Tunisia, Egypt, Lebanon, Libya and Yemen. Bloody conflict is being waged in Syria and in some of the Gulf States.

The Threat of Nuclear War

At the time of writing, Iran stands accused of developing nuclear weapons. Israel and the United States stand ready to mount a pre-emptive strike. Such an outcome

would doubtless have extreme consequences for all but particularly Europe. In the distance, North Korea continues to develop its nuclear programme. There remains the fear of proliferation of nuclear weapons throughout the Middle East and beyond with the likelihood of nuclear weapons falling into the hands of terrorists or rogue states.

Climate Change and Other Adverse Events

Europe is not immune from natural phenomena. In 2003, a Europe wide heat wave caused more than 30,000 deaths. The L'Aquila earthquake in Italy in 2009 was one of the worst in that country's history. Over 300 people were killed and over 65,000 made homeless. Doubtless, more adverse events will occur indicating that humanitarian assistance may be required on the home front and not just in far-flung places.

A Dangerous New World: Humanitarians at Risk

This book is primarily written for humanitarian volunteers – a high percentage of these come from Europe. Deployment overseas on humanitarian missions has always been associated with risk, and workers have always accepted this – risk goes with the job. The community has long accepted this fact and has coped with sporadic instances of death and serious injury. Historically, these have been concerned with accidents or disease, and rarely has the humanitarian volunteer been deliberately targeted. There was a widespread belief that the flags and emblems of the humanitarian organisations provided shields for their volunteers. This is no longer the case.

The historical safety of the humanitarian volunteer and the non-combatant civilian was based on concepts developed within sovereign states as already discussed. However, these concepts such as neutrality, impartiality, human rights and the various duties imposed by various Geneva Conventions assume a functioning state with its instruments of power (e.g. police and military forces) intact and obeying the rules of national and international law.

Within failed, failing or defeated states, such institutions and codes of behaviour may cease to exist. This may also apply to states affected by natural disasters, at least for a time. Power or control may become vested in the hands of illegal bodies such as irregular militias, paramilitary groups or terrorists, often commanded by local warlords. Within failed states, there may be a myriad of such groups engaged in conflict among themselves, but often forging short-lived alliances, making the climate even more dangerous and unpredictable for outside agencies. The particular tragedy of such conflicts is the deliberate targeting of civilians, including women, children and the elderly. In some cases, the aftermath of the fall of Vukovar in Croatia, for example, this has extended to the slaughter of the ill and injured in

hospitals. In past wars, the majority of the killed and injured have been soldiers. The ratio has historically been 80 % soldiers to 20 % civilians. In modern war and during conflict in failed states, this ratio has reversed as a matter of deliberate policy. It is salutary to note that between 1900 and 1987 about 130 million indigenous people were slaughtered by genocide within their own countries.

One of the features of conflicts within these states is an attempt to “purify” the regions ethnically by enforced movement of populations perceived to be alien and posing a threat – this is the phenomenon of ethnic cleansing. On occasion, this may extend to attempts at annihilation; the holocaust is an unsurpassed example. More recently, and on a smaller scale, mass murder of refugees and IDPs has occurred in Rwanda, Bosnia, Kosovo and East Timor.

Humanitarian volunteers cannot remain immune. Non-state groups such as militias, or indeed state sponsored organisations in the case of external conflict, increasingly find political advantage in targeting volunteers and their organisations. The aim has usually been to cause destabilisation. Aid organisations are also targeted because they may be seen to favour one faction over another. In Bosnia, Somalia, Sudan and Afghanistan, this has led to hijacking of food and medical aid convoys and the kidnapping and beating of volunteers. Journalists, reporting in the international media, describe a climate of cold-blooded terrorism against aid volunteers. Volunteers working with the World Food Programme (WFP) are being targeted as they deliver food in refugee camps. Many have been killed. WFP has the unenviable record of having lost more staff members to violence than any other UN agency. The statistics are grim: The UN has lost 184 civilian employees to violence between 1992 and 1999. In 1998, more civilian humanitarian aid workers died than armed and trained UN military peacekeepers. Risk extends to all humanitarian aid organisations. Volunteers working for the International Committee of the Red Cross, an organisation long considered immune, have been threatened and beaten in Africa and murdered in their beds in Chechnya.

Staying Safe: The Way Ahead

With the close of the twentieth century and the beginning of the new millennium, a paradox may be observed. It was on the one hand the most productive century in terms of social progress, education, health and wealth creation; on the other hand, it was the most destructive in the annals of human history. There were 250 wars and conflicts resulting in nearly 110 million deaths. These are grim statistics for humanitarian workers gazing in the crystal ball of the new millennium. One fact is clear – during this millennium, no aid worker should consider that donning a white uniform with an NGO emblem on the sleeve is a guarantee of safety. The opposite may be the case. What then are the implications for the humanitarian aid volunteer in the twenty-first century? To withdraw completely and ignore such conflicts is not an option – although many have suggested it. Highly motivated and skilled humanitarian volunteers have never been needed more urgently. The numbers required will also rise during the new millennium. Assuming people will continue to volunteer,

the question must be asked: How may they protect themselves and their colleagues? Should they be armed or work under the protection of armed groups? These are vexing questions and must be addressed. At last, the United Nations Security Council are debating these issues. Under discussion are initiatives to train future aid volunteers in techniques such as anticipating danger, recognition of mine fields, extraction from trouble at roadblocks, coping with kidnap imprisonment and interrogation. Many of these difficult and contentious issues are debated in later chapters and sections of this manual. There are no easy or hard and fast answers; however, preparation and training well in advance of deployment has never been more important. While another section of this manual discusses personal preparation and training in detail, it is reasonable here to emphasise some of the more important aspects.

Choosing an IGO or NGO

The proliferation of organisation engaged on humanitarian aid missions in areas of conflict and catastrophe has been noted. Many, if not the majority, of these organisations enjoy well-deserved reputations for their effectiveness. They take great care in the preparation of volunteers and look to their safety. However, there are numerous smaller organisations that arise, often involved in single issues and then disappear. Volunteers should spend time checking the credentials of any IGO or NGO seeking their services. There are central clearing houses, which hold extensive information on such organisation, notably the International Health Exchange.

As a minimum, a volunteer should insist on the following:

- Written details of the organisation, including annual reports and financial statements
- Mission briefings, including clear aims and objectives
- Political and security briefings
- Details of local and international logistical support
- Health checks, including vaccination needs and disease prophylaxis
- Medical insurance scheme including repatriation
- Mission-oriented training programmes and workshops
- Provision of details concerning mission's end point and return home.

In summary, volunteers should only work for organisations of good standing, who prepare volunteers before deployment, transport them safely, house them adequately during deployment, give clear and achievable tasks and then ensure safe return.

Personal Preparation

In a climate of increased danger, volunteers should examine their motivation and suitability. Physical and mental fitness are paramount. A history of cardiovascular, gastrointestinal or psychiatric illness should preclude deployment. This also applies

to those on any form of long-term medication. If in doubt, seek expert advice (most reputable organisations demand rigorous health checks); exacerbation of a long-standing medical condition during deployment may have catastrophic consequences. A well-known aphorism states, “Do not become a casualty yourself and become a burden on already overburdened comrades.” Personal preparation should extend to home and family. Consider “Will and bills”. Check life assurance policies for validity in conflict settings. Consider too the effects of deployments, particularly long and arduous ones, on family life. It is easy to forget that volunteers have to return home and pick up the pieces of their personal and professional lives.

Professional Preparation

Any volunteer must consider the professional task required during the mission and then question their ability to perform. This extends beyond the individual’s own ability and skill to include the means to carry out a task. It would be pointless to recruit and deploy a surgeon without an appropriate team and infrastructure in place, yet this has happened.

It is usually a requirement for volunteers to be multi-skilled and adaptable in austere environments. At very least, an individual should be capable of personal survival and should, for example, be able to prepare clean water and food, choose appropriate shelter, drive off the road vehicles and use a basic radio set. Many organisations would regard these as a minimum set of skills over and above medical or related qualifications. Further, if the volunteer is taking part in a basic or higher professional training programme, assurances must be sought that no time or professional penalty will be accrued because of the deployment.

Conclusion

This is the uncertain future facing the volunteer in 2000 and beyond. Yet, taking part in a humanitarian aid deployment is an enriching experience and affords a unique opportunity to understand the plight of most the world’s population and to realise the good fortune of those living in stable and wealthy sections of the world. The prospect for the future humanitarian volunteer is that he will *live in interesting times*. The authors of this chapter wish you *bon voyage*.

Chapter 2

New Paradigms: The World in the Twenty-First Century – A US Perspective

Charles W. Beadling and Norman M. Rich

Abstract The US approach to both domestic and foreign disaster preparedness and response has undergone significant change over the past few decades. Regarding domestic disasters, a National Response Framework replaced the National Response Plan. The NRF is intended to allow flexible and adaptable response across all levels of government, local, tribal, state and federal.

The US Government response is led by the US Agency for International Development (USAID). Within USAID, the Office of Foreign Disaster Assistance provides financial, relief commodities and Disaster Assistance Response Teams.

US military support to foreign disaster response is changing due to evolving security threats and the need to stabilize host nation governments. Following the Oslo Guidelines when possible, military forces bring several distinct strengths. One of these strengths is a large number of personnel experienced in working in austere and hostile environments. Global communications is another very beneficial capability. Probably, one of the most valuable contributions is helicopter transportation for equipment, supplies and personnel to isolated areas.

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Keywords Global paradigms • Twentieth Century • Twenty-First Century • Europe • United States • Failed state • Globalization • Disintegration • Complex humanitarian emergencies • Terrorism • Rebellion • Revolution • Natural disasters • Nuclear war • Climate Change • Financial crises • Humanitarians at risk • US Agency for International Development (USAID) • US Office for Foreign Disaster Assistance • National Response Framework • Oslo Guidelines

US Perspective: Domestic Disaster Response

In the United States (US), the current status of disaster preparedness, planning and response to domestic catastrophic events is the result of many changes over past decades. A feeling of complacency about our readiness was challenged in 2005 when massive destruction was suffered along the southern US coastal region of the Gulf of Mexico from two Category 5 hurricanes, Katrina and Rita. This led to a re-evaluation of our National Response Plan and its replacement with the National Response Framework (NRF) in 2008 [1].

The transition from a plan to a framework was intended to provide better flexibility and be adaptable to “All Hazards” preparedness. While an All Hazards approach is appropriate for the United States, which is truly at risk for any hazard, most countries are better served by a “Multi-Hazard” disaster preparedness programme that is tailored to the threats with the greatest risk based on the vulnerability of the population and the probability of occurrence. For example, if a country has frequent earthquakes or a large portion of the population lives in structures not designed to resist seismic activity, then specifically planning and preparing for earthquakes is appropriate. If an area is at very low risk for seismic events, then the benefit may not be worth the cost for a nation with limited resources.

Another aspect of the current NRF is that disaster preparedness is intended to span the “whole of society”. The responsibility to be ready to respond extends from each individual to the federal civilian government, the military and the private sector. Family and household readiness includes everything from discussing what to do in case of a fire to having a kit of supplies for survival. These supplies could be as simple as food and water, to more complicated supplies such as occlusive material and tape to put over windows in order to reduce exposure to a bioterrorism agent.

The initial response to a crisis situation or disaster will be local: city, tribal or county jurisdiction. Many local jurisdictions have mutual support agreements with neighbours. If local resources become overwhelmed, the next level of response is the state. The state Governor has National Guard military resources that he or she can deploy in response. These units are often trained in disaster response and can provide additional technical expertise in a variety of areas, such as security, engineering, large equipment operation or medical assistance, as required.

A federal response requires a formal request from the Governor of the affected state (Fig. 2.1). In severe disasters, the escalation of response can occur quickly.

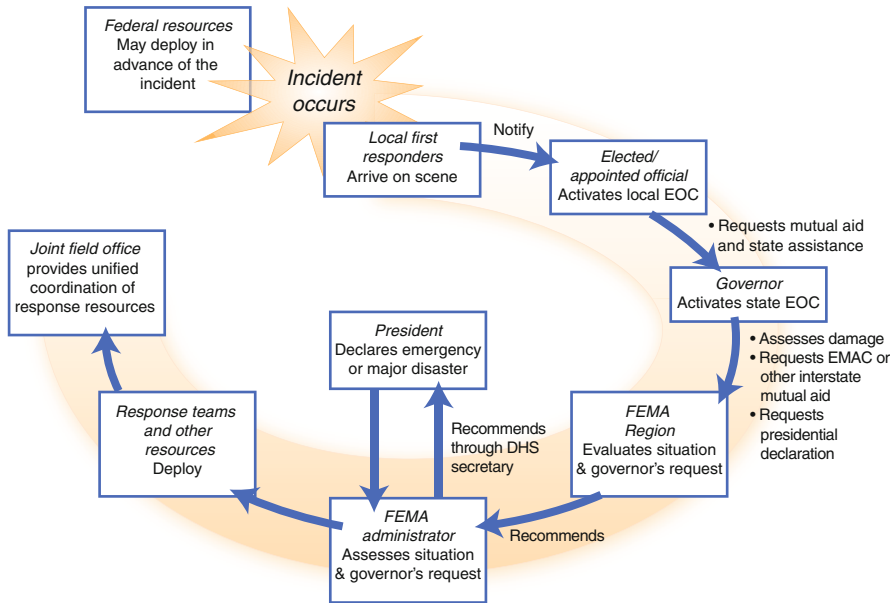


Fig. 2.1 Tiered response through local–state/tribal–federal levels

One of the difficulties with the response to Hurricane Katrina was a delay in the request for federal assistance from the Governor of Louisiana. The federal response will be under the control of the Federal Emergency Management Agency, which is in the Department of Homeland Security. Resources from the federal government can be provided from any of the departments or agencies.

The federal response is organized into 15 Emergency Support Functions, each with a lead federal department or agency (Table 2.1). Which functions are deployed will depend on the specific needs of the situation. Any single, combination or all 15 Emergency Support Functions (ESF) might be called to respond. Medical support is included in ESF 8, Public Health and Medical Services, which is coordinated by the Department of Health and Human Services. Besides public health and general medical support, this function specifically includes responsibility for mental health and mass fatality management.

The NRF is built on five key principles. The first is that preparation and response is based on an *engaged partnership*, not only between levels of government but with non-governmental organizations and the private sector. The second is that the response will be *tiered*, hence the local, tribal, state and federal levels of response. The response is intended to be managed at the lowest level appropriate for the severity of the situation. Third is that operational capabilities must be *scalable, flexible and adaptable*. This is what allows the NRF to cover the array of catastrophic events from a terrorist detonation of a nuclear device in one city to a hurricane that impacts a large region. The response will depend on the size, scope and complexity of each situation.

Table 2.1 Emergency Support Functions and coordinating agency

Emergency Support Function (ESF)	Coordinating agency
1. Transportation	Department of Transportation
2. Communications	Department of Homeland Security (National Communications System)
3. Public Works and Engineering	Department of Defense (US Army Corps of Engineers)
4. Firefighting	Department of Agriculture (US Forest Service)
5. Emergency Management	Department of Homeland Security (Federal Emergency Management Agency)
6. Mass Care, Emergency Assistance, Housing and Human Services	Department of Homeland Security (Federal Emergency Management Agency)
7. Logistics Management and Resource	General Services Administration and Support Department of Homeland Security (Federal Emergency Management Agency)
8. Public Health and Medical Services	Department of Health and Human Services
9. Search and Rescue	Department of Homeland Security (Federal Emergency Management Agency)
10. Oil and Hazardous Material Response	Environmental Protection Agency
11. Agriculture and Natural Resources	Department of Agriculture
12. Energy	Department of Energy
13. Public Safety and Security	Department of Justice
14. Long-Term Community Recovery	Department of Homeland Security (Federal Emergency Management Agency)
15. External Affairs	Department of Homeland Security

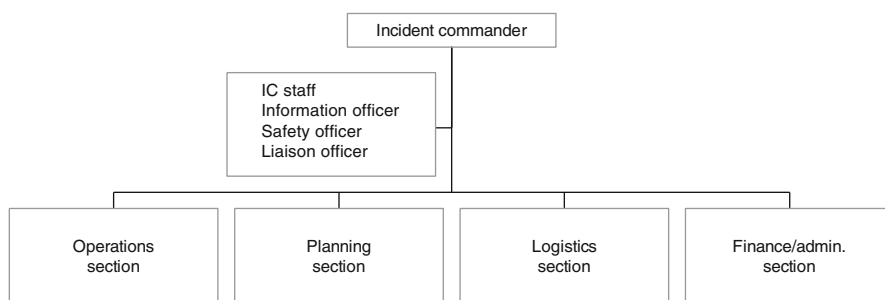


Fig. 2.2 Incident Command System

The fourth principle is that unity of effort must be achieved through a *unified command structure*. The Incident Command System (Fig. 2.2) provides a standardized unified command structure that is commonly used across all levels from local to federal. Using a standardized, common organization facilitates rapid integration and better coordination of resources, resulting in a more effective response. When an organization from a different jurisdiction or level of government responds to provide assistance, there is much less confusion regarding responsibilities and lines of authority.

Under the authority and responsibility of the Incident Command are a Command Staff and four functional areas. The Command Staff normally includes specific capabilities, including Public Information Officer, Safety Officer and Liaison Officer. The four functional areas include Operations, Planning, Logistics and Finance/Administration. Medical support is under the direction of the Operations Chief.

Finally, *readiness to act* is the fifth principle. This principle applies to everyone, from individuals all the way to the federal government. All levels must work to be prepared through public education, training and disaster exercise programmes. Public disaster preparedness efforts include tornado response drills in schools, fire evacuation drills in the workplace and large-scale community disaster exercises. These preparation programmes should require communication and coordination across all levels in order to have a smoother response in the event of an actual disaster.

US Perspective: International Disaster Response

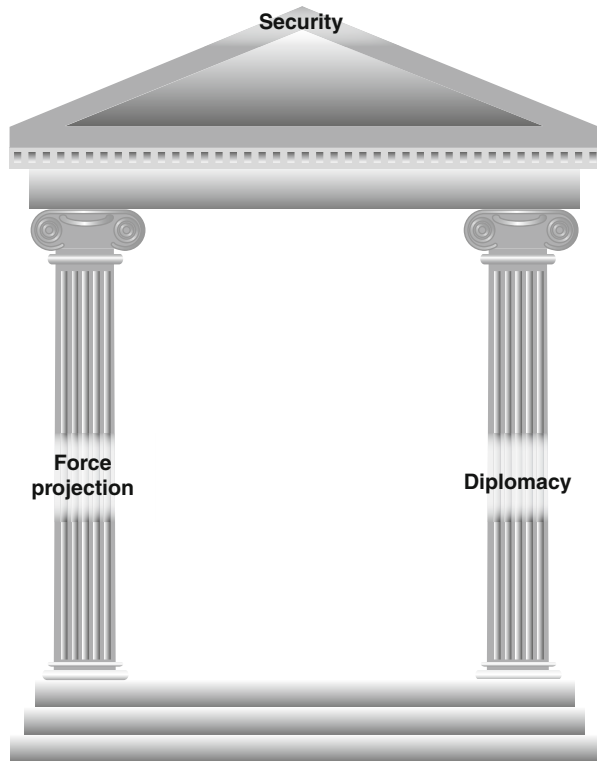
Introduction

As one of the world's leaders, the United States has an obligation to provide aid to countries in need due to catastrophic events. It does so across the cycle of prevention, mitigation, preparedness, response and recovery. First, the United States contributes financially to many funds, including the United Nations (UN) Central Emergency Response Fund (CERF). Since the CERF was established in 2006–2012, the US Government has donated 36 million dollars [2]. Following the devastating earthquake in Haiti in 2010, US aid organizations have donated over two billion dollars [3]. Besides US Government donations, individuals and private corporations regularly donate to various relief funds. In addition to financial support, each year, thousands of individuals volunteer their time and expertise with a variety of non-governmental organizations, such as the International Medical Corps, Doctors Without Borders and the American Red Cross.

Besides fiscal assistance to international organizations, like the UN, and non-governmental organizations (NGOs), direct response has also consistently been significant. The US Agency for International Development (USAID) is the lead agency for the US Government for efforts to mitigate and prepare for foreign disasters before they occur, as well as during rebuilding and reconstruction following a catastrophe. USAID works closely with UNOCHA, UNDP and the host nation government to meet the needs of individual nations. The lead US Government agency for foreign disaster relief following a catastrophe is the Office of Foreign Disaster Assistance (OFDA), which is within the USAID [4].

Material support, such as humanitarian daily rations and deployable field hospitals, has been provided to nearly every humanitarian emergency from earthquakes

Fig. 2.3 Previous model of US National Security

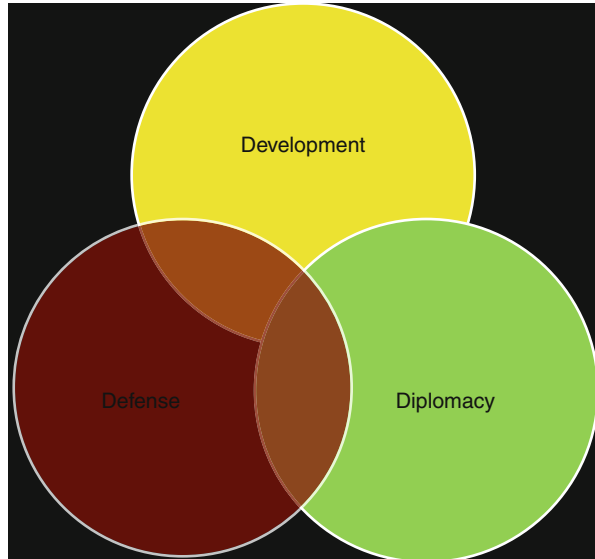


in Pakistan, to mudslides in Guatemala, to flooding in Mozambique. OFDA maintains warehouses around the world where relief commodities are stored [4]. USAID/OFDA also maintains Disaster Assistance Response Teams (DART), each with specialized skills that can be deployed to the disaster area. US military resources, including engineering support, aviation transportation, mobile field hospitals and personnel, are provided when requested and appropriate.

The US Government (USG) has significantly changed its policies for responding to disasters and providing humanitarian aid abroad. During the first decade of the twenty-first century, consequences of infrastructure collapse following military operations in Iraq and Afghanistan, along with persisting threats of insurgency in many parts of the world, resulted in doctrinal changes for the provision of international assistance.

As well as the primary goal of altruistically helping those in time of need, it has become apparent that national security at home cannot be guaranteed by the use of, or threatening to use, force alone. Previously, US National Security was provided by two main pillars, diplomacy and defence (Fig. 2.3). Defence, the use of military force, consists of Force Projection – either the use of force or the threat to use force. The use of pillars to represent this situation is appropriate because policies and

Fig. 2.4 New model of US National Security



functions were often completely independent between the Department of State and the Department of Defense.

It is now widely appreciated that creating stability in regions around the globe is essential to US National Security, as well as security everywhere. This requires improving the quality of life for populations vulnerable to insurgency or terrorism, including assistance to the legitimate government to meet essential services, such as health. The increased emphasis on improving the ability of these nations to meet the needs of their populations, in order to avoid conflict and ensuing complex humanitarian emergencies, has led to a coordinated engagement philosophy referred to as the “3 Ds”, for diplomacy, defence and development (Fig. 2.4).

Current policy not only endorses civil–military, or “whole of government” cooperation, but includes international organizations, non-governmental organizations and the private sector for a “whole of society” effort. Involvement by the private sector is critical to sustain economic viability. By using the relative strengths of each component, a more effective response is possible. US Department of Defense policy and guidance aligns our military guidance with these broader US Government policies.

Therefore, the United States has invested heavily in disaster preparedness of partner nations and regions of strategic importance. The post-conflict humanitarian emergencies in Iraq and Afghanistan have resulted in dramatic financial, material and human resource investments. A large part of this investment has been to establish, reconstitute and maintain health sector capacity and capability for the indigenous population. Less visible than the engagements in Iraq and Afghanistan, but possibly more effective, have been multilateral programmes in extremely vulnerable areas such as Africa and Central Asia.

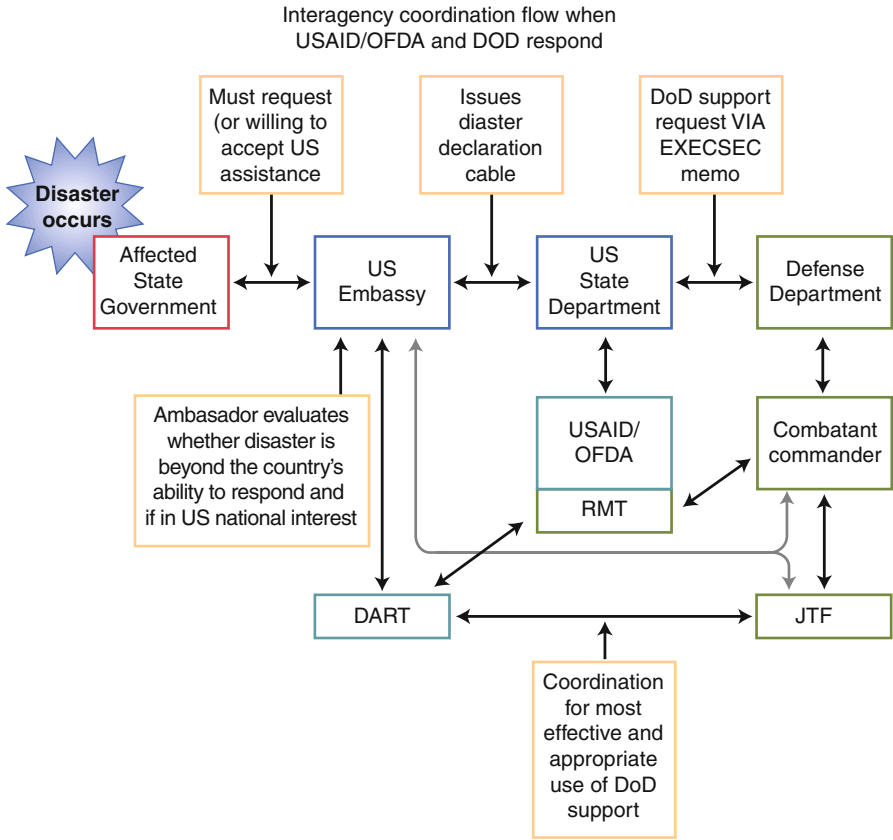


Fig. 2.5 US Interagency Coordination for Foreign Disaster Assistance when USAID/OFDA and DOD respond (From USAID/OFDA)

US Office of Foreign Disaster Assistance (OFDA)

The process for the US Government providing aid to a foreign disaster situation involves multiple actions that occur by different parts of the government at the same time. This process begins with the host nation government, which must request aid, or state a willingness to accept assistance, through the US Embassy in that country. The US Ambassador then determines if the situation meets USAID criteria, and if it does, issues a Disaster Declaration Cable (Fig. 2.5). The essential criteria include:

- The disaster is beyond the ability of the affected country to respond.
- The affected country requests, or will accept, assistance.
- Responding is in the interest of the US Government.

The determination is normally made by the Ambassador with consultation with Regional Advisors from USAID/OFDA. If a nation does not have an official US

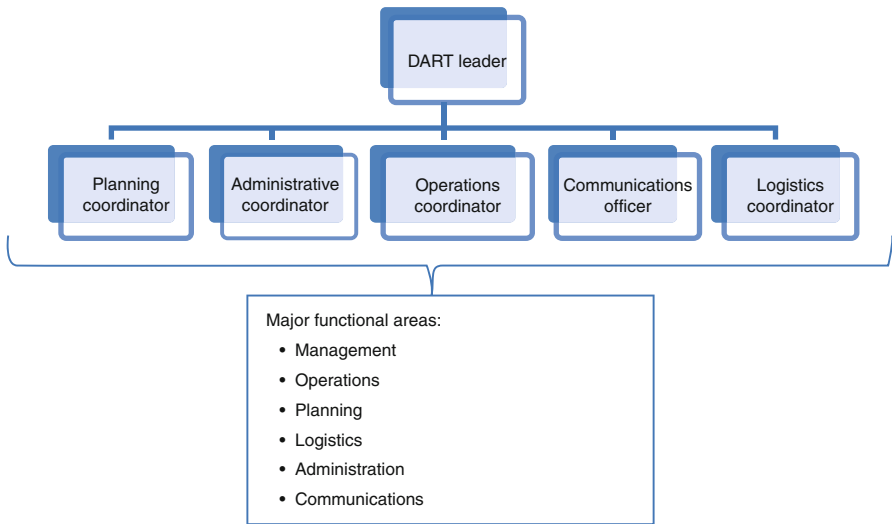


Fig. 2.6 DART organizational diagram

diplomatic presence, such as Iran, this responsibility falls to the Assistant Secretary of State for the geographic region where the disaster occurred. An important aspect is that the decision is not made by one agency in isolation of others.

Primary US Government agencies include USAID, the Department of State and the Department of Defense. In a foreign disaster situation, it is the Department of State that determines if it is consistent with US foreign policy goals to respond. USAID is the primary response agency and the Department of Defense is in a support role.

After determining if the situation meets the criteria for a foreign disaster, the US Ambassador can request up to \$50,000 from USAID/OFDA for immediate relief. These funds are not to be used for long-term reconstruction or food. Generally, these funds are provided to existing organizations, such as NGOs, to deliver assistance. Additional funding can be requested through USAID for approval. Depending on the needs assessment, a variety of immediate relief supplies, such as plastic sheeting for shelters and water containers, can be delivered from the stockpiles maintained in warehouses in Italy, United Arab Emirates and the United States.

If it is determined that a DART should be sent to the affected area, with the concurrence of the US Ambassador, an on-call Response Management Team (RMT) is stood up in Washington, D.C. The RMT supports the DART and coordinates the overall US Government response. Each DART has a standard organization and consists of members with a variety of skills (Fig. 2.6). Team size and composition depends on the situation and can contain technical expertise in areas such as Search and Rescue or Medical/Health. The DART Leader reports to the Ambassador and ensures coordination of overall US Government efforts.

If OFDA determines that there are requirements that US military resources are most appropriate to meet, a request is generated from the Department of State to the

Department of Defense. The Secretary of Defense will task the geographic Combatant Command with responsibility for the area that includes the affected country to provide support. In extreme conditions, involving urgent life-threatening conditions, the commander of the geographic Combatant Command can respond on his own authority during the first 72 h of the disaster.

Oslo Guidelines

Most recently revised in November 2007, the Oslo Guidelines, officially titled Guidelines on the Use of Foreign Military and Civil Defence Assets in Disaster Relief – “Oslo Guidelines”, were created to protect humanitarian operations from militarization. There is concern that the presence of foreign military forces increases the threat to civilian humanitarian responders. These guidelines are not binding, but many Member States of the United Nations attempt to operate within the guidelines.

The Oslo Guidelines limit the role that foreign military and civil defence assets (MCDA) should play in disaster response and describe the procedures for requesting and coordinating MCDA support. Specifically, they state, “Therefore, foreign military and civil defence assets should be requested only where there is no comparable civilian alternative and only the use of military or civil defence assets can meet a critical humanitarian need. The military or civil defence asset must therefore be unique in capability and availability” [5].

Military Support to Foreign Disaster Relief

US military forces, like other militaries, bring several strengths to an emergency response. These strengths include availability of large number of personnel that are trained to operate in austere and hostile environments that can deploy on short notice. There is also robust capability for engineering and large equipment for clearing debris, opening roads and building shelters. One of the most useful and unique capabilities is helicopter support to move personnel, equipment and supplies to remote locations when ground transportation is not possible. This was visibly demonstrated during the Pakistan earthquake in 2005. Without helicopter support, there would have not been another way to bring life-saving supplies to extremely remote areas where roads were made unusable.

Global communications and mobile field medical facilities are other resources that are often requested. A less visible but important characteristic that military forces have inherently is a strong command and control structure. This can be important for bringing some order to the chaos of a disaster situation. Obviously, a core competency of a military organization is the ability to provide security. When the social infrastructure is reduced or destroyed by a disaster, this can be a critical step to rebuilding.

A significant part of the US response to the 2010 earthquake in Haiti was from the military. US Air Force air traffic controllers were some of the first responders. They used their combat procedures to open the airfield at Port-au-Prince within 30 min of arriving. An aircraft carrier, the USS Carl Vinson, replaced fighter jets with helicopters to provide critical airlift capability. Naval warships were able to provide over 400,000 gal of fresh water a day. Military medical support ranged from mobile Expeditionary Medical Support facilities, providing general medical and surgical care, to the USNS Comfort hospital ship. The USNS Comfort provided state of the art care to over 8,600 patients, including nearly 1,000 surgeries.

In recent post-conflict situations, most notably in Iraq and Afghanistan, US military resources played a significant role in attempting to rebuild the health system infrastructure destroyed by years and decades of war and neglect. One factor contributing to the major role played by the military was the nonpermissive nature of the environment. Many civilian, and even United Nations, organizations were unable to function due to the high threat to the safety of personnel. The success of these operations, referred to in current guidance as stability operations, was limited for several reasons. One of the reasons was limited training, experience and guidance for the execution of these missions.

Partially as a result of those operations, several key documents were developed and signed. The first was Department of Defense Directive (DoDD) 3000.05, Security, Stability, Transition and Reconstruction Operations, which was signed in 2005. It defined stability operations as “Military and civilian activities conducted across the spectrum from peace to conflict to establish or maintain order in States and regions” [6]. A dramatic, watershed statement was that stability operations were “...a core US military mission” and that they “...shall be given priority to combat operations”.

Another major factor leading to this increased emphasis on stability operations was the realization that instability of nations and regions had become a major threat to national security. Assisting the recognized, legitimate government of countries in need to meet the needs of their populations decreased their vulnerability to insurgency and terrorism. DoDD 3000.05 was replaced by Department of Defense Instruction (DoDI) 3000.05, Stability Operations, in 2009 [7].

DoDI 3000.05 refined and expanded the guidance to include the mandate, “to maintain or reestablish a safe and secure environment, provide essential government services, emergency infrastructure reconstruction, and humanitarian relief”. It went on to require the military to work with other US Government agencies, foreign governments, international organizations, non-governmental organizations and the private sector. This methodology is now known as the “whole of society” approach.

In 2010, DoDI 6000.16, Military Health Support for Stability Operations, provided health-specific roles and responsibilities and uses the term “Medical Stability Operations” [8]. It stated, “The MHS (Military Health System) shall be prepared to perform any tasks assigned to establish, reconstitute, and maintain health sector capacity and capability for the indigenous population when indigenous, foreign, or U.S. civilian professionals cannot do so.” One result of this tasking has been the development of a variety of education and training programmes for US military health personnel so they will be prepared as directed. The Center for Disaster and

Humanitarian Assistance Medicine, part of the Uniformed Services University of the Health Sciences, has led the effort to develop these education and training programmes. These range from a weeklong Medical Stability Operations Course to a month-long Global Health Strategies for Stability Course.

The Diploma in the Medical Care of Catastrophes is another way military physicians have become better prepared for foreign disaster response missions. Faculty from the Uniformed Services University of the Health Sciences serve as faculty in the Conflict and Catastrophe Medicine Course and as examiners for the Diploma in the Medical Care of Catastrophes. However, there is still a significant gap in competencies of many military personnel to execute the gamut of these missions.

Another outcome of these two recent Instructions is the emergence of global health engagements to build disaster preparedness capacity and capability of vulnerable partner nations. The Center for Disaster and Humanitarian Assistance Medicine developed a very successful model for sustained engagements that allows for the establishment of trust and stronger relationships with partner nations. The Disaster Preparedness Programme have been working with countries in Africa for over 3 years. The host nation is provided training, resources and assistance to develop national disaster response plans and military contingency plans to support the civilian government during a disaster response.

The cycle of prevention, mitigation, preparedness, response and recovery is used. Simulated exercise programmes are used to provide training for new personnel and to test the effectiveness of existing disaster response plans. An outcome from this approach will be that vulnerable nations are better prepared to take care of their own populations, reducing the need for an international response. This sustained engagement results in *sustainable* capacity building for the host nation.

This approach has been referred to as “soft power”, in contrast to the threat or use of force to provide national security. Previously, a symmetric threat, or force-on-force, by another nation’s military was the primary risk to national security. In today’s world, there is a global asymmetric threat from terrorists and insurgents. It is no longer possible to easily identify the threat, or “the enemy”. Hence, the building of host nations’ capabilities and capacity to meet the needs of their population to create stability is seen as contributing to national security and therefore valid mission for military personnel. When the engagement has a health focus, it is sometimes called “health diplomacy”.

NATO also has guidance for stability operations, disaster relief and humanitarian assistance. They include:

- MCM 0054-2007, military support to stabilization activities and reconstruction
- MC 343/1, military assistance in international disaster relief operations
- ACO Directive 83-2, military medical involvement with humanitarian assistance and development

ACO Directive 83-2 states, “...in the acute phase of complex emergencies, it will usually be international organisations (IOs) and non-governmental organisations (NGOs) that will be the main provider of essential “substitution” emergency services...” [9]. However, it goes on to say, “There is nonetheless a clear place for military medical support in humanitarian relief.”

Summary

The US approach to both domestic and foreign disaster preparedness and response has undergone significant change over the past few decades. Regarding domestic disasters, a National Response Framework replaced the National Response Plan. The NRF is intended to allow flexible and adaptable response across all levels of government, local, tribal, state and federal.

The US Government response is led by the US Agency for International Development (USAID). Within USAID, the Office of Foreign Disaster Assistance provides financial, relief commodities and Disaster Assistance Response Teams.

US military support to foreign disaster response is changing due to evolving security threats and the need to stabilize host nation governments. Following the Oslo Guidelines when possible, military forces bring several distinct strengths. One of these strengths is a large number of personnel experienced in working in austere and hostile environments. Global communications is another very beneficial capability. Probably, one of the most valuable contributions is helicopter transportation for equipment, supplies and personnel to isolated areas.

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Chapter 3

The Spectrum of Conflict

Alan Hawley

Abstract From the beginning of recorded history, organised fighting between human groups has been a frequent occurrence. The genesis of this behaviour is a matter of debate; theories range from genetically driven to socially created. Regardless of this uncertainty, the fact of conflict is undeniable whilst its external manifestations vary. Patterns of conflict, purposes and end states have all varied through the thousands of years of human existence. There have been as many different organisations for conflict as there have been different human societies. Nor should this be a surprise, since the organisation of resources required to deliver violence is a social process which necessarily reflects the prevailing culture of the society from which it springs.

Keywords Conflict • Spectrum • History • War • Genocide • Massacre • Criminal Behaviour • Theories of Warfare • Military Philosophy • Role of Law • Impact on humanitarian assistance

Objectives

- To define conflict
- To describe the spectrum of conflict
- To indicate the changing nature of conflict
- To describe the impact of conflict on humanitarian assistance

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Introduction

From the beginning of recorded history, organised fighting between human groups has been a frequent occurrence. The genesis of this behaviour is a matter of debate; theories range from genetically driven to socially created. Regardless of this uncertainty, the fact of conflict is undeniable whilst its external manifestations vary. Patterns of conflict, purposes and end states have all varied through the thousands of years of human existence. There have been as many different organisations for conflict as there have been different human societies. Nor should this be a surprise, since the organisation of resources required to deliver violence is a social process which necessarily reflects the prevailing culture of the society from which it springs.

The Changing Nature of Conflict

The nature of conflict has continuously evolved and changed, whilst reflecting some external factors and their interplay on each other. Hence, the available technology is a main driver. This has evolved from simple handheld weapons (possibly derived from hunting tools) to stand-off precision munitions with satellite control systems. In the process, the actual physical component of conflict has altered. There has been an increasing depersonalisation of conflict as technology has allowed methods of killing at a distance to be utilised, not that direct face-to-face violence has disappeared. There is a continuing tradition, and indeed a military requirement in certain circumstances, to close with the enemy and engage him in the most direct and intimate form of fighting.

However, for many armed forces, this is not the preferred option since it gives free rein to the play of chance and fortune. Risk aversion has political attractions and requires the control, if not the elimination, of chance from the battlefield.

The Essence of Conflict

Despite all the variations and evolutions witnessed throughout history, the essence of conflict remains the same; it is the defeat of one human group by another using the threat or actual delivery of organised and purposeful violence. By its nature, this involves injury and death. These are inevitable consequences of conflict. Indeed, they are more than this; they are the very currency of conflict. The rational intention of warring sides is to force the other to undertake a certain action. Violence is used to alter perceptions. Fundamentally, war is waged *in* men's minds *for* men's minds. It is this psychological basis which provides the key to understanding the utility and limits of conflict.

The Nature of War

The essence of conflict is the actual or implied use of violence. This is also the fundamental nature of war, and so the relationship between the two becomes a matter of some significance. Is conflict the same as war? Are the words merely synonyms of each other? If not, what is the difference?

Conflict is the process of organised and purposeful violence of one human group against another. In the context of a consideration of war and conflict, violence is taken as actual physical action, although in different settings, other forms of action, including verbal and emotional, may be appropriate. It can be seen that war can also be defined in the same terms as conflict. However, war has a forensic dimension with legal implications. Interestingly, there have been few declared wars since the Second World War. However, there have been hundreds of conflicts. Part of the solution to this conundrum is that *war implies an act by a sovereign nation state*, whilst many of the conflicts have been intra-state, or states have chosen not to engage in the formal process of a declaration of war. Clearly, there are contingent questions about legitimacy and authority in these deliberations. These can be complex and complicated and require a whole body of law to accommodate them. Nevertheless, there may be ramifications for all parties involved in a conflict or in immediately post-conflict operations. As a simple rule, war contains conflict and conflicts; the reverse does not apply.

Massacre, Genocide and Criminal Behaviour

Recent experience has seen the continued play and existence of massacre and genocide on various violent stages throughout the world. Not only are these distinct from each other, they are also different from conflict and war. Whilst there is a linkage between them—it is difficult to conceive of genocide occurring without conflict—they are patently not the same concepts. All forms of criminal behaviour may become prevalent, especially crimes against the person. Rape has become a distressingly common feature of wars with an ethnic edge to them. Similarly, assault and murder are also more common in these circumstances. Massacre can be thought of as wanton or indiscriminate killing in large numbers. It may occur in conflict as the result of a temporary loss of control in the heat of battle or as a result of moral and disciplinary laxity. Sadly, there are many examples of this type of behaviour and they can be found in the annals of all armies. It seems that the rasp of war may sometimes fray the leash of civilisation a little too vigorously. Recognising this fact, additional moral limits have been applied by outlawing such conduct.

Genocide is a rather different matter. This is the deliberate use of violence to kill and eventually eliminate an entire racial, cultural or ethnic population. It is a perennial fact of human life that such campaigns have been frequent visitations on the species. They have clearly varied in effectiveness but have not disappeared with the

growth of literacy and assumed knowledge. Whilst the experience of the holocaust brought the issue of genocide to an appalled and shocked Europe, recent similar episodes in the Balkans, Rwanda and Cambodia serve as sad reminders of the tendency to genocide within the human condition. It is a tendency to be guarded against, and to this end, the developing structure of international and human rights legislation is welcome. For the purposes of this chapter, the concepts of conflict, war, massacre and genocide need to be borne in mind since they reflect recent practitioner experience. An insight into how the extent of philosophies of conflict and war has evolved is both a useful and necessary adjunct to understanding conditions in a post-conflict context. Without such comprehension, avoidable mistakes and errors will ensue, and in humanitarian operations such failings may cause distress and death.

Traditions of War and Conflict

Attempts have been made throughout the history of conflict to make sense of it and to define its purpose. Given the significance and consequences of conflict, it is hardly surprising that effort has been invested in considerations of organised intergroup fighting. The risks are generally high and the results are unpredictable. In addition, there are real moral questions of the legitimacy of killing which require examination and analysis. In general, there are two such generic approaches to these ethical considerations: the absolutist and the pragmatic.

The Absolutist Views of Warfare

There are two differing absolutist views of warfare, which can be viewed as polar opposites. The pacifist contention would suggest that no killing and violence can be justified and so it is wrong. Policies which incorporate the acceptance of conflict are ethically unacceptable. Such a view is clear and unambiguous. Conversely, the tradition of a Holy War also bases itself on absolute moral principles and legitimacy but comes to a different conclusion. In this approach, the sanction, or even the command, of a deity is taken as the driving force behind the conflict. Further, the omnipotent nature of the deity is such that the norms of human intercourse can be overridden. In such a view, all manner of atrocities can be visited upon an opponent because of the support of the Supreme Being. Such support places the action beyond human sanction or consideration. Hence, morally absolute ethical positions, whilst having the advantages of clarity and simplicity, do not sit comfortably with the realities of compromise and negotiation which are the tools and instruments of international politics. Apart from noting that these two traditions exist and that they are mutually exclusive (pacifism defines an absolute moral duty not to fight), no further consideration of them will be made. Instead, the more general approach of pragmatism and politics will now be addressed.

Moral Basis of Conflict

Difficult decisions about the moral basis of conflict have existed throughout history. A justification for shedding blood has been a necessary concomitant to declarations of war as well as other forms of fighting. Such concerns clearly spring from a need in many people to have a clear basis and purpose before committing themselves to the demanding process of fighting. Supplying that justification has been a main preoccupation of leaders before conflict is openly commenced. Throughout history, there have been a myriad such reasons, ranging from trade, hegemony, security and principle to sheer covetousness. What such a list also suggests is that conflict can be seen as a not unusual form of human intercourse with both ethical and political dimensions. The emergence of this tradition within the Western world began with the acceptance of Christianity by the Roman Empire. The early Christian movement was a pacifist organisation, but the welcome accommodation with the temporal power of the Empire required some rethinking of this issue. The eruption of barbarian threats and invasions gave added point to this development. Accordingly, Saint Augustine and others laid the foundations of the theory of a “just war”.

Just War Theory

This approach attempts to set the context in which conflict and war are acceptable. Inevitably, such a philosophy requires there should be an acceptance of certain limitations. These limitations are applied in two separate but linked areas.

The first approach sets down criteria for the war itself. This is the “jus ad bellum” and lays down a set of conditions to be followed if a war is to be accorded the description of just:

1. There must be a just cause.
2. There must be a right intention; the stated reason for war is the crucial determinant, and ulterior motives are unacceptable.
3. The decision to go to war must be made by a legitimate authority.
4. There must be a formal declaration of war.
5. There must be a reasonable prospect of success; the evils of war must not be lightly entered upon.
6. War must be used only as a last resort.
7. The principle of proportionality must apply. This means that the good coming from the war must be of such significance as to outweigh the evils of the war itself.

Once war has been entered upon, a different set of conditions apply: “jus in bello”. These are used to codify and define the conduct of the conflict. These are essentially simple and linked concepts:

1. Non-combatant immunity must be respected. Fighting must be directed against other combatants.

2. Proportionality of means must also be used (as well as that of ends). The means adopted must not be such that the evils and harm inflicted outweigh any possible good to be achieved.

This corpus of philosophy has become ingrained in the norms of state conduct and personal ethos. It has provided the underpinning for much of the current body of international law in this area. It is now uncontentious and widely accepted. However, there are other strands in the philosophical foundations for war, and some of these substantially predate the Christian church. Many of them spring from China.

Sun Tzu and the Art of War

The most well known of the oriental military philosophers is Sun Tzu. He was a Chinese warlord who lived about 600 BC. His life was spent in the hard pragmatic school of field soldiering. He accrued experience and expertise in warfare during a series of campaigns within China itself. Much of this knowledge was then recorded in a book, *The Art of War* [1], that has survived in part to contemporary times. In this book, a series of aphorisms and advice has been recorded. Whilst many of these are of limited relevance to the actual physical conditions of modern conflict, the underlying philosophical approach still has relevance. Indeed, much of it has provided the intellectual foundations for the manoeuvrist approach that has become enshrined in much contemporary Western military thinking. An important element of this philosophy is the requirement to match one's strength against an enemy's weakness. Sun Tzu enjoins his readers to avoid unnecessary bloodshed by avoiding matching strength against strength; it is the exploitation of weakness which is central to this doctrine. It also implicitly recognises the central significance of psychology in this process. The creation and exploitation of uncertainty in the mind of an enemy is the essence of Sun Tzu's doctrine. This is a lesson in applied psychology.

Von Clausewitz on War

Whilst it is invidious to select just a few examples from 3,000 years of military experience, any such collection would always include the musings of Carl Von Clausewitz. He was a Prussian officer who fought throughout the French Revolutionary and Napoleonic wars. His personal experience started at the age of 12 and extended to his death from cholera in 1832 aged 51. He never quite achieved the distinction as an operational commander which he craved. However, this frustration was sublimated into a deep consideration of war and its nature. This analysis formed the basis of his great seminal work *On War* [2], which has been studied and discussed endlessly since its posthumous publication. In this book, the actual form, purpose and character of war and conflict were examined and analysed. Von

Clausewitz used the examples of conflicts that he had witnessed and illustrated points by reference to recent historical events. He surmised that the purpose of war lay in seeking political advantage over an opponent. Indeed, he postulated that war was itself part of the process of political intercourse. As such, he recognised and gave voice to the realist position in politics and strategy; war was a process of cost-benefit analysis in the endless struggle between states. However, his own experience in battle and campaigns against the French convinced him that conflict has a dynamic of its own. It possesses a tendency to escalate from a limited form into the absolute. Nor should this be a surprise, since the actual physicality of combat means that chance and uncertainty have a major effect on the events of that conflict, and the process of bloodshed serves to harden and change perceptions. Such alterations in commitment and engagement require a dispassionate analysis of the political purpose and goals of the conflict to be continued. Von Clausewitz believed that this ultimate rationality should remain the duty of the government. Further, he felt that the state consisted of three elements: the government, the military and the people. There was a necessary interplay between them in order that the political benefits of the conflict could be achieved, and each component had its own specific part to play. A successful outcome could only be achieved if all elements did their duty within this relationship. Fundamentally, as an experienced practitioner of warfare, Von Clausewitz understood the psychology of conflict. He knew how to use the methods of applied psychology in the realm of uncertainty which was the battlefield. Highlighting this truth by an analogy with a wrestling match in which each opponent seeks to gain an advantage and eventually to secure victory by throwing the other, he explained the central essence of conflict. The exercise of maximum effort, chance and free will helps to guarantee a probability rather than a certainty. Nothing can be taken for granted, since there is a universal potential for disruption. This he described as friction due to the interplay on the battlefield of chance, fatigue and fear. Together, this combination ensured that human failure and frailty continued to affect the outcomes of conflict. Furthermore, Von Clausewitz memorably described the requirement for character in a commander by asserting that in strategy all things are simple but not on that account necessarily easy. It is an admirable description of the reality facing a commander and his troops on the battlefield. Clarity and fortitude are basic requirements to meet the challenges of combat.

Marx, Lenin and Political Conflict

For Prussia and Von Clausewitz, the security problem faced by the state was one of survival against stronger neighbours and no natural defensive positions or features. In such a situation, the central organisation of the state so that all of its resources could be most efficiently deployed was of paramount importance. This set of geostrategic realities led to a communitarian orientation of society, with the *rights of the individual being subordinated to the security of the whole*. It also coincided with the political instincts of revolutionary movements, especially those of Marx and Lenin [3].

The political nature and dimension of conflict dovetailed with their perception of revolutionary struggle. Accordingly, Von Clausewitz was embraced by the new schools of revolutionary thinking and enshrined in their philosophy of action. In particular, his understanding of applied psychology, the political nature of conflict and the relationships between the components of society were adopted. Implicitly accepted in this analysis was the communitarian view of society. This was the antithesis of the libertarian view, which placed the individual at the heart of society and then placed rights and obligations around him in order to maximise personal liberties. Such a view was the predominant philosophy in the Atlantic maritime states with a global trading viewpoint and the geostrategic security which that geographical position gave.

Mao, Giap and Revolutionary Warfare

The revolutionary warfare concepts developed by Mao [4] and Giap [5] bore clear evidence of their genesis from Sun Tzu and Von Clausewitz. The essential political nature of conflict was derived from the latter, whilst attacking the enemy's weaknesses and subsequent exploitation of that vulnerability came from the Sun Tzu camp. Both Mao and Giap pioneered the struggle by a movement against a stronger government establishment. The importance of politics and the need to win men's minds were central to successful revolutionary warfare. The pursuit of these ends was to be ruthlessly maintained. Since the eventual result was to be a revolution, conventional means and methods were not necessarily to be used. Thus, the creed of *the end justifies the means* became enshrined in this revolutionary doctrine. Reprisals and violent acts against those identified as enemies of the revolution were to be routinely employed. Terror and intimidation were used alongside conciliation and reward. Such a heady mixture of outrage and selflessness bore fruit in a number of different campaigns. The retreat from empire in the post-war period saw many examples of this approach. It also witnessed some successful campaigns against revolutionary war, notably in Malaya and Dhofar. Such examples owed their effectiveness to the early recognition of the political process enshrined in revolutionary action and the appropriate coordinated politico-military response. However, such successes were not easily won, since they required an investment in time and in military, financial and political resources. The conflict itself was often highly destructive and had many of the unpleasant features of civil war. Frequently, populations were the targets of direct military action, with the recognised effects of migration, disenfranchisement and poverty, as well as trauma in all its guises. Humanitarian aspects became increasingly significant.

Terrorism has been spawned from the ideas of revolutionary warfare and is the antithesis of humanity in conflict. Sadly, it is a commonplace problem in the contemporary world and is always a possible option open to opponents. It can be waged either nationally or internationally, with varying degrees of discrimination and violence. However, it is based on Mao's advice, "Kill one, frighten 1000". Once more,

it can be seen that violence is being used to change and manage perceptions. The moral context may differ from that of conventional conflict, but the underlying purpose does not.

Modern Military Philosophy

Modern military thinking is inevitably derived from historical, philosophical, cultural and technological imperatives. Essentially, its basis is the realist view of international relations in which the pursuit and promotion of the national interest in a competitive world is underpinned by the exercise of power. This approach implicitly depends upon an understanding of and commitment to the rationality of force; military power is cast in the Von Clausewitzian role of political action. For most developed nations, the likelihood of conflict is seen in terms of fighting against either comparable powers or less well-developed opponents. This division is usually referred to as *symmetric* and *asymmetric* warfare.

Symmetric Warfare

Symmetric conflict occurs between two opponents who have similar capabilities. Furthermore, these capabilities are matched by similar commitments to targeting policies, limits of action and acceptability of risk. In many ways, symmetric conflict can be viewed as traditional warfare between approximately equal nation states. It is a quintessentially Von Clausewitzian perspective. There is some degree of commonality in ends, ways and means between the competing sides. Thus, in modern times the Falklands Campaign and the repeated Indo-Pakistan conflicts are representative of this genre. There is an understood and usually implicit commitment to the common standards of acceptability. Within this overall commitment, both sides will seek to gain maximum advantage in order to prosecute their case most effectively. As Von Clausewitz emphasised, bloodless battle is a chimera; fighting means the expenditure of money, resources, sweat and blood. Nevertheless, symmetric warfare presupposes equivalence in capability and commitment.

Asymmetric Warfare

On the other hand, asymmetric conflict reflects the divergence in ends, ways and means between two antagonists. Such a conflict highlights the fundamental asymmetry between both warring parties. Differences in targeting policies are frequently key areas of asymmetry. Thus, one side may adopt a more terrorist-like targeting approach, aiming to hit selected individuals by assassination or frighten whole

populations by arbitrary acts of indiscriminate violence. Meanwhile, a whole raft of considerations (political, ethical and military) may restrain the other side to a more traditional engagement of opposing military forces only. Equally, substantial differences in available military power may be reflected in these opposing approaches. Indeed, classic revolutionary warfare enjoins the insurgents not to match strength against strength. For the weaker force, attempting to match an adversary's strength with one's own is a recipe for military defeat. Instead, using one's strength against his weakness, along the lines of Sun Tzu, is a more profitable line of operation. A corollary of this is the concept of protracted struggle.

Protracted Struggle

In order to circumvent the greater military strength of an opponent, the weaker party needs to avoid quick solutions and adopt a strategy to prolong the struggle. Such a philosophy would tie up increasing proportions of the enemy's resources and render it increasingly expensive in all dimensions, including casualties. For this strategy to become effective, time is required for the commitment to grow in terms of resources engaged, whilst the commitment in terms of political will declines in the face of burgeoning bills for finance, materials and manpower. This strategy was perfected by Mao and was termed a "protracted struggle". The strategy recognised the disparities in ways, means and ends in asymmetric warfare and outlined the approach by which the militarily weaker party might eventually prevail. Time was the critical component. As an example of the successful waging of asymmetric warfare by a weaker side, the Vietnam War is a classic. In this conflict, the most powerful nation on the earth failed to subdue an insurgency from a small peasant-based economy. At heart was Giap's belief that the Vietnamese could maintain being killed for longer than the Americans could maintain killing them. The disproportion in casualties between the two sides underlines this contention (55,000 US troops, 1.3 million Vietnamese) [6]. In the end, the strength of political commitment to the cause was greater on the communist side.

Manoeuvrist Approach

The complexities of symmetric and asymmetric warfare may differ from each other in both kind and degree. However, they both share an understanding that it is the human mind that is the real battlespace. Conflict is the process by which perceptions may be changed; it is at heart a political process. The contexts may vary, but this essential truth is recognised by both streams of warfare. Equally, both approaches recognise an underlying doctrinal view known as the *manoeuvrist* approach. Basically, this approach is derived from an amalgam of historical and philosophical antecedents which have produced a military doctrine enshrining the importance of the psychological elements within it. In this philosophy, uncertainty is recognised as

being unavoidably intermingled with conflict and the battlespace. The recognition of this central fact then allows the military to exploit it by seeking to reduce their own uncertainty, whilst accepting that an irreducible minimum exists, and simultaneously increase that of the enemy. Uncertainty can be most debilitating, especially to organisations that require detailed planning and coordination to deliver their capability as military forces.

Hence, the central significance of uncertainty to the applied psychology of the battlespace is enshrined in a series of training, organisational and equipment issues for most armed forces.

Technocentric War

Military development is an iterative process of an intensely pragmatic nature tempered by intellectual rigour. Consequently, the future direction of military development in a climate of increasing resource constraint and increasing unit costs for personnel and equipment is a matter of much debate and consideration. This process has been loosely called a revolution in military affairs and is an attempt to resolve the competing issues of the utility of the military, the contexts in which development and deployment might occur and the structure of future military organisations. Many of these questions are complex and opaque in nature. However, in accordance with Von Clausewitz's direction to use recent history for illumination, the significance of the Gulf War of 1991 has been central to this debate.

One school of thought which might accurately be described as technocentric suggests that the Gulf War is the first of the modern wars. In this view, conflict will be characterised by a reluctance to engage the enemy closely. Instead, stand-off weaponry will be used to reduce casualties. In addition, modern technology will allow an increasing precision of effect, so that the need to risk a close engagement, with all the uncertainties of casualty generation and loss of materials, will be avoided. Instead, the relatively risk-free, clean option of conflict at arm's length will be attainable. In order to achieve this, the importance of the air dimension is emphasised. Indeed, the only way in which this option can be maximally developed is by switching resources into the creation of capabilities delivered from air/space. Target acquisition, reconnaissance, surveillance and weapons deliveries are all to be effected from the air and aerial platforms. The importance of traditional military structures in armies and navies is then greatly reduced. Instead, the air element is emphasised. Such a view is profoundly challenging to many military orthodoxies.

Van Creveld: An Alternative View

Equally challenging is the approach of Van Creveld, the eminent Israeli strategist and military writer. Whilst agreeing that the Gulf War has a central significance, his

view is markedly different from the technocentric perspective. Far from being the first of the modern wars, Van Creveld argues that the Gulf War was the last of the old-style conflicts. At heart, his argument rests on the nature of political organisations in the future. The Gulf War model implicitly accepted the existence and relevance of the nation state with the interplay of the traditional three players: the government, the armed forces and the people. This is the trilogy as described by Von Clausewitz. However, political and economic realities are increasingly undermining the existence of the nation state, with many of them foregoing sovereignty for reasons of economic or security interests. In addition, the nature of conflict is becoming less interstate and increasingly intra-state in nature. Thus, the usual pattern is for a state to suffer separatist tensions that evolve into political and military campaigns with potential overlays from terrorism, organised crime and interested outsiders, some of whom may be commercial organisations. This is a complicated welter of influences and ideologies to which the technocentric view of warfare has at best only limited applicability. Instead, the military requirement is for close engagement almost in a policing role with the ability to escalate up to full military action for particular objectives. Whilst the advantages of better surveillance and target acquisition capability which are central to the technocentric view would be useful in Van Creveld's picture of future conflict, technocentrism is irrelevant to the core question of the political problem. On the contrary, the importance and relevance of the traditional military organisations and structures are confirmed. Thus, these two views of future conflict set the parameters for the debate on the revolution in military affairs. Within these poles there is a range of views and beliefs which are part of a continuing and complex debate.

Aspects of Conflict

The contemporary world is composed of a mixture of states in varying degrees of economic, political and military development. The passing of the Warsaw Pact and the decline of superpower rivalry have resulted in a patchwork of national tensions and rivalries across all the continents of the world. In many ways, the loss of the certainties associated with the superpower ideological struggle has made the globe a more dangerous place. Instead of the control exercised by the two superpowers over their respective satellite states, there is now no effective, extant and overarching control mechanism for international conflicts other than the United Nations (UN). Recent experiences in the Balkans, sub-Saharan Africa and Asia illustrate the problems that the UN faces in preventing and then engaging in these sorts of conflicts. As a consequence, a series of bloody conflicts has arisen, and these have resulted in thousands of deaths, many of which have been in civilian populations. The spectacle of migrant populations and poorly targeted, if not indiscriminate, military action had become all too familiar a sight on the television screens of the world. Conflict has re-established itself as one of the prime drivers of population movement. Frequently, humanitarian disaster follows forced migration.

The Changing Pattern of Conflict

The pattern of conflict has altered over the last 200 years. During this period, warfare has moved from being predominantly an inter-nation state affair (largely European and North American in extent), through three major world wars (the Napoleonic, and the First and Second World Wars), to the age of wars of national liberation (the retreat from empire by colonial powers). This process has seen a decreasing likelihood of developed nations waging war against each other. Instead, a pattern has emerged of war being waged between developed and developing nations or between two developing nations. Many of these are legacies of colonial political or economic affairs. In these conditions, symmetry and asymmetry apply to both sets of circumstances. In contrast, processes of negotiation, trade sanctions and compromise resolve disagreements between developed nations. Nevertheless, all nations remain vigilant about their own security and are reluctant to forego the means of guaranteeing it, and so the military option remains available.

Failed States

Not infrequently, circumstances may change so that the actual viability, or even the existence, of a state is called into question. Prolonged civil strife, war or economic failure that is severe enough to threaten the fabric of a society may cause such conditions. In such a situation, the delicate balance between the needs of the individual and the requirements of the community is completely disrupted, causing the failure of normal social and economic relationships.

Hardship and destitution follow, with the young, the women and the elderly frequently being the most vulnerable. In such a society there may be reversion to gun law and a complete failure of social norms. Sadly, such examples abound in Africa (notably Rwanda, Somalia and Angola at various times). Regrettably, the problem of the failed state is likely to be a continuing challenge in the future. It presents a particular challenge for humanitarian involvement because of the complex of security, political, logistic, legal and ethical dilemmas that may ensue.

Conflict will almost always be a further complicating factor in the mixture, and its nature may vary from the symmetry of deployed military groups with the concomitant pattern of fighting to the vagaries of gun law and arbitrary violence.

The Spectrum of Conflict

Attempts have been made to codify and simplify the pattern and nature of conflict. One of the best known is the spectrum of conflict depicted in Fig. 3.1. In this model there exists a gradual gradation of the level of conflict from assistance to the civil power up to full high-intensity warfare. Usually, this top end of the spectrum refers

Fig. 3.1 Spectrum of conflict

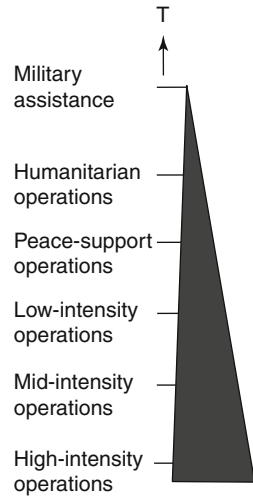


Fig. 3.2 Cycle of conflict



to the type of conflict seen during the 1991 Gulf War, using the full range of conventional weaponry in an integrated strategy within the battlespace. This type of warfare would ideally be waged at high tempo and continuously until the objectives had been attained. Such conflict demands the full synchronisation of air, land and maritime elements throughout all weathers and regardless of night or day.

Figure 3.1 also usefully illustrates the possibilities of escalation and de-escalation within a particular conflict. Indeed, there might simultaneously occur a range of conflicts within the same theatre of operations. Thus, high-intensity operations could be prosecuted in one sector whilst low-intensity conflict is being waged, all this being coterminous with humanitarian relief. It is a potentially complicated mixture that the model illustrates with some clarity.

An alternative model of conflict portrays the process as a continuous cycle varying between pre-conflict, conflict and post-conflict stages, as shown in Fig. 3.2.

This view allows for the different stages of the conflict process to occur simultaneously and demonstrates how they may meld from one to another. It is a useful construct since it gives some idea of the dynamism which conflict generates. It also indicates the element of confusion that always exists with conflict. The confusion is an aspect of Von Clausewitz's friction as well as being inseparable from the complexities of simultaneous operations. The concept of a cycle with ease of passage between the different stages of the continuum is extremely useful in conveying the operational and philosophical reality.

Conclusions

Conflict has existed throughout recorded history. It has evolved to accommodate cultural, economic, political and technological aspects. As a result it is a multifaceted process with distinctive differences between peoples and countries. Whether it is the cause of instability or the product of it is a difficult question that would require a detailed case-by-case analysis. Probably, the truth lies somewhere between the extremes, with an acceptance that conflict may *exacerbate* instability but is more usually the *manifestation* of it. At any rate, it has become a perennial factor in the process of human relations.

Humanitarian Law and the United Nations

There has been a slow change in both the acceptability and utility of conflict in the world. With the emergence of a body of humanitarian law and the establishment of the UN, a vehicle for the analysis and expression of the rationale for conflict has been provided. Whilst in many quarters there is a deep cynicism about the value of the UN in conflict prevention and resolution, there is an undeniable requirement for states to justify a resort to arms in settlement of a dispute.

Even the most powerful states feel compelled to invest effort in public defence of their actions and if possible to seek UN support for such action. A significant example of exactly this process was the detailed negotiations and dealing that preceded the arrival of the British Task Force in the Falklands in 1982. Both the British and the Argentineans mobilised their supporters and the UN in support of their particular cause and actions. Similarly, the American-led coalition against Saddam Hussein in 1991 expended considerable effort to ensure UN support. These examples may be interpreted as an acceptance by states that there are legal, political and moral considerations in the choice of conflict to resolve differences between them.

The Role of Law

The increased significance of the role of the law on the international stage is a recent development. The gradual evolution of a coherent body of humanitarian law is a

major element in this success. However, compliance with the law is still patchy at best. Recent captures and successful prosecutions of war criminals by the War Crimes Tribunals are notable developments. Nevertheless, the process is still in its infancy and has a long way to go. Similarly, the attempts to outlaw war itself seem to be premature given the state of the world political stage and the lack of an enforcing mechanism. The trend is easily identifiable, but a successful imposition of a single international criminal code regulating inter-state relationships seems a far distant prospect.

In the interim, it is likely that conflict will continue to afflict mankind. This means that all the uncertainties, brutalities and vicissitudes of the battlespace will continue to be visited upon combatant and non-combatant alike. An understanding of why a particular conflict is being waged and its nature will remain invaluable to a successful humanitarian operation. Only if the essence of conflict is comprehended can maximally effective humanitarian assistance be applied. Shortcomings in this crucial comprehension can only worsen the prospects for humanitarian actions as well as the security of all involved. Knowledge is power in all fields of human endeavour. On the other hand, in the situation of conflict, ignorance may represent failure and even death rather than bliss.

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Chapter 4

The Players: Humanitarian Organisations and Their Coordination in Humanitarian Assistance

Maria Kett and Alexander van Tulleken

Abstract The way humanitarian aid is delivered has changed over the past few decades largely as a consequence of lessons learned but also in response to the different contexts of contemporary humanitarian emergencies. This has necessitated a process of significant reform.

Debates about the number of humanitarian crisis continue: While statistically numbers of cross-border conflicts have dropped, intrastate or non-state conflicts have increased. Long-term effects of such crises include an increase in civilian injuries and deaths, as they are often deliberately targeted as part of low-intensity warfare, population displacement, resource scarcity, poverty, inequality and exclusion of poor and marginalised groups. Questions are raised as to the extent to which some states are able, and willing, to protect their citizens in these circumstances. There are also increasing concerns about climate change and its effect on the environment and availability of resources, which can be a significant factor in precipitating conflict. These events often take place in insecure political contexts, with limited resources and capacities to respond. All this has led to an increase in the number of complex humanitarian emergencies.

This chapter aims to give an overview of who intervenes to assist before, during and in the immediate aftermath of violent conflict and humanitarian crisis: What are the roles of the many different international and national organisations, agencies and individuals who intervene? What are their responsibilities? Who coordinates

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these? This chapter will assist those involved in humanitarian assistance in understanding who is who, their various agendas and the potential areas of cooperation and conflict that arise in a response to complex emergencies.

Keywords Humanitarian agencies and organizations • Reforms • United Nations • Cluster approach • Private military and security companies • PMSCs • Regulation • Account Holding • Rights • Accountability • International Court

Objectives

- To describe the agencies and organisations that healthcare providers are likely to encounter in disasters and complex humanitarian emergencies
- To outline the mandate and expertise of some of these agencies
- To describe recent humanitarian reforms, including the UN-led cluster approach for coordination of humanitarian assistance in disasters and complex emergencies
- To highlight the potential obstacles to effective communication and cooperation between agencies
- To direct readers to useful resources for coordination between agencies

Introduction

The way humanitarian aid is delivered has changed over the past few decades largely as a consequence of lessons learned but also in response to the different contexts of contemporary humanitarian emergencies. This has necessitated a process of significant reform.

Debates about the number of humanitarian crisis continue: While statistically numbers of cross-border conflicts have dropped, intrastate or non-state conflicts have increased [1, 4]. Long-term effects of such crises include an increase in civilian injuries and deaths, as they are often deliberately targeted as part of low-intensity warfare, population displacement, resource scarcity, poverty, inequality and exclusion of poor and marginalised groups. Questions are raised as to the extent to which some states are able, and willing, to protect their citizens in these circumstances. There are also increasing concerns about climate change and its effect on the environment and availability of resources, which can be a significant factor in precipitating conflict. These events often take place in insecure political contexts, with limited resources and capacities to respond. All this has led to an increase in the number of complex humanitarian emergencies.

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and individuals who intervene? What are their responsibilities? Who coordinates these? This chapter will assist those involved in humanitarian assistance in understanding who is who, their various agendas and the potential areas of cooperation and conflict that arise in a response to complex emergencies.

Humanitarian Organisations and Their Role in Emergencies

At the time of writing, there are over 20 UN agencies present in Darfur, Western Sudan, as well as peacekeeping forces, African Union soldiers and over 70 international NGOs. There are also numerous local NGOs, international oil companies, private security companies, three-armed rebel groups and local and national government departments. This number and variety of different actors is not uncommon in a complex (humanitarian) emergency. The logistical difficulties of communicating and coordinating in circumstances when infrastructure has been destroyed or never existed are vast. In addition many of these parties may have differing and competing agendas. It is impossible for any healthcare provider to function in a vacuum and many of these agencies and organisation will be encountered in the course of providing humanitarian relief.

In addition to clinical challenges, healthcare workers are often required to take on administrative roles and are required to coordinate their work with other agencies as well as report to UN departments, their own donors and the host government. Much of this work must be done with very limited resources, in uncomfortable and often dangerous circumstances.

There are an enormous number of different agencies in the field at any one time. For the sake of brevity, this chapter will focus primarily on lead agencies (often, though not exclusively, UN agencies) as well as give a brief outline of the mandate of some of the other organisations and agencies likely to be encountered.

The Structure and Purpose of the UN

At the time of writing there are 192 UN members, recognising nearly every independent state. Each UN member is a signatory to the Charter of the United Nations which outlines the purposes and aims of the United Nations including:

- "...to maintain international peace and security"
- "...to promote social progress and better standards of life in larger freedom"
- "...to employ international machinery for the promotion of the economic and social advancement of all peoples..."

The principles of the Universal Declaration of Human Rights (1948) are integral to the role of the UN and its agencies. A detailed description of the incredibly complex structure of the United Nations that has developed since it was brought into

being in 1945 is beyond the scope of this chapter. For readers who wish to understand more of the politics and history surrounding this controversial organisation, there are some suggestions in the bibliography.

It is, however, useful to understand some basic concepts about the organisation and its agencies as almost everyone working in a humanitarian response will come into contact with one or more of the UN agencies at some point.

The UN is administered by five bodies:

- The General Assembly
- The Security Council
- The Secretariat
- The Economic and Social Council
- The International Court of Justice

The General Assembly

The General Assembly is composed of all members states and operates under the “one state, one vote” principle. It is the main deliberative organ of the UN and acts as a parliament of nations. When voting on “important” matters, including recommendations on peace and security, a majority of two thirds is required to pass a resolution. The GA meets in regular yearly sessions from September to December, under a rotating presidency.

The Security Council

The Security Council (UNSC) is composed of 15 members. The five permanent members are the United States, the United Kingdom, France, the Russian Federation and the People’s Republic of China. All the permanent members have a vote over any resolution under debate. There are also ten elected members who serve five-year terms and are elected by the General Assembly.

The Secretariat

This is the administrative department of the UN with offices in New York, Geneva, Vienna and Nairobi. The Secretary General is the head of the Secretariat.

Economic and Social Council

The Economic and Social Council (ECOSOC) is the coordinating body for planning and implementing policies concerned with all areas of economic and social issues. It is the largest of the main UN bodies. ECOSOC coordinates the overlapping

functions of the UN subsidiary bodies, including the International Labour Organization (ILO), World Health Organization (WHO) and United Nations Children's Fund (UNICEF), as well as the functional commissions (e.g. UN Human Rights Council) and the five regional commissions (e.g. UN Economic Commission for Africa).

International Court of Justice

The International Court of Justice (ICJ) is the main judicial organ of the United Nations (UN). It is based in The Hague, Netherlands. Its principle function is to settle disputes in accordance with international law and advise the UN and its organisations on aspects of international law.

Humanitarian Emergencies and the UN System

In most large-scale responses to complex emergencies and disasters, the UN leads coordination attempts. In many cases, however, NGOs are responsible for over half the operational capacity of a response and so their involvement in any process of coordination will determine how useful it is.

Coordination of UN responses across the world is through the Office for the Coordination of Humanitarian Affairs (OCHA). OCHA is a department of the Secretariat, headed by an Emergency Relief Coordinator (ERC). The ERC is also chair of the Inter-Agency Standing Committee (IASC), which was established in 1992 in response to UN resolution 46.182 on the strengthening of humanitarian assistance, which affirmed its role as the primary mechanism for interagency cooperation. IASC membership is currently composed of all operational UN organisations along with standing invitations to the International Committee of the Red Cross and Red Crescent, the International Federation of Red Cross and Red Crescent Societies and the International Organization for Migration. It is these UN agencies which are most likely to be encountered in the field and a brief description of their activities is given next.

It is also through the IASC that much of OCHA's coordination function is carried out. For each disaster or complex emergency, OCHA appoints a Humanitarian Coordinator (HC – see later in this chapter) who is responsible for a coherent relief effort.

OCHA coordinates humanitarian efforts in several ways: It is responsible for developing common policies, guidelines and standards across humanitarian response procedures, and it raises and distributes funds to support humanitarian responses through administration of the Consolidated Appeals Process (CAP), flash appeals and the Central Emergency Relief Fund (CERF). It is not an implementing agency but operates a network of field offices to support the HCs and a 24-h monitoring and alert system covering the globe. OCHA also supports surge capacity

mechanisms such as the UNDAC (the United Nations Disaster Assessment and Coordination System)¹ and information services, including Relief Web and IRIN news (see resources section in this chapter).

Humanitarian Reform: The Benefits of Coordination

The United Nations is frequently criticised for being inefficient, political, slow to act, and, in cases such as Rwanda and Darfur, inexcusably negligent. These criticisms are justified in many instances, and the ongoing process of reform acknowledges its recent failures in humanitarianism. However, the ability of the UN to respond to disasters has been severely limited by two major factors.

The first is the budget of the UN, which is annually approximately \$12 billion. This is a smaller budget than that of New York City Fire Department to run an organisation which operates in every country on earth. While donations of either money or resources are made available separately to fund operations, the real value of contributions to run many departments of the UN has not increased for decades, making it extremely difficult to invest in infrastructure or reform.

The second limiting factors on the United Nations are also its greatest asset: the Security Council and the General Assembly. The United Nations organisation can only be as good as its member states allow. The delicacy with which UN agencies operate in the field can be infuriating for NGO staff. But the UN's hesitation in condemning human rights abuses, or in taking decisive action in the face of atrocities, stems from the conflicting agendas of its member states. For example, the failure of the United Nations to respond to the crisis in Darfur is in some part due to China's reluctance to pass resolutions imposing penalties on Sudan, one of its major oil suppliers.

Agencies operating independently of the UN in a humanitarian response are right to demand action from the UN in the face of atrocities, but it is rarely apathy or ineptitude on the part of UN field staff that is the underlying problem. One of the key problems has been that of coordinating the vast number of actors in the field and ensuring cooperation in responses.

Coordination and Cooperation

Every natural disaster and complex emergency produces different challenges and involves different actors. Political and geographical circumstances will to a large extent determine the nature of the responders and how effectively they coordinate.

¹“The Surge Capacity is the OCHA response mechanism for rapid deployment of staff to provide timely support to the OCHA field structures and IASC (Inter-Agency Standing Committee) Country Teams in emergency situations.” (<http://ochaonline.un.org/AboutOCHA/Organigramme/EmergencyServicesBranchESB/SurgeCapacity/tabid/1943/Default.aspx>)

In addition, the nature of the particular humanitarian crisis, for example, whether of slow or rapid onset, affects the nature of the intervention. The coordination structures described in this chapter are not therefore, universally encountered, nor do they always function the way they are intended; nevertheless, the overall structure of the coordination system described is frequently employed in the response to a disaster or emergency.

Coordination is time consuming and expensive so it is important to justify the resources spent on it. In 2001, a letter published in *The Lancet* entitled “Cowboys in Afghanistan” outlined how the humanitarian endeavours in Afghanistan routinely failed to direct aid to where needs were highest. Amongst the criticisms listed were ad hoc, uncoordinated meetings, poor information sharing between NGOs competing for funds and a lack of good quality field data available to donors.

Problems such as these have been common in the past as humanitarian crises generate massive influx of NGOs and UN agencies with large budgets and disparate agendas, to places where infrastructure and government control is often extremely poor.

The benefits of agencies coordinating their activities are obvious. The sharing of information between organisations regarding everything from reporting the first observed cases of measles or meningitis in a camp to the location of displaced persons who are not receiving any assistance is invaluable. It allows effective prioritisation of tasks so that the populations with the greatest needs can be targeted first and prevents duplication of programmes so that resources are usefully divided within the affected population, ensuring that no sector of activity is inadequate to meet the needs of the population and that no part of the population is neglected.

The United Nations has come under heavy criticism over the course of repeated disasters where, despite available resources and funds, there have been evident “gaps” in the humanitarian response. In 2005, under pressure from the General Assembly, the then UN Emergency Relief Coordinator, Jan Egeland, commissioned the Humanitarian Response Review (HRR), an independent report which sought to identify why the humanitarian aid community was falling short of its goals and to make recommendations for reform.² The recommendations made in this document have become the basis for “humanitarian reform”, a set of changes designed to improve response capacity, predictability and accountability, to streamline financing; to improve coordination of agencies in disasters both in the field and globally and to improve partnerships between the United Nations and NGOs. These reforms focus on three main areas:

- The development of the cluster system
- Strengthening the role of the Humanitarian Coordinator
- Improving financing with the Central Emergency Relief Fund (CERF)

²Humanitarian Response Review, commissioned by the United Nations Emergency Relief Coordinator and Under-Secretary-General for Humanitarian Affairs, August 2005. Available in multiple locations on-line <http://www.reliefweb.int/library/documents/2005/ocha-gen-02sep.pdf>.

These changes are examined later in this chapter. They will impact fieldwork in many ways and it is important for healthcare workers to understand the basis of them, whether working for a UN agency, as head of mission for an NGO or as a healthcare provider in the field.

The United Nations Cluster System

In September 2005 the Inter-Agency Standing Committee (IASC) agreed to implement a new coordination system that would be used in all new emergencies. Known as the “cluster system”, this system is subject to ongoing review and alterations, but regardless of how effective it turns out to be, it is likely that most field workers will encounter it in some form, and an understanding of its structure and its strengths and weaknesses will be invaluable.

The aim of the cluster system is to eliminate gaps in a humanitarian response by allocating an agency of the United Nations to take the lead in each sector. The lead agency is not only responsible and accountable for the quality of work done in the sector but also as “provider of last resort”, that is, if there is a deficiency that cannot be met by any other implementing partner then it falls to the lead agency to intervene.

The clusters approximately correspond to the main sectors which have been recognised as important in disaster response. There are sectors in which there has historically been clear leadership (e.g. agriculture, led by FAO; food, led by World Food Programme; refugees, led by UNHCR; and education, led by UNICEF) of which agriculture and education now have designated global clusters (discussed later in this chapter). In addition, in 2005 the IASC designated lead agencies for nine sectors which in the past either lacked predictable leadership or needed strengthened cooperation between humanitarian actors.

There has been ongoing confusion amongst NGOs regarding the number of clusters that exist. Much of this stems from the fact that while there are 11 clusters at a global level (Table 4.1), the number of clusters and the cluster leads at a field level can vary depending on the circumstances. The differences between global and field level clusters are explained next.

Clusters at a Global Level

The global cluster leads are responsible for ensuring system-wide preparedness and technical capacity. It is hoped that this will be achieved by activities in three main areas:

- Standards and policy setting, including identification of best practice
- Building response capacity, including establishing and maintaining material stockpiles and standby rosters

Table 4.1 Global cluster leads

Sector or area of activity	Global cluster lead
<i>Clusters associated with service provision</i>	
Emergency telecommunications	OCHA/UNICEF/WFP
Logistics	WFP
<i>Cluster dealing with relief and assistance to beneficiaries</i>	
Emergency shelter:	
IDPs (from conflict)	UNHCR
Disaster situations	IFRC (convener) ^a
Education	UNICEF
	Save the children (UK)
Nutrition	UNICEF
Water, sanitation and hygiene (WaSH)	UNICEF
Health	WHO
Agriculture	FAO
<i>Clusters dealing with cross-cutting issues</i>	
Early recovery	UNDP
Camp coordination/management:	
IDPs (from conflict)	UNHCR
Disaster situations	IOM
Protection: IDPs (from conflict)	UNHCR
Disasters/civilians affected by conflict (other than IDPs) ^b	UNHCR/OHCHR/UNICEF

^aIFRC has made a commitment to being a “convener”, not a “cluster lead”, and it is therefore not committed to being “provider of last resort” nor is it accountable to any UN agency

^bUNHCR is the global protection cluster lead. At the country level in disaster situations or in complex emergencies without significant displacement any of the three core protection mandated agencies (UNHCR, UNICEF and OHCHR) can assume the role of Lead for Protection

- Operational support, including needs assessments, securing access to technical expertise and ensuring complementarity of efforts across UN agencies and other humanitarian actors

Examples of Global Cluster Leads

The World Health Organization

The World Health Organization (WHO) is the coordination authority on international public health. Its functions include coordination, research, campaigning and operational activities. The scope of the WHO’s activities is vast, and their research and guidelines affect health policy and practice in most countries.

Within the cluster system, the WHO is lead agency for health and as such is training a roster of specialised Health Cluster Field Coordinators. These people will

be the cluster lead and will usually have medical qualifications along with post-graduate training in public health.

The strategic areas for the health cluster are:

- Coordination and management
- Information management
- Rosters and stockpiles (including surge capacity)
- Capacity building
- Operational support (including resource mobilisation)

Disasters and complex emergencies can have catastrophic effects on public health and rapid provision of healthcare is almost always a critical determinant of survival. Information gathering is the cornerstone of effective public health and the WHO is responsible for gathering epidemiological data from all responders and making it available in a useful form. As such it is an invaluable resource in the field in planning and assessing strategy.

The health cluster works closely with the nutrition and water and sanitation clusters and depending on the context may have close links to the protections cluster regarding psychosocial issues. Cross-cutting issues such as gender and HIV/AIDS are particular consideration in the health sector where many of the beneficiaries are likely to be women and children.

The World Food Programme

The World Food Programme (WFP) is the largest humanitarian agency in the world with a direct expenditure of \$2.9 billion in 2006. Its operations reach over 80 million people per year, more than half of whom are children. Its aim is to eradicate hunger and malnutrition across the world, and its programmes are divided into emergency programmes, relief and rehabilitation programmes, development programmes and special operations.

Food supply is a concern in almost every emergency. In order to deliver the quantities of food needed (four million tonnes in 2006) WFP has developed large and sophisticated logistic capabilities and as well as being the lead agency for agriculture, it is also the logistics lead and partners with OCHA and UNICEF as the telecommunications lead within the cluster system.³ In 2006 WFP's Humanitarian Air Service transported over 300,000 passengers from over 100 NGOs to locations all over the world. It has operational capacity for sea and land transport and has developed its own field communication system, DFMS, which is used by many NGOs in the field.

As the lead agency for the food sector the WFP will perform emergency needs assessments, procure food using its own internal Immediate Response Account and

³ As noted here, there is no specific food cluster as the WFP has historically had a clear role as the agency responsible for this sector.

launch international appeals for contributions in the form of food, as well as delivering and distributing food. The WFP's programmes are intended not merely to meet the nutritional and calorific requirements of the population but also to rebuild local capacity with "food for work programmes" and to target particularly vulnerable groups such as children and those with HIV/AIDS.

United Nations High Commission for Refugees

Under the cluster system, the United Nations High Commission for Refugees (UNHCR) is the lead agency for those internally displaced by violent conflict in three areas: camp management, shelter and protection.

There has been much debate about the differences between internally displaced people (IDPs) and refugees. The 1951 Refugee Convention defines a refugee as:

"...a person who, owing to well-founded fear of being persecuted for reasons of race, religion, nationality, membership of a particular social group or political opinion, is outside the country of his nationality and is unable or, owing to such fear, is unwilling to avail himself of the protection of that country".⁴

The Refugee Convention was expanded in 1967 to the protection of displaced people globally. Some 146 states are signatories to the 1951 Refugee Convention and/or its 1967 Protocol.

Those defined as refugees cannot be forced to return to a country deemed as unsafe for them on any of the grounds listed previously – the principle of *non-refoulement*. While states that have not signed the conventions are not bound by them, they are liable under other international humanitarian laws (such as the Genocide Convention).⁵

UNHCR is mandated to take the lead in the care and protection of refugees and to resolve refugee problems worldwide, through the right to seek asylum and find safe refuge in another state, return home voluntarily, integrate locally or to resettle in a third country.

UNHCR's mandate has gradually been expanded to include those designated "internally displaced people" (IDPs). According to the 1998 United Nations Guiding Principles on internal displacement, these are defined as:

"...persons or groups of persons who have been forced or obliged to flee or to leave their homes or places of habitual residence, in particular as a result of or in order to avoid the effects of armed conflict, situations of generalised violence, violations of human rights or natural or human-made disasters, and who have not crossed an internationally recognised State border".⁶

⁴ Article 1: 1951 UN Convention Relating to the Status of Refugees.

⁵ UNHCR [8].

⁶ Guiding Principles on Internal Displacement (1998 Introduction: Paragraph 2).

These guiding principles are not legally binding, though they have been incorporated into national policy in a number of countries, including Angola, Burundi, Colombia, Georgia and Uganda.

According to the Internal Displacement Monitoring Centre, by the end of 2006, the number of people internally displaced by conflict alone was estimated to be around 24.5 million people in 41 countries (IDMC 2006). The vast majority of these are in Africa, including around 5.3 million people in Sudan, but there are IDPs in almost every continent of the world. In Colombia, estimates of the number of IDPs vary between 1.8 and 3.8 million. By their very nature, accurate numbers of IDPs are hard to obtain as it is very often their own states that are creating the protection problems for people in the first place. Women and children make up the majority of IDP populations (approximately 75–80 %), making protection issues even more essential.

IDPs are particularly vulnerable to political change, having both insecure political status and a lack of international protection. Opposing factions may use IDPs as political pawns to highlight causes, which may result in their situation being worsened and prolonged. Crucial to the debate is the fact that IDPs are not afforded any protection under the refugee conventions as they have not crossed international borders and therefore remain citizens of their own countries and subject to sovereign laws. They do, however, have the right to protection under international human rights instruments and customary law. Furthermore in armed conflict, they enjoy the same rights to the protection provided by international humanitarian law as long as they take no active part in combat.

Though there are numerous organisations who take on responsibility for the care and protection of refugees, UNHCR takes the lead as mandated under the 1951 Refugee Convention. However, much of its operations are undertaken through national partner NGOs in the field. As noted earlier, under the cluster system, UNHCR shares responsibility for refugees and IDPs with a number of other organisations including the International Federation of the Red Cross and Red Crescent (discussed next) and the International Organization of Migration (Box 4.1).

Box 4.1: International Organization of Migration (IOM)

IOM is an intergovernmental organisation, established in 1951 to ensure humane management of migration, promotion of international cooperation on migration issues, assisting with the search for practical solutions to migration problems and to provide humanitarian assistance to migrants in need, including refugees and internally displaced people.

IOM works closely with governmental, intergovernmental and non-governmental partners. IOM activities include the promotion of international migration law, policy advice and protection of migrants' rights (<http://www.iom.int/jahia/jsp/index.jsp>).

International Red Cross and Red Crescent Movement

The Federation (IFRC), together with the National Red Cross and Red Crescent Societies and the International Committee of the Red Cross (ICRC), make up the International Red Cross and Red Crescent Movement. The movement is based on seven fundamental principles of humanity, impartiality, neutrality, independence, voluntary service, unity and universality. Across the world the movement works with governments, donors and other aid organisations to provide humanitarian assistance to vulnerable people.

The ICRC has the mandate under international law (Geneva Conventions) to carry out humanitarian activities in situations of armed conflict. It includes prison visits, monitoring the implementation of international conventions, organising relief operations, assisting with missing persons and family reunification. The ICRC is one of the world's leading humanitarian organisations in terms of size and technical expertise. It has, however, attracted controversy because of its policy of "non-disclosure". It cannot be compelled to give evidence in any court about war crimes it has witnessed. This neutrality gives it access to populations which would be denied to many NGOs, but the ICRC had been criticised for failing to condemn human rights abuses in some situations. The ICRC does considerable amounts of advocacy work with governments in complex emergencies, but does not publicly denounce them.

The IFRC coordinates and directs international assistance following natural and man-made disasters in non-conflict situations. The IFRC works with national societies to respond to catastrophes around the world. The national societies work with public services in their respective countries to provide a range of services including disaster relief, health and social programmes. The Secretariat, based in Geneva, coordinates the provision of humanitarian assistance to international emergencies, as well as promoting cooperation between national societies and representing the national societies in the international arena.

Under the UN cluster system, it is the Federation Secretariat, rather than the national societies, who are the convenor. Though the IFRC have agreed to be shelter cluster convenor for people displaced by natural disasters, they have argued that being accountable to the UN would compromise their principles, especially of neutrality and independence. Therefore, they will not commit to being "provider of last resort" nor will they be held accountable to the UN Emergency Response Coordinator.

Clusters at a Field Level

The field clusters will usually be an in-country team for a given sector of activity, with a lead agency that will, in most instances, correspond to the global cluster lead. There may be cases where particular sector groups are not needed, where clusters

may merge at a field level (e.g. health and nutrition or food and agriculture) or where it is appropriate for a particular NGO to act as a sector lead in parts of the country where they have a strong presence or particular expertise.

The field clusters will focus on four main activities:⁷

- Needs and priorities assessments
- Securing commitments to follow up “gaps” in the response
- Assessments of performance of the cluster as a whole and of individual actors
- Acting as “provider of last resort”

The concept of “provider of last resort” is a particularly important feature of the cluster approach. It represents a commitment of the lead agency of each cluster to ensure that a humanitarian response is of a minimum standard for the population it aims to serve. The cluster should function to direct all the actors involved in the response to programmes that will maximise their effectiveness. In the case of a shortfall in resources, the sector lead is committed to fill the gap. Clearly this is easier said than done and budgetary insufficiency and security concerns may make this impossible in many instances. Even in these circumstances, however, the provider of last resort is expected to pursue methods such as advocacy to fill the gap.

A clear account of the cluster leads and field functions of the various clusters can be found in “Key Things to Know” a document published by humanitarian reform to assist cross-cluster coordination.⁸

Other Agencies and Organisations in the Field

In addition to the many UN bodies, there are also many other international and national non-government organisations and civil society organisations that will be encountered in any form of humanitarian response, in both the immediate and longer term. Each has its own mandate, core values and beliefs and ways of working in the field. There have been attempts to unify and standardise responses in the past, including the drafting of the SPHERE Guidelines on Minimum Standards in Emergencies (see resources section), as well as the Global Humanitarian Partnership – an arena for dialogue between the UN and NGOs.⁹ However,

⁷ A complete term of reference for sector/cluster leads at the country level can be found in Annex 1 of the IASC Guidance note on using the cluster approach to strengthen humanitarian response. Available in <https://clusters.humanitarianresponse.info/system/files/documents/files/IASC%20Guidance%20Note%20on%20using%20the%20Cluster%20Approach%20to%20Strengthen%20Humanitarian%20Response%20%28November%202006%29.pdf>

⁸ http://www.untj.org/docs/Disaster_Management/Resources%20Page/IASC,%202007%20-%20Cross-cluster%20Coordination.%20Key%20Things%20To%20Know.pdf

⁹ www.icva.ch/ghp.html

it is still debatable to what extent southern NGO voices have yet been heard within these.

One of the main aims of the reform of the UN and the cluster system is to enable coordination of all the different players. However, not all agencies adhere to the cluster system: For example, *Médecins Sans Frontières* (MSF) believe that humanitarian imperatives to save lives and provide for immediate needs should be the pri-

Box 4.2: Médecins Sans Frontières (MSF)

MSF is an independent humanitarian emergency medical aid organisation established in 1971. As an organisation, MSF has remained main neutral and largely independent of individual governments, including their sources of funding. However, MSF will speak out to renounce violations of basic human rights encountered during its work.

Though MSF has not publicly announced their position about the current humanitarian reform process, they have highlighted its increasing politicisation, which, they argue, compromises the provision of humanitarian aid. They have clearly stated that they will not be a member of a cluster and that their actions will not be placed under the responsibility of UN Humanitarian Coordinators nor be accountable to them (http://www.msf.org/msfinternational/invoke.cfm?component=article&objectid=95542E25-5056-AA77-6C6F0623221C3658&method=full_html).

mary goal of humanitarian assistance and should not be subordinated to political goals or solutions.¹⁰ MSF have their own mechanisms for coordination and data collection in their responses and as yet have had limited participation in the cluster system (Box 4.2).

There are a number of other organisations whose scale and size alone enables them to equal the UN in terms of interventions. In 2006 World Vision, one of the world's largest NGOs, received a total income of \$2.6 billion, \$540 million of which was spent on disaster relief. In 2004 the world's seven largest NGOs all had annual incomes of over \$100 million.¹¹ In the case of organisations such as MSF, over half of this income was from voluntary donations, giving them freedom to operate outside constraints imposed by government donors.

Many of these NGOs, funded through large government donations, operate closely with or within the cluster system. Indeed Save the Children UK (SCUK) is leading the Global Education Cluster.

¹⁰Stobbaerts et al. [7].

¹¹Global Humanitarian Assistance, 2006. Available on-line at <http://www.globalhumanitarianassistance.org/pdfdownloads/GHA%202006.pdf>.

A detailed description of the activities of the huge variety of NGOs, both international and local, is beyond the scope of this chapter; there are NGOs that operate in every sector, at every level and the largest ones have implementing capacities to rival any UN agency.

It is worth noting the relationships between NGOs and their donors. Large sums of money are spent by donor governments on humanitarian assistance through NGOs – the largest official donor globally is the European Union (through ECHO), spending \$403 million in 2004 – therefore donors hold considerable influence over NGOs. Many of the large donors effectively contract NGOs to do specific work, for example, provide medical services to a certain number of people, within a given region. The NGOs compete for these contracts, and while this does promote efficiency and accountability it has the intrinsic drawback of disincentivising some forms of cooperation and coordination.

The major government donations are usually distributed through government bodies with a specific aid budget, such as the UK's Department for International Development (DFID), the United States' USAID. These donations are inextricably linked to the donor government's foreign policy and it has been argued that the term "humanitarian" should not be used to describe donations that have a political motivation.

Large government donations, while often pledged rapidly, can take considerable time to deliver. In an emergency these delays can be critical to relief efforts and new financing systems are being developed as part of the process of humanitarian reform to streamline access to funds.

The Military

Another increasingly important player in the field is the military, who in terms of manpower, technical skill and resources, often have an advantage over many NGOs or UN agencies. For example, the Pakistan military played a vital role in the search and rescue efforts after the Kashmir earthquake in October 2005. However, they also highlighted the international relations aspects of involving the military – India refused to allow the Pakistan military to search in disputed territories.

Other debates about involving the military include expense and duration of involvement. The military usually only have very short-term mandates, especially in disasters. However, the links between civil and military joint missions seem essential in current situations of increasing insecurity and in countries where the boundaries between humanitarian operations and military involvement are blurred, such as Afghanistan. Increasingly, humanitarian aid is being used as a tool to win combat through "hearts and minds".

An option that is becoming increasingly popular in very insecure areas is the use of private contractors to undertake projects. The advantage is they are contracted to do a particular job, hence will usually do whatever is necessary to ensure that job is completed. However, such practices as viewed as antithetical to "traditional"

humanitarian interventions as they are seen as profit making, as opposed to most aid and development which does not make a profit per se.

It is likely that future decisions on how budgets are allocated by donors to future humanitarian and emergency response may well be affected by the role of these organisations.

Practical Considerations in the Field

The headquarters of the eleven clusters, along with many other UN agencies, are likely to be found in the capital city, along with the Humanitarian Coordinator. If the disaster is occurring in another region of the country, then there will be subclusters or humanitarian hubs which are near the site of aid delivery. In both locations there will be frequent meetings to facilitate coordination, meetings between NGOs and UN agencies within the clusters and cross-cluster. Not all NGOs are invited or even allowed to attend cluster meetings but it is important to be aware of the clusters as potential resources. The health cluster, for example, is responsible for, amongst other things, providing databases of technical experts, health and nutrition tracking service, global stockpiles of health supplies and guidance for advocacy and fund raising.

The functions of the clusters can be of great value to humanitarian efforts but may require considerable input from partner organisations. The health cluster for instance will be responsible for gathering considerable quantities of epidemiological data regarding measles and meningitis epidemics, and health NGOs may be expected to devote some resources to gathering and reporting data.

Coordination Problems: Problems with the Cluster System

Since its first use in the response to the Pakistan earthquake in 2005, the cluster system has been used in Africa, Southeast Asia and South America in a wide variety of situations, and the problems encountered with the system have been well described by a number of NGOs.¹² This is potentially a challenge to UN coordination since international NGOs are not obliged to operate within the cluster system. In many disasters over 50 % of the operational capacity may lie with NGOs and without their cooperation the effectiveness of the cluster system may be severely limited.

The main criticism levelled by several NGOs is that the system is extremely UN-centric. In many circumstances NGOs or the ICRC may have a larger operational capacity or more expertise than the lead UN agency within a cluster. NGOs

¹² See also FMR Issue 29, Forced Migration Review [2].

have reported that they are uninvolved at the creative and strategic stages of response planning and are treated only as implementing partners.

Numerous other problems have been reported from different locations:

- Proliferation of subclusters or “cluster spread” in the field as specialists clusters develop, creating communications problems and making it difficult to ascertain which organisations are responsible for which activities.
- Poorly organised, overly long meetings with no clear agenda and meetings timing changes at short notice. Many field staff have begun to regard meetings as “talking shops” which achieve little and prefer to work outside the clusters.
- Poor staff training and high staff turnover in field clusters.
- Lack of involvement of local NGOs.
- Lack of understanding of the purpose of the cluster system amongst NGOs.
- Underfunding of the cluster approach infrastructure.

However, there are solutions to most of these problems and changes are ongoing to improve the joint training of NGO and UN staff in using the cluster system. Overall, despite some of the problems outlined previously, there has been widespread support for the approach from NGOs.

In 2006 a Global Cluster Building Capacity Appeal was launched to raise nearly \$40 million dollars. A similar appeal will be used to fund the cluster approach in 2007–2008, after which time capacity building costs will be factor into the individual agency’s budgets.

Other Aspects of Humanitarian Reform

As well as the implementation of the cluster system, the Humanitarian Response Review recommended reforms of the UN’s human resources (in the form of Humanitarian Coordinators) and improvements to the system of financing emergency relief.

Strengthening the Role of Humanitarian Coordinator

In each country where the UN is operational, there will be a Resident Coordinator (RC), a senior UN official (usually the head of UNDP in that country, and funded and managed by UNDP). The RC’s role is to work closely with national government, advocating the interests and mandates of the United Nations. In an emergency or humanitarian crisis, the Emergency Relief Coordinator (ERC), in consultation with the IASC, may appoint a Humanitarian Coordinator (HC). The HC will be a representative of the ERC and consequently of OCHA. The normal practice is to “double-hat” the Resident Coordinator, but in cases where the RC is too busy or special expertise is required, then a separate HC is appointed.

The cluster heads report to the HC who assumes overall responsibility for ensuring a rapid and effective response to the emergency. The roles of the HC include:

- Consulting cluster leads to develop overall strategy
- Ensuring information sharing takes place
- Ensuring that cross-cutting issues (gender, HIV/AIDs, age, disability) are addressed in all sectors
- Supporting all sectors to ensure a comprehensive, well-prioritised humanitarian response

The strategy for strengthening the HC's role focuses developing a system to select and train the most effective individuals, in order to maintain a pool of highly qualified HCs who can be deployed in an emergency. These individuals may be drawn from non-UN IASC partners including Oxfam and the Norwegian Refugee Council but the pool will be maintained and assessed by OCHA.

The Financing of Humanitarian Operations: CERF, CHAPs and CAPs

Lack of rapidly available financing for operations has previously severely hampered UN operations, especially those elements of a response that are time dependent. In most humanitarian operations prior to 2006, the main funding mechanisms were the Consolidated Appeals Process (CAP) and flash appeals. Both of these are strategic response plan requests for funding from donors, not funds in themselves. A consolidated appeal relies on a common humanitarian action plan (CHAP), a strategic plan for the overall humanitarian response within a region.

The CHAP should provide:

- An analysis of the context in which the response takes place
- A needs assessment
- Best, worst and most likely scenarios
- Identification of roles and responsibilities (who, what, where)
- A statement of longer-term objectives and goals
- A framework for monitoring and revising the strategy

The CHAP, as part of the CAP, is an essential part of the coordination of any humanitarian response. It is produced by the close collaboration of donors, UN agencies, NGOs and the International Red Cross. It assists not only in fund raising but also in planning, implementation and monitoring activities.

Despite attempts to streamline the process of CAP and flash appeals, there have often been considerable delays in getting funding for emergency response. Between 2002 and 2005 only two of the 20 flash appeals achieved over 50 % of their funding requirements for the first month of operations. Nine flash appeals during this period received less than 20 % of their first month requirements.

In response to these problems, one of the major UN reforms has been to modernise the previously existing Central Emergency Revolving Fund to the Central Emergency Response Fund by adding a \$450 million grant facility to the existing \$50 million loan facility. The CERF is administered by the Emergency Relief

Coordinator who disburses funds in consultations with Humanitarian Coordinators and other humanitarian agencies. The loan facility exists to cover costs when donors have committed funds but not yet paid, or when commitment is thought highly likely. The grant portion of the fund is divided in two ways: Two thirds are for rapid response to disasters, and one third is to be used for underfunded crises.

CERF is not intended to substitute for regular fundraising but rather to provide rapid and efficient access to funds for implementing agencies. The money is earmarked for core, lifesaving projects and is specifically not to be used for building infrastructure, disarmament or other medium–long-term relief strategies. It is important to note that in 2005 \$12.8 billion was spent worldwide on humanitarian assistance; the CERF fund makes up less than 5 % of this total.

Conclusions

The vast number of different organisations with varying agendas, working in response to disasters and complex emergencies creates intrinsic coordination problems. When these are added to problems of inadequate funding and the difficulties of working in countries where there is little or no infrastructure, coordination becomes a monumental task. However, the diversity of organisations in humanitarian assistance is to be welcomed, not lamented, and though this diversity presents enormous challenges, there are encouraging signs that these are being met.

The UN reforms, though they will not entirely suit the purposes of NGOs wishing to remain independent, and apolitical, should create a mechanism through which parties can communicate and share information. The importance of the concept of “a provider of last resort” cannot be overestimated; it is to be hoped that the many of the gaps that existed in previous humanitarian responses will close, to the benefit of the target populations, and that funding will be more rapidly available for lifesaving projects.

The market economy that drives donors and NGOs is not, despite apparently higher motives, different to any other market and brings with it benefits and costs which are easier to understand and work within, than to fundamentally alter.

Finally, it is worth noting that while most of what has been discussed in this chapter has focused on immediate responses to an emergency or a disaster, current thinking in the field advocates far better linkages between immediate relief and longer-term development. This acknowledges that the repercussions of a disaster or emergency can go on for many years, or in the case of places such as Bangladesh, are recurring; therefore agencies need to take this into account in planning interventions and activities. Strengthening infrastructure and creating sustainability and capacity are vital to ensure future growth and development. It must also be remembered that the nature of any type of intervention is as political as the initial “cause” of the crisis.

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Chapter 5

The Players: Private Military and Security Companies (PMSCs) in the Humanitarian Space

James Grant

Abstract The change in the post-Cold War climate has seen states and international organisations turn to the private sector for services which were traditionally considered the reserve of the armed forces and the state, i.e. military- and security-related tasks often involving the application of lethal force. It is now widespread practice for non-governmental organisations (NGOs) and international organisations to use private companies for security and logistical support. Of importance is the claim that the new PMSC approach represents a new paradigm, which has irrevocably changed the wider international context. This account neither admonishes nor encourages the new PMSC paradigm but recognises that these actors are present in the humanitarian space and that those working in this sphere must understand the drivers and motivations of such companies.

Keywords Humanitarian agencies and organizations • Reforms • United Nations • Cluster approach • Private military and security companies • PMSCs • Regulation • Account Holding • Rights • Accountability • International Court

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Objectives

- To provide historical background to the new PMC concept and why a need for them has evolved and how they interact within the humanitarian sphere
- To discuss the spectrum of activity whilst at the same time providing definitions of different types of organisations acting within the spectrum
- To detail the rules of engagement and regulatory legislation in place (or in evolution)
- To summarise the current position of the industry and attempt to speculate on the future of the industry

Introduction

The change in the post-Cold War climate has seen states and international organisations turn to the private sector for services which were traditionally considered the reserve of the armed forces and the state, i.e. military- and security-related tasks often involving the application of lethal force [1]. It is now widespread practice for non-governmental organisations (NGOs) and international organisations to use private companies for security and logistical support. Of importance is the claim that the new PMSC approach represents a new paradigm, which has irrevocably changed the wider international context. This account neither admonishes nor encourages the new PMSC paradigm but recognises that these actors are present in the humanitarian space and that those working in this sphere must understand the drivers and motivations of such companies.

The extent of the private military industry is staggering, having grown from \$55.6 billion worldwide in 1990 to an estimated \$210 billion in 2010 [2]. It should also be understood that professional military organisations are an age-old creation [3]. Primarily war-fighting corporate entities, such as the now defunct Executive Outcomes, which operated in Sierra Leone and Angola, should not be taken as the benchmark of the new brand of PMCs. The vast majority of the work of these new companies resides in logistical support and the provision of training packages. There are, however, still examples of traditional mercenary activity. There have also been examples of unacceptable conduct, such as the 2007 involvement of Blackwater contractors in the shooting of 17 Iraqi nationals in alleged Nisour Square, Baghdad.¹

The United Nations has attempted to chart this new trend in mercenary soldiering. In one of the earlier reports to the United Nations High Commission for Refugees (UNHCR), it was noted there was a clear difference in the way that mercenaries were working. The new trend appeared to move away from small bands of men fighting for profit towards a more organised, professionally run, almost

¹Jenkins [4]. At the time of writing the case is still being heard in the US Federal Criminal Court.

“corporate” approach to soldiering.² It is this arrangement which signified the development of the private military sphere.

The major problem that many observers have with the rise in private military enterprise rests on two major concerns. The first is that private companies are undertaking tasks that they believe should be performed by the armed forces of a state and, secondly, it is the nature of that enterprise which provokes strong response. Private military companies, by their very nature, benefit from war and suffering [6]. Indeed, do the contractual obligations of the company tally with the obligations of actors in the international system?

Acquiring information from private military contractors can be difficult. In general it is this author’s belief that secrecy and reluctance to divulge information is due to concerns about operational security and effectiveness and not as a consequence of an attempt to hide from regulation or oversight. Furthermore, many commentators have pointed out that private concerns in failed states employ considerable numbers of the local population in a vast spectrum of tasks, which in itself makes a contribution to nation building and civilian empowerment, thus conferring a tangible humanitarian benefit. The conflicts now engaged in are different in that they often require bespoke packages that PMCs can deploy at a moment’s notice, free of the time constraints of official military bureaucracy, together with having a significant “hearts and minds” component which may be best served by employing local nationals as part of the implementation process.

The following chapter will give some historical background to the new PMC concept and why a need for them has evolved and how they interact within the humanitarian sphere. It will then discuss the spectrum of activity whilst at the same time providing definitions of different types of organisations acting within the spectrum. A section will follow detailing rules of engagement and regulatory legislation in place (or in evolution) before closing with a summary of the current position and an attempt to speculate on the future of the industry.

Historical Background

Mercenarism is as old as time itself. The suggestion that it started in Africa in the 1960s as a form of postcolonial opportunism on the part of unscrupulous individuals in search of riches is incorrect. The creation of modern standing armies is a contemporary practice, and up until the nineteenth century, military commanders preferred to use professional mercenary soldiers. Standing military forces are also very expensive.

When one thinks of mercenary soldiers, the immediate image is of the “Dogs of War” mercenary figure operating illicitly in central Africa in the 1960s and 1970s.

²United Nations [5]. The document contains details of hired soldiers involved in conflicts in a variety of locations including Armenia, Azerbaijan, Tajikistan, Afghanistan, Angola, Rwanda, Zaire and the Former Republic of Yugoslavia to name but a few.

However, it is a more recent brand of corporate military soldiering in the 1990s, one in Africa and the other in the former Republic of Yugoslavia, which serves to give a clear indication of the early history of this new epoch.

Case Studies

Executive Outcomes (EO) in Angola and Sierra Leone

EO's activities in Africa provided cause for concern and recrimination in some quarters. The most contentious point was the direct involvement of EO operatives in support of combat operations, together with the alleged intricate connection between the military side of the business and wider corporate interests in the energy and mineral extraction industries. The most serious accusation levelled against EO was that it had been paid for its services in Angola and Sierra Leone by the granting of mineral extraction concessions in lieu of financial remuneration.

EO represented a demobilised army for hire owing much of its operational effectiveness to the common heritage of many of its employees from their time in the SADF and other Special Forces Units. It did not serve as a proxy for government aims abroad and had been shown to be an effective provider, if not sustainer, of security. With complicated corporate links leading back to the Branch-Heritage Group of Tony Buckingham and indirectly to Sandline International, the company was formed by Eeben Barlow of the 32nd Battalion.³ The award of a \$60 million contract to EO to protect the Canfunfo diamond mine in Lunda Norte, Angola, reflects the huge influence that a PMC can have in the affairs of a weak state. It is certainly the case that the victory over UNITA, with the subsequent ending of the 3-year civil war and signing of the Lusaka Protocol in November 1994, would not have happened without the input of EO in Angola [7]. Subsequently, EO was contracted by the Angolan MPLA government in May 1995 to train the FAA following the success of the company in retaking the Soya coastal oil centre from UNITA rebels.⁴ Once the situation in Angola had stabilised, two companies, Saracen Security and Lifeguard Security, respectively, provided security arrangements for Branch Energy-run enterprises.

Many of the former soldiers who worked for EO whilst contracted to the MPLA against UNITA had been members of the South African Special Forces, most notably the 32nd Battalion, who had been heavily involved in the destabilisation policies of the pre-Apartheid regime and had fought with UNITA against the Marxist

³ A unit of the South African Defence Force responsible for commando-type operations throughout southern Africa, destabilising operations and the intimidation of anti-Apartheid campaigners.

⁴ Executive Outcomes first became involved in Angola in March 1993 when it assembled a force of 50 men to free an Angolan mine from UNITA. Against the background of this success, in September EO negotiated what is reported to have been a \$40 million contract to protect a diamond mine in Canfunfo, Lunda Norte.

regime. Nic Van Den Bergh took over as CEO of EO in 1997, largely in an attempt to enhance the corporate military profile of the company and distance the company from an association with political intimidation.

Further to the activities in Angola, EO became involved in Sierra Leone. EO was contracted by the Sierra Leone government to intervene in the civil war. Unable to pay for the military services provided by EO, it is alleged payment came in the form of mineral concessions awarded to the Branch Heritage Energy Group, allowing them to run the recently retaken mines. Whilst the Sierra Leone government retained a 60 % stake in the wider Koidu diamond field, the concern was that the government was mortgaging away its future, allowing a foreign company to retain a huge stake in the political economy of the nation. It was commented that if EO continued to expand its operations in Africa, “its influence in sub-Saharan Africa could become crucial”.⁵

EO changed the course of the war, forced the RUF to negotiate and thus enabled the government in Freetown to hold elections and return one million refugees to their homes in previously war-torn areas. These African situations are unique in that foreign individuals have successfully created a situation in which recalcitrant parties have been forced to the negotiating table by coercive means. The concern is that a peace achieved in such a manner is rarely sustainable should the conditions that created that arrangement disappear.

Commenting on PMC involvement in Sierra Leone, William Shawcross felt that the activities of EO produced real advantage and saw a wider role for privatised military assistance. In his study of UN peacekeeping, he writes “By defending the Kono area, EO had enabled 300,000 people to get on with their lives...Had EO been more widely deployed...they could have saved dozens around Bo...It seemed to me that, under proper control, private armies such as EO could play an increasingly useful role” [8].

Military Professional Resources Incorporated (MPRI) in the Former Republic of Yugoslavia

In contrast to EO, MPRI is a company that claims to provide training only and has no combat arm to speak of, with the implication that it is only interested in the pre- or post-conflict aspects of military provision. MPRI was established in 1987 and is said to have been founded by retired US Army General Vernon Lewis. At the forefront of the MPRI ethos was the recognition that, with the downsizing of the US military, there were a number of areas where military assistance was clearly required. It is this demand for military provider firms that MPRI has tapped so effectively by capitalising on a strong US military corporate image.

⁵Deen. “On present showing, EO will become even richer and more potent, capable of exercising real power, even to the extent of keeping military regimes in being”. Inter Press Service, 1997. In effect, this never happened as EO was curbed by the legislation brought into force in South Africa.

The company has succeeded in securing contracts for a variety of ventures traditionally administered by the US military such as the introduction of new equipment and the administration of training establishments.⁶ Much of MPRI's work centres around training, such as the provision of war-gaming and battle group and brigade-level military strategic training with a focus on command and control. It is the extent of the company's activities in the former Republic of Yugoslavia which have received most attention.

Prior to the signing of the November 1995 Dayton Accords, it was the award of a contract to modernise the Croatian military in preparation for NATO membership that confirmed MPRI's influence abroad [10]. MPRI implemented the "Long-Range Management Program" and the "Democracy Transition Program", and it is the influence of these training packages on the success of the Croatian military in the August 1995 offensive against Serbian forces in the form of Operation Storm that has proved to be such a contentious issue. The implications of the assistance given to the Croatian Army in the planning and execution of Operation Storm to clear Serbian forces from the Krajina are of great significance. The use of typically combined-arm tactics allowed the Croatian Army to displace 120,000 Serbs from the region, leaving hundreds of civilians dead. With US forces absent in the region at the time, it has been suggested that such a spectacular success could not have been achieved without the provision of US-style military know-how on the ground at the time. MPRI has always denied a direct operational link. In the aftermath of company involvement in the affairs of the Croatian military, MPRI was awarded a more outwardly combat-oriented contract to train the army of the Muslim-Croat federation in 1995 in the form of the "Train and Equip Program" [11]. This involved the supply of \$100 million worth of surplus military equipment, together with extensive war-gaming and command and control assets, for the Bosnian military.⁷

Although opposed by European countries including the UK, the training package became a condition of Muslim agreement at the Dayton Accords. The terms of the contract are confidential, but it is rumoured to have finished on October 1998. It has been suggested that the "Train and Equip Program" represents a chance to ensure that a military balance exists in the Balkans between the Croatian and Bosnian forces on the one hand and the Serbs on the other. This outcome would suggest that the activities of a US company have reconfigured Balkan politics. Depending on how one interprets the extent of US assistance on the ground, it is clear that at one extreme, we have the US heavily influencing Balkan order, and at the other, we have private citizens enacting US foreign policy. The question remains as to whether it is to the advantage or detriment of those in the Balkans now or in the future. Clearly, the extension of US foreign policy without the commitment of US ground troops suggests a significant sea change. As one State Department official commented, MPRI's presence "supports US policy with someone else's money" [13].

⁶Harris [9]. MPRI was awarded the contract to introduce the M2/M3 Bradley fighting vehicle to the National Guard and is responsible for the administration of the University Reserve Officer Training Corps.

⁷Located at Hadzici, west of Sarajevo, central Bosnia.

The practice of outsourcing has become quite firmly entrenched in some quarters. In 1998 in Kosovo, whilst other European member states sent military staff as part of the verification mission to observe Serbian military activity, the USA contracted Dyncorp to fulfil its tasks [14]. The question is whether these conventionally military tasks are appropriate to be carried out by a private company.

Definitions, Classification and Extent of Activity

Current definitions relate to mercenaries but classification of the new PMSCs remains in evolution. There will follow a summary of the current legal definitions of a mercenary activity, some of the emerging definitions of the new PMC/PSC concept, together with examples of the extent of private military activity.

Definitions

Article 47 of the Geneva Convention

A mercenary is defined under *Article 47 of the Geneva Convention*⁸ as one who *satisfies all* of the following criteria:

- (a) Is specifically recruited locally or abroad to fight in an armed conflict
- (b) Does, in fact, take direct part in the hostilities
- (c) Is motivated to take part in the hostilities essentially by the desire for private gain and, in fact, is promised, by or on behalf of a party to the conflict, material compensation in excess of that promised or paid to the combatants of similar ranks and functions in the armed forces of that party
- (d) Is neither a national of the party to the conflict nor a resident of territory controlled by a party to the conflict
- (e) Is not a member of the armed forces of a party to the conflict
- (f) Has not been sent by a state which is not a party to the conflict on official duty as a member of the armed forces

The difficulty with this definition, in which each of these criteria has to be met, is that the definition of mercenary becomes exceptionally narrow. Individuals have in the past taken the step to register as temporary citizens of the country or the state that they are working for as a means of bypassing some of the criteria required to define them as a mercenary. An example of this was the appointment of Sandline International operatives as special constables in Papua New Guinea in 1997, in effect making them agents of the state.

⁸ Article 47 of the 1977 First Additional Protocol to the Geneva Conventions of 12th August 1949. This at present represents the UN definition of a mercenary.

Organisation for African Unity Definition

Attempts have been made to define mercenary activity in a way that is less narrow than the criteria used by the Geneva Protocol. The *Organisation for African Unity* (OAU) in its Convention for the Elimination of Mercenarism in Africa attempts to define a mercenary “as anyone who is not a national of the state against which his actions are directed” is employed, enrolls or links himself willingly to a person, group or organisation whose aim is:

- (a) To overthrow by force of arms or by any other means, the government of that Member State of the OAU
- (b) To undermine the independence, territorial integrity or normal working institutions of the said State
- (c) To block by any means the activities of any liberation movement recognised by the OAU”⁹

As such the OAU definition defines mercenarism rather than who a mercenary is. However, the final point in the OAU definition indicates that a further problem with legislative control is that the rules are often drafted specifically to suit the requirements of the authors or certain organisations rather than introducing a set of unbiased guidelines.

1989 International Convention Against the Recruitment, Use, Financing and Training of Mercenaries

The third important piece of legislation is the *1989 International Convention Against the Recruitment, Use, Financing and Training of Mercenaries*.¹⁰ It does not ban mercenaries, only their activities that undermine the state. In this context there is also real confusion about the status of the new PMC contractors and the point at which international law takes over from domestic legislation to assert the rule of law upon them. Common Article 3 of the Geneva Convention refers both to civil and internal conflict and is binding for all countries and individuals, whether they be enlisted in the armies of the state or employed in a mercenary/PMC capacity. It should also be noted that mercenary forces, if contracted to the government of the state, are thus state actors and are answerable for excesses under UN human-rights conventions. If the individual is not contracted to the government, acts as a terrorist

⁹The only enforceable international legal instrument on mercenaries is the OAU’s Convention for the Elimination of Mercenaries in Africa which was signed by the member states in 1977 and came into force in 1985. The 1972 organisation of African Unity Convention for the Elimination of Mercenaries represented the first attempt to establish a definition in the context of international law. It does not include any mention of PMCs or PSCs.

¹⁰This international convention requires 22 signatories for ratification. It was finally ratified on 20th October 2001 when Costa Rica became the 20-s signatory. The British government has not signed, claiming that the form of the Convention does not provide the means for a successful prosecution under international law.

or fights as a rebel, then they are subject to the domestic legislation of the country in which they operate. As far as customary international law is concerned, they are entitled to treatment as prisoners of war. The difficulty, as Zarate points out, is that customary international law pertains to the individual and not to a company [15].

PMSC Spectrum Definitions

A variety of activities in which these new companies engage struggle to be defined under the traditional mercenary label. Rather than direct involvement in direct combat operations, these tasks more commonly include the provision of advice and training packages, the training of local police forces, logistical support, specialist advice with demining and monitoring roles in peace keeping, together with specialist security provision, and close protection capabilities. Indeed it is the NGOs and international organisations, often so critical of mercenary activity, that have employed such companies. Perhaps the most useful appraisal of the situation came from *Ortiz* when he placed different well-known companies at different points in a spectrum of activity. He describes companies that act variously to quell a rebellion or restore a deposed government to power (Sandline International in Papua New Guinea), those that raise and maintain a degree of internal stability in conflict regions (Executive Outcomes in Angola and Sierra Leone), those that upgrade to western standards indigenous military and security apparatuses (MPRI in the Balkans) and those that coordinate countrywide security operations for companies investing in unstable countries (Aegis Defence Systems for the US government in Iraq since mid-2004). Furthermore, firms such as Kellogg, Brown and Root provide wide-ranging supportive and logistic services such as laundry, transport and operating base maintenance contracts [16].

A further difficulty in classification emerges when one considers the training packages provided with legitimate arms sales (a training and maintenance package often accompanies the weapons and aircraft themselves) and the services of PSCs. The supply of pilots and personnel, who instruct and maintain the equipment, respectively, may well lead to a situation where those personnel may be called on to assist in the prosecution of offensive operations. The employment of PSCs in certain countries is obligatory if a commercial enterprise wishes to invest in that country. A problem emerges if the PSC becomes involved in intelligence gathering and indigenous police force training, activities which often coexist with conventional security tasks. The delineation of military and security activity subsequently becomes very difficult.

With this newly recognised spectrum of activity, there have been attempts to define the new PMSCs within a spectrum that also defines conventional mercenarism. *Isenberg* breaks mercenaries down into *four separate groups*, these being those who fight anywhere in the traditional sense for money or adventure, those who work for a specific host government and in a specific region, those classified as transnational ideological groups (such as the foreign fighters in Afghanistan during

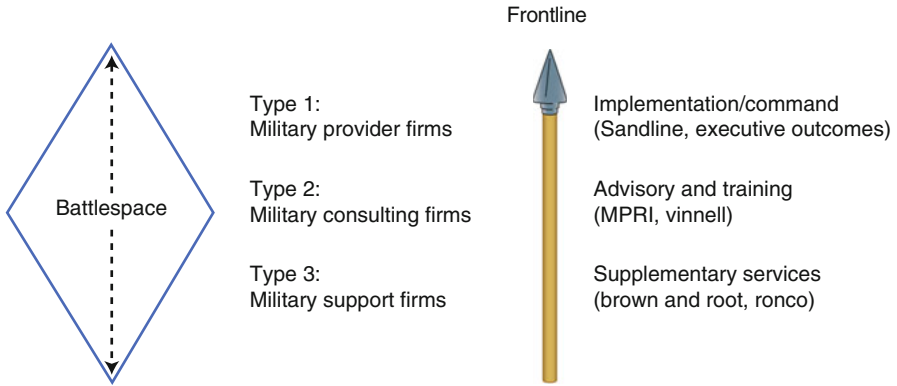


Fig. 5.1 The tip of the spear typology. PMFs distinguished by range of services and force levels (Modified with permission from Singer [38])

the 1980s) and finally those who organise themselves into what we now understand to be a corporate PMC structure [17]. Later, *Adams* postulated that there are three types of mercenary: the “traditional” type that is directly involved in combat or immediate combat support, those that operate within a corporate structure and with the ability to project the sort of organisation expected of a staff-corps in a modern western military with a variety of subcontractors available to them and a third group that provides highly specialised military services [18].

The modes of classification have further developed with *Singer* splitting the industry into three types of firm depending on range of services available and the degree of force used, together with a consideration of the nature of outsourcing. His classification defines firms as military providers (e.g. EO), military consulting firms (e.g. MPRI) and military support firms (e.g. KBR). See Fig. 5.1.

Further authors have looked at classification *according to contract* (*Avant*) or by type of industry (*Brooks*). In particular, *Brooks* brackets according to whether a company acts as a PMC (strategic security, e.g. Dyncorp, MPRI), PSCs (tactical security, e.g. Blackwater USA (now Xe) and ArmorGroup) and nonlethal service providers (e.g. KBR). It is this author’s belief that it is more instructive to classify according to activity rather than as a mercenary or PMSC.

A useful *working definition* is as follows:

- Private military companies (PMCs) – corporate entities providing offensive services designed to have a military impact in a given situation that are generally contracted by governments
- Private security companies (PSCs) – corporate entities providing defensive services to protect individuals and property, frequently used by multinational companies in the extractive sector, humanitarian agencies and individuals in situations of conflict or instability¹¹

¹¹ Makki et al. [19]. This does not appear to take any account of more sophisticated classifications such as *Singer*’s combat, support, provider model. See *Singer* [6].

Also worth considering are the other actors who have historically been involved as humanitarians in conflict regions. Medical services have been provided by companies often employing experienced ex-military medical staff, such as Medical Support Solutions, Frontier Medical or Prometheus Medical, the last of which typically employs medical staff with experience of supporting Special Forces personnel. Trained dog handlers (Chilport) and demining companies (EOD Technology, Ronco Consulting Corporation) similarly provide a substantial humanitarian effect in post-conflict situations. Finally, companies with the ability to mount counter piracy operations, such as Background Asia Solutions are becoming widely employed in the Horn of Africa.

Extent of PMC Activity in Iraq and Afghanistan

The activities of *PMCs in Iraq* have been truly illustrative in demonstrating the new nature of the industry. As Poole commented in 2004, the second largest foreign contingent in Iraq was not from British forces but from that provided by 20,000 PSC and PMC personnel operating in a variety of roles.¹² Since 2003, military companies and security consultants have guarded civilian buildings and telecommunications workers throughout Iraq, whilst the shattered infrastructure of Iraq was rebuilt after the official end of hostilities, together with guarding supply convoys and performing routine base functions such as maintenance, laundry services and electrical maintenance [21]. Blackwater was given the contract to guard provincial outposts of the Iraqi Coalition Provisional Authority and its leader, Paul Bremner. Dyncorp had a contract worth tens of millions of dollars to train an Iraqi police force. The British private security industry was estimated to be making in excess of \$1 billion in post-war Iraq.¹³ It has also been estimated that of the \$18.6 billion (£10 billion) earmarked by the US Congress for regeneration of Iraq, 15 % was being spent on contracts for private military firms. With the US drawdown in Iraq following the 2007 surge, the US State Dept. plans to increase the number of private guards protecting civilian employees to 7,000 [23]. It is worth considering, as Ortiz points out, that the companies and their contracts will continue to evolve as the security situation changes, with firms changing as a result of company mergers and capabilities acquired. By way of example, in 1997 Armor Holdings acquired Defence Systems Ltd to create ArmorGroup, thus developing a wider portfolio of

¹²Poole [20]. In 2004, there were 30 PMCs/PSCs operating in Iraq providing 20,000 employees to satisfy 3,000 contracts awarded by the Pentagon. The rate of growth is significant. By December 2003, there were a reported 10,000 private military contractors on the ground. Compared with the 1991 Gulf War, there has been a tenfold increase in the number of operatives working. See Traynor [29]. However, evidence given to the Foreign Affairs Select Committee Inquiry suggested that only six or so PMCs were based in Great Britain

¹³David Claridge [22]. It has been suggested that prior to the campaign in Iraq, the British PMC / PSC industry made \$200 million but after the end of the war the industry was making more than \$1 billion, making it Britain's leading export to post-war Iraq.

capabilities. Subsequently yesterday’s security firm can metamorphose into tomorrow’s military provider firm, thus making classification and regulation even more problematic.

These examples of company metamorphosis further hint at one of the inherent features of any private security company which is that many of their employees are former servicemen trained in the prosecution of lethal force, which subsequently engenders a company with the means to theoretically stop acting in a *passive* security manner and switch to a more *active* stance more consistent with the military provider firms of Singer’s classification. Ortiz succinctly describes the private military and security industry in Iraq and Afghanistan by saying that many firms operate in a hybrid manner providing a changing portfolio of services according to the demands of the security situation on the ground at the time. Figure 5.2 shows the spectrum of contractor activity in Iraq as of March 2011.

The scope of *PMC activity in Afghanistan* continues to grow with the Foreign and Commonwealth Office spending £29 million on PMSC contracts in Afghanistan. Similarly, the US DoD spent \$11.8 billion on PMSC contracts in the financial year ending 2010, representing 15 % of US defence spending for the region. Interestingly, as of March 2011 contractor personnel nearly equalled numbers of uniformed personnel, reflecting the US reliance on contractors for the current campaign [24]. Table 5.1 shows the proportion of contractors involved in sustaining military operations in the Balkans, Iraq and Afghanistan, and Fig. 5.3 shows the trend in troop vs. contractor numbers in Afghanistan.

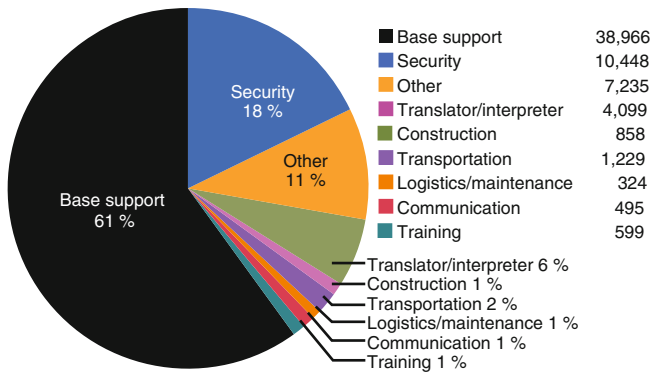


Fig. 5.2 Contractor personnel in Iraq by type of service provided (as of March 2011). Notes: Numbers may vary slightly from data in other sections of the report due to differences in the points in time when data was gathered. The Department of Defence did not separately track Logistics/Maintenance or Training until the first quarter of 2010 (Source: DOD US CENTCOM 2nd Quarter FY2011 Contractor Census Report)

Table 5.1 Comparison of contractor personnel to troop levels (as of March 2011)

	Contractors	Troops	Ratio
Afghanistan only	90,339	99,800	0.91:1
Iraq only	64,253	45,660	1.41:1
CENTCOM AOR	173,644	214,000	0.81:1

Source: CENTCOM 2nd Quarter FY 2011 Contractor Census Report; Troop data from Joint Chiefs of Staff, “Boots on the Ground” January report to Congress

Notes: CENTCOM AOR includes figures for Afghanistan and Iraq. CENTCOM troop level adjusted by CRS to exclude troops deployed to non-central command locations (e.g. Djibouti, Philippines, Egypt). Troop levels for non-CENTCOM locations are from DMDC, DRS 11280, “Location Report” for June 2010”

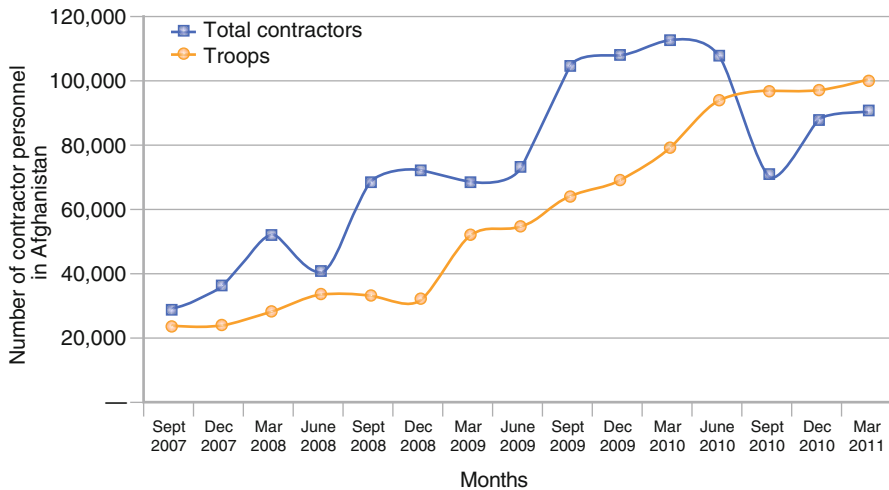


Fig. 5.3 Number of contractor personnel in Afghanistan vs. troop levels (Source: CENTCOM Quarterly Census Reports; *Troop Levels in the Afghan and Iraq Wars, FY2001-FY2012: Cost and Other Potential Issues* by Amy Belasco, Congressional Research Service; Joint Staff, Joint Chiefs of Staff, “Boots on the Ground” monthly reports to Congress)

Why Do We Need Them?

Why has private military provision flourished and what the drivers are for it? As mentioned previously, there has been a conscious move to subcontract many services previously undertaken by the military as a means of saving money. Financial concerns still predominate with a perception that instead of maintaining standard services in the military, it is cheaper and more effective to enlist contractors as the need arises. Another motivation has been the reluctance of politicians and their

voting public to see rising troop casualty numbers. Deaths of private contractors do not make headline news, and indeed casualty levels have been lower than they would have been had contractors not been used so widely in the campaigns in Iraq and Afghanistan [25, p. 2].

When one considers the strategic reasons for engaging in current conflicts, Shearer has commented that the “current debate on the nature and role of these companies is ... simplistic and obscures the strategic issues at stake”. He continues “western states have become reluctant to deploy forces in areas in which they have little direct strategic interest” [26]. This argument rang true for the Balkan and African conflicts which necessitated humanitarian involvement rather than the directly strategic and national security-driven campaign in Afghanistan. Two of the most prominent counter insurgency exponents in the US military point to some compelling reasons to outsource some military functions. Writing in 2009, General Ray Odierno commented “employment of Iraqis not only saves money but it also strengthens the Iraqi economy and helps eliminate the root causes of the insurgency – poverty and lack of economic opportunity”.¹⁴ Echoing this point, Commander ISAF Afghanistan General Patreus wrote in March 2011 “Hire Afghans first, buy Afghan products and build Afghan capacity”.¹⁵ These convincing arguments need to be tempered with a careful approach to hiring, particularly in Afghanistan that is sensitive to the needs of the local population and does not bring in individuals from different tribal areas, stimulating tribal or sectarian resentment at perceived favouritism towards certain tribal groups. It should be noted that this probably holds for the non-military provider support functions but may not be entirely relevant for private military provider firm-type direct combat functions.

What Are Their ROEs?

There have been a number of examples which illustrate the rules of engagement under which PMSCs work. In Iraq, British Global Risk Strategies were the first in Iraq to draw up strict rules of engagement with the governing Coalition Authority. Conversely, an example of poor professional conduct where rules of engagement were not followed correctly is the alleged involvement of the US-based Titan Corporation and CACI International Inc in supervising interrogations in the Abu Ghraib prison in Baghdad [27].

The overriding problem remains the extent to which PMSCs are allowed to prosecute lethal force. A variety of suggestions have been made. At one end of the spectrum, the least practical suggestion has been the banning of small arms use by private contractors, but this has been denounced as clearly unrealistic. Indeed some

¹⁴Odierno R. Memorandum “increased employment of Iraqi civilians through command contracts”. Multi-national force-Iraq. 31 Jan 2009. Cited in Schwartz and Swain [24].

¹⁵Patreus D. “COMISAF’s COIN contracting guidance”. ISAF/United States Forces – Afghanistan. 8 Sept 2010. Cited in Schwartz and Swain [24].

private security companies have called for an increase in the amount of firepower available to turn against their assailants [28]. The murder and mutilation of four Blackwater security employees on 31 March triggered the US offensive into the holy city of Fallujah and clearly confirms the need for these operatives to be able to defend themselves.

Attempts have been made by the US Department of Defence (DoD) to introduce draft regulations that bring the activities of PMCs in Iraq under the jurisdiction of military law.¹⁶ This has proved problematic when one considers that the PMC operatives are civilians outside the military chain of command but may well bear arms and prosecute military force. The alleged killing of 17 Iraqis by Blackwater employees in Sept 2007 has forced the US DoD to look closely at how such individuals might be prosecuted for such excesses. The situation is further complicated by the fact that uniformed operatives serving in US forces often have had little training or awareness of how to manage contractor personnel, reflecting a real risk that these organisations are neither controlled appropriately together with the contracting government not receiving value for money for the contract in place. The confusion is further highlighted by the fact that PMSCs working in a “defensive” capacity to supplement the activities of a conventional armed force are subject to a different set of rules of engagement compared to their uniformed colleagues. They further occupy an ambiguous position with regard to the Hague and Geneva Conventions with “less far-reaching liability” than professional soldiers of armed forces.

When a PSC becomes involved in a contact (i.e. is engaged with small arms or other munitions), it has to rely on the training and ingrained inclination of the ex-soldiers there. By the very nature of the soldiers’ training, they will work to liquidate the threat before them by moving to “close and destroy the enemy”. The implication is that any PSC operative involved within such a situation will then invariably be operating within the PMC role.¹⁷ As such any proposed regulatory framework has to include a *clause or caveat permitting such activity*. If this arrangement is formalised, then it does rather imply that all PSCs do in fact have the capability to evolve into PMCs as the situation demands.¹⁸ This inherent military instinct points to a further concern. PMCs, depending on their contract and remit, may have the “teeth” to quell an insurgency or bring recalcitrant parties to the negotiating table, but they are not designed to tackle the far-reaching and often time-consuming tasks required in the post-conflict situation. It could be suggested that they merely end the immediate problem that brought the need for intervention but do little to remedy the long-term failures in the fabric of a society. It is often the case that coun-

¹⁶D Leigh, *ibid*. It should be noted that some PMCs have reacted to this and are against such a move. For example, Chris Bertelli, a Washington lobbyist for Blackwater, has described the proposed action as unworkable.

¹⁷These views, concerning the transition from the PSC to the PMC role, were expressed by Duncan Boulevant, the Managing Director of Henderson Risks International in the Radio 4 broadcast, *File on Four*.

¹⁸Wilson [28]. One source quoted in the article who wished to remain anonymous said “Our job is to move people as quickly and safely as possible...we are not sending soldiers to fight in battles, we are sending civilians to provide a service for civilians”.

tries and governments in need would rather have a legitimate body such as the UN or the EU. But the restrictions of political rigmarole and operational imperatives intervene often making these organisations ineffective.¹⁹

Nonetheless the majority of these new PMCs, being populated by experienced military personnel, tend to work along prescribed military lines with clear rules about the prosecution of force, clear command structures, abilities to delegate responsibility effectively and limitations on the application of force. Apart from a few notable exceptions, they tend to run efficiently with an emphasis on professionalism and a wish to retain a good professional reputation which, in an unofficial way, serves to prevent excesses. The concern is that these implied, informal methods of control are not satisfactory in the absence of overarching legislation which should lay down clear rules of engagement and are not subject to international ratification in the event of transgression. What is clear is that rules of engagement tend to be created locally according to the perceived risks of the particular operation but there is not a clear set of international rules or regulations that govern what the company can and cannot do.

Regulation and Holding to Account

There is currently no overarching international agreement in place. The closest legislation regulating the industry comes in the form of the 2008 Montreux Document (commissioned by the Swiss government and the ICRC) which attempts to summarise all legislation in place at a national and international level and advocate best practice for the industry.²⁰ Legislation is an amalgam of national legislation and customary international law often ill defined to fit the new PMC industry and more focused on defining the outdated mercenary label. The core functions of the Montreux document are shown here:

- Recalls the pertinent international legal obligations of States, PMSCs and their personnel in situations of armed conflict
- Contains a compilation of good practices designed to help States take national measures to implement their obligations

¹⁹Becirbasic E. Bosnian military official involved in managing the Bosnian side of the MPRI “Equip and Train” program. “I had some problems with the American generals...I represent the national interest, but they’re businessmen. I would have preferred ...state organisations like NATO or the Organisation for Security and Cooperation in Europe. But we had no choice. We had to use MPRI”. Quoted in Traynor [29].

²⁰Montreux Document: A Swiss initiative that brought experts on the PMC industry together from 17 countries and set out a set of core responsibilities for Contracting, Territorial and Home states with regard to PMCs. It does not provide new legislation but clarifies existing domestic and international law for all parties involved with PMCs.

- Highlights the responsibilities of three types of States: Contracting States (countries that hire PMSCs), Territorial States (countries on whose territory PMSCs operate) and Home States (countries in which PMSCs are based)
- Makes it clear that States have an obligation to ensure respect for international humanitarian law and to uphold human rights law; as a result, they have a duty to take measures designed to prevent misconduct by PMSCs and ensure accountability for criminal behaviour
- Recalls that PMSCs and their personnel are bound by international humanitarian law and must respect its provisions at all times during armed conflict, regardless of their status
- Recalls that misconduct on the part of PMSCs and their personnel can trigger responsibility on two levels: first, the criminal responsibility of the perpetrators and their superiors and, second, the responsibility of the State that gave instructions for directing or controlling the misconduct
- Provides a toolkit for governments to establish effective oversight and control over PMSCs, for example, through contracts or licensing/authorisation systems

Most noteworthy are some of the following points regarding PMSCs, their status and their responsibilities.

Status of PMSC Personnel

International humanitarian law distinguishes between combatants and civilians.

Statement 24 explains that the status of PMSC personnel in armed conflicts is determined on a case-by-case basis. It cannot be said, for instance, that PMSC personnel are always combatants just because they carry weapons, nor can it be said that they are always civilians because they are not members of the armed forces. The status of PMSC personnel depends on the contract under which they are employed and on the services they provide. Personnel of PMSCs can be:

- *Civilians*: This is probably the case for the large majority of PMSC personnel. As such, they benefit from the protection afforded to civilians in situations of armed conflict (see explanatory comment on statement 25 below).
- *Civilians accompanying the armed forces in the meaning of Article 4A(4) of the Third Geneva Convention*: A category that only exists in international armed conflicts, which are rarer than non-international armed conflicts. To qualify, civilians must have a real link with, i.e. provide a service to the armed forces and not merely the State. This means that, for instance, contractors employed by civilian State authorities or by private companies do not fall into this category. The status of civilians accompanying the armed forces does not apply in non-international armed conflicts.
- *Members of the armed forces*: If they are formally incorporated into these forces. PMSCs usually work outside the chain of command and on a mandate basis only. They thus rarely qualify for this status. But if they do, they are bound not only by

international humanitarian law but, as State agents, also by human rights law (see explanatory comment on statement 26d below).

- *Militias or other volunteer corps belonging to a state party to an armed conflict* in the sense of Article 4A(2) of the Third Geneva Convention or Additional Protocol I. This is the case if, in a situation of international armed conflict, PMSCs constitute an organised armed group “belonging to” a party to the conflict and fulfil the four criteria defining that group: to be under responsible command, to have a distinctive fixed sign, to carry arms openly and to obey the laws and customs of war.

Protection of PMSC Personnel from Attack

Statement 25 explains that if PMSC personnel qualify as civilians (which they do in most cases), they may not be attacked. However, international humanitarian law provides that civilians lose their protection against attack if and for such time as they directly participate in hostilities.

Direct participation in hostilities is a rather complex term. Simply put, it means participation in combat operations or activities aimed at weakening the enemy’s military capacity and specifically meant to support one party to the conflict against the other. Guarding military bases against attacks from the enemy party, gathering tactical military intelligence and operating weapons systems in a combat operation are examples of direct participation in hostilities in which PMSC personnel may be involved.

Rights and Responsibilities of PMSC Personnel

Statement 26c explains that even if they are civilians, PMSC personnel are entitled to prisoner-of-war status when, in an international armed conflict, they are hired to work as “civilians accompanying the armed forces”. The armed forces should provide such civilians with identity cards identifying them as such.

One of the problems when attempting to formulate a framework of legislation is the sheer breadth and changing nature of activities that these companies are involved in. Current legislation is often tailored to suit the specific concerns of the drafting government or international body. However, there is often a degree of hypocrisy which emerges from some parties, who are advised to be revolted by the use of mercenary forces but frequently employ PSCs for protection, as do a number of the more prominent NGOs. There is a need to reconfigure a consistent legislative framework but also to reassess the position of such PSCs and PMCs with regard to various international organisations and NGOs.

To date, the Montreux Document represents the most comprehensive attempt to synergise all existing legislation pertaining to PMSCs. It is the product of legislation from a number of countries including the UK, the USA and South Africa. The

essential difficulty concerning any sound evaluation of private military companies is the failure to grapple with the evolution of the mercenary concept. Clearly a change in the conceptual framework has occurred.

British Regulation: The FCO, the Legg Inquiry and the House of Common Foreign Affairs Committee Inquiry into the Sandline Affair

The British approach to PMC regulation evolved from the findings of the February 1998 Legg and the 1999 House of Commons Select Committee Inquiries into the Sandline Affair.

The crux of the difficulties facing Sandline International following its intervention in Sierra Leone hinged on the Security Council Resolution 1132. This resolution pertained to an arms embargo against forces of the rebel junta which was later ratified by an Order-in-Council issued by the British Government. UN SCR 1132 expressed support for the efforts of the Economic Community of West African States (ECOWAS) to restore President Kabbah to power and placed an embargo on the supply of arms and support to the rebel junta in Freetown.²¹ Efforts to expel the junta and restore President Kabbah were the responsibility of ECOMOG, the military arm of ECOWAS, but it soon became clear that the Nigerian-led efforts were achieving little. The ambiguity was that, having attempted to assist the democratically elected President Kabbah and restore him to power, Sandline International was charged with having broken the embargo on arms and assistance, even though this pertained to the junta and not President Kabbah.

Following the findings of the 1999 House of Common Foreign Affairs Committee Inquiry into the Sandline Affair, in which it was recognised that there was a necessity for regulation of the expanding private military and private security sector, the British Government published the February 2002 Government Green Paper titled *Private Military Companies: Options for Regulation*.²² In a fair and balanced exploration of the burgeoning private military and security industry, The Green Paper sets out the following options for regulation:

- A ban on private military activity abroad
- A ban on recruitment for military activities abroad
- A licensing regime for military services
- Registration and notification
- A general licence for private military companies/private security companies
- Self-regulation: a voluntary code of conduct

²¹ UN SCR [30].

²² Official Report, published 2nd July, 2001. From the outset it is important to realise that the paper does not represent policy, but is intended as a consultative document designed to stimulate debate.

The British Government drive to regulate the industry has long been in evolution since 2002. As of April 2010 the FCO published “PMSCs: Summary of Public Consultation Working Group”. In this document it highlighted the stake holders involved in the process (NGOs and PMSCs, together with MoD, DfID and the Security Industry Authority (SIA)). The focus of their discussions has been to review a draft BAPSC code of conduct and attempt to harmonise it with the recommendations of the international Montreux Document. Currently, discussions centre on how to implement the regulatory process, who should perform such a process, the requirement for in theatre spot checks of PMSC activity and how such regulation should be paid for. A number of contractors have advocated an extension of the SIA’s Approved Contractor Scheme to be extended to PMSCs, but this may be constrained by the fact that the SIA’s remit does not extend outside the UK. It is forecasted that harmonisation of UK domestic legislation and the recommendations of the Montreux Document will not occur until at least 2012.²³

The difficulties of regulating such companies in the United Kingdom, let alone internationally, are substantial. The more obvious dilemmas are the cost of regulation imposed on the taxpayer,²⁴ the difficulties of collecting evidence of wrongdoing when many of these operations take place abroad and are outside the scope of British law and the difficulty faced if the activities of commercial military enterprise take place without contract to the host government of the nation.

US Government

The DoD uses a variety of mechanisms to track and regulate contractor activity. Legislation and hearings take place via the National Defence Authorization Act (NDAA) of the US Congress and have involved attempts to gather census data of how many contractors are working in Afghanistan and Iraq, and aim to centralize contracting support and management data (by implementing the Synchronized Pre-deployment and Operation Tracker (SPOT) programme started in January 2007), together with the creation of a Joint Contracting Command [31]. There have also been attempts to train uniformed personnel in the management of contractors. Most notably in 2008 and 2009 Congress via the NDAA imposed regulations governing the screening, equipping and management of PMSCs in combat operations.²⁵ There have also been steps to ensure that the taxpayer gets value for money and that appropriate oversight of contracting services is undertaken by way of the Commission on Wartime Contracting.²⁶

²³Private military and security companies (PMSCs): summary of public consultation working group, foreign and commonwealth office. April 2010.

²⁴By way of comparison the UN Observer mission in Angola cost approximately \$1 million per day in 1997.

²⁵P.L. 110–181, sec 862. Cited in Schwartz and Swain [24].

²⁶P.L 110–118, sec 841. Cited in Schwartz and Swain [24].

A difficult issue has been on how foreign nationals bring cases of alleged criminality or human rights violations against contractors. In many of the countries where PMCs operate, the civil infrastructure is shattered or under reconstruction. In Iraq, for example, legislation governing contractors has been pending since 2008 with no clear domestic legal framework [32]. In the absence of a functioning domestic judiciary, in the USA the Alien Tort Claims Act (ATCA) allows claims to be brought by foreign nationals but does not include criminal liability. Furthermore, no cases brought to court via the ATCA have found in favour of the prosecution. In two cases brought against contractors involved in the Abu Ghraib prisoner abuse scandal, the court found that a “battlefield pre-emption” granting immunity extended to the contractors as well as soldiers [25]. Convictions for the 2007 Nisour Square shootings in Baghdad are still pending. Furthermore there exists a 2009 Status of Forces Agreement between Iraq and the USA which contains a provision removing the immunity of some foreign security contractors in Iraq, but it is not clear whether the removal of immunity covers all contractors and whether it is fully implemented in Iraqi courts [33].

Accountability and the International Criminal Court

The disjunction of military capability and state control makes regulation and accountability all the more important, particularly when one considers that those operating in PMCs abroad are not signatory to the Geneva Convention. At present, although individuals may be prosecuted by the International Criminal Court, the company does not come within the statute of the Court. What if a rogue PMC is contracted to a weak government that cannot control it? Regulation would aim to address this situation by limiting the governments for whom the company could be contracted. The difficulties of international regulation are compounded not only in the chaos of a war zone but also in view of the way in which certain PMCs, with their freelance employments tend to mutate according to the requirements of their changing contracts and commercial obligations. Of concern is the rogue PMC, who having failed to gain a license, then elects to work for an illegitimate government or rebel force.

It has been suggested that if employees transgress the rules of engagement, then they are subject to the same laws as all foreign troops. However, if problems emerge off duty, where the individual should be subject to domestic laws, then in a country with a poorly functioning civil judiciary, it is unlikely that any of these operatives could be effectively tried and prosecuted.

Whilst many of the larger PMCs insist that they will only work for legitimate elected governments, it is quite plausible that a weak government with an unsatisfactory human-rights record might enlist the assistance of a PMC. There are other wider concerns. It has been suggested that the presence of a fragile, coercively introduced security to a country following the intervention of a PMC has the effect of lulling the international community into obviating the need to address the

underlying causes of instability [34]. It has been contested that this stores up problems for the future instead of sorting them out prior to the departure of the PMC.

What Is the Future? Fewer Soldiers and More PMC/PSC to Take Over as Future Combatants?

When the control of non-state violence becomes more and more tenuous, the activities of PMSCs can become a matter of great concern. It is not inconceivable that a situation could arise where corporations could command forces that threaten states. We have only to look at the influence that organisations such as the East India Company exerted to understand that it is not unwise to wish to regulate the activities of individuals and companies operating in the private military and security spheres. A further concern is the after effect of specialised military training to potential destabilising influences and the accumulation of military expertise in the hands of transnational actors.²⁷

The use of the term mercenary promotes moral indignation and is not helpful. It would be better to ensure that appropriate scrutiny is focused on PMSC activities. If it is the case that contracts have been scrutinised appropriately and are seen to obviate the concerns of human rights groups, then this represents an ideal form of regulation, where opacity in the dealings of a company and no governmental policy objections are taken as the “gold standard” for sound business practice overseas. It should also be noted that the ability to generate a force when required for a specific task rather than having to maintain a peacetime standing force has obvious financial advantages, particularly in our recent times of government deficit and given the drive to outsource many costly services.

Many advocates an engagement with PMCs as a means of further and proper regulation. But the situation continues to change. The globalised, Internet-driven world in which we live has altered many of the conventional security concerns that used to plague military and political minds alike. The PMC sector has attempted to engage with these.

It is hoped that this chapter has highlighted the changing nature of the multifaceted industry that now characterises private military provision.²⁸ From the outset, it is clear that PMSC activities in post-Saddam Iraq and latterly in Afghanistan represent an exponential rise in industry activity and organisation not seen since the days

²⁷During the 1980s, extensive US and British efforts were made to train the Mujahedeen in their war against the Soviets. The consequence, following Russian withdrawal, was the creation of a demobilised, highly politicised military clique, many of whom went onto fight for the Taliban regime or international Islamicist terror groups. See Rashid [35].

²⁸The approach to classification is illustrative in itself. In 1997 David Isenberg published *Soldiers of Fortune Ltd: Profile of Today's Private Sector Corporate Mercenary Firms*. In 2003 P W Singer published *Corporate Warriors: The Rise of the Privatized Military Industry*. Whether greater respectability is implied by the differences in titles remains contentious.

of the East India Company. Anyone deployed on a humanitarian mission in these areas needs to understand who these companies are and what they do. The amalgamation of existing legislation under one umbrella in the form of the ICRC's Montreux Document represents a helpful aid to understanding these companies.

It is important not to lose the advantages that some PMSCs provide in terms of speed of response and logistical capability. The danger in disengaging with PMSCs is that there is often a need to bring about a coercive end to hostilities among warring factions.²⁹ The elimination of such a capability compromises many of the advantages that distinguish PMSCs from the UN and NATO. In addition, one should realise that the need for official military intervention is increasing, whilst the capacity to provide it is on the wane and that other opportunities and options need to be engaged if not condoned.³⁰

A variety of questions will continue to trouble the industry. What constitutes a legitimate company? Who decides what represents a legitimate host country to work for? Are the means available to adequately police the industry? Furthermore, as commented in the foreword to the Montreux Document "...PMSCs are viewed in some quarters now as an indispensable ingredient of military undertakings". It is now time to engage and regulate them in an open way so that they may be used beneficially, with the potential for real possible humanitarian advantage.

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²⁹ Shearer [36] refers in particular to Christopher Clapham's categories of insurgency which delineate the main driving forces behind civil wars and conflicts. The categories are warlord insurgencies, liberation movements, separatist insurgencies and reform insurgencies. See Clapham [37].

³⁰ Foreword by the secretary of state for foreign and commonwealth affairs. *PMCs: Options for Regulation*. February 2002.

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Chapter 6

Medical Ethics in Disasters

Edmund G. Howe

Abstract Disasters frequently create demands that outstrip available existing medical and societal resources. This may be particularly problematic for giving medical care, because disasters may destroy the infrastructures necessary to both provide patients care and keep new health problems from emerging. Disaster may, for example, not only strike care providers and hospital facilities directly; they may decimate communities' capacities to provide food to the population and carry out critical waste disposal services. All these effects may be most important to policy-makers and care providers deciding triage priorities during disasters. Referring to just these two examples, food and waste disposal services, for instance, care providers should treat first not only other care providers, who can, then, take care of others, but food preparers and waste disposal personnel, likewise, to save the most lives. These two examples are just a few among many that warrant priority for this same reason.

Keywords Medical ethics • Values • Moral principles • Ethics of care • Psychological considerations • Allocation of resources • Triage • Tiering

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Objectives

- To outline the ethical issues that may arise during disasters at both the policy and clinical levels.
- Frameworks and values will be discussed, including the limitations of ethical analysis.
- There will be a focus on allocation of resources, psychological reactions of both patients and providers, and practical implications for policymakers and practitioners.

Introduction

Disasters frequently create demands that outstrip available existing medical and societal resources. This may be particularly problematic for giving medical care, because disasters may destroy the infrastructures necessary to both provide patients care and keep new health problems from emerging. Disaster may, for example, not only strike care providers and hospital facilities directly; they may decimate communities' capacities to provide food to the population and carry out critical waste disposal services. All these effects may be most important to policymakers and care providers deciding triage priorities during disasters. Referring to just these two examples, food and waste disposal services, for instance, care providers should treat first not only other care providers, who can, then, take care of others, but food preparers and waste disposal personnel, likewise, to save the most lives. These two examples are just a few among many that warrant priority for this same reason.

This ethical question, whom care providers should first treat, is, perhaps, the most profound and controversial ethical question that disasters may pose. Disasters vary, of course, widely. They include pandemics; natural disasters, such as earthquakes, hurricanes, and floods; and nuclear accidents. Each kind of disaster raises different ethical issues. Yet, many remain common to all.

This discussion will focus on these common ethical issues. It will use infectious disease as the principal paradigm representing other disasters. The use of this disaster as a paradigm may be particularly useful, because, with infectious diseases, new ethical problems may arise at different stages, over time. For instance, during pandemics, a first task may be to identify people already infected or possibly infected and to then isolate them so that they do not pass on their virus to others. Next, contacts must be reached. All such patients must, of course, also, be treated, but the numbers infected may increase and, indeed, multiply every week.

The discussion that follows will outline ethical issues that can arise during disasters at both the policy and clinical levels. Initially, conflicting frameworks and values will be discussed. The limitations of ethical analysis in resolving these conflicts will then be presented.

Since, "the facts" are a first step in ethical analysis, possible psychological reactions of both patients and care providers during disasters will next be enumerated.

These reactions may vary and be quite uncertain. Both of these considerations may profoundly affect and, indeed, alter what policymakers and care providers should best do. One plan may be best “on paper”. If, though, in practice, this plan is impossible to implement due to, particularly, people’s emotional reactions, the best-laid plans may prove suboptimal.

Ethical concerns involving the allocation of limited resources, this most pressing of ethical issues, then, for all of the reasons stated previously, will be the focus of the following discussion. Specific issues addressed will include, also, the practice known as “tiering”, which occurs when more patients than are expected continue to “arrive” over time; a scheme, based especially on respecting peoples’ relations with each other, posed in New Zealand; and finally international obligations.

Practical implications for policymakers and clinicians, finally, will be discussed. It will be suggested that although several ethical considerations that arise during disasters remain controversial, other ethical guidelines, now developed, can be quite helpful.

Ethical Frameworks and Values

The foremost ethical issues posed by disasters involve triage and treatments, when resources are limited. The favoured values are utility and saving the greatest number of lives.

These decisions, in context, are, however, difficult and complex. In an outbreak of influenza, for instance, treatment may be most effective if given to patients within 48 h. If, then, this cut-off is used, this raises the question how this time of exposure should be determined.

Should care providers merely ask people? If they ask, people may lie. Parents, for example, having learned of this cut-off time “through the grapevine”, may say that their children have been exposed for less than this 2-day window in the hope that they will, then, be among those first treated.

A further, more self-evident ethical conundrum that may arise during disasters is the degree to which people should be given equal access to life-saving procedures. Patients may have emotional or physical conditions, already, for example, such that they need another person to help take care of them. A question raised in regard to these patients, then, is how, if at all, their dependency on this other person should be factored in, if it is factored in at all.

Moral Principles

Due to these people’s greater dependency, they require more resources. Thus, if they are treated equally, in theory, fewer lives could be saved. From a utilitarian standpoint, treating these people equally may, then, not be warranted. Yet, the principle of justice, in the sense of all people’s lives being equal, might require that

these patients be treated equally, even though this end result would most likely be nonutilitarian in its ultimate, net effect. The ethical principles of utility and justice may, then, here be in conflict.

As this example exemplifies, however, this use of justice is only one of the ways in which justice can be viewed and applied. Other equally valid meanings of justice are to help most those who are worst off and giving all an equal opportunity to live a full life. As will be discussed, this last application may support, rather than conflict with, the principle of utility. Ethical analysis may, then, serve to clarify the different ways “justice” can be applied during disasters. This may, in turn, help clarify what should be done.

Another value, preventing harm, may mean giving some resources during disasters to relieving patients’ suffering. Here, justice for those worst off might require providing some care to people greatly suffering, even though this might mean that some other patients, as a result, may die, when, otherwise, they might have lived. People unduly subject to suffering might be, for example, those who are bedridden and, thus, can’t be moved during disasters, but require ongoing analgesics for severe pain.

Another most difficult issue is how, if at all, treatment criteria should change if and when the number of people needing life-saving treatment greatly increases. This issue is the one referred to this as tiering.

Other additionally more problematic issues involve finding ways to communicate optimal advice and available resources as equally as possible among poorer persons, who may not have the same access to radios and televisions in some contexts and/or live in extremely rural settings. Still others involve limiting individuals’ freedoms, such as by restricting their freedom due to quarantines, contact tracing, and requiring the reporting of possible transmission of disease.

The Ethics of Care

A particularly heartfelt additional, ethical framework does not involve principles at all. Instead it primarily involves giving moral weight to people having and maintaining close, caring relationships with one another [1]. This perspective may be seen as including, during disasters, keeping people close to one another, as in the same family, together. Criteria for who is treated first during triage could, however, favour treating one family member, on utilitarian grounds, over another. Then, particularly, one family member may survive, when another may not.

This most excruciating ethical dilemma arose in one hospital, for example, after Hurricane Katrina. Due to the flooding that occurred around this hospital, only a few patients at a time could be rescued there by rescue boats.

Here, then, this other moral framework, the care perspective, might apply. Thus, these frameworks, themselves, in addition to different moral principles within the traditional framework using ethical principles, such as justice and utility, may conflict. This other framework, known as the Ethics of Care, may give greater moral weight to maintaining the relationships between these people by giving a parent and child or husband and wife, together, greater priority. Thus, in regard to the question,

who at a hospital “stranded” by a flood should be the first ones rescued, this different framework might give more priority to saving all one’s family members over applying usual more abstract ethical principles.

This second moral framework, the Care Perspective, also may apply more when care providers or others must decide when, if ever, they should put limited resources into relieving patients’ pain, as opposed to saving patients’ lives. Here, it is important to find some means of relieving patients’ pain, but, as just one example, sufficient numbers of care providers may no longer be available to both provide pain relief and give life-saving care.

As another example, further supplies of analgesics may no longer exist. Then, some care providers might, though, be willing to stay behind, as when others are being evacuated during a flood. They may, then, devote themselves to relieving the pain of these patients as best they can. Shalev has said, for instance, “When little can be done...., it is wise to reduce survivors’ loneliness” [2].

A related ethical question (which ethical analysis may be unable to resolve) is what care providers should do if a patient has severe pain they can’t relieve; he or she is expected to die, no matter what is or isn’t done; and he or she asks for active euthanasia [3, 4]. What, also, should they do if these patients have unbearable pain, but they aren’t competent? Or are children? And what if, in this last case, the child’s parents are present and plead with the care provider to relieve their child’s pain by ending the child’s lives? Should the parents requesting this make any difference?

Some of the strongest arguments, here, are self-evident. One value in regard to incompetent patients in extreme pain is, for example, justice: they should have equal access to obtaining pain relief. This application of justice may apply, even, or, perhaps, especially, if they are children [5]. Children may not understand what they are going through, for example, and may, as a result, suffer more. Moral arguments against these are that life is sacred and, in regard to competent adults versus other patients, that the former should have, at least, some autonomy to die as they want.

A consideration particularly complex is how much moral weight, if any, should be placed on these patients not understanding why they are in and/or being left in extreme pain. This lack of understanding could, on one hand, perhaps, be beneficial, because these patients wouldn’t know that their pain, short of death, might not be soon resolved. This same lack could, on the other hand, though, as already said, deprive them of the gains they could have from knowing why care providers can’t give them greater relief than they are.

How these many most difficult questions should be decided is itself, of course, also a critical question. A conventional approach and answer is that these decisions should be made by legislators since they represent the majority’s rule. Yet, ethically, this approach may, itself, be unacceptably problematic. This “majority” may be insufficiently aware of and/or responsive to the needs of the few. They may, therefore, be insufficiently sensitive to the needs of the “worst off” during disasters. These people may include those emotionally or physically ill or bedridden, as previously considered.

It may be that, in regard to how these decisions are made, then, in making these prior decisions, other approaches more likely to offset this risk should also or instead

be carried out. These approaches may include, for example, convening focus groups and other outreach efforts. These endeavours should be designed particularly to acquire greater input from those likely to be, and/or know those who would or might be, more disadvantaged during disasters than those closer to the average person among the greater population.

Limitations of Ethical Analysis

It is critical for policymakers and clinicians to know, when asking these questions, what ethical analysis can and can't be expected to offer.

Ethical analysis can show the relative strengths and weaknesses of different arguments and this may help provide better answers, but it often can't provide best answers. This is because reasonable persons may reasonably differ on which among sound, but mutually exclusive, core values, should prevail.

An example involving rationing is illustrative. As indicated previously, an ethical conflict may exist between the principles of justice and utility. A most difficult question exemplifying this conflict involves age. Justice might, for example, support all persons' lives being valued equally, whereas utility might "give priority" not to saving the greatest number of lives but to maximizing the number of years; in net effect, those persons saved would live. This value then might give greater priority to people who are younger.

The moral weight, if any, that age should have may, then, also differ and depend on which meaning of justice is applied. That is, people could be treated "equally", but not just in regard to their being able to continue to live. They could, instead, be given equal opportunity to live to an older age. According to this use of equity, treating a 30-year-old and 80-year-old equally might mean giving priority to the 30-year-old, since this would give the 30-year-old "more equal access" to living to be 80.

This second use of justice would accord more with the principle of utility and, accordingly, add stronger support to the ethical argument for deciding in favour of utility. This other, second conception of justice has been referred to as the "fair innings approach" [6].

This example of one's considering different possible applications of the principle of justice illustrates how ethical analysis may increase one's capacity to arrive at a better argument and, thus, how this analysis may make the end result better, even though this analysis may not give a "right" answer.

Psychological Considerations

Ethical policies should be based on as valid assessments of realities as are possible. Patients and care providers may have significant, different, psychological reactions.

The discussion in this section will consider both these groups' reactions during pandemic disasters. This discussion should be paradigmatic in illustrating how these and other realities should be initially assessed when ethically analyzing other kinds of disasters, as well.

These examples illustrate the kinds of psychological realities that particularly policymakers should take into account when deciding which people's treatment should be given priority during disasters.

In designing these policies, a key question is, always, who should decide them. People's views differ, even in regard to the moral framework that should be used. Whose view should decide policy, thus, is a paramount question. This will be considered in a later section.

Individual's Psychological Behaviour

A first significant behaviour people may have, prior to and during a pandemic, is to hoard medications. Here, as in other such situations, it could be hoped that people would not hoard treatments. This expectation may, however, not be met. As Gostin states, "This altruistic consensus is comforting, but may not reflect real behavior in a time of crisis...[which may include] hoarding, stockpiling, and black marketeering" [6]. If hoarding occurs, of course, less treatment supplies will be available.

A second psychological possibility involves family members quarantined in their homes. Here, as Gostin declares, "[H]ome quarantines can only be morally justified in contexts where residential units permit... asymptomatic individuals to remain confined without imposing risks on those with whom they live" [7].

Family members already exposed may be instructed to remain separate from others not exposed. Even if family members know the importance of staying apart, they may, though, engage in denial. Wanting to be with their loved ones, they may not comply.

Some people, also, may all live together in only one room. Then, for them, this desired separation may not be feasible. If other living arrangements aren't possible, but they remain together, those families who live in just one room may be treated unequally. As, again, Gostin says, "Home quarantine... can create divisions based on social class, because the poor may not have homes adequate to protect the unexposed" [7].

As both these examples illustrate, people may respond during disasters based on their feelings for others. This is what, of course, the Ethics of Care approach to ethics takes most into account.

Some people, during disasters, care so much for loved ones that they choose to stay with them even at much greater risk to themselves. During floods, as those caused by hurricanes, for example, people may be stranded with family members who are bedridden in their homes. Then, those who could leave may, later, refuse to. They may refuse to enter rescue boats, for example, because they could not take these family members with them. Some have even refused to leave pets.

Parents, even if adequately informed, may, also, not take appropriate steps during disasters to vaccinate their children. They may, for instance, fear that vaccinations would pose unnecessary risks.

Further, when persons are first exposed to an infectious agent, they must be identified as potentially contagious. One means of early identification may be by detecting a rise in people's temperature. People must not come in for this temperature testing. This testing could be involuntary. Yet, if it is not, they may, due to fear or denial, not come in.

Once identified, there may be a need for contact tracing to locate and isolate all other persons exposed to a person who is infected. As Lo states, "Public health investigations require... cooperation... to identify contacts... Voluntary measures generally promote cooperation more than do mandatory ones" [8]. Again, it might be hoped that people infected would identify these other people, but they may not. Here, they may fear stigma or feel shame.

Perhaps the greatest psychological concern that should be taken into account by policymakers and care providers before and during disasters is that people may panic [9]. In 1995, in the Democratic Republic of the Congo, in response to Ebola, for example, neighbours feared that even care providers and their families might be infected. These neighbours, reportedly, then, burned their homes [9: 449].

All these possible psychological responses suggest the need for appropriate preventive antidotes, to the degree that these can be implemented. In an effort to prevent panic, for example, due attention must be put, in advance, to achieving optimal, true, but reassuring communication [10]. Emphasis should be placed on informing the public as fully as possible what is being done, for example, to reduce this panic.

There is a tendency for people not faced with a crisis, on the other hand, to, at this time, overlook its importance to them. Resources should be allocated in advance, therefore, also, to try to help overcome this source of "resistance" so that the public can respond in the most effective as well as calmest way possible if and as a pandemic occurs.

Those responsible for having and making key resources available during a pandemic should do what is necessary, then, to be adequately prepared. This preparation includes stockpiling medications, having plans for delivering them, and anticipating how this can be best accomplished, so that those more disadvantaged, such as groups in outlying areas, can be adequately reached.

A gain from the practice of carrying out mock preparations for a disaster, such as a hurricane "drill", is that institutions may find out that their plan is workable. This knowledge may have the desirable secondary effects of increasing both care providers' and the public's confidence that such a disaster can be survived.

At this same time that there is this need to plan and, perhaps, also carry out mock measures, there is a need when disasters, such as, again, hurricanes, threaten to not implement these plans prematurely. An example, here, is when the "real likelihood" of a hurricane's striking a precise area is extremely remote. It would be possible in all such instances to institute full evacuation procedures at once. This could save lives but also effect extraordinary costs. Reasonable criteria regarding when these

responses should be triggered must be established beforehand, on the basis of the best evidence available.

Ethically, though, there is no place here for high-stake gambling. It is better here to be safe than sorry.

Care Providers' Psychological Behaviour

During disasters, care providers should be able to offer emotional support to their patients, to the degree that they can, even and especially when their patients are having most severe reactions. When, for example, patients were feeling the panic previously described, due to fear that they would acquire Ebola in the Belgian Congo, care providers should have, when possible, sought to continue to see that these reactions are “misguided but self-protective behaviours”, so that with this accurate understanding of these patients, these care providers would remain most able to help them [9].

Still, care providers may, of course, be beset by feelings beyond their control. In the Democratic Republic of the Congo, at this time, for instance, care providers felt fear. Fifty-five percent feared having pain and suffering, 53 % feared a horrible death, 41 % feared being separated from their loved ones, and 23 % feared being abandoned [9].

During the SARS outbreaks that occurred throughout the world between November 2002 and July 2003, as another example, care providers feared that they, too, might also acquire SARS and that they, too, could inadvertently spread SARS to their families. SARS could be acquired from patients through respiratory droplets when they were within 6 ft of patients with SARS. In one SARS ward in Toronto, 90 % of the ward nursing staff became infected. In a hospital in China, 17 medical students acquired SARS after doing physical exams on SARS-infected patients [11].

Care providers detecting and treating patients with SARS also had to try to determine whether a patient's fever was or wasn't due to SARS. They knew that if they were wrong, this could result in several people's lives, possibly, being lost due to SARS. This one instance of undetected SARS, then, could also continue to not be identified and go on to spread the infection. Care providers had to screen numerous people likely to have been exposed, so that they could separate those who might have SARS from others.

These fears, in addition to those for themselves and for their families, are, obviously, most distressful. Care providers, during disasters, also may find it highly stressful to not be able to treat patients as they would under normal circumstances [12]. Even when resources are available, care providers may not be able to obtain adequate follow-up for patients [13].

Another source of stress for care providers during disasters is that their role or roles may be unclear: “Although ideally an experienced triage officer is designated, it may fall to the individual clinician to make allocation decisions until order is restored” [14].

Their roles may conflict. If they serve both the roles of triaging and treating patients, for example, as indicated in this statement, when triaging, they may be the one deciding to treat or not to treat a patient, only later, in a treatment role, to be responsible for providing the same patient care.

Bursztajn and Brodsky, two psychiatrists, sought to study how care providers cope in what they hoped was a sufficiently analogous situation, a conflicting triage context to be generalizable to their behaviour during disasters. They studied care providers having such conflicting duties in a managed care setting.

They found, not surprisingly, that care providers feel “conflicted”. Care providers may regard their primary allegiance to be to the patient, but may, as a result of this, “inadvertently abandon their fiduciary duties”. This may, in turn, “undermine the doctor-patient alliance”. This alliance, they speculate, is “a protective factor” in care providers being able to better bearing their feelings of uncertainty and grief [15].

Care providers may, alternatively, be so committed to their alliance with individual patients that they do not fully support allocation policies. They may even choose, out of loyalty to patients they have known and seen for years, to store meds for them, even when this might mean that they would not be able to distribute them more equally, as public policies might require, to others, later.

Their doing this would be seen as unconscionable from a traditional, principled point of view, since they would be violating justice in order to favour the interests of their own patients over those of others. As Lo states, “Physicians who urge an exception for a particular patient should also be willing to support an exception for other similar patients” [8].

From an Ethics of Care perspective, however, this might not be at least so self-evidently or unequivocally, ethically wrong. Care providers doing this could be viewed as, even if violating “more important” values, at least fulfilling their traditional commitment and an implicit promise to their patients to continue to put their interests first. Some of their patients might, in fact, expect this.

This dilemma of whether to treat all patients according to objective criteria, to the degree that this is plausible during a disaster, is best illustrated, perhaps, in regard to children. This is also, presently, still controversial.

There is first, here, a question of whether care providers’ more subjective medical judgments should play any role here, and if so, how much. These subjective medical judgments may be more potentially problematic in regard to children, it is argued, since children tend to evoke exceptional empathy. Thus, some report that, in general, during triage, children may be “overly” triaged or placed into groups such that care providers will treat them with greater priority than they should, based solely on the severity of condition [16, 17].

There is also present controversy on an altogether different theoretical level. People disagree on whether care providers should, in general, give children greater priority over others, less, or the same priority. From a utilitarian perspective, they will live longer. Yet, if they are treated equally, this will further more the principle of justice or equity, if applied in this way. Some argue, even, that only children of a given age, such as teenagers, should be “prioritized”. They assert that the death of an adolescent is a greater loss than that of a toddler or infant [18].

Children, clearly, have unique needs. Their body surface area-to-mass ratio and decreased subcutaneous tissue make them, for example, medically, more vulnerable to hypothermia. They also may be less able to communicate their needs and wants.

An additional problem involving children, and, more particularly, their parents' exceptional feelings for them, noted previously, is how care providers can determine accurately such answers as how long a child – much less any patient – has been infected when these answers may determine whether they will be treated and, thus, possibly, whether this patient lives or dies.

One means of determining the duration of a patient's infection is, for example, to ask, "When did [you or] your child first have this cough?"

A care provider asking a patient this question might choose not to divulge why he or she is asking this question. This ethically may be regarded rightfully as implicit deception by omission.

Care providers may want to view this in other ways, but the validity of any other view is open to question. Some ethical choices, such as this one, unfortunately, involve extreme and painful ethical and emotional costs.

This situation may be, then, highly problematic for some care providers, for both this reason and because the stakes, here, for patients, are so high. How patients answer may determine in triage situations, as I've said, whether they live or die.

If, indeed, care providers ask this same question to many patients and/or parents over time, these patients and parents may come to know, prior to these care providers asking them, what the consequences of their different answers, likely, will be. Thus, care providers may for this reason feel that they should lie. They may believe, rightly, that from the standpoint of utility, if they do lie, more patients will fare better. This may, of course, make this situation more problematic for care providers who don't lie, as well!

For these kinds of reasons, then, also, it may be preferable for care providers to treat patients only on the basis of objective findings, to the degree, of course, that this is possible. These bases might not include, then, parents' statements of how long their children have been stricken. Patients, also, then, would not be placed in the position of having to decide whether to lie, as parents might, especially, feel that they should and must, to try to most help their children.

Another psychological concern regarding care providers is the extent, if any, to which they will sacrifice the needs of their families for the public good. They, as others, might want greatly to put their loved ones' needs first. This may mean to some that they should stay with them, as opposed to going to work to help far larger numbers of patients.

A question posed regarding this is what, if any, sanctions should be brought against care providers who, during disasters, place their own families' interests above patients', by not coming in to work at their hospitals, but, instead, remaining at their homes. One view is that care providers, "being care providers", should be trusted to put their patients first. Another view is that care providers not coming in should lose their medical licence to practice.

In light of these stresses, some physicians who have treated patients with SARS afterwards formulated ten lessons for future doctors treating patients during

pandemics, to share what they had learned. One lesson was this: during disasters, mental health resources should be made available to *both* patients and staff [19].

The Allocation of Limited Resources

The predominant ethical question pandemics and other disasters raise is how limited resources should be rationed: “Triage results in categorization of patients... As a consequence, the central ethical challenge for clinicians and organizational leaders in ... disasters will be the preferential management of some patients with the expected consequence of increased morbidity and even mortality for other patients” [20].

Triage

The primary ethical issue, here, is who, among many, should have greater priority for receiving limited medical supplies. Clearly, to enhance a population’s overall survival, it is necessary to treat first those who serve most critical functions. They must remain healthy to be able to help others.

Thus, the paradigmatic example of whom care providers should treat first is other care providers who provide direct care, but those who serve essential functions include many more groups. These people include, for example, other first responders, such as ambulance, fire, and humanitarian assistance personnel; security persons, such as police, national guard, and, I would argue, now, especially after 9/11, military personnel; those who provide essential products and services involving water, food, and pharmaceutical supplies; those maintaining critical infrastructures, such as transportation, utilities, and communication; and those maintaining sanitation, such as undertakers, cemetery workers, and waste removal personnel, among others [6].

This group includes, also, those responsible for continuing government functions. These people include key persons in executive, legislative, and judicial systems and those who support them [6].

Beyond those in these groups, however, the questions of priority become more taxing. One approach is, here, for example, to protect most, more vulnerable groups, such as the very old and very young, as already in part mentioned, since this, in some regard, most respects all peoples’ dignity, though this, at the same time, violates utility. Factually, though, these groups may actually not be those most vulnerable. “Seasonal influenza disproportionately burdens infants and the elderly, but highly pathogenic strains may affect young adults, as occurred with Spanish flu” [6].

The elderly are more vulnerable, but they also will benefit less, as said, because they will not have as long to live. Still, even though this statement is valid, people’s age may not, of course, reflect their actual health. Thus, making “cut-offs” on the basis of age alone is ethically, significantly problematic.

Justice, as stated here, also, may be applied in different ways. An 80-year-old could have the same access to treatment as someone 30, based on justice, but the “fair innings” principle might favour care providers treating younger adults, children, and pregnant women first.

Another more vulnerable group is the poor. The poor may be disadvantaged, relative to other groups, for many reasons. As said, for example, they may, relative to other people better off, lack the same access to the media which may inform the public where they should go and when. If poorer people receive less information or receive it in a less timely manner, they will be disadvantaged, accordingly.

As stated, “the poor” may also be disadvantaged if they live in smaller homes.

They, may, in addition, suffer more, also for other reasons. If quarantined, for example, they may have a greater need for lost income. They also may not be in positions in which they can as easily take time off and still get paid.

A final example of a disadvantage the poor may experience may occur if they must travel to be at the front of a queue of people getting treatment. Policies may follow a “first-come, first-served” principle. If and when this is the case, poor persons may lack equal access to transportation. They may, for example, have to make several bus transfers to travel across a city. This may take more time than others take. This may allow others to arrive first and, thus, be before them in a queue.

Tiering

Perhaps the most troubling, more specific ethical problem raised, at least in theory, by a pandemic, is the question alluded to previously: What if the number of patients stricken increases over time and is more than was initially expected?

Suppose respirators are initiated on a small number of patients at first. Should this treatment be stopped after it has begun if the lives of more patients could be saved as a result of freeing-up these same resources? If so, how many more patients likely to be saved would this require? Three times as many? Ten times as many?

“Stopping” these respirators to save more patients’ lives is known as the “tiering” approach. Under this approach, the criterion for deciding who can receive treatment may become stricter over time, as the number of patients infected becomes greater. Moreover, ethically, saving the most lives then may mean having to withdraw resources from patients who are stable or even improving [21]. Should this be done?

A first question here is, as always, practical. Would patients, their loved ones, and/or society accept this? If the public receives prior information and education regarding the rationales for this approach, it may be that people could more readily accept this, if it becomes “necessary”. At some points, however, people may find such rationing schemes unacceptable, even if they, previously, have been informed.

It may be, though, that this need for respirators wouldn’t, in some circumstances, have *to* come about. It may be that volunteers could manually squeeze airbags to breathe for these patients. It may take just two volunteers, taking turns, to accomplish this [22].

This possibility raises, again, in this different context, the possible relevance of the Ethics of Care.

A Model Example: New Zealand

The National Ethics Advisory Committee (NEAC) in New Zealand recently (in 2006) put forth a document stating its basic ethical aspirations during a pandemic, for the public's response [23].

This document stressed the importance of giving exceptional priority to people's relationships. The NEAC, there, in general, puts "the community" first [24].

The NEAC would, for example, send volunteers to "rural people" to rescue them when necessary. It would also send volunteers to people's houses when they couldn't be reached by phones.

It would also seek to make up for past wrongs to a group there called the Māori that occurred in a prior pandemic in 1918. It would give this group priority during disasters. The ethical principle it would enact here is "compensatory justice" [26].

Here, a support team would, also, help staff cope with its many demands. Further, since staff would take on greater risks, as risking their contracting influenza due to caring for patients, treatments for staff would have priority if this occurred.

People would, also, in this event, contact and specially support these care providers' families and express their exceptional appreciation of staff taking on this additional risk [2].

The public would be informed of all this. This priority is not, however, without bounds. If other patients' needs are significantly greater than those of staff members, these other patients' needs will prevail [2].

How, finally, here, would the NEAC resolve triage conflicts when some can receive medical care, but others can't? This determination would be made on the basis of who would most benefit and, if this can't be determined, decided on a random basis. Those making these decisions would not, however, discriminate against people with disabilities. Rather, extra support would be provided to those who take on exceptional responsibility for others [2].

This document states explicitly that policies that are constructed with "able" people in mind potentially disadvantage those with disabilities. Thus, this document recognizes and acknowledges that, especially during a pandemic, people with disabilities may be particularly vulnerable to being further disadvantaged by policies, unless special consideration is given to avoiding this outcome [2].

International Obligations

In a pandemic, all persons are at risk, but those living in more remote areas may have less direct access to treatment, as stated. They may, also, though, be at less risk

of exposure than others. Thus, even though these persons may, in this first way, be at greater risk, their greater, relative safety from becoming infected may offset this.

The same amount of resources may, then, ideally, perhaps, be initially provided to different places in the same city that have similar population densities. One approach to dividing resources after a pandemic begins, then, is to determine subsequently all these same areas' needs on an ongoing, regular basis, such that if and when there are disparities, resources can be shifted from places doing better to those places not doing as well.

Ethically, analogously, better-off countries should consider other nations that have greater needs. These countries may also lack the same means to help themselves. As Gostin states, "This really can have devastating consequences for resource-poor countries that cannot compete economically for expensive counter-measures" [6].

The ethically highest road any country can take may be to help other nations, even though this is, to some degree, to the detriment of one's own citizens. Here, the practical limiting factor may be, of course, what the people in the better-off country will tolerate.

People may, though, be more willing to make such sacrifices if they are better informed. Here, though, as with mock hurricane drills, there is again a real factor regarding what risks can be anticipated by other countries and what is their likelihood. Here, again, the facts and in this case the uncertainty of these facts may be, even in theory, as important in determining what a better-off country should do as any other factor.

Implications

Policy Requirements During Disasters

There are, in the view of Gostin (an eminent lawyer and ethical authority in this area), five major ethical principles that policymakers should particularly take into account when designing policies to be implemented during disasters [7].

The first principle, as noted, is utility. This principle typically involves saving the greatest number of lives. Some additional values not based on consequences should, possibly, prevail. An example, already considered, is the value of justice. Another is respecting persons, as by telling them the truth, keeping promises to them, and insuring that they are adequately informed.

An example, in another (non-disaster) context illustrating how important these latter, deontological, or non-consequence-based values, is our present practices when doing research. A person cannot be enrolled in a protocol against his or her will, since this would violate this person's autonomy, despite the possible gain to others. Likewise, it may be also that during disasters, some similar dis-utilitarian outcomes should be absolute and built in. An example might be an absolute

prohibition against active euthanasia. Another example mirroring the New Zealand model might be equally treating people dependent on others. This might be done, despite its foreseeable result of saving fewer lives.

The second principle is to respect people's dignity, as indicated already. Here, though, it may be that utilitarian concerns still should prevail even when there is only a threat of great harm to many. This "precautionary principle" holds that there is an obligation to protect populations against "reasonably foreseeable threats, even under conditions of uncertainty" [7]. Here, though, there is also an ethical requirement that the least restrictive or least intrusive alternative that will still "achieve the [same] objective" should be implemented [7]. An example is this: during pandemics, people's interest in privacy, though important, is of only secondary importance.

The third principle of utmost importance is that of justice, also considered earlier: "Justice requires that the benefits and burdens of public health action be fairly distributed..." [7]. Here, as an example already discussed, people who are poor may have less direct access to acquiring protective medications and/or treatments. Again, compensatory practices may be adopted, though these, too, might go against achieving maximal utility.

The fourth principle is what Gostin refers to as procedural justice or fairness: "Procedural justice requires a fair and independent hearing for individuals who are subjected to burdensome, public health action" [7]. An example, here, is that people shouldn't be subject to undergoing personal harm without their having access, at some time, to making an appeal. People, during a disaster, may, for example, as stated, lose income if they stop work to care for members of their family. If this occurs, it may be that they should be able to appeal for compensation, as on the ground that if they hadn't cared for a family member at this time, he or she would have gone without it.

The fifth principle, which Gostin sees as "non-negotiable", is "transparency". This principle requires all institutions, including government officials, and care providers to make decisions in an "open and fully accountable manner" [7]. A foremost rationale for transparency is that if a policy is unfair, this requirement allows other people to better review this. Then, as a result, practices, later, can be changed. Ethically, also, of course, this respects all people, maximally, by keeping them more fully informed.

Groups should, then, be made available to provide these reviews, and these groups should be balanced. The judgments they make should not reflect, of course, a "tyranny of experts" [24].

Clinicians' Practices

Present evidence suggests that during disasters, people have five most basic emotional needs: to feel safe, calm, connected, a sense of efficacy, and hope [25, 26].

It may be that care providers can meet most of these needs most effectively by gaining patients' trust. This may be exceptionally possible during disasters. As Jay Katz, another most eminent attorney and ethicist, has said, "Vulnerable patients in their quest for relief of suffering may be readily inclined to place their trust in physicians" [27].

To do this best, of course, care providers must first be able to cope with their own emotions. They may, like others, for instance, feel fear. Still, if they do, they must keep these feelings in check, as by talking with other care providers, so that, if feeling this fear, they may hopefully reduce its intensity by then not feeling so alone.

Several empirically based approaches may also be helpful. One such approach is to "separate out" patients who do not need as urgent care, early on, to reduce "chaos" and improve "patient flow" [28]. Care providers can, in addition, provide "psychological first aid" by asking people to rate and then share their present level of distress. By doing this, they can observe themselves, as it were, as they observe others. They may help them reduce the intensity of whatever stressful emotions they are feeling [29]. Other optimal approaches are listed elsewhere [30, 31].

Two additional approaches care providers, themselves, may adopt may be less well known. First, despite the need, care providers should not try to be too courageous. Second, if at all possible, they should try not, as discussed, to mix two incompatible roles. They should not, if possible, for example, as explained, perform triage prior to treating patients.

Care Providers Being Too Courageous

Care providers must care for their own physical and emotional needs to be able to best care for others. Their psychological needs are like their patients'. Thus, they may be best able to reduce their intensity by attending to such personal physical needs as being warm, fed, and safe from danger [32]. Care providers, also, may fare psychologically better if, through planning, they are as prepared as they can be and, thus, gain comfort from this belief [33].

They should not, though, try to be heroes because their being too courageous during disasters can actually prevent the providers from being able to do all for their patients. How?

During disasters, care providers often are an overlooked, highly stressed group. They may be expected to carry on in ideal ways by those whom they treat. These "ideal" ways include, for instance, their being able to bear being away from their families without worrying, their always being "good" to their patients, and their not having the need to express their own worries, fear, and, even, despair [33].

Further, during disasters, care providers may feel it is right and, indeed, only right for them to help their patients as much as they can [10]. Thus, they may continue to do this, even when they themselves need sleep, food, and time for respite.

Care providers should, for this reason, it is advised, arrange to have a "buddy". This buddy can tell those, when necessary, that they need to stop treating these

patients for any or all of these reasons. These buddies, in turn, should have some preparation for serving in this role themselves; they should, for example, be prepared to accept that their asking these care providers to sleep, eat, and take these times off may result in these care providers at these moments resenting them [10]!

Care providers should, also as noted, not accept taking on potentially conflicting roles, such as triaging and treating, if possible. If they perform these conflicting roles, patients may be more likely to perceive them as being more willing to betray their interests by switching back to “meeting the needs of the many”, if these care providers see this as necessary at a later time [34]. Their greater patients’ distrust of them may be as stressful as any other factor.

Conclusion

Disasters may pose unique ethical dilemmas. Care providers analyzing some of these dilemmas prior to their occurring may help suggest ways in which they can be best resolved or at least help prepare them for what may occur. Policymakers, likewise, by anticipating these problems, may be better able to reduce them.

These analyses usually won’t, though, provide right answers. Rather, reasonable persons will, still, reasonably disagree. Then, what may be important and, indeed, most important is that these disagreements are decided in a way that many or most see as sound and fair.

Such analyses may, on some occasions, however, suggest outcomes that may go against common logic. They may suggest, for example, that care providers triage people during disasters in a less than the most utilitarian way. This may involve their not pursuing only the greatest good for the greatest number. They may give, instead, some moral weight to values not based only on consequence, such as their respecting patients and treating them justly. They may even not give priority to ethical principles at all. They, rather, may give priority to an Ethics of Care.

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Chapter 7

Medicine at High Altitudes

Sundeep Dhillon

Abstract Humans evolved at sea level and with the exception of the high-altitude populations of Central Asia and South America (who have adapted over many generations to the rarefied air) are poorly suited to high altitude. The most significant problem is hypobaric hypoxia (low oxygen levels as a result of a reduced barometric pressure), but cold, wind, reduced humidity, increased ultraviolet radiation and a paucity of flora, fauna and readily available drinking water make this a challenging environment.

Keywords High altitude • Physiological effects • Acclimatization • High altitude illness • Prevention • Recognition • Treatment • Medical care

Objectives

- To describe the physiological effects of high altitude and acclimatisation
- To outline the prevention, recognition and treatment of high-altitude illnesses
- To discuss the provision of medical care during conflicts or catastrophes at high altitude

N.B.: Drug dosages are given as a guide only and should be checked. Medicines should only be used under supervision of an appropriate and competent medical authority.

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Introduction

Humans evolved at sea level and with the exception of the high-altitude populations of Central Asia and South America (who have adapted over many generations to the rarefied air) are poorly suited to high altitude. The most significant problem is hypobaric hypoxia (low oxygen levels as a result of a reduced barometric pressure), but cold, wind, reduced humidity, increased ultraviolet radiation and a paucity of flora, fauna and readily available drinking water make this a challenging environment.

Mountains are formed under conditions of great pressure and are often located in proximity to tectonic plate margins. As a consequence, these regions are often involved in natural disasters, mainly earthquakes and mudslides. On 8 October 2005, a magnitude 7.6 earthquake occurred in Pakistan. At least 86,000 people were killed and more than 69,000 injured with extensive damage to property and infrastructure in northern Pakistan. The heaviest damage occurred in the Muzaffarabad area, Kashmir, where entire villages were destroyed and at Uri where 80 % of the town was destroyed (Fig. 7.1). Most of the affected people lived in mountainous regions with access impeded by landslides that blocked the roads, leaving an estimated 3.3 million homeless in Pakistan. The UN reported that four million people were directly affected, prior to the commencement of winter snowfall in the Himalayan region. It is estimated that damages incurred are well over US\$ 5 billion (300 billion Pakistani rupees).



Fig. 7.1 Earthquake damage in Muzaffarabad, Pakistan, October 2005

The subsequent relief effort was hampered by the high-altitude terrain, remote villages with single access roads blocked by landslides and the onset of the Himalayan winter (snow started falling in some areas on 13 October).

Mountains form a natural barrier, often used as the border between countries. When disputes arise, increasingly over the origin of watercourses originating in the mountains, soldiers are exposed to the hazards of the high-altitude environment. The highest conflict in the world is the dispute between India and Pakistan over parts of Kashmir. Troops have been stationed and have fought at altitudes over 5,000 m on the Siachen Glacier.

Nearly 140 million people live at altitudes above 2,500 m. The two regions of the world with the largest high-altitude populations are the South American Andes and the Tibetan plateau (Himalaya and Karakoram). It is estimated that between 10 and 17 million people live at over 2,500 m in the Andes and that over 50,000 people in Peru reside above 4,000 m. Lhasa (3,658 m) in Tibet has over 130,000 inhabitants. Other areas of the world with significant high-altitude populations include Central and North America (Rockies), Europe (Alps), Russia (Caucuses), Africa (Tanzania, Kenya, Uganda, Somalia and South Africa) and Indonesia.

Definitions

There are no universally accepted definitions of high altitudes, but in medical terms, the following terms reflect the underlying physiology (Table 7.1). There is much individual variation with some individuals suffering with acute exposure to 2,000 m. Most people will suffer to a greater or lesser degree with rapid ascent above 2,500 m (the approximate altitude to which a commercial airplane is pressurised).

Table 7.1 High-altitude definitions

Description	Altitude (m) ^a	Comments
Low altitude	<1,500	No effect on healthy individuals
Intermediate altitude	1,500–2,500	Arterial oxygen saturation remains above 90 %. Altitude illness possible ^b
High altitude	2,500–3,500	Altitude illness common with rapid ascent above 2,500 m
Very high altitude	3,500–5,800	Arterial oxygen saturation falls below 90 %, especially with exertion/exercise. Altitude illness is common even with gradual ascent
Extreme altitude	>5,800	Limit of permanent human habitation, progressive deterioration with increased length of stay eventually outstrips acclimatisation, marked difficulty at rest

Adapted with permission from Pollard AJ, Murdoch DR. The high altitude medicine handbook. 3rd ed. London: Radcliffe Publishing; 2003

^a1 m=3.281 ft; 1 ft=0.305 m

^bAt sea level in healthy individuals, arterial oxygen saturation is 97–100 %. Lower values are seen in smokers and those with lung disease. Below 92 % supplemental oxygen is usually administered

The majority of altitude illness occurs between 2,500 and 3,500 m due to the large number of people ascending rapidly to these altitudes, mainly for recreational purposes.

The High-Altitude Environment

The high-altitude environment is uniquely challenging for humans. A basic understanding of the factors involved is essential in planning sensible strategies for missions into high-altitude regions.

Barometric Pressure

Barometric pressure decreases exponentially with increasing altitude. The proportion of oxygen in the atmosphere remains constant at 21 % (at altitudes that support life), and therefore, the available oxygen is directly related to the barometric pressure. At Everest Base Camp (around 5,300 m), the barometric pressure (and therefore the amount of oxygen available to the body) is approximately half that at sea level, reducing to one third of sea-level values at the summit (8,850 m). Barometric pressure is generally lower in winter than in summer and decreases with increasing latitude (mountains in the subarctic “feel” as if they are equivalent to Himalayan mountains a few 100 m higher). The available oxygen for any given altitude is therefore lowest on subarctic mountains in winter (e.g. Denali) and highest on equatorial mountains in the summer (e.g. Kilimanjaro).

Temperature

Ambient temperature falls linearly with increasing altitude with a 1 °C (C) drop for every 150 m of altitude gained. In a snow and ice environment, the ground stores very little heat and radiant heat from the sun provides most warmth. Ultraviolet radiation increases by approximately 10–12 % for every 1,000 m gained in altitude, increasing the risk of sunburn, snow blindness and skin cancer. When this solar radiation is reflected off white snow and ice, temperature can reach over 40 °C on Everest. Conversely, when the sun sets (or goes behind a mountain feature or cloud), the temperature can drop dramatically by as much as 40 °C. Frostbite may easily occur, especially if skin is exposed to the wind.

Table 7.2 Wind chill index

		Air temperature (celsius)																
		0	-1	-2	-3	-4	-5	-10	-15	-20	-25	-30	-35	-40	-45	-50	-55	-60
Wind speed (Km/h)	6	-2	-3	-4	-5	-7	-8	-14	-19	-25	-31	-37	-42	-48	-54	-60	-65	-71
	8	-3	-4	-5	-6	-7	-9	-14	-20	-26	-32	-38	-44	-50	-56	-61	-67	-73
	10	-3	-5	-6	-7	-8	-9	-14	-21	-27	-33	-39	-45	-51	-57	-63	-69	-75
	15	-4	-6	-7	-8	-9	-11	-17	-23	-29	-35	-41	-48	-54	-60	-66	-72	-78
	20	-5	-7	-8	-9	-10	-12	-18	-24	-30	-37	-43	-49	-56	-62	-68	-75	-81
	25	-6	-7	-8	-10	-11	-12	-19	-25	-32	-38	-44	-51	-57	-64	-70	-77	-83
	30	-6	-8	-9	-10	-12	-13	-20	-26	-33	-39	-46	-52	-59	-65	-72	-78	-85
	35	-7	-8	-10	-11	-12	-14	-20	-27	-33	-40	-47	-53	-60	-66	-73	-80	-86
	40	-7	-9	-10	-11	-13	-14	-21	-27	-34	-41	-48	-54	-61	-68	-74	-81	-88
	45	-8	-9	-10	-12	-13	-15	-21	-28	-35	-42	-48	-55	-62	-69	-75	-82	-89
	50	-8	-10	-11	-12	-14	-15	-22	-29	-35	-42	-49	-56	-63	-69	-76	-83	-90
	55	-8	-10	-11	-13	-14	-15	-22	-29	-36	-43	-50	-57	-63	-70	-77	-84	-91
	60	-9	-10	-12	-13	-14	-16	-23	-30	-36	-43	-50	-57	-64	-71	-78	-85	-92
	65	-9	-10	-12	-13	-15	-16	-23	-30	-37	-44	-51	-58	-65	-72	-79	-86	-93
	70	-9	-11	-12	-14	-15	-16	-23	-30	-37	-44	-51	-58	-65	-72	-80	-87	-94
	75	-10	-11	-12	-14	-15	-17	-24	-31	-38	-45	-52	-59	-66	-73	-80	-87	-94
	80	-10	-11	-13	-14	-15	-17	-24	-31	-38	-45	-52	-60	-67	-74	-81	-88	-95
	85	-10	-11	-13	-14	-16	-17	-24	-31	-39	-46	-53	-60	-67	-74	-81	-89	-96
90	-10	-12	-13	-15	-16	-17	-25	-32	-39	-46	-53	-61	-68	-75	-82	-89	-96	
95	-10	-12	-13	-15	-16	-18	-25	-32	-39	-47	-54	-61	-68	-75	-83	-90	-97	
100	-11	-12	-14	-15	-16	-18	-25	-32	-40	-47	-54	-61	-69	-76	-83	-90	-98	
105	-11	-12	-14	-15	-17	-18	-25	-33	-40	-47	-55	-62	-69	-76	-84	-91	-98	
110	-11	-12	-14	-15	-17	-18	-26	-33	-40	-48	-55	-62	-70	-77	-84	-91	-98	

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Wind Chill

The effect of wind on exposed skin is far more important than the actual temperature. Wind chill is the apparent temperature felt on exposed skin, which is a function of the air temperature and wind speed. The wind chill temperature is always lower than the air temperature, except at higher temperatures (Table 7.2).

Humidity

The amount of water vapour in the air (absolute humidity) decreases with temperature. This can lead to dehydration in cold, high environments since exhaled breath is fully saturated with water. Combined with the increased respiratory rates required at altitude (magnified when working), the water losses through breathing alone can be significant, and 3–4 l of water per day may be required to avoid dehydration. When this has to be obtained by melting snow, sufficient fuel must be taken, adding to the logistical burden.

Acclimatisation

Acute exposure to the summit of Everest would result in loss of consciousness within a few minutes, followed rapidly by death. This is equivalent to sudden aircraft

cabin depressurisation. Yet, some people have managed to climb Everest without the use of supplemental oxygen. This is only possible due to a number of changes in human physiology collectively known as acclimatisation. The main effects noticed by the individual are an increase in resting heart and respiratory rates accompanied by a decrease in exercise capacity (maximum heart rate). The proportion of red blood cells, which carry oxygen, increases along with a raft of other biochemical adjustments, which aim to improve oxygen delivery and utilisation. Unlike adaptation, where favourable characteristics are genetically selected over many generations, the effects of acclimatisation are rapidly lost on descent to low altitudes.

High-Altitude Illnesses

Ascending to high altitude too rapidly can result in a range of disorders which may be life threatening. They are best prevented using a gentle ascent profile allowing plenty of time to acclimatise. There is great individual variation and some people will be susceptible to the effects of high altitude even with an extremely conservative ascent profile. Awareness, early recognition and prompt treatment of high-altitude illnesses are thus paramount.

Acute Mountain Sickness (AMS)

Four teenage members of a youth expedition were attempting the Kilimanjaro in Tanzania (5,895 m). Setting off late from the park entrance (1,600 m), the group reached Mandara Hut (2,740 m) in just under 3 h. After a poor night's sleep, all four complained of a headache, loss of appetite and tiredness the following morning. All were assumed to have AMS and treated with a combination of paracetamol/acetaminophen (1 g every 6 h) and acetazolamide (125 mg every 12 h). Following 2 days rest, the group were able to continue and all successfully reached the summit.

The rate of ascent is probably the most important modifiable factor in preventing high-altitude illness. In Nepal, 50 % of trekkers getting to 4,000 m in 5 days suffered from AMS compared with 84 % of those who flew directly to 3,860 m. Above 3,000 m, one should ascend no more than 300 m per day with a rest day every 3 days. This may be irritatingly slow for some members of the team, but provides an opportunity for everyone to acclimatise. There will be occasions when it is not possible to camp within a 300 m altitude gain of the previous night's camp. In these situations, an extra night prior to the extra height gain is required. It is the sleeping altitude that matters, so it is perfectly acceptable to carry supplies higher (say 500 m), provided one descends to a camp at a lower altitude (300 m or less above the previous night's camp). This acclimatisation strategy is known as "climb high, sleep low".

The symptoms of AMS are headache, nausea, vomiting, lethargy, fatigue, loss of appetite and poor sleep. None are specific and other conditions such as dehydration, hypothermia, exhaustion and viral infections are also common, but AMS must be

excluded in the mountains, particularly if there has been a recent height gain. The mechanism is unknown, but thought to involve increased permeability of blood vessels leading to swelling (oedema) of the brain. Swelling of the limbs and face are risk factors for altitude illness.

Treatment involves avoiding any further ascent until symptoms have resolved, simple painkillers (paracetamol/acetaminophen or ibuprofen) for headache and acetazolamide (125–250 mg twice a day. With severe AMS (or if the symptoms do not improve with treatment as indicated) dexamethasone 4 mg every 6 h may be used along with supplemental oxygen.

Descending to a lower altitude is the most effective and definitive treatment for all forms of altitude illness.

Acetazolamide 125–250 mg at night (or twice daily) is also effective as a prophylaxis to reduce the incidence of AMS in susceptible individuals or when a large height gain is unavoidable (e.g. crossing a high mountain pass). It is most effective if taken a few days before going to altitude.

High-Altitude Cerebral Oedema (HACE)

From the summit of Cho Oyu in Tibet (8,201 m), a team of British mountaineers spotted a lone figure moving slowly and unsteadily towards them. Realising he was in difficulty, they descended quickly and found him lying face down in the snow. On closer inspection, they found that he had lost his gloves and sunglasses and was so confused that he was unable to answer simple questions. A diagnosis of HACE was made and an injection of dexamethasone 8 mg administered. Eventually, he was helped down to Camp 3 (7,400 m) where he was met by team-mates. On returning to Advanced Base Camp (5,650 m) 3 days later, he was found to have no memory of the incident. Despite making a full recovery from HACE, he eventually lost four fingers from frostbite.

HACE is a life-threatening form of altitude illness. Fortunately, it is rare affecting around 1–2 % of people ascending to 4,500 m. It is usually preceded by AMS, but can occur without warning. The cardinal feature is ataxia (unsteadiness – best tested by heel-toe walking with the eyes closed). HACE is often accompanied by strange and inappropriate behaviour (such as removing gloves). Almost any neurological sign and symptom may be seen including strokes, but the most common are confusion, disorientation, hallucinations and an inability to pass urine. Untreated, it can rapidly lead to unconsciousness, coma and death.

The main treatment is immediate descent. Dexamethasone 8 mg is given immediately (oral or iv) followed by 4 mg every 6 h. Supplemental oxygen should be given if available. A portable hyperbaric chamber may also be beneficial and should be considered by all teams ascending to very high/extreme altitudes. Other altitude illnesses commonly occur along with HACE and both acetazolamide and nifedipine may be considered.

Descending to a lower altitude is the most effective and definitive treatment for all forms of altitude illness.

High-Altitude Pulmonary Oedema (HAPE)

On descending from the summit of Aconcagua in Argentina (6,962 m), a young female climber became increasingly tired and breathless. On arriving back at Camp 2 (5,700 m), she began to cough up blood-stained sputum and complained of pain in her chest. On examination at rest she was found to have a respiratory rate of 44, a heart rate of 142 and an arterial oxygen saturation of 65%. A diagnosis of HAPE was made and 20 mg of nifedipine SR (SR=slow release preparation) given. With her friends carrying her equipment, she was able to descend to Base Camp (4,200 m). The following morning, she was evacuated by helicopter to the local hospital. After 2 days of treatment, she was given the “all clear” and discharged home.

Unlike AMS and HACE which appear to be at opposite ends of the same spectrum of disease, HAPE is probably an independent altitude illness. It also involves increased permeability of blood vessels, but this time in the lung, where fluid leaks into the lung, reducing the space available for gas exchange and causing extreme respiratory distress (drowning from inside). The incidence may be 10 % with rapid ascents to 4,500 m, but 1–2 % is more likely with a sensible ascent profile. HAPE typically occurs on the second night after ascending to high altitude and is more common following a viral upper respiratory tract infection. It may be preceded by AMS and is manifested by shortness of breath, initially on exertion (out of proportion to the activity) and then as the disease progresses to acute shortness of breath at rest. They may be so severe that the individual cannot lie down (hence symptoms worse at night) and may be accompanied by a wet, bubbly productive cough with blood in the sputum (pink or red stained). A dry cough is common at altitude due to the dry air – if there are no other symptoms, this is unlikely to be related to HAPE. An increased heart and respiratory rate is usually found even at rest.

Treatment is immediate descent and nifedipine 20 mg four times a day. Supplemental oxygen and a portable hyperbaric chamber may be used if available.

Descending to a lower altitude is the most effective and definitive treatment for all forms of altitude illness.

The medical management of altitude-related disorders is summarised in Table 7.3.

People who have suffered an episode of HAPE remain susceptible to HAPE (usually around the same altitude as the original episode). Further ascent is inadvisable, but if unavoidable nifedipine may be used prophylactically. There is some evidence that inhaled salmeterol (125 µg twice daily) may also be effective. Prophylaxis against HAPE should not be a substitute for graded ascent

Other Problems of High Altitude

Retinal haemorrhages are common at high altitude (present in up to 50 % of trekkers at Everest Base Camp (5,400 m)) but are usually peripheral and asymptomatic.

Table 7.3 Summary of medical management of altitude-related disorders

Medication	Indication	Adult dose	Paediatric dose	Route
Acetazolamide	Prevention of AMS and HACE	125 mg every 12 h	2.5 mg/kg twice daily	Oral
	Treatment of AMS	250 mg every 12 h	2.5 mg/kg twice daily	Oral
Dexamethasone	Prevention of AMS and HACE	2 mg every 6 h <i>or</i> 4 mg every 12 h	Not recommended	Oral
	Treatment of AMS	4 mg every 6 h		Oral IV IM
	Treatment of HACE	8 mg stat <i>followed by</i> 4 mg every 6 h	0.15 mg/kg every 6 h	Oral IV IM
Nifedipine	Prevention and treatment of HAPE	60 mg SR daily (30 mg SR twice daily <i>or</i> 20 mg SR every 8 h)	Not recommended	Oral

Adapted with permission from Luks AM, McIntosh SE, Grissom CK, Auerbach PS, Rodway GW, Schoene RB, et al. Wilderness Medical Society consensus guidelines for the prevention and treatment of acute altitude illness. *Wilderness Environ Med.* 2010;21(2)

If central, there may be a sudden, painless loss of vision. The individual must be evacuated to definitive medical care.

Gastrointestinal diseases may result from assuming glacial water is clean or not boiling water for long enough. The temperature at which water boils decreases with barometric pressure and therefore water must be boiled for longer. Fresh snow may hide the site of a previous camp toilet and care must be taken to select appropriate water sources and ensure the water is clean. Alluvial deposits in glacial water may lead to gastrointestinal discomfort and mild upset.

Sleep is often disturbed. Respiratory drive comes from a build-up of carbon dioxide from active tissues rather than from low oxygen. At night, the respiratory centre is depressed and periodic breathing may occur. Respirations become shallow and irregular and may stop altogether for up to 30 s. During this time, carbon dioxide levels build up until breathing resumes. This pattern may occur throughout the night resulting in a fitful, restless sleep. Acetazolamide 125 mg at night may be used to treat periodic breathing.

Strategies for Optimising Emergency Deployment to High Altitude

Personnel may need to ascend rapidly to high altitude during disaster relief and military operations. Previous performance at altitude is the most reliable, but not infallible, guide to future performance, provided the individual is healthy and not suffering from any illness (especially a viral upper respiratory tract infection). Such

missions are hazardous and are ideally undertaken by experienced high-altitude residents or adequately acclimatised small teams familiar with the type of terrain. A doctor experienced in high-altitude disorders should be consulted at an early stage. Medicines such as acetazolamide, dexamethasone and nifedipine may be used prophylactically. Physical performance (payload carried, speed across terrain and endurance) will be significantly reduced. Helicopter resupply or evacuation may not be possible unless the airframe has been stripped of excess weight and modified for high-altitude work and is rarely possible above 5,000 m. A detailed risk assessment is mandatory before committing personnel to such a mission.

Further Reading

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- Luks AM, McIntosh SE, Grissom CK, Auerbach PS, Rodway GW, Schoene RB, et al. Wilderness Medical Society consensus guidelines for the prevention and treatment of acute altitude illness. *Wilderness Environ Med.* 2010;21(2):146–55.
- Medex. Travel at high altitude. 2nd ed. Medex; 2008. Free download from www.medex.org.uk. Easy to read, designed for both medical & lay readers. Available in a variety of languages & recommended for anyone contemplating any activity at high altitude.
- Pollard AJ, Murdoch DR. The high altitude medicine handbook. 3rd ed. Abingdon: Radcliffe Medical Press; 2003. A little dated now, but an excellent resource designed for both medical and lay readers.
- West JB, Schoene RB, Luks AM, Milledge JS. High altitude medicine and physiology. 5th ed. Boca Raton: CRC Press; 2012. The definitive textbook – a tremendous resource for the dedicated high altitude doctor, but probably too in-depth for most.

Chapter 8

Medical Support of Special Operations

Frank K. Butler and Charles W. Beadling

Abstract “Special operations” as applied to the US military describe a variety of missions carried out by highly select units from the Army, Navy, and Air Force. Individuals in these units are subjected to notably rigorous selection and training in preparation for missions which are often extremely physically demanding and carried out with limited support from larger conventional forces. Special operations units are required to operate under environmental extremes, in isolated, austere locations and with very limited supplies. Providing optimal medical support to these units requires a detailed understanding of the organizational structure of Special Operations Forces, the nature of the missions, the medical administrative tasks which must be addressed, acute and primary medical care, preventive medicine and the management of combat trauma in this special environment. These issues have not been previously addressed in a single comprehensive document. This chapter will meet that need; it draws substantially from a chapter published previously in the Textbook of Military Medicine.

Keywords Special operations • Medical Support • Care Under Fire • Tactical Field Care • Tactical evaluation care

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Objectives

To detail the types of special operations missions and the medical support/ care (both combat and routine) that is provided to them.

Introduction

“Special operations” as applied to the US military describe a variety of missions carried out by highly select units from the Army, Navy, and Air Force. Individuals in these units are subjected to notably rigorous selection and training in preparation for missions which are often extremely physically demanding and carried out with limited support from larger conventional forces. Special operations units are required to operate under environmental extremes, in isolated, austere locations and with very limited supplies. Providing optimal medical support to these units requires a detailed understanding of the organizational structure of Special Operations Forces, the nature of the missions, the medical administrative tasks which must be addressed, acute and primary medical care, preventive medicine and the management of combat trauma in this special environment. These issues have not been previously addressed in a single comprehensive document. This chapter will meet that need; it draws substantially from a chapter published previously in the *Textbook of Military Medicine* [1].

Types of Special Operations Missions

US Special Operations Command (USSOCOM) Forces conduct a wide variety of missions both during armed conflicts and peacetime [2]. Although SOF combat operations are often carried out in support of conventional forces, special operations missions typically involve relatively small force elements operating clandestinely in areas that are geographically remote from main bodies of conventional forces. Some relevant missions performed by SOF personnel are described next [2]:

- *Civil Affairs*: Activities that establish, maintain, or influence relations between military forces, civil authorities, and the civilian population to accomplish national objectives. CA may include the performance by military forces of functions that are normally the responsibility of local government.
- *Combatting Terrorism*: Active measures undertaken to prevent, deter, and respond to terrorist activities.
- *Direct Action*: Short duration strikes and other small-scale offensive actions to seize, destroy, capture, recover, or inflict damage upon designated personnel or materiel.

- *Foreign Internal Defence/Civic Action*: Missions which provide assistance to another country to help free and protect its citizens from subversion, lawlessness, and insurgency.

USSOCOM's collateral missions include:

- *Humanitarian Assistance*: Programmes conducted to prevent or reduce pain, hunger, or loss of life resulting from natural or manmade disasters or endemic conditions.
- *Operations Other Than War*: Many of the primary and collateral missions assigned to SOF can be conducted not only during wartime but also during operations described broadly as operations other than war. These missions are being undertaken with increasing frequency. It is important to recognize, however, that these operations often involve great risk and may transition rapidly into hostile encounters.

Routine Medical Support of SOF Forces

The primary responsibility of SOF medical personnel is to provide medical support to the United States and allied Coalition SOF. This mission is often referred to as Force Health Protection, as it includes preventive medicine, primary and acute medical care, as well as combat trauma care. Providing care for partner nation populations is a secondary mission, either as part of a relief effort following a disaster or to improve the health and well-being of the partner nation population through delivering health care or building the capacity of the local health system.

During times when SOF are not engaged in a conflict, there is nonetheless a busy cycle of training and operational exercises. SOF medical personnel play a critical part in helping their units to maintain their operational readiness. In this setting, the need to care for combat casualties is not routinely encountered in the daily activities of SOF medical personnel. For humanitarian assistance and disaster response (HA/DR) missions, SOF medical personnel require competency for the functions noted in the sections that follow.

Primary Health Care

SOF medical personnel must be able to deal with the routine problems encountered in providing health care and periodic physicals to a group of generally healthy young and (lest we forget the colonels and the master chiefs) not-so-young individuals. The establishment of efficient and well-run sick call procedures for SOF units is essential. It is generally expected that most SOF units will have primary medical care for their active duty personnel provided by the medical personnel organic to the unit if at all possible. Care for dependents is less common and

paediatric and ob-gyn care may be best accomplished at a clinic which routinely deals with patients in these specialties. SOF medical personnel should work to establish a rapport with the local referral medical treatment facility so that consults to that facility will be handled promptly. It may be a very worthwhile investment in time to visit the facility with a senior line commander on a periodic basis and to invite the hospital or clinic leadership to visit the SOF compound for a tour so that they can better understand and appreciate SOF and missions.

Sports Medicine

Special operations personnel are in reality tactical athletes and are required to maintain an extremely high level of physical fitness in order to perform the many physically demanding activities encountered in their operations. This requirement necessitates a heavy emphasis on both strength and aerobic physical training in SOF units. Associated with these rigorous training schedules is a high incidence of traumatic and overuse musculoskeletal injuries. If these exercise-related injuries are not accurately diagnosed and treated with the most effective therapeutic measures available, they may result in unnecessarily long recovery periods. This may have detrimental effects on operational readiness as well as on the long-term health of the service member.

In order to ensure that the best possible care is obtained for these injuries, a proactive sports medicine programme with a self-contained rehabilitation facility, as well as regular supervision by physical therapists, physical therapy technicians, and/or athletic trainers, should be a high priority of every SOF major command, as should a close relationship with the orthopaedic department of the nearest service medical facility. Most internships provide relatively little instruction and training in sports medicine. SOF physicians should receive supplemental training in this area shortly after reporting on board unless they are already well qualified.

Occupational Medicine

SOF medical personnel frequently encounter occupational medicine issues. The need to conduct prolonged training evolutions in harsh environments may result in heat, cold, or actinic (sun induced) injury if reasonable guidelines for preventing such injuries are not established and followed. Other occupational health hazards might include biomechanical injuries such as impact, jolt, vibration, and blast exposures; toxic hazards such as propellant gases from munitions, smoke and obscurants, and combustion by-products such as carbon monoxide; and potential electromagnetic hazards from imaging and communications equipment. There are also potential health effects from the stress, sleep disruptions, and neglected nutritional needs that often accompany SOF operations and training exercises. SOF medical

personnel must be alert for the presence of such hazards and implement whatever measures are needed to reduce the risk and monitor the well-being of their units.

Medical Readiness

Shifts in national defence policy, a changing worldwide geopolitical picture, and advances in medical care create a constantly evolving environment for Special Operations Forces. SOF medical personnel must monitor all of these changes and evaluate the ability of their personnel and equipment resources to meet their units' medical needs in the light of these changes.

Preventive Medicine

Preventive medicine measures are an important aspect of in-theatre medical support. Sanitation and hygiene inspections should be conducted to ensure that the deployed forces have the safest living and eating spaces possible. Medical officers should be aggressive in making recommendations to line commanders regarding such issues as thermal stress and sleep hygiene, since both of these areas may have a direct impact of operational success.

Tactical Combat Casualty Care in Special Operations

Tactical Combat Casualty Care in the SOF environment has been addressed in a summary paper [3]. Trauma care training for SOF physicians, corpsmen, and medics has historically been based primarily on the principles taught in the Advanced Trauma Life Support (ATLS) course [4]. ATLS provides a well-thought-out, standardized approach to the management of trauma that has proven very successful when used in the setting of a hospital emergency department. The value of at least some aspects of ATLS in the *prehospital* setting, however, has been questioned [5–27].

The importance of the prehospital phase in caring for combat casualties is evident from the fact that approximately 90 % of combat deaths occur on the battlefield before the casualty reaches a military treatment facility (MTF) [28]. The standard ATLS course makes no mention of the exigencies of combat care, and perceived shortcomings of ATLS in the combat environment have been addressed by military medical authors [24, 29–33]. The need to make significant modifications to the principles of care taught in ATLS is obvious when considering the complicating effect of such factors as darkness, hostile fire, medical equipment limitations, multiple casualties, longer evacuation times, and the unique problems entailed in transporting casualties which occur in special operations [3].

Stages of Care

It is useful to consider the management of casualties which occur during direct action SOF missions as being divided into several distinct phases of care as described next [3, 34]:

1. *Care Under Fire* is the care rendered by the medic or corpsman at the scene of the injury, while he/she and the casualty are still under effective hostile fire. Available medical equipment is limited to that carried by each operator on the mission or by the corpsman or medic in his medical pack.
2. *Tactical Field Care* is the care rendered by the medic or corpsman once he and the casualty are no longer under effective hostile fire. It also applies to situations in which an injury has occurred on a mission, but there has been no hostile fire. Available medical equipment is still limited to that carried into the field by mission personnel. Time prior to evacuation to an MTF may range from a few minutes to many hours.
3. *Tactical Evacuation Care* is care rendered once the casualty has been picked up by an aircraft, vehicle, or boat. Additional personnel and medical equipment which has been pre-staged in these assets should be available at this stage of casualty management. The term “TACEVAC” encompasses both casualty evacuation (CASEVAC) which entails the use of armed, armoured, evacuation platforms that are not marked with the Red Cross as well as unarmed medical evacuation (MEDEVAC) helicopters that do bear Red Cross markings.

Basic Tactical Combat Casualty Care Plan

Having identified the three phases of casualty management in the SOF tactical setting, the next step is to outline in a general way the care which is appropriate to each phase. A basic tactical casualty management plan is presented in Tables 8.1, 8.2, and 8.3. This management plan is a generic sequence of steps that will often require modification for specific SOF casualty scenarios, but the basic plan is important as a starting point from which development of individualized scenario-based management plans may begin. A detailed rationale for the steps outlined in the basic management plan for each of these stages of care has been presented [3, 34]. A few of the major differences between this management plan and ATLS will be reviewed here.

Care Under Fire

A minimal amount of medical care should be attempted, while the casualty and corpsman or medic are actually under effective hostile fire. The temporary use of a tourniquet to manage life-threatening extremity haemorrhage is appropriate in light

Table 8.1 Basic TCCC management plan. Phase one: Basic management plan for Care Under Fire. 25 June 2012

-
1. Return fire and take cover
 2. Direct or expect casualty to remain engaged as a combatant if appropriate
 3. Direct casualty to move to cover and apply self-aid if able
 4. Try to keep the casualty from sustaining additional wounds
 5. Casualties should be extricated from burning vehicles or buildings and moved to places of relative safety. Do what is necessary to stop the burning process
 6. Airway management is generally best deferred until the Tactical Field Care phase
 7. Stop life-threatening external haemorrhage if tactically feasible
 - Direct casualty to control haemorrhage by self-aid if able
 - Use a CoTCCC-recommended tourniquet for haemorrhage that is anatomically amenable to tourniquet application
 - Apply the tourniquet proximal to the bleeding site, over the uniform, tighten, and move the casualty to cover
-

Used with permission from PreTrauma Life Support Committee of the National Association of Emergency Medical Technicians in cooperation with the Committee on Trauma of the American College of Surgeons [90]

http://www.usaisr.amedd.army.mil/assets/pdfs/TCCC_Guidelines_130830.pdf

Table 8.2 Basic TCCC management plan. Phase two: Tactical Field Care. 25 June 2012

-
1. Casualties with an altered mental status should be disarmed immediately
 2. Airway management
 - (a) Unconscious casualty without airway obstruction
 - Chin-lift or jaw-thrust manoeuvre
 - Nasopharyngeal airway
 - Place casualty in the recovery position
 - (b) Casualty with airway obstruction or impending airway obstruction
 - Chin-lift or jaw-thrust manoeuvre
 - Nasopharyngeal airway
 - Allow casualty to assume any position that best protects the airway, to include sitting up
 - Place unconscious casualty in the recovery position
 - If previous measures unsuccessful
 - Surgical cricothyroidotomy (with lidocaine if conscious)
 3. Breathing
 - (a) In a casualty with progressive respiratory distress and known or suspected torso trauma, consider a tension pneumothorax and decompress the chest on the side of the injury with a 14-gauge, 3.25-in. needle/catheter unit inserted in the second intercostal space at the midclavicular line. Ensure that the needle entry into the chest is not medial to the nipple line and is not directed towards the heart. An acceptable alternate site is the fourth or fifth intercostal space at the anterior axillary line (AAL)
 - (b) All open and/or sucking chest wounds should be treated by immediately applying an occlusive material to cover the defect and securing it in place. Monitor the casualty for the potential development of a subsequent tension pneumothorax
 - (c) *Casualties with moderate/severe TBI should be given supplemental oxygen when available to maintain an oxygen saturation >90%*
-

(continued)

Table 8.2 (continued)**4. Bleeding**

- (a) Assess for unrecognized haemorrhage and control all sources of bleeding. If not already done, use a CoTCCC-recommended tourniquet to control life-threatening external haemorrhage that is anatomically amenable to tourniquet application or for any traumatic amputation. Apply directly to the skin 2–3 in. above wound
- (b) For compressible haemorrhage not amenable to tourniquet use or as an adjunct to tourniquet removal (if evacuation time is anticipated to be longer than 2 h), use Combat Gauze as the haemostatic agent of choice. Combat Gauze should be applied with at least 3 min of direct pressure. Before releasing any tourniquet on a casualty who has been resuscitated for haemorrhagic shock, ensure a positive response to resuscitation efforts (i.e. a peripheral pulse normal in character and normal mentation if there is no traumatic brain injury (TBI). **If a lower extremity wound is not amenable to tourniquet application and cannot be controlled by haemostatics/dressings, consider immediate application of mechanical direct pressure including CoTCCC-recommended devices such as the Combat Ready Clamp (CRoC)**)
- (c) Reassess prior tourniquet application. Expose wound and determine if tourniquet is needed. If so, move tourniquet from over uniform and apply directly to skin 2–3 in. above wound. If a tourniquet is not needed, use other techniques to control bleeding
- (d) When time and the tactical situation permit, a distal pulse check should be accomplished. If a distal pulse is still present, consider additional tightening of the tourniquet or the use of a second tourniquet, side by side and proximal to the first, to eliminate the distal pulse
- (e) Expose and clearly mark all tourniquet sites with the time of tourniquet application. Use an indelible marker

5. Intravenous (IV) access

Start an 18-gauge IV or saline lock if indicated

If resuscitation is required and IV access is not obtainable, use the intraosseous (IO) route

6. Tranexamic acid (TXA)

If a casualty is anticipated to need significant blood transfusion (e.g. presents with haemorrhagic shock, one or more major amputations, penetrating torso trauma, or evidence of severe bleeding)

Administer 1 gramme of tranexamic acid in 100 cc normal saline or lactated Ringer as soon as possible but not later than 3 h after injury

Begin second infusion of 1 g TXA after Hextend or other fluid treatment

Note: Per the Assistant Secretary of Defence for Health Affairs memo dated 4 November 2011, use of TXA outside of fixed medical facilities is limited to the special operations community

7. Fluid resuscitation

Assess for haemorrhagic shock, altered mental status (in the absence of head injury), and weak or absent peripheral pulses are the best field indicators of shock

- (a) If not in shock
 - No IV fluids necessary
 - PO fluids permissible if conscious and can swallow
- (b) If in shock
 - Hextend, 500 mL IV bolus
 - Repeat once after 30 min if still in shock
 - No more than 1,000 mL of Hextend
- (c) Continued efforts to resuscitate must be weighed against logistical and tactical considerations and the risk of incurring further casualties
- (d) If a casualty with an altered mental status due to suspected TBI has a weak or absent peripheral pulse, resuscitate as necessary to maintain a palpable radial pulse**

8. Prevention of hypothermia

- (a) Minimize casualty's exposure to the elements. Keep protective gear on or with the casualty if feasible
- (b) Replace wet clothing with dry if possible. **Get the casualty onto an insulated surface as soon as possible**
- (c) **Apply the Ready-Heat Blanket from the Hypothermia Prevention and Management Kit (HPMK) to the casualty's torso (not directly on the skin) and cover the casualty with the Heat-Reflective Shell (HRS)**
- (d) **If an HRS is not available, the previously recommended combination of the Blizzard Survival Blanket and the Ready-Heat Blanket may also be used**
- (e) If the items mentioned above are not available, use dry blankets, poncho liners, sleeping bags, or anything that will retain heat and keep the casualty dry
- (f) **Warm fluids are preferred if IV fluids are required**

9. Penetrating eye trauma

If a penetrating eye injury is noted or suspected

- (a) Perform a rapid field test of visual acuity
- (b) Cover the eye with a rigid eye shield (not a pressure patch)
- (c) Ensure that the 400-mg moxifloxacin tablet in the combat pill pack is taken if possible and that IV/IM antibiotics are given as outlined below if oral moxifloxacin cannot be taken

10. Monitoring

Pulse oximetry should be available as an adjunct to clinical monitoring. *All individuals with moderate/severe TBI should be monitored with pulse oximetry.* Readings may be misleading in the settings of shock or marked hypothermia

11. Inspect and dress known wounds

12. Check for additional wounds

13. Provide analgesia as necessary

Note: Ketamine must not be used if the casualty has suspected penetrating eye injury or significant TBI (evidenced by penetrating brain injury or head injury with altered level of consciousness)

(a) Able to fight

These medications should be carried by the combatant and self-administered as soon as possible after the wound is sustained

Mobic, 15 mg PO once a day

Tylenol, 650-mg bilayer caplet, 2 PO every 8 h

(b) Unable to fight

Note: Have naloxone readily available whenever administering opiates

Does not otherwise require IV/IO access

Oral transmucosal fentanyl citrate (OTFC), 800 µg transbucally

Recommend taping lozenge on a stick to casualty's finger as an added safety measure

Reassess in 15 min

Add second lozenge, in other cheek, as necessary to control severe pain

Monitor for respiratory depression

or

Ketamine 50–100 mg IM

Repeat dose every 30 min to 1 h as necessary to control severe pain or until the casualty develops nystagmus (rhythmic eye movement back and forth)

or

Ketamine 50 mg intranasal (using nasal atomizer device)

(continued)

Table 8.2 (continued)

Repeat dose every 30 min to 1 h as necessary to control severe pain or until the casualty develops nystagmus

IV or IO access obtained

Morphine sulphate, 5 mg IV/IO

Reassess in 10 min.

Repeat dose every 10 min as necessary to control severe pain

Monitor for respiratory depression

or

Ketamine 20 mg slow IV/IO push over 1 min

Reassess in 5–10 min.

Repeat dose every 5–10 min as necessary to control severe pain or until the casualty develops nystagmus

Continue to monitor for respiratory depression and agitation

Promethazine, 25 mg IV/IM/IO every 6 h as needed for nausea or for synergistic analgesic effect

Note: Narcotic analgesia should be avoided in casualties with respiratory distress, decreased oxygen saturation, shock, or decreased level of consciousness

14. Splint fractures and recheck pulse

15. Antibiotics is recommended for all open combat wounds

(a) If able to take PO

Moxifloxacin, 400 mg PO once a day

(b) If unable to take PO (shock, unconsciousness)

Cefotetan, 2 g IV (slow push over 3–5 min) or IM every 12 h

or

Ertapenem, 1 g IV/IM once a day

16. Burns

(a) Facial burns, especially those that occur in closed spaces, may be associated with inhalation injury. Aggressively monitor airway status and oxygen saturation in such patients and consider early surgical airway for respiratory distress or oxygen desaturation

(b) Estimate total body surface area (TBSA) burned to the nearest 10 % using the Rule of Nines.

(c) Cover the burn area with dry, sterile dressings. For extensive burns (>20 %), consider placing the casualty in the Heat-Reflective Shell or Blizzard Survival Blanket from the Hypothermia Prevention Kit in order to both cover the burned areas and prevent hypothermia

(d) Fluid resuscitation (USAIRS Rule of Ten)

If burns are greater than 20 % of total body surface area, fluid resuscitation should be initiated as soon as IV/IO access is established. Resuscitation should be initiated with lactated Ringer, normal saline, or Hextend. If Hextend is used, no more than 1,000 ml should be given, followed by lactated Ringer or normal saline as needed

Initial IV/IO fluid rate is calculated as %TBSA × 10 cc/h for adults weighing 40–80 kg

For every 10 kg above 80 kg, increase initial rate by 100 ml/h

If haemorrhagic shock is also present, resuscitation for haemorrhagic shock takes precedence over resuscitation for burn shock. Administer IV/IO fluids per the TCCC Guidelines in Section 6

(e) Analgesia in accordance with the TCCC Guidelines in Section 12 may be administered to treat burn pain

(f) Prehospital antibiotic therapy is not indicated solely for burns, but antibiotics should be given per the TCCC guidelines in Section 14 if indicated to prevent infection in penetrating wounds

(g) All TCCC interventions can be performed on or through burned skin in a burn casualty

 17. Communicate with the casualty if possible

- Encourage; reassure
- Explain care

18. Cardiopulmonary resuscitation (CPR)

Resuscitation on the battlefield for victims of blast or penetrating trauma who have no pulse, no ventilations, and no other signs of life will not be successful and should not be attempted. **However, casualties with torso trauma or polytrauma who have no pulse or respirations during TFC should have bilateral needle decompression performed to ensure they do not have a tension pneumothorax prior to discontinuation of care. The procedure is the same as described in Section 3 above**

19. Documentation of care

Document clinical assessments, treatments rendered, and changes in the casualty's status on a TCCC Casualty Card. Forward this information with the casualty to the next level of care

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All changes to the guidelines made since those published in the 2011 Seventh Edition of the PHTLS Manual are shown in bold text. The most recent changes are shown in italics text

http://www.usaisr.amedd.army.mil/assets/pdfs/TCCC_Guidelines_130830.pdf

Table 8.3 Basic TCCC management plan. Phase three: Tactical evacuation (TACEVAC) care. 25 June 2012

1. Airway management

(a) Unconscious casualty without airway obstruction

- Chin-lift or jaw-thrust manoeuvre
- Nasopharyngeal airway
- Place casualty in the recovery position

(b) Casualty with airway obstruction or impending airway obstruction

- Chin-lift or jaw-thrust manoeuvre
- Nasopharyngeal airway
- Allow casualty to assume any position that best protects the airway, to include sitting up
- Place unconscious casualty in the recovery position
- If above measures unsuccessful
 - Supraglottic airway*
 - Endotracheal intubation
 - Surgical cricothyroidotomy (with lidocaine if conscious)

(c) Spinal immobilization is not necessary for casualties with penetrating trauma

2. Breathing

- (a) In a casualty with progressive respiratory distress and known or suspected torso trauma, consider a tension pneumothorax and decompress the chest on the side of the injury with a 14-gauge, 3.25-in. needle/catheter unit inserted in the second intercostal space at the midclavicular line. Ensure that the needle entry into the chest is not medial to the nipple line and is not directed towards the heart. *An acceptable alternate site is the fourth or fifth intercostal space at the anterior axillary line (AAL)*
 - (b) Consider chest tube insertion if no improvement and/or long transport is anticipated
 - (c) Most combat casualties do not require supplemental oxygen, but administration of oxygen may be of benefit for the following types of casualties:
 - Low oxygen saturation by pulse oximetry
 - Injuries associated with impaired oxygenation
-

(continued)

Table 8.3 (continued)

Unconscious casualty
Casualty with TBI (maintain oxygen saturation >90 %)
Casualty in shock
Casualty at altitude
(d) All open and/or sucking chest wounds should be treated by immediately applying an occlusive material to cover the defect and securing it in place. Monitor the casualty for the potential development of a subsequent tension pneumothorax
3. Bleeding
(a) Assess for unrecognized haemorrhage and control all sources of bleeding. If not already done, use a CoTCCC-recommended tourniquet to control life-threatening external haemorrhage that is anatomically amenable to tourniquet application or for any traumatic amputation. Apply directly to the skin 2–3 in. above wound
(b) For compressible haemorrhage not amenable to tourniquet use or as an adjunct to tourniquet removal (if evacuation time is anticipated to be longer than 2 h), use Combat Gauze as the haemostatic agent of choice. Combat Gauze should be applied with at least 3 min of direct pressure. Before releasing any tourniquet on a casualty who has been resuscitated for haemorrhagic shock, ensure a positive response to resuscitation efforts (i.e. a peripheral pulse normal in character and normal mentation if there is no TBI.) If a lower extremity wound is not amenable to tourniquet application and cannot be controlled by haemostatics/dressings, consider immediate application of mechanical direct pressure including CoTCCC-recommended devices such as the Combat Ready Clamp (CRoC)
(c) Reassess prior tourniquet application. Expose wound and determine if tourniquet is needed. If so, move tourniquet from over uniform and apply directly to skin 2–3 in. above wound. If a tourniquet is not needed, use other techniques to control bleeding
(d) When time and the tactical situation permit, a distal pulse check should be accomplished. If a distal pulse is still present, consider additional tightening of the tourniquet or the use of a second tourniquet, side by side and proximal to the first, to eliminate the distal pulse
(e) Expose and clearly mark all tourniquet sites with the time of tourniquet application. Use an indelible marker
4. Intravenous (IV) access
(a) Reassess need for IV access
If indicated, start an 18-gauge IV or saline lock
If resuscitation is required and IV access is not obtainable, use intraosseous (IO) route
5. Tranexamic acid (TXA)
If a casualty is anticipated to need significant blood transfusion (e.g. presents with haemorrhagic shock, one or more major amputations, penetrating torso trauma, or evidence of severe bleeding)
Administer 1 gramme of tranexamic acid in 100 cc normal saline or lactated Ringer as soon as possible but NOT later than 3 h after injury
Begin second infusion of 1 g TXA after Hextend or other fluid treatment
Note: Per the Assistant Secretary of Defence for Health Affairs memo dated 4 November 2011, use of TXA outside of fixed medical facilities is limited to the special operations community
6. Traumatic brain injury
(a) <i>Casualties with moderate/severe TBI should be monitored for</i>
1. <i>Decreases in level of consciousness</i>
2. <i>Pupillary dilation</i>
3. <i>SBP should be >90 mmHg</i>
4. <i>O₂ sat >90</i>
5. <i>Hypothermia</i>

-
6. *PCO₂ (If capnography is available, maintain between 35 and 40 mmHg)*
 7. *Penetrating head trauma (if present, administer antibiotics)*
 - (b) *Unilateral pupillary dilation accompanied by a decreased level of consciousness may signify impending cerebral herniation; if these signs occur, take the following actions to decrease intracranial pressure:*
 1. *Administer 250 cc of 3 or 5% hypertonic saline bolus*
 2. *Elevate the casualty's head 30°*
 3. *Hyperventilate the casualty*
 - (a) *Respiratory rate 20*
 - (b) *Capnography should be used to maintain the end-tidal CO₂ between 30 and 35*
 - (c) *The highest oxygen concentration (FIO₂) possible should be used for hyperventilation*

Notes:

Do not hyperventilate unless signs of impending herniation are present

Casualties may be hyperventilated with oxygen using the bag-valve-mask technique

7. Fluid resuscitation

Reassess for haemorrhagic shock (altered mental status in the absence of brain injury and/or change in pulse character) **If BP monitoring is available, maintain target systolic BP 80–90 mmHg**

- (a) If not in shock

No IV fluids necessary

PO fluids permissible if conscious and can swallow

- (b) **If in shock and blood products are not available**

Hextend 500 mL IV bolus

Repeat after 30 min if still in shock

Continue resuscitation with Hextend or crystalloid solution as needed to maintain target BP or clinical improvement

- (c) **If in shock and blood products are available under an approved command or theatre protocol**

Resuscitate with 2 units of plasma followed by packed red blood cells (PRBCs) in a 1:1 ratio. If blood component therapy is not available, transfuse fresh whole blood

Continue resuscitation as needed to maintain target BP or clinical improvement

- (d) **If a casualty with an altered mental status due to suspected TBI has a weak or absent peripheral pulse, resuscitate as necessary to maintain a palpable radial pulse. If BP monitoring is available, maintain target systolic BP of at least 90 mmHg**

8. Prevention of hypothermia

- (a) Minimize casualty's exposure to the elements. Keep protective gear on or with the casualty if feasible

- (b) Replace wet clothing with dry if possible. **Get the casualty onto an insulated surface as soon as possible**

- (c) **Apply the Ready-Heat Blanket from the Hypothermia Prevention and Management Kit (HPMK) to the casualty's torso (not directly on the skin) and cover the casualty with the Heat-Reflective Shell (HRS)**

- (d) **If an HRS is not available, the previously recommended combination of the Blizzard Survival Blanket and the Ready-Heat Blanket may also be used**

- (e) If the items mentioned above are not available, use poncho liners, sleeping bags, or anything that will retain heat and keep the casualty dry

- (f) **Use a portable fluid warmer capable of warming all IV fluids including blood products**

- (g) Protect the casualty from wind if doors must be kept open

(continued)

Table 8.3 (continued)

9. Penetrating eye trauma

If a penetrating eye injury is noted or suspected

- (a) Perform a rapid field test of visual acuity
- (b) Cover the eye with a rigid eye shield (not a pressure patch)
- (c) Ensure that the 400-mg moxifloxacin tablet in the combat pill pack is taken if possible and that IV/IM antibiotics are given as outlined below if oral moxifloxacin cannot be taken

10. Monitoring

Institute pulse oximetry and other electronic monitoring of vital signs, if indicated. *All individuals with moderate/severe TBI should be monitored with pulse oximetry*

11. Inspect and dress known wounds if not already done

12. Check for additional wounds

13. Provide analgesia as necessary

Note: Ketamine must not be used if the casualty has suspected penetrating eye injury or significant TBI (evidenced by penetrating brain injury or head injury with altered level of consciousness)

(a) Able to fight

These medications should be carried by the combatant and self-administered as soon as possible after the wound is sustained

Mobic, 15 mg PO once a day

Tylenol, 650-mg bilayer caplet, 2 PO every 8 h

(b) Unable to fight

Note: Have naloxone readily available whenever administering opiates

Does not otherwise require IV/IO access

Oral transmucosal fentanyl citrate (OTFC), 800 µg transbucally

Recommend taping lozenge on a stick to casualty's finger as an added safety measure

Reassess in 15 min

Add second lozenge, in other cheek, as necessary to control severe pain

Monitor for respiratory depression

or

Ketamine 50–100 mg IM

Repeat dose every 30 min to 1 h as necessary to control severe pain or until the casualty develops nystagmus (rhythmic eye movement back and forth)

or

Ketamine 50 mg intranasal (using nasal atomizer device)

Repeat dose every 30 min to 1 h as necessary to control severe pain or until the casualty develops nystagmus

IV or IO access obtained

Morphine sulphate, 5 mg IV/IO

Reassess in 10 min

Repeat dose every 10 min as necessary to control severe pain

Monitor for respiratory depression

or

Ketamine 20 mg slow IV/IO push over 1 min

Reassess in 5–10 min

Repeat dose every 5–10 min as necessary to control severe pain or until the casualty develops nystagmus

Continue to monitor for respiratory depression and agitation

Promethazine, 25 mg IV/IM/IO every 6 h as needed for nausea or for synergistic analgesic effect

Note: Narcotic analgesia should be avoided in casualties with respiratory distress, decreased oxygen saturation, shock, or decreased level of consciousness

13. Reassess fractures and recheck pulses

14. Antibiotics is recommended for all open combat wounds

- (a) If able to take PO
 - Moxifloxacin, 400 mg PO once a day
- (b) If unable to take PO (shock, unconsciousness)
 - Cefotetan, 2 g IV (slow push over 3–5 min) or IM every 12 h
- or
 - Ertapenem, 1 g IV/IM once a day

15. Burns

- (a) Facial burns, especially those that occur in closed spaces, may be associated with inhalation injury. Aggressively monitor airway status and oxygen saturation in such patients and consider early surgical airway for respiratory distress or oxygen desaturation
- (b) Estimate total body surface area (TBSA) burned to the nearest 10 % using the Rule of Nines
- (c) Cover the burn area with dry, sterile dressings. For extensive burns (>20 %), consider placing the casualty in the Heat-Reflective Shell or Blizzard Survival Blanket from the Hypothermia Prevention Kit in order to both cover the burned areas and prevent hypothermia

(d) Fluid resuscitation (USAISR Rule of Ten)

If burns are greater than 20 % of total body surface area, fluid resuscitation should be initiated as soon as IV/IO access is established. Resuscitation should be initiated with lactated Ringer, normal saline, or Hextend. If Hextend is used, not more than 1,000 ml should be given, followed by lactated Ringer or normal saline as needed

Initial IV/IO fluid rate is calculated as %TBSA × 10 cc/h for adults weighing 40–80 kg

For every 10 kg above 80 kg, increase initial rate by 100 ml/h

If haemorrhagic shock is also present, resuscitation for haemorrhagic shock takes precedence over resuscitation for burn shock. Administer IV/IO fluids per the TCCC Guidelines in Section 5

- (e) Analgesia in accordance with TCCC Guidelines in Section 11 may be administered to treat burn pain
- (f) Prehospital antibiotic therapy is not indicated solely for burns, but antibiotics should be given per TCCC guidelines in Section 13 if indicated to prevent infection in penetrating wounds
- (g) All TCCC interventions can be performed on or through burned skin in a burn casualty
- (h) Burn patients are particularly susceptible to hypothermia. Extra emphasis should be placed on barrier heat loss prevention methods and IV fluid warming in this phase

16. The pneumatic antishock garment (PASG) may be useful for stabilizing pelvic fractures and controlling pelvic and abdominal bleeding. Application and extended use must be carefully monitored. The PASG is contraindicated for casualties with thoracic or brain injuries

17. CPR in TACEVAC Care

- (a) **Casualties with torso trauma or polytrauma who have no pulse or respirations during TACEVAC should have bilateral needle decompression performed to ensure they do not have a tension pneumothorax. The procedure is the same as described in Section 2 above**
- (b) **CPR may be attempted during this phase of care if the casualty does not have obviously fatal wounds and will be arriving at a facility with a surgical capability within a short period of time. CPR should not be done at the expense of compromising the mission or denying life-saving care to other casualties**

(continued)

Table 8.3 (continued)

18. Documentation of care

Document clinical assessments, treatments rendered, and changes in casualty's status on a TCCC Casualty Card. Forward this information with the casualty to the next level of care

Used with permission from PreTrauma Life Support Committee of the National Association of Emergency Medical Technicians in cooperation with the Committee on Trauma of the American College of Surgeons [90]

The term "tactical evacuation" includes both casualty evacuation (CASEVAC) and medical evacuation (MEDEVAC) as defined in Joint Publication 4-02 (All changes to the guidelines made since those published in the 2011 Seventh Edition of the PHTLS Manual are shown in bold text. The most recent changes are shown in italics)

http://www.usaistr.amedd.army.mil/assets/pdfs/TCCC_Guidelines_130830.pdf

of the fact that haemorrhage from extremity wounds was the cause of death in more than 2,500 casualties in Vietnam who had no other injuries [35]. Use of direct pressure or compression dressings may result in delays in getting the casualty to cover, exposing both casualty and rescuer to increased hazard of additional injury. They may also be less effective than a tourniquet at stopping the bleeding during the initial combat rescue in which the casualty may have to be dragged or carried to cover by the rescuer.

There is no requirement to immobilize the cervical spine prior to moving a casualty out of a firefght if he has a penetrating neck or head wound. Arishita, Vayer, and Bellamy examined the value of cervical spine immobilization in penetrating neck injuries in Vietnam and found that in only 1.4 % of patients with penetrating neck injuries would immobilization of the cervical spine have been of possible benefit [5]. The risk of additional hostile fire injuries to both casualty and rescuer while immobilization is being attempted poses a much more significant threat in this setting than that of damage to the spinal cord from failure to immobilize the neck [5].

Tactical Field Care

If a trauma patient is found to be in cardiopulmonary arrest on the battlefield as a result of blast or penetrating trauma, attempts at cardiopulmonary resuscitation are not appropriate, although bilateral needle decompression of possible tension pneumothoraces should be performed before attempts at resuscitation are abandoned [3, 36]. Prehospital CPR in trauma patients in cardiac arrest has been found to be futile even in the urban setting where the victim is in close proximity to trauma centers. One study reported no survivors out of 138 trauma patients who suffered a prehospital cardiac arrest in whom resuscitation was attempted [37]. Only in the case of non-traumatic disorders such as hypothermia, near drowning, or electrocution should cardiopulmonary resuscitation be performed [34].

Unconscious casualties should have their airways opened with the chin-lift or jaw-thrust manoeuvres. If spontaneous respirations are present and there is no respiratory distress, a nasopharyngeal airway is the airway of choice in these patients.

The two main advantages of this device are that it is better tolerated than an oropharyngeal airway should the patient suddenly regain consciousness and that it is less likely to be dislodged during transport [3].

Should an airway obstruction develop or persist despite the use of a nasopharyngeal airway, a more definitive airway is required. The ability of experienced paramedical personnel to master the technique of endotracheal intubation has been well documented [7, 8, 38–47]. This technique may be more difficult to accomplish in the SOF Tactical Field Care setting, however, for a number of reasons [3], and cricothyroidotomy is probably a better next step for SOF combat medics and corpsmen in most combat circumstances. This procedure has been reported to be safe and effective in trauma victims [48]. It may well be the only feasible alternative for any potential intubationist in cases where the casualty has sustained maxillofacial wounds in which blood or disrupted anatomy precludes visualization of the vocal cords [24, 48]. This procedure is not without complications [49, 50] but SOF corpsmen and medics are all trained in this technique.

A presumptive diagnosis of tension pneumothorax should be made when progressive, severe respiratory distress develops in the setting of unilateral penetrating chest trauma. The diagnosis of tension pneumothorax on the battlefield should not rely on such typical clinical signs as breath sounds, tracheal shift, and hyperresonance on percussion because these signs may not always be present [51] and, even if they are, they may be exceedingly difficult to appreciate on the battlefield. A patient with penetrating chest trauma will generally have some degree of hemo/pneumothorax as a result of his primary wound and the additional trauma caused by a needle thoracostomy would not be expected to significantly worsen his condition should he not actually have a tension pneumothorax [47]. All special operations corpsmen and medics are trained in this technique and should perform it in this setting. Paramedics are authorized to perform needle thoracostomy in some civilian emergency medical services [42, 47]. Chest tubes are not recommended in this phase of care [3]. Tube thoracostomy is generally not part of the paramedic's scope of care in civilian EMS settings [42, 47] nor were any studies found which address the use of this procedure by corpsmen and medics on the battlefield.

Tourniquets applied during the Care Under Fire phase should be replaced with Combat Gauze and a pressure dressing or direct pressure when the tactical situation allows if these measures are equally effective at controlling the haemorrhage in the tactical environment encountered, unless contraindications to tourniquet removal (e.g. a casualty in shock or an anticipated tourniquet time of less than 2 h) are present [34]. Casualties with proximal amputations that preclude the use of a tourniquet on a bleeding extremity should be treated with Combat Gauze and direct pressure. In lower extremity junctional haemorrhage, the Combat Ready Clamp may also be of use in controlling the bleeding [52].

Although standard trauma care involves starting two large bore (14 or 16 gauge) intravenous catheters [4], the use of an 18-gauge catheter is preferred in the field setting because of the increased ease of starting [3]. The larger catheters are needed to be able to administer large volumes of blood products rapidly, but this is not a factor in the tactical setting since blood products will not be available. Crystalloid

solutions can be administered rapidly through the 18-gauge catheters [53, 54]. Although larger bore catheters may subsequently need to be started upon arrival at an MTF, prehospital IVs are often discontinued upon arrival at an MTF because of concern about contamination of the IV site [55].

The use of tranexamic acid (TXA) in bleeding trauma patients has been found to produce a survival benefit [56, 57]. TXA should be given as soon as possible after injury [58]. The survival benefit is lost after 3 h and TXA given after this time may actually reduce survival [56].

Despite its frequent use, the benefit of prehospital fluid resuscitation in trauma patients has not been established [8–10, 12–14, 16, 18, 21, 23, 24, 27, 59]. The beneficial effect from crystalloid and colloid fluid resuscitation in haemorrhagic shock has been demonstrated largely on animal models where the volume of haemorrhage is controlled experimentally and resuscitation is initiated after the haemorrhage has been stopped [23, 25]. In uncontrolled haemorrhagic shock models, it is clear from the animal data that aggressive fluid resuscitation in the setting of an unrepaired vascular injury is associated with either no improvement in survival or increased mortality [11, 12, 17, 19–23, 25–27, 60–65]. This lack of benefit is presumably due to interference with vasoconstriction and haemostasis as the body attempts to adjust to the loss of blood volume and establishes haemostasis at the bleeding site. Several studies noted that only after previously uncontrolled haemorrhage was stopped did fluid resuscitation prove to be of benefit [64–67].

Three studies were found which address this issue in humans. One large study of 6,855 trauma patients found that although hypotension was associated with a significantly higher mortality rate, the administration of prehospital IV fluids did not influence this rate [16]. A retrospective analysis of patients with ruptured abdominal aortic aneurysms showed a survival rate of 30 % for patients who were treated with aggressive preoperative colloid fluid replacement; in contrast, there was a 77 % survival rate for patients in whom fluid resuscitation was withheld until the time of operative repair [67]. The author of that study strongly recommended that aggressive fluid resuscitation be withheld until the time of surgery in these patients. A large prospective trial examining this issue in 598 victims of penetrating torso trauma was recently published by Bickell and colleagues [6, 15]. They found that aggressive prehospital fluid resuscitation of patients with penetrating wounds of the chest and abdomen was associated with a higher mortality than seen in those for whom aggressive volume replacement was withheld until the time of surgical repair. Although confirmation of these findings in other randomized, prospective studies has not yet been obtained, no human studies were found which demonstrated any benefit from fluid replacement in patients with ongoing haemorrhage, which battle-field casualties with penetrating abdominal or thoracic trauma must be presumed to have prior to surgical repair of their injuries.

If fluid resuscitation is required for haemorrhagic shock in the Tactical Field Care phase, Hextend (6 % hetastarch) is recommended as an alternative to lactated Ringer's solution (LR) [34, 68, 69]. Lactated Ringer's solution is a crystalloid, which means that the primary osmotically active particle is sodium. Since the distribution of sodium is the entire extracellular fluid compartment, LR moves rapidly

from the intravascular space to the extravascular space. This shift has significant implications for fluid resuscitation. If one infuses 1,000 cc of LR into a trauma patient, 1 h later, only 200 cc of that volume remains in the intravascular space to replace lost blood volume [3]. This is not a problem in the civilian setting, since the average time for transport of the patient to the hospital in urban settings is less than 15 minutes. Once the patient has arrived at the hospital, infusion of blood products and surgical repair can be initiated rapidly. In the military setting, however, where several hours or more typically elapse before a casualty arrives at an MTF, effective volume resuscitation may be difficult to achieve with LR.

In contrast, the large hetastarch molecule in Hextend is retained in the intravascular space and there is no loss of fluid to the interstitium. Hextend actually draws fluid into the vascular space from the interstitium such that an infusion of 500 cc of Hespan results in an intravascular volume expansion that exceeds the amount of fluid infused [70], and this effect is sustained for 8 h or longer [71]. In addition to providing more effective expansion of the intravascular volume, a significant reduction in medical equipment weight is achieved by carrying Hextend instead of LR into the field. Four litres of LR weigh almost 9 lb, while the 500 cc of Hespan needed to achieve a similar sustained intravascular volume expansion weigh just over 1 lb [3]. Although concerns have been voiced about coagulopathies and changes in immune function associated with the use of Hextend [26, 72–75], these effects are not seen with infusion volumes of less than 1,500 cc [74–76]. Several papers have found Hextend to be a safe and effective alternative to LR in resuscitating patients with controlled haemorrhagic shock [77, 78]. Hextend is also felt to be an acceptable alternative to LR for intraoperative fluid replacement [79].

If the casualty is conscious and requires analgesia, it should be achieved with morphine, preferably administered intravenously, or oral transmucosal fentanyl citrate [34]. This mode of administration allows for much more rapid onset of analgesia and for more effective titration of dosage than intramuscular administration. An initial dose of 5 mg of morphine is given and repeated at 10 min intervals until adequate analgesia is achieved. If the casualty is in shock or is at high risk for shock, ketamine may be used as an alternative analgesic. Ketamine does not cause the cardiorespiratory depression seen with opiates and is a better choice in casualties with circulatory or respiratory compromise [80].

Infection is an important late cause of morbidity and mortality in wounds sustained on the battlefield. Parenteral (IV or IM) administration of antibiotics is required in casualties who are unconscious or who cannot take medications by mouth due to maxillofacial injuries. It is also required for casualties in shock, in whom the gastrointestinal tract blood flow may be inadequate for absorption of oral medications. In the 2003 PHTLS Manual, cefotetan was recommended as the parenteral antibiotic of choice for wound infection prophylaxis at the time of injury. It was chosen because of its longer duration of action as compared to the previously recommended cefoxitin. Cefotetan should be given over 3–5 min when given IV. It may also be given IM. Recently, however, interruptions in the production of cefotetan have caused the CoTCCC to seek an alternative for this drug. Ertapenem (Invanz®) was recommended by Murray as the best choice for a replacement

antibiotic because of its once-a-day dosing, excellent coverage, and good safety profile [81]. Ertapenem should not be mixed or co-infused with other medications to prevent crystallization and should not be mixed with diluents containing dextrose (alpha-D-glucose). It may be administered intramuscularly if needed [34].

The logistical burden of carrying, reconstituting, and injecting parenteral medications makes the use of oral antibiotics an attractive alternative when oral administration is possible [34]. In choosing antibiotic agents as part of the medic's loadout, characteristics such as effectiveness across a broad range of potential bacterial pathogens, minimal side effects, environmental stability, simple and infrequent dosage regimens, and comparatively low cost are all highly desirable. In 2002, O'Connor and Butler proposed the fourth-generation fluoroquinolones gatifloxacin and moxifloxacin as good choices for PO battlefield antibiotics [82]. Gatifloxacin was selected initially based on its lower cost to the military compared to moxifloxacin. Gatifloxacin was subsequently reported to cause disorders of glucose metabolism several years later, and the CoTCCC recommended moxifloxacin as the best replacement for an oral antibiotic [34]. The choice of moxifloxacin as the oral antibiotic of choice was also endorsed in the recent review by Hospenthal and his colleagues in 2008 [81].

It is important that unit medics screen their troops for medication allergies when providing the units with prepacked combat pill packs. For individual who should not take moxifloxacin or ertapenem, consult with the unit physician about appropriate substitutions for that individual. The unit corpsman, medic, or pararescueman should likewise be aware of any allergies that unit members may have to other medications recommended by the TCCC guidelines [34].

TACEVAC Care

The TACEVAC phase of care presents the opportunity to employ additional resources to treat the casualties. This additional medical expertise and equipment will allow for the expanded diagnostic and therapeutic measures outlined in Table 8.3 for the TACEVAC phase of care. The use of critical care flight paramedics and other advanced providers as well as ensuring that critically injured casualties are evacuated on platforms that have the capability to initiate haemostatic resuscitation with blood component therapy offers the opportunity to increase survival in these subset of casualties [83, 84].

Medical Support of Foreign Internal Defence/Civic Action Missions

Medical support of FID and humanitarian assistance missions pose a different set of challenges than combat missions [85]. SOF medical personnel may have to function in areas which are devoid of sophisticated diagnostic equipment, specialty consultations,

modern surgical facilities, and adequate supplies of medications. In addition, the population which is being treated is often ravaged by the debilitating effects of malnutrition and chronic disease [86]. Cultural differences may make seemingly simple steps complex in their implementation. One report documents the difficulty encountered by Air Force medical personnel trying to control an outbreak of rabies by using poisoned meat to rid the area of stray dogs [87]. The local spiritual leader required that two equal-sized pieces of meat (one poisoned and one not) be put out, thus giving the rabid dogs some choice in the matter. The same report discusses the difficulty in prescribing medications to a populace that speaks a different language from the health-care provider and often reads not at all.

Adequate quantities of medicines, vitamins, and medical supplies to treat the expected disease entities must be determined and taken into the area with the SOF unit deployed. The scope of care for the providers should be carefully outlined and procedures established for handling those emergency cases which fall outside of the prescribed scope of care. Both action and failure to act may have unfavourable consequences, so a careful examination of both the medical ethics and the political realities of such dilemmas must be accomplished before the medical provider leaves for the mission. The Department of Defence has a growing telemedicine capability which may be of some use in this environment. FID missions require a maximal effort to teach and train the populace in medical and preventive measures that they can implement themselves, since the presence of the US advisors must be assumed to be only temporary. First-world medical care provided for a brief period of time is of little benefit if the population subsequently returns to their baseline state of health care. Medical personnel must be familiar with those elements of the local culture and religion which are likely to impact on health care prior to deployment. A final consideration is to provide the medical personnel on the mission with clear instructions on how to document and follow-up on human rights violations which may be encountered in rendering care to the local population [84]. Violations committed by the current power structure may be encountered. Immediate confrontation with the local authorities may result in a rapid breakdown in relations, so this eventuality in particular should be planned for in advance.

Medical Support of Humanitarian Assistance Missions

Humanitarian assistance missions are often undertaken after another country, typically a third-world nation, has been ravaged by an armed conflict or a natural disaster. Such natural disasters often have more devastating effects in underdeveloped countries than in first-world nations. An example of this is the cyclone which struck southeastern Bangladesh in 1991 with 160-knot winds and a 6-m storm surge, resulting in the loss of more than 140,000 lives [88]. SOF personnel assisting on relief efforts such as this will typically have most of the considerations described for FID missions to contend with but in addition will have the superimposed effects of the conflict or natural disaster. Some of the additional considerations in this

circumstance are the need to provide security for personnel, equipment, and medications as medical teams try to render care to what may well be an impossibly large number of patients. Deployable clinics and medical facilities should be used as extensively as possible. Preventive medicine measures such as the obtaining of potable water and establishing adequate sanitation facilities are a very high priority in caring for the victims of natural disasters and armed conflicts [88]. SOF efforts in such undertakings will have to be coordinated with theatre medical personnel and other agencies involved with international relief efforts.

Medical Support of Operations Other Than War

Planning for operations other than war may present the greatest challenge of all to SOF medical personnel in that they may entail elements of anything from TCCC to foreign internal defence to humanitarian medical assistance. SOF medical personnel may have to shift rapidly from rendering care to friendly foreign personnel to flying into a gunfight to evacuate multiple combat casualties. The potential for this rapid change in conditions was dramatically illustrated in the SOF actions during Operation Restore Hope in Somalia in which a planned humanitarian relief effort quickly turned into a direct action combat situation [89].

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Chapter 9

Terrorism 101

Zygmunt F. Dembek

Abstract There is not a single, and universally accepted, definition of the word “terrorism”. It is important to consider that political considerations can be brought to bear in the definition of “terrorism”, as one person’s “terrorist” can be another person’s “freedom fighter”. However, functional definitions of “terrorism” are required by the legal and law enforcement communities, even should a debate rage about the usage and application of the word.

Keywords Terrorism • Domestic • Al Qaeda • Drones • FBI • Department of Homeland Security • State Department • Cyberterrorism • Cyberdefense

Objectives

To give a brief, introductory overview of the meaning of terrorism with respect to the USA and other countries, of the activities of various US governmental agencies in counterterrorism, of drone technology, of cyberterrorism, of cyberdefense, and of terrorism preparedness training.

Introduction: What Is Terrorism?

There is not a single, and universally accepted, definition of the word “terrorism”. It is important to consider that political considerations can be brought to bear in the definition of “terrorism”, as one person’s “terrorist” can be another person’s

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“freedom fighter”. However, functional definitions of “terrorism” are required by the legal and law enforcement communities, even should a debate rage about the usage and application of the word.

More specifically, “terrorism” should be a well-defined term, so as to distinguish between domestic and international terrorism, state-sponsored and non-state-sponsored terrorism, and terrorism per se and legal revolutionary violence that falls within the laws of war [1]. Law enforcement agencies in the USA are required to rely on a legal definition of terrorism. The US Code of Federal Regulations (CFR) defines “terrorism” as “the unlawful use of force and violence against persons or property to intimidate or coerce a government, the civilian population, or any segment thereof, in furtherance of political or social objectives (28 CFR Section 0.85)” [2]. Another legal definition of terrorism is found in 18 USC Section 2331(5), where “domestic terrorism” is specifically differentiated from “international terrorism” and other criminal activity [3]. Title 22 of USC Section 2656f(d) also makes these particular differentiations and also states that the term “terrorism” means “premeditated, politically motivated violence perpetrated against noncombatant targets by subnational groups or clandestine agents, usually intended to influence an audience” [4].

Other commonly used definitions of “terrorism” include that used by the American Red Cross, which defines terrorism as “is the use of force or violence against persons or property for the purpose of intimidation, coercion or ransom” [5]. Also, according to the Red Cross, the goals of a prospective terrorist are “to create fear among the public, to try to convince people that their government is powerless to prevent acts of terrorism, and to get immediate publicity for their causes” [5].

Terrorist acts can be perpetrated or threatened to occur in many different forms: kidnappings; assassinations and murders; bombings of various types; the use of (also known as CBRNE, or weapons of mass destruction – WMD) weapons; the Internet or cyberterrorism; agricultural terrorism (agrorterrorism – targeting agriculture); food and waterborne terrorism; and likely many other ways.

The Changing Nature of Terrorism

According to the US Federal Bureau of Investigation, terrorist targets have historically been chosen for their vulnerability and symbolism. In the past, indiscriminate injuries and deaths were mostly an unintended consequence of terrorist attacks. During the 1990s, however, the nature of domestic and international terrorism underwent recognizable changes in both tactics and methodologies whereby terrorists deliberately sought to bring about higher numbers of casualties. Simultaneously, terrorist interest grew in the acquisition and use of WMD, also known as CBRNE. The infamous sarin (a chemical nerve agent) gas attacks upon the Tokyo subway system, carried out by the Aum Shinrikyo cult, occurred on Mar 20, 1995, resulting in 12 deaths and as many as 5,000 exposed individuals [2]. In reality, this event was botched by the perpetrators. Only a small number of casualties resulted from this

attack, compared to what could have occurred had a more efficient means of chemical agent dispersal been used. The attack was carried out by cult members who had carried the sarin chemical agent in plastic bags wrapped in newspaper and then punctured the bags with a sharpened umbrella tip. If this agent had been dispersed as an aerosol, considerably more casualties could have resulted. The Aum Shinrikyo had made many similar attempts to disperse biological weapons in Japan, including the causative agents of anthrax disease and botulism, but these efforts were unsuccessful [6, 7]. For those interested in learning more about these topics, there are various articles and book chapters available describing the historical past and more recent attempts by terrorists and their organizations to acquire and use chemical [8], biological [9], and radiological/nuclear [10] weapons.

Domestic Terrorism

Domestic terrorism, or people who commit crimes within the USA and have received inspiration from US-based extremist ideologies and movements, have killed Americans and damaged property across the country in over two dozen incidents since 9/11. Not all of these criminals have been prosecuted under terrorism statutes. A recent Congressional Research Service report documents the domestic terrorism threat in great detail [11]. Concerns included the increased level of activity, use of nontraditional tactics, increasing use of the Internet, a decentralized and often leaderless threat, and prison radicalization.

One of the most infamous recent acts of domestic terrorism occurred at Fort Hood, Texas, on November 5, 2009, when 40-year-old Army psychiatrist Major Nidal Malik Hasan is killed 13 people and wounded 32 others [12, 13]. This was the worst shooting to have ever occurred on a US military base. About 150 rounds were fired until two police officers shot Hasan. Born in Arlington, Virginia, Hasan was a self-radicalized American Muslim of Palestinian descent, who communicated with the radical cleric Anwar al-Awlaki, based in Yemen. Al-Awlaki is widely known as “one of the most popular figures among hard-line, English-speaking jihadis around the world”, and he subsequently praised Hasan’s actions at Fort Hood. Al-Awlaki had served as imam at mosques attended by three of the 9/11 hijackers and has been implemented in influencing both a plot to bomb government buildings in Canada and another to attack Fort Dix, NJ [14]. Hasan’s communications with al-Awlaki prior to the shootings brought him to the attention of federal intelligence agencies. But this relationship was dismissed at the time by the FBI, who later stated that “There was no indication that Major Hasan was planning an imminent attack at all, or that he was directed to do anything” [15]. Hasan was left paralyzed below the middle of his chest. Hasan was charged with 13 counts of premeditated murder [16]. On 23 August 2013, a military jury found Hasan guilty of all charges, and on 23 August 2013 the jury recommended that Hasan be sentenced to death [17, 18].

Continued Terrorist Plots Against the USA

According to an Internet article posted by The Heritage Foundation, there have been at least 60 terrorist plots against the USA that have been thwarted since 9/11 [19]. As of this writing, their comprehensive list of terrorist attempts begins with Richard Reid's infamous attempted "shoe bombing" on a flight from Paris to Miami in December 2001 and ends with Chiheb Esseghaier's and Raed Jaser's arrest in April 2013 for attempting to carry out an attack on a Via Railway train travelling from Canada to the U.S. It would be useful for the interested reader to continue checking this Internet website for any additions to this ongoing list. Among the greatest concerns that has arisen from these terrorist attempts within the USA has been the threat of home-grown terrorism. Fortunately, examples abound of failed attempts at terrorism, the some of which include:

- Sami Osmakac, a naturalized US citizen from Kosovo, who planned to use vehicle-borne explosives in Jan 2012 to attack night clubs, businesses, and a sheriff's office [20].
- Jose Pimentel, a naturalized US citizen from the Dominican Republic, who planned to use pipe bombs in November 2011 to attack targets throughout New York City, including police stations, post offices, and US soldiers [21].
- The Oct 2011 plot to assassinate the Saudi Arabian ambassador to the USA and bomb the Saudi and Israeli embassies in Washington, DC, by Manssor Arbabsiar, an Iranian-born US citizen [22].
- Rezwan Ferdaus, a self-radicalized 26-year-old US citizen, was arrested in September 2011 for trying to provide material support to terrorist organizations and sought to use small drone aircraft laden with explosives to attack the Pentagon and US Capitol, followed by a ground attack carried out by armed men with automatic rifles [23, 24].

The War Against Al-Qaeda

Al-Qaeda, Osama bin Laden's global militant Islamic organization, has been seriously weakened by the continuing Global War on Terror (GWOT), to the point where, prior to his death, Osama bin Laden was obsessed with the mistakes that had been made by al-Qaeda and its "affiliates" [25]. Known affiliates of al-Qaeda include [25]:

- Islamic State of Iraq/al-Qaeda in Iraq (ISI/AQI). Foreign (non-Iraqi) fighters played key roles in this organization, including its first leader, Abu Musab al-Zarqawi. This group's history of violent attacks upon Iraqi Muslims has earned disdain from the al-Qaeda leadership and the recommendation that al-Qaeda be dissociated from ISI/AQI.
- Al-Qaeda in the Arabian Peninsula (AQAP). Often termed "the most dangerous" al-Qaeda affiliate, it is located in Yemen. AQAP was behind the 2000 bombing of the USS Cole in Yemen, the 2004 Khobar Towers massacre, kidnappings, murders, the attempted 2009 Christmas Day airplane bombing, the 2010 cargo plane bomb plot, and many others.

- Tehrik-i-Taliban Pakistan (TTP), also called the Pakistani Taliban. Its indiscriminate attacks against Muslims in Pakistan have pushed it closer towards confrontation with al-Qaeda.
- Al-Shabaab, or the Harakat al-Shabaab al-Mujahideen (HSM), is a Somalia-based cell of al-Qaeda. Designated a terrorist organization by several Western governments, the US Department of State has several open bounties (as of June 2012) on Al-Shabaab senior commanders [26]. Al-Shabaab countered with an offer of ten camels for information on the hideout of President Obama [27].
- Al-Qaeda in the Islamic Maghreb (AQIM). An Islamist militia whose aim is the overthrow of the Algerian government [28].
- Taliban. A right-wing Islamist movement of Pashtun tribal origin. The Taliban ruled portions of Afghanistan as the Islamic Emirate of Afghanistan from 2006 to 2011. This group currently operates in northwest Pakistan and in Afghanistan, where they continue to battle Afghani, US, and coalition forces [29].

Drone Technology in the War on Terrorism

At remarks made at the Woodrow Wilson Center in Washington, DC, on April 30, 2012, John O. Brennan, the Assistant to the President for Homeland Security and Counterterrorism, described the continued use of remotely piloted aircraft (drones) against top al-Qaeda targets around the world. He stated that the continued use of such “technologically advanced weapons” is both legal and ethical [30].

Mr. Brennan also pointed out in his speech that, although the USA is the first nation to use remotely piloted aircraft in an armed conflict, “Other nations also possess this technology. Many more nations are seeking it, and more will succeed in acquiring it.” Importantly, “If we want other nations to use these technologies responsibly, we must use them responsibly. If we want other nations to adhere to high and rigorous standards for their use, then we must do so as well. We cannot expect of others what we will not do ourselves” [30].

Brennan also said: “So damaged is al-Qa’ida’s image that bin Laden even considered changing its name. And one of the reasons? As bin Laden said himself, U.S. officials “have largely stopped using the phrase “the war on terror” in the context of not wanting to provoke Muslims.” Simply calling them al-Qa’ida, bin Laden said, “reduces the feeling of Muslims that we belong to them.” To which I would add, that is, because al-Qa’ida does not belong to Muslims. Al-Qa’ida is the antithesis of the peace, tolerance and humanity that is at the heart of Islam” [30].

Federal Bureau of Investigation and Response to Terrorism

The Federal Bureau of Investigation (FBI) has recently outlined their organizational top ten priorities. These concerns are ranked according to the significance of the threat to the security of the USA, the priority the American public places upon that

threat, and the degree to which addressing the threat falls most exclusively within the FBI's jurisdiction. In this listing, the #1 FBI top priority is to protect the USA from a terrorist attack. As the top priority, FBI counterterrorism initiatives receive first consideration in allocation of funding, physical space, resources, and the hiring and training of personnel [2]. The FBI therefore defines the domestic and international terrorism threat to the USA, contributes to the intelligence community in its evaluation of these threats, and provides investigative and crisis response in the event a terrorist attack should occur.

In response to an increasing concern for terrorist use of CBRNE weapons, the FBI created a WMD Directorate (WMDD) in July 2006 to have a coordinated approach to incidents involving CBRNE weapons, with a primary concern for prevention [31, 32]. Even greater specialization within the WMDD is found within the Biological Countermeasures Unit (BCU) [33]. The FBI is often directly involved in national "suspicious powder" incidents, when a suspicious powder is discovered in a letter or package and reported to the FBI. Upon confirmed discovery of a suspicious powder, specially trained FBI agents (hazardous materials and weapons of mass destruction (HazMat/WMD) special agents), hazardous materials (HazMat) teams, or other first responders notify FBI counterterrorism headquarters, which assembles a multiagency response team. Field testing of the suspicious powder is performed, and, if warranted, personnel decontamination occurs, and the letter or package is sent to appropriate laboratories (certified by the Centers for Disease Control and Prevention – CDC) for further testing. Public notification and evidence of the case is presented to the US Attorney for potential prosecution, whenever necessary [34].

Weapons of mass destruction (WMD) Coordinator special agents are assigned to each of the 56 FBI state/regional offices, so that a rapid regional federal response to WMD/CBRNE terrorism can occur [35]. The WMD Coordinator special agent is the primary point of contact for any CBRNE terrorism event within their respective FBI regional office [36]. When a WMD/CBRNE terrorism event or suspect terrorism event occurs, the WMD Coordinator special agent will serve as the principal coordinating federal law enforcement official and leads the investigation. The full resources of the FBI become rapidly available upon confirmation of a bona fide WMD/CBRNE terrorism event.

Department of Homeland Security Response to Terrorism

The Department of Homeland Security (DHS) has as its highest priority and a founding principle to protect the Americans from terrorist threats. The DHS counterterrorism responsibilities focus on three goals [37]:

1. Prevent terrorist attacks.
2. Prevent the unauthorized acquisition, importation, movement, or use of chemical, biological, radiological, and nuclear materials and capabilities within the USA.
3. Reduce the vulnerability of critical infrastructure and key resources, essential leadership, and major events to terrorist attacks and other hazards.

DHS has a number of programmes within its Office of Policy Development that deal with various aspects of counterterrorism, including Biological Threats and Biodefense Policy, Counterterrorism Policy, Cybersecurity, Emergency Preparedness and Response, Foreign Investment and Trade, Law Enforcement and Information Sharing, Nuclear/Radiological/Chemical Threats and Science and Technology Policy, and Transportation, Cargo, and Infrastructure [38].

To be better prepared to cope with biological threats, DHS has created the National Biodefense Analysis and Countermeasures Center (NBACC) at Fort Detrick, Maryland, after the anthrax mailings subsequent to 9/11. NBACC is intended to be the principal US biodefence research institution engaged in laboratory-based threat assessment and biological forensics [39, 40]. Also located within the NBACC are the National Bioanalysis Forensics Center (NBFAC) and National Biological Threat Characterization Center (NBTCC) [40].

Department of State Response to Terrorism

The US Department of State has formed a Bureau of Counterterrorism to forge partnerships with non-state actors, multilateral organizations, and foreign governments to advance the counterterrorism objectives and national security of the USA. In 2011, it founded the Global Counterterrorism Forum (GCTF), as a new multilateral counterterrorism body with 30 founding members (29 countries plus the EU) from around the world. With a primary focus on capacity building, the GCTF seeks to increase the number of countries capable of dealing with the terrorist threats within their borders and regions [41].

New York City as a Target for Terrorism

Until the events of 9/11 and the al-Qaeda attack upon the World Trade Center, perhaps the largest explosive catastrophe that had occurred in New York City as a result of a terrorist attack was the explosion of about two million pounds of ammunition at the Black Tom freight terminal in the city harbour during the night of July 29–30, 1916. This was caused by German saboteurs eager to hinder the US support of Allied nations during WWI [42]. Almost 100 years after the Black Tom incident, we as a nation are still concerned about terrorism in the USA. New York City, in particular, has not forgotten this lesson.

New York City Police Department Response to Terrorism

In a city that has figuratively worn a target on its back for the past century, the NYC police department has responsibility for the safety of the city's citizens and has prepared for terrorism eventualities with development of a counterterrorism

force. At over 50,000 employees (35,000 in uniform), the NYC police department is larger than the FBI. And rightfully so, in what other city in the USA would 137 heads of state gather for a United Nations General Assembly meeting [43]? What other city could be targeted as the financial and communications capital of the USA? The consensus of the national intelligence community is that NYC will continue to remain a target for terrorism, as it did during the 1993 and 2001 World Trade Center attacks. And at least 14 additional terrorist plots have taken place in NYC since 9/11. Popular movies such as “The Peacemaker” have depicted a plot to set off a “dirty bomb” in NYC, and the NYC police department counterterrorism team takes such events seriously and plans accordingly. NYC counterterrorism police also travel overseas, such as at the Madrid train bombings, gathering real-time intelligence that could be used to protect NYC train stations, or at the Mumbai hotel attacks, to determine how to better protect NYC hotels from terrorist attacks.

Cyberterrorism

Cyberterrorism, or attacks against computer-based architecture, has become an increasingly greater concern during the twenty-first century. Attacks against government computers have increased exponentially. Recent targets in the USA have included the Department of Defense, the White House, the New York Stock Exchange, and the Washington Post newspaper [44]. Successful cyberattacks against foreign interests include the infamous Stuxnet worm that temporarily set back a developing Iranian nuclear programme. “Stuxnet was able to continuously penetrate a supposedly impenetrable network and sabotage highly critical equipment used by the Iranians to enrich uranium, which could be used to build a nuclear weapon”, according to John Bumgarner, CTO of the US Cyber Consequences Unit [45].

Cyberdefense

Many foreign nations have been accused of conducting cyberattacks against the USA and its interests, including China, North Korea, and Russia [46–48]. There have been calls for recruiting elite computer hackers when caught by law enforcement authorities, rather than prosecuting them [49]. Examples of how our nation has performed similar efforts in the past include the highly successful re-employment of Dr. Wernher von Braun, a top Nazi rocketry expert, who later became a national hero as a leader of his leadership in the US space programme. Programmes set up to counter cyberterrorism include the US Cyber Consequences Unit, which provides assessments of the strategic and economic consequences of possible cyberattacks

and cyber-assisted physical attacks and also investigates the likelihood of such attacks and examines the cost-effectiveness of possible countermeasures [50]. And, the US military has established the US Cyber Command, directed by Army General Keith Alexander, who is also head of the National Security Agency. According to Army Colonel Gregory Conti, who, with Colonel John Surdu, first proposed the creation of a new military Cyber Warfare Branch in 2009 [51], “I sense very broad recognition in the White House and Congress – and to a non-trivial extent, the American people – of the mortal danger and strategic advantage that cybersecurity and cyber warfare hold for the nation. The military services now are seeking to define the types of knowledge, skills, and abilities required for cyber professionals and to create appropriate career fields” [52].

Terrorism Preparedness Training

It is important to promote an awareness of terrorism, as the greater the awareness of terrorism, the greater the potential for preparedness. Various course providers are available for those so interested. The federal Department of Homeland Security (DHS) has developed a basic terrorism awareness course that provides basic concepts about terrorism in the workplace [53]. A more comprehensive DHS-sponsored course is 1-day Anti-Terrorism Intelligence Awareness Program [54]. Another basic course for military terrorism awareness is the Marine Corps Institute’s *Terrorism Awareness for Marines* [55]. Many state first-responder organizations and emergency preparedness centres associated with state universities regularly present terrorism awareness seminars and training [56, 57]. Further advanced terrorism preparedness training information can be obtained from the US Homeland Security Centers of Excellence [58], the US Department of Justice, Bureau of Justice, Office of Justice Programs [59], or the State and Local Anti-Terrorism Training Program [60].

Summary

Terrorism has many definitions, but codified legal definitions can and are used by law enforcement agencies and for legal proceedings. Terrorism has existed in many forms and in historic contexts and continuous to evolve. Domestic terrorism is a continued concern and has affected many aspects of life in the USA. Its prevention and response are top priorities with many federal, state, and big city agencies. The continuing war against al-Qaeda appears to have been successful in lessening global terrorism threats. Cyberterrorism appears to be a continuing and growing threat worldwide. Terrorism preparedness training is readily obtained and should be a basic training component for everyone today.

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Part II

Disasters, Public Health, and Populations

Aroop Mozumder

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The aim in Part II is to give the reader a framework within which to consider disasters and how they affect people. There are different ways of planning a response to bring help to a stricken population, and a number of ways are described here.

A population is not a homogenous grouping: within a population, there will be groups with particular vulnerabilities such as prisoners, and an introduction is given to the special considerations they require.

This section is expanded in this new edition and includes new chapters on important topics such as rebuilding health systems and a consideration of standards of care in the disaster environment. The final chapter raises the spectre of pandemics.

Chapter 10

Disasters: An Overview

Anthony D. Redmond

Abstract There have been numerous attempts to provide a universally accepted definition of a disaster. Any new definition is almost always accompanied by a challenge to its accuracy and widespread applicability.

However, whatever definition is chosen it always reveals a small number of key elements. Something happens, usually quite suddenly, but sometimes over time, that *overwhelms* the capacity of local agencies to *cope*. This failure to cope may be relatively short lived, for example, when several multiply injured patients present to an emergency department, or prolonged, for example, during continuing civil war in an impoverished society. With this in mind the response to a disaster will involve the best use of existing resources and the appropriate use of additional resources.

Keywords Terminology for disasters and complex emergencies • Natural disasters • Emergency medical aid • Developed countries • Developing countries • Floods • Earthquakes • Tsunamis • Tropical storms • Volcanoes • Landslides • Famine

Objectives

- To explain the terminology used in disaster and complex emergencies
- To describe the features of natural disasters
- To discuss the purposes of emergency medical aid

Including material from Kenneth I. Roberts, Rowland M.F. Gill and Eric K. Noji.

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Introduction

There have been numerous attempts to provide a universally accepted definition of a disaster. Any new definition is almost always accompanied by a challenge to its accuracy and widespread applicability.

However, whatever definition is chosen it always reveals a small number of key elements. Something happens, usually quite suddenly, but sometimes over time, that *overwhelms* the capacity of local agencies to *cope*. This failure to cope may be relatively short lived, for example, when several multiply injured patients present to an emergency department, or prolonged, for example, during continuing civil war in an impoverished society. With this in mind the response to a disaster will involve the best use of existing resources and the appropriate use of additional resources.

How much a system is overwhelmed and how little the system can cope determine the *impact* of the disaster. Measuring impact clearly involves the number of people affected, and they can be affected in many ways including death, injury and displacement. The impact may continue for many years if subsequent morbidity is not addressed. Disasters impact upon the environment, which may or may not have a further impact upon populations. An impact upon the economy will quickly impact upon people. We therefore have a number of issues to consider when planning a response to a disaster:

- Vulnerability
- Capacity to cope
- Impact

Sometimes the nature of an event will always lead to it being described as a disaster. This may take no account of the ability of emergency services to cope, the vulnerability of the system or the impact of the incident upon a population. An air crash is invariably described as a disaster even when emergency services have responded without difficulty and well within their capacity and the invariably high mortality of the incident has meant that the capacity of local medical services was not breached.

Many developed countries now refer to a major incident rather than a disaster. This recognises the special nature of the incident but also recognises that with planning and preparation a disaster that is an overwhelming of available resources can be avoided. The development of major incident plans and planning has been a great step forwards in recent years with the recognition of generic roles, a clear command and control structure, and the distribution of casualties more widely in order to increase the capacity of health services in particular to cope. The principles of planning for major incidents in urban areas can be extended to disasters. One must plan, practise and prepare and recognise and reinforce the need for a clear command and control structure. In fact it is often the absence of a previously prepared plan and the recognition of the need for the implementation of a clear command and control structure that increases the host vulnerability to an incident, thereby contributing to it becoming a disaster. Once command and control has been established, capacity can increase and the impact be controlled, the disaster moving from *uncompensated* to *compensated*.

Because the term disaster is applied quite loosely and widely, it can encompass events that involve a sudden large number of casualties in a developed country, usually in an urban area, as well as evolving catastrophes in developing countries that continue for weeks, months and sometimes years. If the purpose of studying disasters is to improve the response to them, then it is probably best to, on the one hand, recognise common themes that characterise any “disaster”, but refer specifically to certain types of events and describe in more detail their specific requirements.

Mass Casualty Incident in Developed Countries

There are well-established disaster plans/major incident plans that will have or should have been practised. People will understand the roles that need to be filled and their place in the overall scheme of the response. The response involves the emergency services who will have their *gold*, *silver* and *bronze* command levels and the local hospital network. Within the hospital there will be a senior triage officer, an overall medical controller and senior specialists carrying out further triage to ensure “the most for the most”. As a system, if either potentially or actually being overwhelmed is a key element to any disaster, then *triage* whereby the bottle neck is relieved is the key to any response. The principles of triage will be described in the clinical section of this book (Chap. 35).

An important element in planning for and responding to a disaster is a recognition of the need for a multidisciplinary approach. Fire and rescue, police, military and ambulance services have essential roles, as also do administrators and managers and all those who make up the work force of a hospital. Learning to work as part of a team, and a team of which you may not be the leader, is essential if as a doctor you are to maximise the contribution you can make to the overall response.

When planning for disasters and creating a disaster plan, it is important to understand that planning for the next disaster purely on the experience of the last disaster is a recipe for disaster. Each incident has its own characteristics, although all share common themes. A plan should therefore be simple, easily understood and readily applied. It should maximise the use of existing personnel and systems. It should recognise and emphasise generic roles rather than individual people. A named person on a disaster plan may not be available on the day or take time to arrive at the institution or scene. However, if a generic role is identified, this will be adopted by those immediately to hand, although of course replaced by more senior and appropriate personnel if/when they arrive. A prehospital example of major incident management in practice is given at Annex A at the end of this chapter.

An important element in the response to disasters and the planning for disasters is the recognition that illness and injury will continue to occur in the host population, and if not catered for alongside, the victims of the incident will contribute to the overall mortality and morbidity from the disaster as a whole.

The distribution of patients from the scene of an incident is crucial to the overall success. There is a tendency for individuals in hospitals to adopt the “we will cope” approach even when patently they are unable. Casualties can be distributed across a range of hospitals rather than overwhelming a single and often the nearest institution. Moving patients on from a hospital once they have been admitted to the emergency department is slow and difficult and requires a further use of ambulance personnel. It involves staff appearing to acknowledge that they cannot cope where somebody else might cope better. These problems are best avoided by a more even and appropriate distribution of patients from the scene.

Mass Casualty Incidents in Developing Countries

The role of the media is important. They often determine how and if governments respond to certain events by focusing publicity on it albeit for a very limited period of time. The increasing availability of television news in particular at the sites of disasters leads to an impression that they are more frequent. Whilst this may very well be the case, it is important to remember that the largest famine in human history took place in China between 1959 and 1961 when 30 million Chinese starved to death and largely went unnoticed by the rest of the world.

Individual disasters of themselves do not appear to contribute greatly to overall mortality and morbidity.

The eight leading causes of death worldwide (15–59 years):

1. HIV/AIDS
2. Ischaemic heart disease
3. Tuberculosis
4. Road traffic accident
5. Cerebrovascular disease
6. Self-inflicted injuries
7. Violence
8. Cirrhosis of the liver

The eight leading causes of global disease burden (15–59 years):

1. HIV/AIDS
2. Unipolar depressive disorders
3. Tuberculosis
4. Road traffic accident
5. Ischaemic heart disease
6. Alcohol use disorders
7. Adult onset hearing loss
8. Violence

However, it again comes down to definitions. The toll from road traffic accidents in developed and developing countries is itself a continuing disaster as in fact is the

impact of HIV, AIDS and childhood disease in developing countries. By appearing to focus too much on the rare special and even exotic we are missing, and therefore not responding, to the greatest disaster of all – poverty.

Once accepting that the capacity to cope influences the vulnerability to disaster, then it is not surprising to know that 96 % of deaths from natural disasters occur in the developing world. At least 130 million people are affected by disasters. They might be referred to as *natural* disasters, but earthquakes, floods and other phenomena only cause human disaster when human beings lay themselves open to its effects and are unprepared to deal with its consequences. The vulnerability to disasters is likely to increase exponentially as the world population rises inexorably and this population becomes increasingly concentrated in urban areas.

Global warming appears to be creating an increase in the risk of certain natural hazards, and this is compounded by deforestation, urbanisation and poverty. Human beings are forced to live in very vulnerable areas creating large urban settlements within these vulnerable areas. Another billion people have populated the world in the last 10 years alone, and most of these are in the developing world adding to urbanisation and poverty. The intergovernmental panel on climate change forecasts an increase in the average world temperature of 1–3.5 °C over the next 100 years. This will cause global sea levels to rise perhaps by 50 cm during this period of time although in some places this may be greater. This will increase coastal flooding and we are already seeing its effects. Climate change will also be associated with changes in wind and weather patterns, effects that we also appear to be noticing already. The impact of a disaster is proportionate to the vulnerability of those affected. The poor are always the most vulnerable. The very poorest are the most vulnerable of all. One talks about *sudden onset* disasters such as hurricanes/tropical cyclones and earthquakes and volcanic eruptions. The event itself may appear sudden, but the vulnerability to its effects has usually been there for a long time.

Complex Emergencies

When civil conflict meets humanitarian crisis, a complex emergency ensues. The inherent difficulty in meeting large-scale health needs is compounded by communal violence. This is further explored in Chap. 14, on Operation Phoenix.

Natural Disasters

Introduction

This phrase is commonly used but is often not helpful. We have now taken to removing the word *accident* from the medical lexicon as it implies that the condition that resulted was not preventable. I would recommend that the prefix *natural* be removed

from disasters for the same reasons. All disasters are fundamentally human made and a function of where and how people choose or are forced to live by economic and political forces and those of conflict. Superimposed on this may be a natural phenomenon, but the disaster is the result of human forces. Moreover, the impact of the disaster, natural or otherwise, is proportional to the prior vulnerability of the affected population. As in all disasters a population's vulnerability relates to political and economic factors. These are compounded exponentially by war, and those most vulnerable are usually women, children and the elderly. *The main threat to health does not always come from the disaster itself but the mass movement of people that follows.*

Case Study: The Kurdish Refugee Crisis

After the first Gulf war, many thousands of people attempted to leave Iraq for neighbouring countries. Many attempted to gain access to Turkey. Many also attempted to cross the Iran/Iraq border. These two countries had not long been at war for many years, and now recent enemies were being asked to provide shelter. The area between Iran and Iraq had been the scene of a prolonged and bitter fight and was heavily mined.

Aid workers therefore had to deal with a range of problems including land mine injuries. The mass migration of people led to a typhoid outbreak. People walking across mountains suffered snake bites, and tented cities produced epidemics of meningitis.

The most important skill for those working in small medical tents was the exercise of triage.

Earthquakes

Earthquakes occur below ground and that is where their centre lies. The "epicentre" is the point nearest to this on the surface and marks the site where the quake has its strongest impact.

The force of an earthquake is measured on the Richter scale. This is a logarithmic scale with each point ten times greater than the one before.

The greatest risk from earthquakes and the greatest potential for survival lie in the work of architects and engineers. Earthquake-resistant buildings can prevent much loss of life, but as ever this is a function of politics and economics. It is no surprise that earthquakes of similar magnitude in the developing world create death tolls and numbers of injured very much greater than those in the developed world and sometimes by a factor of tens of thousands.

The structure of the building when of poor quality, such as adobe huts and mud brick buildings, has a significant influence on mortality. Such buildings crumble and suffocate those beneath. Sturdier structures that collapse in layers leaving a lean-to structure will allow pockets in which there may be survivors. Medium- and low-rise

buildings of brick or poor local materials collapse into rubble with little or no room for survivors. Not surprisingly earthquakes are more deadly at night when buildings are more fully occupied.

Although the perceived fear of epidemics following earthquakes is repeated by the media after each one occurs, there is no such published evidence. Mass movement of people into tented cities, which may subsequently follow, is associated with epidemics but not the earthquake itself. The commonest immediate consequence of an earthquake is likely to be electrocution and fires. The number of people injured may be up to three times more than those killed, overwhelming local medical facilities for a significant period of time. However, the severity of injury and associated entrapment tends to reduce the number of very severely injured patients presenting to medical services, and the surgical help most required is usually that needed for the treatment of peripheral limb injuries, both orthopaedic and reconstructive. However, the supply of emergency medical aid will usually take second place to the supply of the restoration of communications, transport and power. Water supplies may be disrupted and occasionally contaminated. As ever local fears of the unburied dead will be augmented by the claims of the local media; but the dead pose little or no threat to the living. Whatever diseases they had at the time they died will remain with them. It is the mobile living that present a threat of contamination. Great publicity is given to international search and rescue teams, but the published evidence from their activity would indicate that they save relatively few lives although set against this is the cost of their deployment which is relatively small.

Case Study: The Bam Earthquake (by Kenneth I. Roberts)

Introduction

On Friday, 26 December 2003, at 0527h, an earthquake with the magnitude of 6.7 on the Richter scale hit the city of Bam in south-eastern Iran. The aim of this case study is to document the disaster and its impacts and to critically review the acute response to it.

Background

The city of Bam is located in the east of Kerman Province, approximately 220 km from the provincial capital (Kerman City), and 1,283 km from Tehran. Bam is the only significantly sized city of its district and is located on a vast plain between the mountain ranges of Barez and Kabudi. At the time of the earthquake, the population of the Bam District was assessed to be 240,000. Of these, 97,000 lived in urban areas, with an additional rural population of 143,000. The climate is extremely changeable, and the District experiences very warm summers (especially on the plains) and very cold winters (especially in the mountains). In addition to being a significant population and administrative centre, it is also the site of the 2,000-year-old citadel (the Arg-e-Bam), which is the largest sun-dried mud brick construction in the world. As such, this structure represents a highly significant cultural icon for Iran. Most of the 200,000 houses in Bam District were also constructed of mud or

brick and ranged in age from 30 to 50 years. Many were located in narrow alleys. Bam had an extensive and well-developed healthcare system, ranging from “Health Pots” to provide primary care up to district and maternity hospitals. Facilities for the training of paramedics and nurses were present in the city. This part of Iran is a known earthquake-prone area: the incident under study was the third to occur in Kerman Province over the previous 25 years.

Disaster and Response

Impact

Given the magnitude of the earthquake and the nature of local construction (sun-dried mud brick, largely), the initial impact was massive. 31,000 people were killed, 22,000 injured (approximately 12,000 requiring hospital treatment) and 75,000 made homeless. In addition to important public health infrastructure such as water and sewage systems being badly damaged, the majority of the healthcare facilities were destroyed, and approximately 50 % of the local healthcare workers killed. Survivors were exposed to near-freezing night temperatures, with no immediate access to accommodation. No significant healthcare facilities were available. The Arg-e-Bam was reduced to rubble.

Response

The Iranian government put an existing disaster relief plan into swift execution. The overall response can be summarised as follows:

- Patients requiring hospitalisation would not be treated in Bam (using field hospitals) but rather evacuated (by air) to the neighbouring provinces. A coordinated effort by the Ministry of Health, the Ministry of the Interior, the Red Crescent Society of Iran and the Army airlifted over 12,000 casualties in the first 48 h.
- An innovative aspect of the plan was to divide Bam, and its neighbouring villages, into 12 medical zones. Each of these was allocated to a hospital from a neighbouring province. They sent medical teams forwards to Bam to provide triage and some immediate life-saving treatment and to prepare casualties for air evacuation. In addition to spreading the impact of the immediate influx of casualties across a number of medical treatment facilities, this strategy facilitated the tracking of the injured through the treatment system. This enabled displaced persons to be reunited with their families relatively rapidly after the disaster.
- The Iranian government recognised the need for additional external assistance (both financial and physical) and appealed to the international community. This effort was coordinated by the UN (with a WHO lead), based on the requirements identified by the Iranian government, and by WHO and Iranian assessment teams who deployed to the region. This resulted in assistance being provided by over 40 countries and organisations, ranging from the provision of search and rescue teams who arrived on the scene extremely rapidly to the deployment of ten field hospitals. The latter was

designed to provide primary care to those remaining in Bam and to treat minor injuries. They arrived within 3–5 days of the earthquake, and most left within a few weeks, having treated relatively few patients. Indeed, many of these hospitals (despite the need being to provide primary care) deployed with the “traditional” mix of surgeons and trauma treatment staff.

- National stocks of medicines and surgical supplies, water testing and chlorination kits, generators and pumps were mobilised, and these were rapidly supplemented by significant medical support and materiel from Herat (Afghanistan). Iranian Civil Defence/Red Crescent stocks largely provided tents and heating systems.
- By 30 December 2003, WHO reported that water supplies were in place, with over 60 % of the drinking water network being restored; food supplies were adequate and being distributed. Electricity supplies had been largely restored. Ten mobile shower units had been deployed. The following problems were identified: waste collection/sanitation had yet to be established, insufficient shelter was available and communications were only working with difficulty.
- The Iranian Ministry of Health established ten healthcare centres, with five mobile teams to provide primary health care and carry out surveillance. These personnel visited families in their tents or improvised shelters, assessed health need, collected epidemiological data and even provided medication for those who had lost drugs for chronic illness such as diabetes. In addition, 33 curative centres (18 of them mobile teams) delivered initial treatment to the population.
- By 30 December 2003, over 22,000 of the dead had been recovered and buried (many albeit on temporary sites).
- There were no significant outbreaks of infectious diseases among survivors of the earthquake, even though these had been predicted.

Lessons Identified

It is considered that the response to this disaster was exemplary, in terms of its speed and appropriateness. It demonstrates the potential effectiveness of national and/or regional resilience strategies, but also highlights the need for planning and stockpiling of appropriate materiel. In this instance, the necessary level of resilience was a result of experience of previous natural disasters (including earthquakes) and an effective civil defence organisation formed in response to historical regional tensions.

Tsunami

When earthquakes occur at sea, then they stimulate a seismic wave which, as it approaches land and into shallower waters, transfers its energy into building a wall of water which on reaching land destroys buildings and produces flooding. The retreat of the water compounds the impact damage with drag forces that erode

foundations. Whilst most deaths are due to drowning, severe injuries can be incurred from floating debris. Tsunamis are more immediately lethal than earthquakes with the dead outnumbering the injured.

Case Study: Tsunami on Sri Lanka (Red Cross Worker 2005) (Fig. 10.1)

“Our team arrived in Northern Sri Lanka in mid January, several weeks after the Tsunami had hit. The team included hospital specialists, water and sanitation engineers and electricians.

People and equipment had to arrive in Southern Sri Lanka then travel up country and cross the various lines held by the Army and the LTTE. Although there was a cease fire in place both sides had understandable concerns about the movement of vehicles, personnel and communications equipment between the zones of control.

It soon became apparent that our role was not medical disaster relief. That was over and done with. We set up in a local hospital and provided a level of care previously provided by the neighbouring town. The hospital there no longer existed. Patients cared for included women needing caesarean sections, people with new wounds from accidents and others needing ongoing for historic injury.

The care given had to be a balance between clinical need and not disrupting or undermining structures that had evolved locally.”

Landslides

Deforestation, a purely man-made phenomenon, allows rock and soil to destabilise most commonly after heavy rain producing catastrophic falls onto human habitation below. Snow will dislodge similarly to produce avalanches, becoming more common with global warming.

Flows of mud can behave similarly after flooding and tsunami. When extricating victims who have been compressed in mud, snow or rubble for some period of time, consideration must be given to compensating for the redistribution of circulation that follows prolonged compression. Intravenous fluid loading before, during and after extrication may protect against a catastrophic fall in blood pressure that can follow sudden release.

Floods

Global warming is increasing the frequency and severity of flooding. Increases in human population are leading to building on flood plains. Greater damage to human health and welfare may come from damage to crops, housing and infrastructure than injury or drowning. Of particular concern is the contamination of water supplies with sewage.



Fig. 10.1 Tsunami disaster on Sri Lanka, 2005

Volcanoes

Injury is a more common consequence of volcano than burning. When the eruption occurs, people are injured in the escape, from either falling rocks or simple falls. It is possible for pyroclastic flows to suddenly overwhelm a village and for clouds of toxic gas to threaten populations. However, the mass movement of people into tented villages as ever often produces the greatest risk to health. In the mid-1990s a volcano eruption occurred in one of the islands of Cape Verde off the west coast of Africa. Volcanic soil can be highly fertile, and although volcanic eruption was a recurring threat to the population, the lure of volcanic soil was always too much to stop a return to farm the crater and sides of the volcano. Early warning measures were in place but not applied due to lack of funding. Again humans, not nature, provided the element of disaster. When eruption did occur most people escaped but to be housed on a neighbouring island in tented accommodation. A cholera epidemic ensued. Outside medical help was required for the treatment of cholera, not the volcano itself.

There can be direct effects of volcano particularly from the ash that will produce inhalation burns, but only the most superficial of these are likely to lead to survival. Acute respiratory distress with excessive mucus production can occur as can acute respiratory distress syndrome, asphyxia, exacerbation of asthma and in the longer-term potentially silicosis.

Definitions

Lava flow destroys everything in its path. It moves slowly and predictably. It produces secondary fires. There is limited direct risk to life.

Pyroclastic flow is a horizontal blast of gas containing ash and larger fragments in suspension. It moves at several hundred kilometres per hour. The material can be at temperatures of 1,000 °C. Its speed is unpredictable as is its movement and poses considerable risk to life.

Mud flows occur when heavy rain emulsifies ash and loose volcanic ash after a volcanic eruption. Mud can have a consistency of wet concrete and might reach speeds of more than 100 km/h when flowing down hill.

Tropical Storms

They are called *cyclones* in the Indian Ocean, *hurricanes* in the North Atlantic, Caribbean and South Pacific and *typhoons* in the North West Pacific. With global warming these too appear to be increasing in frequency and severity, and over the sea the winds may reach speeds of more than 300 km/h.

Case Study: Hurricane Andrew and Health Coordination

(by Eric K. Noji)¹

When Hurricane Andrew struck south Florida in August 1992, epidemiologists demonstrated the use of a modified cluster-sampling method to perform a rapid needs assessment. In the first survey, 3 days after the hurricane, clusters were systematically selected from a heavily damaged area by using a grid overlaid on aerial photographs. Survey teams interviewed seven occupied households in consecutive order in each selected cluster. Results were available within 24 h of beginning the survey. Surveys of the same heavily damaged area and of a less severely affected area were conducted 7 and 10 days later, respectively.

The initial survey found few households with injured residents, but many without telephones or electricity. These findings convinced disaster relief workers to focus on providing primary care and preventive services rather than to divert resources towards unnecessary mass casualty trauma services. The cluster-survey method used was modified from methods developed by the WHO's Expanded Programme on Immunization (EPI) to assess vaccine coverage. Although cluster surveys have been used in refugee settings to assess nutri-

¹From: Redmond AD, Mahoney PF, Ryan JM, MacNab C. ABC of conflict and disaster. Blackwell Publishing & BMJ Books. 2006. Used with permission.

tional and health status, this represented the first use of the EPI survey method to obtain population-based data after a sudden-impact natural disaster.

In the hurricane, medical systems suffered severe damage. Acute care facilities and community health centres were closed and doctors' offices destroyed. State and federal public health officials, the American Red Cross and the military established temporary medical facilities. In the 4 weeks after the hurricane, officials established disease surveillance at 15 civilian and 28 military free care centres and at eight emergency departments in and around the impact area. Public health workers reviewed medical logbooks and patient records daily and tabulated the number of visits using simple diagnostic categories (e.g. diarrhoea, cough, rash).

The surveillance was able to characterise the health status of the hurricane-affected population and to evaluate the effectiveness of emergency public health measures. Data from the system indicated that injuries were an important cause of morbidity among civilians and military personnel but that most injuries were minor. Surveillance information was particularly useful in responding to rumours about epidemics, so avoiding widespread use of typhoid vaccine, and in showing that large numbers of volunteer healthcare providers were not needed.

Although the surveillance achieved its objectives, there were several problems. First, relief agencies needed to coordinate their efforts. Data from the civilian and military systems had to be analysed separately because different case definitions and data-collection methods were used. Second, there was no baseline information available to determine whether health events were occurring more frequently than expected. Third, rates of illness and injury could not be determined for civilians because the size of the population at risk was unknown.

Although proportional morbidity (number of visits for each cause divided by the total number of visits) can be easily obtained, it is often difficult to interpret. An increase in one category (e.g. respiratory illness) may result from a decline in another category (e.g. injuries), rather than from a true increase in the incidence of respiratory illness.

Famine

There is nothing *natural* about the disaster of starving to death. It usually requires the combined maladies of politics, economics and conflict to produce its greatest effects. Socioeconomic and political issues lie at the roots of famine and point the way to its prevention.

It is useful to know the language of communication with international aid agencies, and that, for example, a Crude Mortality Rate of 1 in 10,000 a day or more is recognised as a significant trigger point for urgent humanitarian intervention. If such things can be measured, then a loss of more than 15 % of normal body weight and/or food energy supplies of less than 1,500 kcal/person/day are also recognised

international triggers. The constant threat of mass migration following famine further compounds the effects of the famine itself. Details on food requirements will be given in Chap. 12.

Emergency Medical Aid

When considering whether or not to respond to a natural disaster, one should first ask a number of questions:

- *How long will it take me to get there?* It is well established that the majority of assistance, medical or otherwise, is given to the victims by their fellow survivors. This is closely followed by local medical and emergency services, then by regional and finally national services. It is sometime later before international services can assume any role, even if they are required.
- *If I might be needed, am I needed now?* International medical aid can help national and local authorities to restore their medical services both for the affected but also the non affected communities.
- *What sort of medical help might they require?* The answer to this question lies with the authorities who are running the disaster response in the country. Therefore make contact and ask.
- *Do they need medical supplies, medical personnel or both?* This is important to establish as it will not be very long before the media, sometimes prompted by some local medical personnel, will be demanding expensive equipment such as dialysis machines for the victims of crush injury. This is a very expensive equipment with an obvious part to play but as part of a coordinated longer-term programme and complimentary to but not a substitute for good basic resuscitative/medical care. Again seek guidance from agencies such as the International Society of Nephrologists.

There can appear to be a conflict between emergency medical aid, development medical aid and public health. These are not mutually exclusive. Obviously there are limitations to the effectiveness of emergency medical aid. However, it can be provided alongside longer-term measures and must clearly never be considered a replacement for preparation, planning and preparedness. These latter activities are likely to produce the greatest health intervention of all that is prevention. One must also not underestimate the impact of simple resuscitative/first aid measures and the philosophical and practical difference between doing something and doing nothing.

One must also understand that whilst a disaster may appear to be sudden onset, the vulnerability to its consequences is likely to have been present for a long time, and once the initial event appears to have passed, the consequences of the incident may last a considerable time longer and paradoxically serve to increase further the vulnerability to later similar or other large-scale incidents. Emergency assistance shortly after the incident may very well be of value, but of equal value and sometimes of longer-term

value is to provide assistance to the survivors who may have a medium- to longer-term requirement for further surgery, rehabilitation, prostheses, etc. When considering medical aid to disasters, one must not lose sight of the value and impact of basic life support. A study has shown that in patients who died before reaching hospital and indeed before arrival of the ambulance service, 39 % at autopsy had injuries compatible with life and 85 % of these showed signs of airway obstruction. The application of simple airway management and cervical spine control, none of which require technology, is greater than might be initially considered. This must be a part of disaster preparedness training. An often-overlooked aspect of “emergency” medical need after a disaster is the rehabilitation of the disabled. This help and it is often some of the most effective help can be provided in a planned and measured way and may be required for years.

The commonest risk to aid workers is death by violence. Until recently this was death from a road traffic accident, but now it is death by personal violence. Aid workers may now be targeted, either because they are considered to be siding with one or other faction or for hostage taking and therefore financial purposes. Road traffic accidents still provide a considerable threat. Many aid workers are not trained in the techniques required to drive large four-wheel drive vehicles over unfamiliar and rough terrain. Aid workers also ignore safety procedures they would automatically carry out at home but not when in an unfamiliar, exotic or even dangerous environment. Four-wheel drive vehicles can turn over very easily, particularly in the hands of the inexperienced and subsequent injuries magnified by the absence of or refusal to wear seat belts. Furthermore, limited local facilities for the treatment of severe injuries compound the mortality from such accidents.

Immediate Response and Needs Assessment in Humanitarian Crises

If we accept that a disaster by its very nature involves an overwhelming of medical services and a corresponding inability of these services to cope, then what service remains functioning will only achieve its maximum impact if it is targeted on those in most need and most likely to benefit. The application of triage is as relevant and important on a national and regional scale as it is in the emergency department. If aid is to do the most good for the most people, it must be *targeted*. This is best achieved by a *rapid needs assessment*. This equates to the primary survey of a severely injured patient in the emergency room. From this flows everything else.

Further details will be provided in the following chapters.

The recognition of the importance and need for immediate assessment is now well established. The United Nations has UNDAC (United Nations Disaster Assessment and Coordination) Team that will be on-site within hours and certainly days of any major international incident. Other major agencies such as the International Committee of the Red Cross and large NGOs such as MSF will also dispatch their own assessment teams. One of the recurring frustrations of

international aid remains the lack of coordination of aid effort at high level, with individual governments and organisations continuing to send out their own assessment teams rather than pool their resources and/or refer to a single assessment. Local officials can be overwhelmed and disheartened by a procession of assessment teams, each of which is delaying the deployment of aid for the duration of their assessment mission rather than responding to the findings of those who have gone before.

It is imperative that assessment teams be experienced and recognised as having knowledge and authority by other agencies. Assessment reports are often, and certainly always by the UN, posted on their relevant websites. Aid should be given in response to what has been identified as needed and not in response to what you have to hand or wish to give. This applies as much to personnel as it does to materials. The assessment of need and the response to such findings must take into account the need to not increase dependency by the provision of inappropriate materials. Supplies of food from outside can destroy the local market, and donated equipment, when unfamiliar or unable to be maintained locally, will have a very limited lifespan.

Whilst specific types of incidents such as earthquakes and landslides will predictably cause injury and volcanoes predictably cause respiratory problems, all large-scale incidents of whatever cause will produce the mass migration of people, if only over short distances. This phenomenon is the single greatest threat to human life in these circumstances. It will be compounded by geography, climate and weather and most often and most significantly by political instability and conflict.

Assessment teams must arrive early and be self-sufficient in food, water, shelter, medical supplies, transport and communications. The team need not be big: a number of pairs of assessors are often adequate, but assessment is likely to be more effective if one assessor does the talking with local authorities and the other listens, observes and takes notes. In this way little will be missed or misinterpreted. One of the greatest immediate needs after a disaster is information both to those affected and to those wishing to contribute to relief efforts. The gathering and distribution of information is a core part of assessment. It is also important to impart health information to the affected population. If this is to be effective, there must be close collaboration with local medical authorities. Health needs almost invariably come second to other needs. When assessing the need for emergency medical aid distinguished between medical and non-medical needs, the requirement for people versus things, the need to support primary and/or secondary care.

Water

You will die of thirst long before you will starve. Potable water must be assessed immediately as it is the greatest human need. Quantity is of more importance than quality but ideally both will be preferred. However, the choice must always be quantity over quality. Water requirements will be high. The minimum maintenance requirement for water, including hygiene needs (potable), is 15–20 l/person/day.

However, certain facilities such as a feeding centre might require to give a person 20–30 l a day and a health centre to give the sick 40–60 l/day.

Sanitation

The swift provision of a basic system will save more lives than the delayed provision of a perfect system. There are recognised guidelines that include one latrine seat for every 20 people and each dwelling being no more than 1 min of walk from a toilet. If this is not available, there either is or very soon will be a serious medical problem.

Food

The minimum amount of foot energy for health is recognised internationally as 2,100 kcal (8.8 MJ) per person per day. Once this falls below 1,500 kcal (6.3 MJ) a day, serious health consequences and mortality will follow. When assessing and advising upon food aid, look to local supplies first. This may require the use of aid funding. Failing this provide imported dry food for local preparation. Communicating with aid agencies is important. A population may be considered malnourished when more than 10 % of its children are moderately malnourished.

Shelter

Establish permanent shelter as soon as possible mindful of the fact that temporary accommodation is rarely replaced and quickly becomes permanent. Sending clothing to stricken areas is a popular international response. However, its transport and storage can be very costly and its distribution to the most needy not always easy. Benefits can be maximised by it being provided by large agencies with long experience, large facilities and good penetration into the affected area. Individuals and smaller agencies are more likely to see their money best spent by donating it directly to such agencies.

Security

The uncertainty and frank chaos that follows disaster of any kind can quickly lead to a breakdown of law and order. Many disaster-prone areas have little and sometimes no effective security to start with. If aid is to be effective, it must be secure. As ever the most vulnerable are women and children, and violence against women in particular is a threat that pervades many refugee camps particularly during and after complex emergencies.

Medical Needs

When populations move in large groups into temporary, usually tented, accommodation with poor sanitation, disease follows. Acute respiratory infections are common. Measles is a particular threat to young children. Malaria is an ever-present threat, and groups of people amassed together are vulnerable to meningitis. Contaminated water will lead to cholera and other diarrhoeal diseases.

When making an assessment of health needs, it is particularly useful to find a familiar point of reference. Go to a health facility that you recognise as being similar to your own place of work. Even allowing for differences of culture and economy, there is often enough to establish points of similarity and comparison allowing you to get a flavour of what things were like before the incident occurred and how they have been affected now. Hospitals can often provide a reasonable reflection of the wider community and economy and will also reflect political attitudes to health. They can be readily accessible to those with a medical background and experience. Support local administrative structures, as outside organisational structures are likely to be ineffective as cooperation will be limited, and if they are effective, then inappropriate recommendations may be ultimately disruptive.

Do take account of local practicalities. Whatever you identify might be needed will only arrive if it can be procured, dispatched and delivered on time. Do get an understanding of the status and capacity of airports, seaports and roads and the availability of trucks and drivers. Ensure your recommendations are in line with and approved by local coordinating bodies. Clarify which of the issues you have identified are immediate, medium term or longer term. A recommendation to do nothing either at all or at the present moment might be valid and entirely justified. It might even be helpful. If the local community is coping the inappropriate or untimely dispatch of aid can add to rather than relieve the burden of the affected country.

Remember that an intimate part of recovery is restoration of the economy. Whilst all of us sometimes shun the desire to simply give money to aid agencies, this can in fact be the most useful element in international aid, allowing goods and services to be procured locally and thereby not only providing immediate aid but also contributing to and restoring the local economy.

On-Site Operations Coordination Centre (OSOCC)

In the early phases when international aid is arriving, it is important that a coordination centre be established. This will usually be established by UNDAC and, in order to avoid competition and duplication, do work through its offices.

Three Important Topics

Dealing with the Dead

A large number of dead bodies can potentially overwhelm mortuary services, but in fact in most developed countries, capacity can be rapidly increased and a disaster as such avoided. This is not the same everywhere however. At times a large number of dead bodies can however provoke a disaster of another sort. This is not because of the threat from epidemics and infectious disease but because of the fears of such conditions and the overwhelming of mortuary facilities. It appears counterintuitive, for example, to not believe that dead bodies pose risk of infection, promote epidemics and might contaminate the water supply if buried. However, this is not borne out by the evidence. *However, the belief that dead bodies are harmful and pose a significant threat to health is ingrained in all of us, including doctors, nurses and other health professionals.* If information of this type is to be successfully transmitted to the population and the unnecessary and catastrophic rush to mass burial avoided, careful and diplomatic discussions must take place with the relevant local health authorities. The World Health Organisation in particular has an important authoritative role in this area. Locating and identifying human remains is a distressing task and requires medical input and support.

Prevention

A declaration by the UN made the 1990s the International Decade for Natural Disaster Reduction (IDNDR), and although much was talked, significant change has yet to emerge. It did, however, bring together the wide range of people and organisations and formally recognised the need for disaster mitigation. There has been a review, and the UK government, for example, has now expressed a determination to include up to 10 % of its emergency relief budget as earmarked for preparedness and planning. IDNDR has re-emerged as an international strategy for disaster reduction.

Medical Evacuation

There is an inevitable conflict between the dangers of home and the risks of separation. It is extremely difficult to define who might qualify. Should a doctor say who goes first or who goes at all? Is the problem that the patient is being evacuated for a result of the war or a result of long-standing issues?

Closing Remarks

The issues covered in this chapter will be explored further. Some final thoughts are given in the following bullet points:

- In addition to food, water, shelter and sanitation, safety is an essential aid requirement.
- Primary and secondary care need not be mutually exclusive.
- Public health medicine and emergency medicine need not be mutually exclusive.
- Healthcare reform and emergency medical aid need not be mutually exclusive.
- High-tech medical aid is often thought to be inappropriate, but it depends on what the other priorities are at the time, what skills are available locally and if the kit can be maintained.
- If primary care alone meets the needs, wishes and aspirations of a local community and is not an expression of unrecognised prejudice or double standards by those from other countries, then high-tech or secondary medical aid may not be appropriate.
- The hidden casualties of war include the old, the already ill and the mentally ill.
- Remember that doing something is better than doing nothing and that a drop of medicine in a sea of need goes a surprisingly long way. One must be wise and cautious but never cynical. One must never underestimate the power of showing that someone cares.
- Disaster prevention requires economic, environmental and political initiatives.
- Doing nothing is never neutral.

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Chapter 11

Disasters: The London Bombings, 7th of July 2005: Forward Medical Response

Steven A. Bland

Abstract On 7th July 2005, four explosive devices were detonated on the London public transportation system including the underground. This chapter provides a personal account of the considerations when responding to a major incident due to a terrorist event.

Keywords Terrorism • Bombing • Blast injuries • Emergency response • Pre-hospital care • Tactical field care • Man-made disaster

Introduction

At approximately 0850, three improvised explosive devices (IEDs) were detonated on the London Underground between Liverpool Street – Aldgate (Circle line), Kings Cross – Russell Square (Piccadilly line) and at Edgware Road station (Circle line). Nearly 1 h later (approx 0947), a fourth device was detonated on a double-decker bus in Tavistock Square outside British Medical Association (BMA) House, close to Russell Square. In total there were 56 deaths including the four bombers. This is an account of the forward medical (bronze doctor) role during the incident. It includes a narrative of the response from a personal perspective as a prehospital doctor deployed in the first air ambulance team to Kings Cross and highlights lessons identified for future contingency planning and emergency response.

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The Response

Following reports of power surges on the London Underground, the Fire and Rescue Service was requested at 0859. The initial incident was thought to be a train trapped in the tunnel, and as a result ambulance attendance is also usually provided. Within minutes it became apparent that this was a complex incident with multiple scenes and significant casualty numbers. A major incident was therefore declared after the initial assessments had been made, initially by the Fire Service but followed soon after by the other two emergency services. Although each emergency service has its own Emergency Operations Centre (EOC)/Gold Command responsible for the strategic management of an incident, a joint Strategic Co-ordination Centre (SCC) was set up in Hendon for the co-ordination of all responders including the Health Sector (Strategic Health Authority and Health Protection Agency).

At the Royal London Hospital, it was the monthly prehospital clinical governance day, and once the London Ambulance Service had declared a major incident, additional prehospital resources were deployed by ground and air to the three initial scenes. In total, 18 doctors and 10 paramedics were deployed with a total of 26 air sorties. An air ambulance paramedic is routinely present in the Ambulance Control/Dispatch Room and is responsible for the tasking of air ambulance teams, whether by air or ground.

The first air ambulance team deployed by air was sent to Kings Cross, landing two blocks from Euston Road and the main line station entrance. After the initial assessment, the team of two doctors and two paramedics was split into a bronze and silver team. As Forward Medical Incident Officer (Bronze Doctor), the main responsibilities are to assess the medical requirements of the scene within the inner cordon. The geographical inner cordon was beyond the lower ground ticketing hall and down the escalators. At this point the Fire Service controls the cordon, although on the day initial resources were understandably depleted with multiple entrances and resource requirements. Casualties assessed on the surface showed signs and symptoms consistent with blast injuries with no signs suggestive of nerve agent exposure such as increased secretions and pinpoint pupils. A medical team had been requested to go to the platform and then proceed into the tunnel, as there were more seriously injured casualties. Before deploying further into an incident scene, it is necessary to consider the potential hazards and risks. This was done with the paramedic and escorting fire fighter. The decision was made to proceed although the down escalator was turned off, while the up escalator was left running to assist casualty rescue. This process is called a dynamic risk assessment (DRA). The fireman also pointed out that his newly issued radiation dosimeter had not gone off; therefore, there was no high-dose radiation consistent with a radiological dispersal device. It should be noted that low-dose radiation could not be excluded. A summary of the hazards, present and potential, is at Table 11.1.

On the platform there were London Underground staff that were able to advise that the 600 V traction current was switched off. The traction current was probably the most significant hazard throughout the whole incident response. There was still

Table 11.1 Present and potential hazards during the London bombings

Type of hazard	Present	Potential
Environmental	Confined space Heat Electrical (traction) current Sharps/debris	Active combustion/fire
Chemical	Combustion products Particulate (dust) debris	Specific chemical agents
Biological	Biological debris, including needlestick risks (bone fragments)	
Radiological		Low-dose debris/dust High-dose fragments/ debris/dust
Other	Secondary devices (bus bomb)	Armed perpetrators

some residual smoke, and passengers were walking out of the tunnel. There was no suggestion of a chemical release although some agents, such as mustard gas, do have a latent period. The train was about 200 m into the tunnel heading to Russell Square. Walking down the tunnel allowed time to discuss the situation and collect thoughts. The most difficult part of responding to a major incident for a clinician is to be not clinical; the main priority is to assess the scene and identify the medical needs. The walking wounded were directed back to the platform. The bomb had been detonated in the first carriage, and so reaching the scene of greatest need took time. It is understandable that without adequate information the role of incident (silver) commander on the surface, whether police, fire, ambulance or medical, can be difficult, and the next priority of the forward team should be to relay the information to the silver commander by any means available. During the incident there was no direct communication with the surface. After the initial assessment, the main interventions by the forward team, now joined by the second HEMS paramedic, were:

- Liaising with and supporting ambulance and other agencies' staff
- Redirecting casualties from heading to Russell Square to the closer Kings Cross station, as additional medical staff were arriving on scene
- Providing or supervising analgesia administration
- Assisting extrication of casualties on the train and trapped in the tunnel

In any major incident, medical staff will present themselves and offer assistance. It is important to ensure they are who they say they are and also are adequately protected and resourced. If they are, they should be directed to the Medical Incident Commander. Many of the casualties exited via Russell Square although the station was further away than Kings Cross. On discussion, it has been suggested that passengers will instinctively move towards the destination that the train was heading to. After the train had been cleared of live casualties, there was a second sweep of the carriage to ensure there were no more casualties and to estimate the number of fatalities. This was repeated by the Medical Incident Commander.

Lessons Identified

After any major incident it is important to reflect on events and identify lessons to be learnt. Major Incident Medical Management and Support teaching uses the CSCATTT¹ principle for prioritising major incident response. This is also a useful guide for post incident debriefing.

Command and Control

Major incident scenes generally are modelled on a concentric command structure with the bronze inner zone surrounded by silver command zone with its resources including a survivor reception centre and casualty clearing station. The incident is supported at the strategic level by gold command. The concentric model was seen at Aldgate and Edgware Road. Kings Cross/Russell Square was complicated by the fact that casualties left the train from both ends of the tunnel requiring two silver commands at each location. River incidents may also have this requirement for multiple silvers as well as bronze zones on each riverbank. Tavistock Square was also divided into two silver commands (north/south) due to security and safety concerns. A summary of the incident command structures is shown in Fig. 11.1.

In the early stages of an incident, first responders will be drawn into the incident and may not immediately identify the requirement to assume command roles. Nevertheless, these roles are essential in order to achieve multi-agency liaison and identify initial priorities. The command infrastructure should also be the framework for communications using the chain of command. Silver command is likely to be the most challenging of the three command tiers for all emergency services. At gold level, commanders will often recognise and have exercised with their counterparts from other agencies. At bronze level, the role is often an extension of current operational roles on scene although less hands-on. Silver level is difficult because during the initial stages frontline staff may be assuming the command roles and may not immediately have their counterparts present or identified. Command vehicles and communication equipment will not arrive until later, and so there is reliance on an austere or improvised Joint Services Emergency Control (JSEC) point, until their arrival.

Safety

Safety must remain paramount at all times. For any incident where there is a deliberate element to the incident, it is important to consider additional hazards targeted at emergency services (secondary devices) in the initial assessment. At Kings Cross,

¹ Command, Safety, Communications, Assessment, Triage, Treatment and Transport.

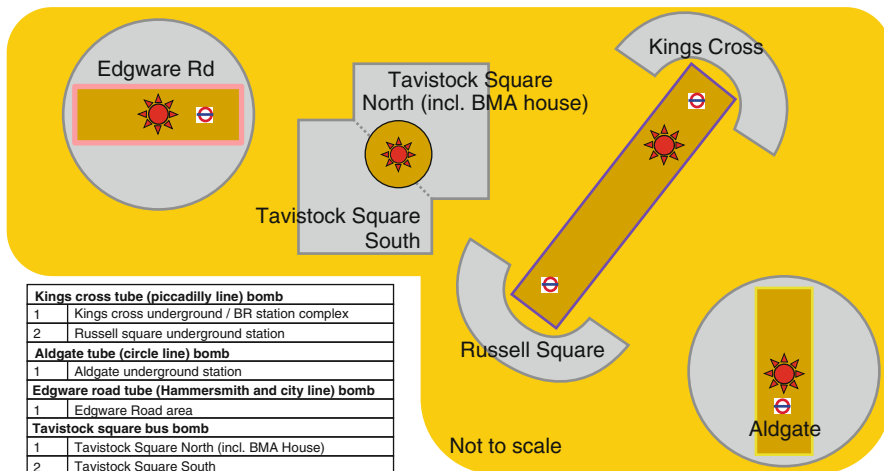


Fig. 11.1 London bombings command hierarchy

the clearance of the scene of CBRN agents and secondary devices did not occur until after emergency responders had entered the scene. Although scene clearance is often focused within the inner cordon, secondary devices are just as likely outside the cordon and at potential rendezvous points and marshalling areas.

Additional equipment required during the response included dust masks and were not immediately available. Electronic Personal Dosimeters (EPDs) now issued to ambulance staff will detect high levels of radiation; however, low-level particulate material may not be detected without specialist equipment. This risk will be mitigated by wearing a dust mask (FFP3 standard). Latent periods for some chemical agents and toxins mean that responders, both prehospital and hospital, should be vigilant for signs of intoxication. A number of individuals were critical of first responders entering the inner cordon before the scenes were cleared. In the absence of any other orders, the decision to enter a scene is a personal one based on a dynamic risk assessment. The assumption that all responders will blindly enter a scene ignorant of the risks is naïve.

Communications

Following the post incident debriefs and reports, it was identified that there were shortfalls in communications at all levels. This is not surprising as communication is the Achilles heel of emergency response and operational deployments. As well as the over saturation of VHF channels and mobile phone communication networks, there are operational limitations on the initial use of communication equipment until there has been secondary device clearance. During the London bombings, the

presence of multiple scenes placed added pressure on the communications network. For complex incidents, it may be necessary to assign individual channels to each scene.

There are two schools of thought on the role of communications during a major incident. The first is reliance on a fully resilient multi-agency system based on digital communications with underground capability. The second school of thought is that all planning and training should be based upon the assumption that there is no communication and the response is predetermined with on scene command flexibility. Whichever method is used, communications should be brief and along established lines of communication. Although communications is considered separately to the establishment of a command structure, the two should be in parallel as the chain of command should be the chain of communications. This reinforces information governance and appropriate integrity and flow of data.

Triage

The aim of triage is to manage the incident so that the best can be done for the most. In an ideal situation the most severely injured casualties will arrive at hospital first. Evidence from several incidents suggests that reverse triage occurs for a number of reasons. The first is that before emergency services arrive, the walking wounded will extricate themselves from the scene. Once away from the inner cordon, the differentiation of walking wounded (T3) casualties and uninjured survivors is sometimes difficult especially if exposure to smoke is considered an injury. Understandably, the first responders will be directed to the more seriously injured casualties (T1/T2) who may be trapped or will require assistance in order to leave the scene. The more seriously injured will therefore take longer to be extricated and receive medical interventions on scene. One report on the 7th of July was critical of emergency services for not attending to the walking wounded and uninjured survivors quickly enough and establishing a survivor reception centre on scene. Many of these casualties/survivors may leave the scene and self-refer not only to local hospitals but also to primary care and medical facilities remote from the incident. The presentation of casualties to any medical facility following a major incident should be recorded and reported to any health register likely to be established, usually by the Health Protection Agency. During the early stages of an incident, limited ambulance and medical resources will be distributed between the initial major incident infrastructure (command and logistic roles) and the treatment of the seriously injured.

Treatment

Prehospital medical interventions were limited on the 7th of July with emphasis on triage, casualty flow, analgesia and the management of amputations (total and partial). Some patients did receive advanced procedures including rapid sequence induction and fluid resuscitation. This was dependent on clinical need, number and type of casualties and medical resources available. Some life-saving interventions

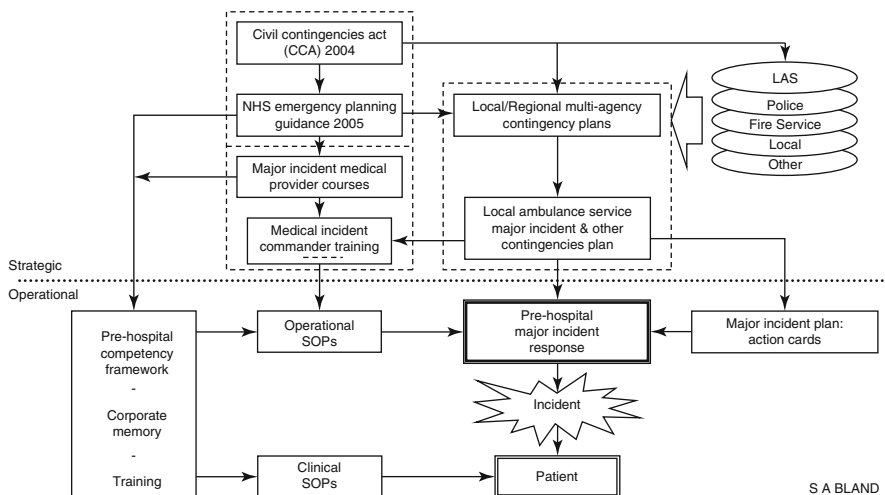


Fig. 11.2 Major incident doctrinal framework (Copyright S.A. Bland)

were provided initially by bystanders and included the application of improvised tourniquets. Analgesia was particularly important for casualties entrapped, particularly in the tunnel. Difficulties in establishing intravenous access in casualties were compounded by multiple limb injuries and poor lighting. The drug of choice used at Kings Cross was intramuscular ketamine using the 100 mg/ml concentration. This provided adequate analgesia to allow extrication with less respiratory depression. Care should be taken due to the sympathomimetic effects of ketamine and the chance of rebleeding due to a raised blood pressure.

Summary

Since the 7th of July, the Civil Contingencies Act 2004 has now come into force. Emergency services are required to have plans in place to respond to a range of major incidents. The role of prehospital physicians has been recognised for some time and was highlighted during the inquiry by Hidden QC into the 1988 Clapham rail disaster. The response from all of the emergency and voluntary services was extraordinary on the day. The four post 7/7 reports including the Coroner’s inquest have made several recommendations including better communications, triage and treat rather than triage in isolation, better management of uninjured survivors and better support to relatives. Previous experience of “one-under” incidents has shown that a single casualty trapped under a train can take up to 90 min to be safely extricated. The management of over 700 casualties with a 50 % conveyance rate to hospital at four complex incident sites within the documented timeframe was a significant achievement, but it is important not to be complacent. The doctrinal framework that can be applied to a major incident response is complex from governmental department and multi-agency guidance down to individual training, operating procedures and contingency plans; this is summarised in Fig. 11.2.

Further Reading

- Archive of the website of the Coroner's Inquests into the London Bombings of 7th July 2005. Accessed 9 Oct 2013. At: <http://webarchive.nationalarchives.gov.uk/20120216072438/http://7julyinquests.independent.gov.uk/>.
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Chapter 12

Responding to Acute Humanitarian Crises: Health Needs Assessment and Priorities for Intervention

Aroop Mozumder and Egbert Sondorp

Abstract Conflict, natural causes or complex humanitarian emergencies may suddenly give rise to large populations being affected, which may include mass displacement. These events present acute and urgent problems that need systematic needs assessment and early intervention, in order to prevent a rapid rise in mortality and morbidity. Whatever the initial cause there are a number of common key factors that need close examination, with a rapid needs assessment which may need completion within a few days.

Over the past three decades, there have been significant developments, with the emergence of evidence-based interventions, and wide acceptance of the principles of both needs assessment and priorities, often referred to as the “top ten” priorities. This chapter will give an overview of the evolution of health interventions for situations when large populations are displaced or otherwise affected and describe the priorities for intervention.

Keywords Priorities for Intervention in Disasters • Initial Needs Assessment • Measles vaccination and Vitamin A supplementation in malnourished populations • Water and Sanitation • Food and Nutrition • Shelter and Site Planning • Health Care in the Emergency Phase • Communicable Disease Control • Public Health Surveillance • Human Resources and Training • Coordination • Provision of security

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Since the end of the Cold War, we live in an era when barely controllable armed conflict has become endemic in large parts of Asia, Africa, Europe and parts of the Pacific. Massacres amounting to genocide and the mass expulsions of populations are once again taking place on a scale not seen since the Second World War.

E J Hobsbawm 2007: Globalisation, Democracy and Terrorism

Over the past decade, the number of refugees remained more or less stable (10–12 Million), while the number of internally displaced people has been rising and now exceeds the number of refugees. The vast majority were fleeing conflict zones. [1]

Objectives

- To understand how health interventions in humanitarian emergencies have evolved in the past three decades
- To understand how minimum standards in performance and their linkage to human rights and humanitarian principles have arisen
- To understand how to undertake a health needs assessment of an acute humanitarian emergency
- To understand the priorities for intervention

Introduction

Conflict, natural causes or complex humanitarian emergencies may suddenly give rise to large populations being affected, which may include mass displacement. These events present acute and urgent problems that need systematic needs assessment and early intervention, in order to prevent a rapid rise in mortality and morbidity. Whatever the initial cause there are a number of common key factors that need close examination, with a rapid needs assessment which may need completion within a few days.

Over the past three decades, there have been significant developments, with the emergence of evidence-based interventions, and wide acceptance of the principles of both needs assessment and priorities, often referred to as the “top ten” priorities. This chapter will give an overview of the evolution of health interventions for situations when large populations are displaced or otherwise affected and describe the priorities for intervention.

Evolution of Humanitarian Interventions in the Last 30 Years

During the 1980s and 1990s, most developments in the health arena were based on lessons learned during Cold War conflicts. These were normally curative, lacking norms and guidelines, with agencies working in isolation. However, this period did include the development of some significant advances, such as the management of

severe malnutrition in therapeutic feeding centres, pioneered by Oxfam, SCF-UK and MSF-France, with protocols used in a number of major emergencies during the period.

From the early 1990s, there was more systematic use of data collection and surveillance and the growing awareness of the need for evidence-based interventions and epidemiological concepts. Humanitarian assistance became a more specialist field with its own reference materials, policies and indicators [2, 3].

Quality and programme evaluation have been increasingly important themes since the mid-1990s, particularly since the evaluation of the relief operation to Rwanda in 1994 by the UK-based Overseas Development Institute (ODI) [4]. Until then there was a widespread view, both amongst aid workers and the general public, that “humanitarian workers were always doing good”. The increase in media exposure and scrutiny, in particular to the prolonged Rwanda emergency, changed this view. The ODI report stated that 100,000 avoidable deaths could be attributed to the poor performance of the relief agencies. Lack of standards, weak accountability and poor coordination were principle factors. The joint evaluation of emergency assistance to Rwanda also noted failures in a number of key areas: lack of policy coherence, lack of coordination between UN and humanitarian agencies as well as government teams and military contingents, poor quality health care from many NGOs and inadequate accountability of agencies and their inability to assess their impact.

Widespread consideration of such evaluations, not least by donors, led to an increased interest in quality, impact and accountability. Evidence base for interventions and value for money was demanded by donors, with performance measures and increasing recognition of the requirement for standardisation and regulation being key themes in the late 1990s.

The first voluntary Code of Conduct was developed by the Red Cross movement and NGOs in 1994 [5]. It sought to safeguard high standards of behaviour and maintain independence and effectiveness of disaster relief. In its ten principles, the Code promoted respect for local culture, involvement of beneficiaries, building on local capacities and the impartial nature of aid. The Code also described relationships that NGOs should seek with the UN system and with host and donor governments. In 1999 nearly 150 agencies and 144 countries had signed up to the Code of Conduct, committing agencies to defined standards of behaviour.

Evaluation of programme performance became an important part of NGO and other agency activity, with donor funding often being reliant on effective evaluation tools by provider agencies. One such method is the use of the logical framework planning method which uses measurable indicators to quantify results.

Another major advance was following the publication of the joint Rwanda evaluation, when the first good practice review for evaluating humanitarian assistance was published in 1998 [6]. Typical criteria for development, like relevance, effectiveness, efficiency, impact and sustainability, as adopted and promoted by the OECD, were not considered fully appropriate for emergency assistance. So, the following evaluation criteria were added for use in emergency programme evaluation, coverage, coherence and appropriateness, while “connectedness” was to replace “sustainability”.

Another part of the humanitarian “industry” working to increasing performance standards and accountability is the ALNAP [7] project, coordinated by the ODI in London. This provides a forum to discuss issues relating to performance and accountability in humanitarian operations, to gather, analyse and disseminate information, research and examples of best practice.

The SPHERE Project

The SPHERE Project [8] of 1998 was brought about by the coordinated activity of a number of established NGOs and the Red Cross movement, much influenced by the lessons identified from recent humanitarian crises. This brought considerations of accountability to beneficiaries and improved effectiveness in humanitarian aid delivery. It included the first statement of minimum standards of humanitarian relief in key areas such as water supply and health care, while linking these to fundamental human rights. These principles are now widely taught and adopted:

SPHERE Project 1998

Meeting essential human needs and restoring life with dignity are core principles that should inform all humanitarian action. Through the Humanitarian Charter and Minimum Standards in Disaster Response, defined levels of service in water supply, sanitation, nutrition, food aid, shelter and site planning and health care are linked explicitly to fundamental human rights and humanitarian principles.

However SPHERE, in its first iteration, was considered by some to have limitations; it covered one of the key elements of humanitarian performance, that of competence. Other key elements were timing, coordination and adequate resourcing. Another view was that although it provided standards, it gave no instructions as to how agencies and other actors could meet the standards. The second edition, however, published in 2004, has addressed some of these issues, with more technical advice and detail; becoming more of an instructional manual than the first edition. The handbook was again updated in 2011, and this third edition expanded on the evidence base, widened the range of topics covered and substantially elaborated on the linkages between human rights and humanitarian principles and practical work on the ground. In addition, the book pays much more explicit attention to protection, the second pillar of humanitarian action next to assistance, which is covered by the bulk of the handbook. Over 400 organisations in 80 countries contributed to the development of minimum standards and key indicators. Overall, SPHERE is seen as a major advance in the development of standards in accountability and service delivery and is widely used.

Evidence Base for Interventions in Humanitarian Aid

In 2000, Banatvala and Zwi [9] noted that data on the public health effects of war and on delivery of public health in settings affected by conflict were increasingly being assembled, but that the effectiveness of many humanitarian initiatives had not

been adequately evaluated. They also noted that generating knowledge and promoting an evidence-based culture would require collaborative initiatives between implementing agencies, academics and donors.

In the past few years, agencies are increasingly using programme evaluations, using tools such as the logical framework analysis method for individual project analysis. Donors are increasingly relying on such formalised evaluations to fund agencies. The increasing use of the Code of Conduct, with more widespread adoption of SPHERE standards and protocols by agencies, is a key advance in operational delivery. Increasing research and increased operational activity of UN agencies, together with moves towards improved coordination, are also significant improvements.

In 1991, following the visibly poor response to the displacement of Kurdish people from Iraq into the Turkish mountains, the UN Security Council requested reforms to the humanitarian system, which resulted in the establishment of a specialised UN coordination body (Office for the Coordinator of Humanitarian Affairs, UNOCHA) to be headed by the Emergency Relief Coordinator, who directly reports to the UN Secretary-General. In addition, the Inter-Agency Standing Committee (IASC) was established to ensure coordination at global level between the UN system and representatives of NGOs.

A major review of the humanitarian response in 2005 resulted in the recommendation and implementation of the so-called cluster approach. This mechanism was “to create accountability in delivery of humanitarian aid. The responsibility of the lead of the cluster is not only coordination, but also to be accountable, right up to the Emergency Relief Coordinator”. The approach includes forming clusters of humanitarian activities, such as clusters for health, nutrition, shelter, education, agriculture and others. Clusters are permanent at the global level, with in most cases one of the UN agencies being the cluster lead. So, for the health cluster, WHO is the lead agency. In case of crises, the cluster approach will be activated at field level. Cluster leads may be the same UN agencies leading the global cluster, but not necessarily so. Occasionally NGOs take up this task. A guide has been published for country-level implementation of the health cluster [10].

Priorities for Intervention in Disasters: The Top Ten Priorities

The priorities for intervention have been developed for the seminal MSF Handbook, “Refugee Health: An Approach to Emergency Situations”, which is still the only technical manual for those involved in humanitarian health emergencies. While dated in some respects, it still has useful material. The top ten priorities remain one of the most useful frameworks for those involved in emergency work. Agencies carrying out their mandated functions will need “humanitarian space” to independently assess need and control provision of aid. Security will need to be in place to provide safety for both their own expatriate and local employees, as well as provide a secure environment for the beneficiaries.

Much of the following is described from the perspective of a refugee camp. However, the same principles of needs assessment and intervention apply for non-camp situations, for instance, population that affected by conflict but stayed in their

area or people displaced but not ending up in a camp. However, adaptations to the specific context will have to be considered.

Top Ten Priorities

1. Initial needs assessment
 2. Measles vaccination and Vitamin A supplementation in malnourished populations
 3. Water and sanitation
 4. Food and nutrition
 5. Shelter and site planning
 6. Health care in the emergency phase
 7. Communicable disease control
 8. Public health surveillance
 9. Human resources and training
 10. Coordination
- To the top ten, an additional priority is often added:
11. Provision of security

Initial Needs Assessment in Displaced or Otherwise Affected Populations

The importance of a rapid, comprehensive, concise needs assessment for displaced populations cannot be overemphasised. It is the first priority before any intervention is provided. The data from such a needs assessment may inform substantial operational planning in various NGO, UN, military and other organisations, particularly if there is little up-to-date information available about the scale of a disaster. Health needs assessment needs to be conducted within a few days; it will be constrained by the urgency to minimise mortality and morbidity, as well as the requirements of the tasking organisation. The principle is to gather key facts on a range of important criteria, backed by evidence or reference, which can easily be provided to the HQ organisation, upon which the principle planning for the relief effort is planned.

There are five main areas which a needs assessment needs to cover: demography, resources and logistics, food and nutrition, health status and environmental risks. These can be further subdivided into key questions.

Demography

What is the population at risk (PAR)? This data may be available from the UN or local National Relief Coordinator if there is one or from NGOs already on the ground. It is right to consider the accuracy of all such information carefully.

Occasionally these figures may be inflated, information to spur the amount and speed of arrival of relief supplies and relief personnel. However, data from reputable organisations can be considered accurate enough for initial assessment purposes.

If this data is not available, such as in the very initial stages of a disaster, there are techniques for estimating the PAR. For smaller areas it may be possible to count all shelters where people reside and count people in a random sample of at least 60 shelters which will provide an average of occupation per shelter and hence an estimate of the total population. Alternatively, the boundaries of the camp can be plotted by a basic survey of the perimeter. This can then give a camp area which can be subdivided into grid squares. Cluster sampling of grid squares using random number tables, with detailed shelter to shelter recording of all persons and ages living in each sample area, is then extrapolated to give the PAR of the whole camp. It is a tried-and-tested method, proven over many emergencies to be reasonably accurate.

The population make-up of the camp is also important. Tribal divisions, ethnic differences, a high proportion of young mothers with children and a high number of orphans need serious consideration in the way shelters will be allocated, proximity to water supplies and latrines being key considerations. Tribal division, particularly if there has been recent violence along ethnic or tribal lines, is an important issue. An example is that young women of a particular tribe may be exposed to increased gender violence or intimidation if housed close to men of an opposing tribe. Orphans may have temporary carers but may also have to forage for themselves, and they are a particularly vulnerable group, which needs to be sought out and brought together for special care when planning a camp.

Demographic concerns thus include the increasingly recognised issues of security, the requirement for which underpins much aid effort and the development of relative stability in a camp. Fear of violence and its random nature is one of the most debilitating factors in a camp or displaced population situation. Assessment of the security state of a camp is therefore a key component in any needs assessment.

This assumes a camp situation. Increasingly, displaced people do not end up in camps, but rather dispersed over larger areas, in between the host population, or in city areas. In those cases, it is much more difficult to find reliable estimates of population numbers.

Environmental Issues

The camp environment is clearly intimately related to the health outcomes of the resident population. Shelter availability, population density per shelter, diurnal variation in temperature, water availability and quality and sanitation facilities are fundamental factors, which need to be assessed and recorded in a needs assessment. These are all factors that contribute to the most common lethal diseases of refugee populations: malaria, lower respiratory infection (lobar pneumonia) and diarrhoeal diseases, particularly when linked with malnutrition.

Availability of water, in terms of walking distance and its continuous, as opposed to sporadic availability, its approximate quality, means of storage for families and whether there is enough for washing as well as drinking are core requirements that



Fig. 12.1 Water collection, Sudan

determine health status. WHO recommends 3 l/day as the absolute minimum for survival, per person, but at least 15 l/day is the accepted norm.

Sanitation facilities, provision of and availability of latrines, their build quality, distance to walk, general quality and cleanliness and safety are key issues. Whether solid waste is properly dealt with, so that vectors cannot obtain access, or remains in poor quality sanitation facilities is also a key factor (Fig. 12.1).

Shelter quality, compared to the current environment, spacing, level of overcrowding and availability of basics such as blankets also have an important bearing on health status.

Vector control is often a problem, more so with large camps, where population behaviour or poor camp management has allowed food waste or stagnant water to accumulate. A view on insect and rodent vectors is important.

Health promotion, particularly hand washing and basic hygiene, for food and water is a key health determinant. Cultural behaviours may often determine this.

Resources

Access by main road; availability of river or spring water; quality of the road network, for example, if it is passable in the rainy season; requirement for all-wheel drive vehicles; size of truck that can gain access; and proximity to ports and airports are also health determinants, albeit indirectly. Personnel resources and logistic considerations,



Fig. 12.2 Food distribution, Ethiopia

such as presence or not of specialist logistic NGOs or UN agencies, need to be known. Communications, by telephone or even Internet access, can also make a vital difference in the organisation of supplies and personnel to support an emergency situation.

Food and Nutrition

Malnutrition prevalence can be assessed very crudely by observation, particularly of vulnerable groups such as children and the elderly. There are a number of means of formal evaluation of the nutritional status of a population, such as the mid-upper arm circumference measurement (MUAC) (children aged 1–5 years) and weight for height measures of children. Existing NGOs may have valuable data from these techniques. These will be discussed in more detail later.

Food supply, its distribution, family storage capability, cultural appropriateness, availability of cooking implements and fuel are all key factors that can relatively easily be assessed by observation of the camp area. Cooking fuel and its scarcity may become a key issue if refugees have to forage locally for this resource (Fig. 12.2).

The fairness, regularity, quality, quantity and appropriateness of the ration system must be assessed. Many NGOs have significant experience in managing food distribution, such as CARE, CRS and CAFOD. These NGOs in turn may be supplied by the World Food Programme (WFP), or have a coordinated mechanism outside of the UN to procure food in bulk.

If malnutrition is a major issue, NGOs may have started to establish supplementary feeding clinics and inpatient therapeutic feeding centres. If this is the case, the NGOs will have considerable useful data on the prevalence of malnutrition (12.3 – Outpatients' clinic – Sudan).

Health Status and Medical Care

The assessment of mortality rates, in particular the Crude Mortality Rate (CMR), is fundamental to assessing the health of a population and in measuring the effectiveness of interventions. It is often the most common single figure reported to higher authority. The urgency of aid delivery and resource allocation may partly depend on this figure.

The CMR is relatively easy to assess and, in emergency settings, is usually expressed as the number of deaths per day per 10,000 population at risk (PAR). Most cultures will have a burial/body disposal ceremony, which may need additional resources such as burial shrouds or simple blankets. These will most likely occur in a designated area that can be monitored and counted. The CMR is relatively easy to assess if the PAR is known, but if it is not, it can be estimated using cluster sampling techniques as described earlier. A CMR above 1/10,000/day is regarded as a serious situation. In the early acute stages of an emergency, this can rise to 10/10,000/day in extreme situations.

Morbidity rates for key diseases, such as malaria, acute respiratory infection or epidemic diseases such as dysenteries and cholera may be recorded by medical NGOs. An understanding of prevalent diseases in populations is a core part of the needs assessment.

The existing health-care facilities, in particular the type, quality, available resources, appropriateness, diagnostic, laboratory and pharmaceutical support, are required information, if an NGO or similar agency is providing these. Additionally, particularly if provided by the host nation, payment methods, referral system and agreements in place with the Ministry of Health are useful knowledge.

Finally, brevity, accuracy and timeliness are key attributes of a good initial report. The urgency may allow only three working days or less to conduct the assessment. It should always be aimed at those who can act on the data: senior UN officials, the military chain of command, the host Nation Relief Coordinator, senior NGO officials and increasingly UNOCHA cluster leads. The SPHERE handbook gives additional guidelines and an alternative checklist for conducting such an initial assessment:

SPHERE Health Assessment Checklist [8]

Preparation

- Obtain available information on the disaster-affected population.
- Obtain available maps and aerial photographs.
- Obtain demographic and health data.

Security and Access

- Determine the existence of the ongoing natural or human-generated hazards.
- Determine the overall security situation, including the presence of armed forces.
- Determine the access that humanitarian agencies have to the disaster-affected population.

Demographics and Social Structure

- Determine the total size of the disaster-affected population and age and sex breakdown of the population.
- Identify groups at increased risk, e.g. women, children, older people and persons with disabilities.
- Determine the average household size and estimates of the number of female- and child-headed households.
- Determine the existing social structure, including positions of authority and/or influence.

Background Health Information

- Identify pre-existing health problems in the disaster-affected area prior to the disaster.
- Identify pre-existing health problems in the country of origin in refugees (area of origin for internally displaced persons).
- Identify existing risks to health, e.g. potential epidemic diseases.
- Identify previous sources of health care.
- Analyse the performance of health system functions.

Mortality Rates

- Calculate the Crude Mortality Rate.
- Calculate the age-specific mortality rates (e.g. under-5 mortality rate).
- Calculate cause-specific mortality rates.
- Calculate proportional mortality rate.

Morbidity Rates

- Determine incidence rates of major diseases that have public health importance.
- Determine age- and sex-specific incidence rates of major diseases where possible.

Available Resources

- Determine the capacity of the Ministry of Health of the country affected by the disaster.
- Determine the status of national health facilities, including total number by type of care provided, physical status and access.
- Determine the numbers and skills of available health staff.
- Determine the available health budgets and financing mechanism.
- Determine the capacity and functional status of existing public health programmes, e.g. Extended Programme on Immunization.
- Determine the availability of standardised protocols, essential medicines, supplies and logistics systems.
- Determine the status of existing referral systems.
- Determine the level of environmental health in health-care facilities.
- Determine the status of the existing health information system.

Data from Other Relevant Sectors

- Nutritional status
- Food and food security
- Environmental conditions
- Shelter – quality of shelter
- Education – health and hygiene education

Measles Immunisation

High population density, particularly from existing rural populations who are displaced into camp settings, when linked with high levels of malnutrition, is extremely susceptible to measles, one of the most contagious diseases. The mortality rate from measles may range from 2 to 21 % in conflict-affected settings, due to complications such as lobar pneumonia, diarrhoea, meningoenzephalitis and croup. Mass measles vaccination for children aged between 9 months and 15 years is the highest priority health intervention and cannot be delayed until other vaccines or a more structured health service provision is available. Ideally it needs to be initiated within the first 10 days of a camp being established. Logistic considerations, including the crucial importance of an effective cold chain, trained personnel and basics such as needles and syringes, must be considered as a priority. Although levels of measles immunity are slowly rising in the less developed nations, due to EPI (Extended Programme on Immunization initiatives), any displaced population where malnutrition is prevalent should be assumed to have imperfect coverage, and a vaccination programme is essential. So, if measles vaccination coverage is <90 % or unknown, a mass measles vaccination campaign for children aged 6 months to 15 years should

be conducted, including the administration of Vitamin A to children aged 6–59 months. All infants vaccinated between 6 and 9 months of age should receive another dose of measles vaccine upon reaching 9 months. Measles in refugee situations is highly preventable, with mass immunisation, given together with Vitamin A capsules, giving around an 85 % protection in children aged 9 months. Vitamin A has been shown to be particularly effective in reducing morbidity and mortality from the disease. Although high at 85 %, this still leaves a significant proportion of children vulnerable to the disease due to its infectivity. Vaccination programmes close to 100 % coverage are therefore essential, which means accurate census of the population at risk that may have to be estimated using mapping of the entire camp and cluster sampling techniques. For those already exposed, vaccination may reduce the severity of the disease.

The aim of a measles vaccination programme is therefore a mass early campaign, targeting at least 95 % of children, given with Vitamin A supplementation, with a more routine vaccination given with other vaccines once the camp is more established and health services are being provided. Measles, however, is a live vaccine and thus particularly susceptible to cold-chain failures. Management of the measles cold chain, particularly in the early stages of a refugee migrations and humanitarian crisis, presents one of the most difficult logistic challenges. More recently it has become clear that some populations may have at least partial immunity to measles, through the more widespread reach of the EPI programme worldwide. However, this cannot be assumed, and the consequences of a measles outbreak are so serious that it must remain as the highest priority health intervention.

Water and Sanitation

Lack of safe water, together with poor hygiene practices, is a major cause of mortality and morbidity in displaced populations, particularly in the initial phases of a humanitarian emergency. Epidemics of *Shigella* dysentery and cholera have been recorded causing over 75 % of deaths in the initial emergency phase.

During the initial phase of the crisis, the aim should be to provide 5 l of water per person per day, as the bare minimum recommended by WHO for survival. However, this bare minimum provides only enough for food and drinking; hygiene is inevitably reduced, causing significant risk of transmissible disease. The aim as the crisis develops must be to increase this to at least 15 l of safe water per person per day, as soon as possible. This will allow enough for washing, clothes washing and better food preparation (12.4 – Water Collection – Ethiopia).

For a large population, protecting the source of water is a high priority, particularly if it is surface water, which is easily contaminated by people, livestock and poor hygiene measures. Controlling access is a method of doing so. Often in the initial phase, water has to be transported in by water tankers or bowsers. These need to be maintained and kept clean, but is usually a very short-term measure. Proper water distribution points need to be built as a high priority, enabling good access,

normally by a bank of taps, with a concreted run-off area and good drainage for waste water. These access points can be supplied ideally by boreholes, which almost guarantee water safety, as long as they are deep enough and properly constructed, rather than collecting spring water or using wells. Temporary tanks, such as “bladder tanks” made out of rubber, or similar material, are effective as a short-term measure.

The recommended planning guidelines are that there should be one handpump for every 500–750 persons, with a bank of six taps of high yield (>5 l/min) in a properly constructed area for at least every 1,200 persons. The population must have access to clean water containers of a suitable size, 20 l containers being the standard, with two per family unit being the target. Lack of reliability and consistency of clean water is a major source of stress for displaced families, and its importance in contributing to health in its widest sense should not be underestimated.

Water quality should be enough such that the health risks are minimised, with the accepted norm being that there should be no faecal coliforms/100 ml. Surface water must always be regarded as contaminated, with chlorination, normally using calcium hypochlorite, being the standard method of disinfection, for relatively clear water. A level of chlorination needs to be maintained in water that is drunk. Some populations may be unused to this smell and may have to be persuaded that it is safe. Highly turbid water will need prior filtration before chlorination. Environmental Health workers or specialist NGOs are well versed in managing water for displaced populations.

Sanitation, including safe disposal of human excreta, is fundamental to the health of a displaced population. It is sobering to know that a camp of 100,000 persons can produce up to 5 t of excreta per day. Attention to this issue is therefore an early and vital public health measure, which must take into account the expectations and cultural habits of the populations. These will include separation of male from female latrines, knowing the distances people are prepared to walk to a latrine, hand washing and privacy. Lack of respect for local culture may mean that the facilities will not be properly used and excreta and waste may be left in the open, an obvious source of ill health.

Initially, designated areas may have to be roped off or otherwise marked. Note that in the tropics, sunlight can destroy pathogens in stools within a short period. However, latrines need to be dug as soon as possible, dependent on the soil conditions and water table. There are tried-and-tested designs for latrines, pioneered by many agencies. Oxfam UK is an internationally recognised leader in this field. In the more settled phase of an emergency, one latrine per 20 persons or ideally one per family unit is the aim. Large banks of latrines are often badly looked after, and it is worth employing guards and cleaners if possible or seeking cooperation with the displaced community to maintain the facilities. Well-designed hand washing facilities, with soap, are vital for this purpose. Waste water must be planned for, with adequate drainage into soak-away pits being mandatory. Stagnant contaminated waste water can easily attract insect vectors, with mosquitoes (vector for malaria, dengue and yellow fever) being one of the main insect disease vectors being able to breed in stagnant pools.

Dead bodies are often overrated as being dangerous disease carriers. Only in cases of cholera and viral haemorrhagic fevers bodies should be handled with utmost care. Usually dead bodies do not pose a risk to public health, in which case there is no need to urgently dispose of the bodies, by inappropriate burying in mass graves or burning. It is important that relatives have the opportunity to identify their family members, to obtain death certificates for legal purposes and to conduct culturally appropriate funerals.

Solid waste is an important problem, with litter and food waste rapidly attracting rodent and insect vectors, and eventually snakes and other undesirables. The availability of landfill sites and the cooperation of the refugee community are important to keep this under control.

Vector control is effective when the first principles of hygiene are adhered to. Effective waste disposal, hand washing, water storage and rubbish disposal are key factors, with the cooperation of the refugee community being paramount. However, one specific measure, the use of insecticide-impregnated bed nets has been shown to be particularly effective and is evidence based. The nets prevent malaria but also protect against nuisance insects.

Food and Nutrition

Protein-energy malnutrition is linked to vulnerability to disease, with measles being particularly important in causing mortality in the emergency phase. Nutritional assistance programmes are therefore an important priority to reduce mortality in any displaced population. WHO recommends a minimum food ration of 2,100 Kcal/person/day, and this has remained the basic aim of nutritional programmes for some decades, with appropriate nutrient balance. Health staffs are usually involved in nutritional assessment, management and selective feeding of those with more serious malnutrition and advising other agencies on the suitability of the rations delivered. The general ration may be made up of purchased rations in the local markets, if available, or the introduction of substantial amounts of food aid from major donors. Care needs to be taken that the local economy is not disrupted, by neither flooding the market with cheap donated grain nor driving up prices such that the locals cannot afford the markets. Either case can lead to major friction with the host community (Fig. 12.3).

Nutritional status of a population is usually extrapolated from the nutritional status of children under 5 years. Weight for height (WFH) as a percentage against internationally agreed child growth norms (NHCS/CDC data) is widely accepted as the most sensitive and accurate measure of an individual child's nutritional status. Standard deviation from the mean, using "Z scores" is commonly used to assess population malnutrition rates. Another quicker method, normally used for screening is the mid-upper arm circumference (MUAC) for children aged 1–5 years. A population's nutritional survey can be carried out by random sampling of children from 6 months to 5 years, which is compared against a reference population.

Fig. 12.3 Malnourished child, Sudan



In many parts of the developing world, a global malnutrition rate of less than 5 % is considered normal, but above 5 % is more significant, and above 10 % is a major problem, requiring intervention. In very severe cases the global malnutrition rate may be artificially low, because those with most severe disease (<70 % median WFH, and/or nutritional oedema) may have already died; this should be borne in mind when conducting a survey. It is worth noting that children under five are not always the most vulnerable. Studies have shown that adolescents or even adult males may suffer disproportionate mortality.

Interventions are based on an adequate and culturally appropriate general ration giving 2,100 Kcal per person per day, selective feeding programmes for those moderately malnourished and therapeutic feeding programmes for those severely malnourished. The latter can use a community-based approach when conditions permit, supplemented by inpatient treatment of severely malnourished children with medical complications. The general ration needs to contain at least 17 % of energy as fat and 10 % as protein and should be culturally acceptable. The main components are cereals, pulses, oils, sugar and salt. The past reliance on dried milk powders has diminished. Often, ample use can be made in feeding programmes of an enriched, peanut-based paste that comes in a plastic wrapper for easy use at home. Plumpy'nut is the best known brand name for this peanut paste.

A number of agencies may be involved in food coordination. The World Food Programme (WFP), is the primary UN agency, while a number of NGOs, such as CAFOD, CARE and the ICRC have considerable expertise in local distribution and ration programmes. NGOs such as SCF, Oxfam and MSF have expertise in delivering therapeutic feeding centres (TFCs) and supplementary feeding (SFC).

Effective and equitable distribution of food to families is a specialist skill; it involves close cooperation with the refugee community, logistical expertise, security of storage, reliability and attention to detail. Most systems are based on ration cards and collection by heads of households on a regular basis.

Every system must be prepared for a certain amount of loss, whether by damage, theft, by corrupt practices or by food diversion. Here families exchange food items for those more attractive, but not necessarily useful. An example is trading food for coffee or spices.

Therapeutic feeding programmes might be required for the proportion of children who suffer from severe acute malnutrition. Therapeutic feeding centres (TFCs) are heavily resource intensive. They are inpatient facilities during the first phase, where children are admitted, normally with mother or elder sibling, to correct dehydration and treat severe malnutrition and infections. Such children are seriously ill, with a high mortality. They are often apathetic and need to be encouraged to take food and may suffer other complications, such as hypothermia, even in tropical climates. They need feeding at regular intervals, often through the night in the most acute cases. Formulas are being used that contain a mixture of powdered milk, sugar and other ingredients designed to provide an easily absorbed mix of carbohydrates and essential micronutrients. They are generally provided as powdered mixes which are reconstituted with water. Additionally, antibiotics and treatment of intestinal parasites might be needed. In younger infants, breast-feeding should continue, if the mother is present. In the later stages, high-energy milk may be replaced by more sold meals less often, porridges or local food may be more acceptable. TFCs need a large number of trained and appropriately experienced health workers to manage them successfully. More recently there has been a move towards more home-based intensive feeding, but TFCs remain important in many crisis situations.

Supplementary feeding is for those children with moderate acute malnutrition, as assessed through WFH or MUAC measurement. Normally children attend as “out-patients” and will be given dry or suitable ready-to-use supplementary food rations to take home.

Finally, there needs to be an awareness of micronutrient deficiencies in acute emergency situations. Outbreaks of xerophthalmia (Vitamin A deficiency), pellagra (Vitamin B3 deficiency), scurvy (Vitamin C deficiency), anaemia (iron deficiency) and goitre (iodine deficiency) have all been found during emergencies when food supplies were lacking these micronutrients.

The treatment of Vitamin A deficiency, previously mentioned in the context of measles immunisation, is a particularly effective intervention in acute emergencies and is often associated with acute malnutrition, particularly in children. Clinically night blindness is followed by dry ocular lesions (Bitot’s spots), leading to corneal softening and permanent blindness if not treated. Vitamin A supplementation, using

an oral capsule, is effective and cheap; it also has significant immuno-supportive effects. It is normally given to all children with any signs of malnutrition.

Finally a good nutritional support programme must comprise an effective general ration distribution, an effective selective feeding programme and an assessment of health and nutritional status (12.6 – Therapeutic feeding – Ethiopia).

Shelter and Site Planning

The importance of effective shelter is of obvious health benefit. Overcrowding, when combined with poor hygiene, is conducive to the transmission of major outbreaks of disease such as *Shigella* dysentery and cholera. The principles are that a camp must have a limited population density, should be in family groups per shelter, that traditional village structures should be replicated as far as possible and that access to essential facilities, such as water and latrines, must be reasonable. Access for food in trucks, security and minimising environmental health risks are also key factors. Clearly in emergency situations, not all these can be addressed, but changes should be made as soon as possible.

There are SPHERE guidelines for type of shelter, spacing and numbers per shelter, which should be followed. For example, 2 m is the minimum distance between shelters, and each person should have 3.5 m² of living space.

Site planning is also clearly defined in UNHCR and SPHERE publications. Criteria for roads, water supply, medical facilities, storage sites, latrines and reception areas are considered. These specialist references should always be considered in camp design. Site planning is one of the early priorities; much effective public health can result from a good early design. Temporary shelter material is vital if a large influx of refugees is foreseen, ideally made from toughened plastic sheeting, and with each family able to erect their own shelter (Fig. 12.4).

Health Care in the Emergency Phase

It is important to realise that in the vast majority of refugee emergencies, the main causes of mortality are due to four main diseases groups: diarrhoeal diseases, respiratory infections, malaria and measles, normally complicated by underlying malnutrition. The mainstay of medical care is therefore to be able to diagnose and treat, using simple diagnostic and treatment protocols that can be taught to local and other health workers.

The key features of a health-care system in an emergency situation are:

- To have locally accessible simple protocol-based diagnosis and treatment facilities
- To provide staged levels of health care from simple health posts to a referral hospital
- To provide curative and preventive services

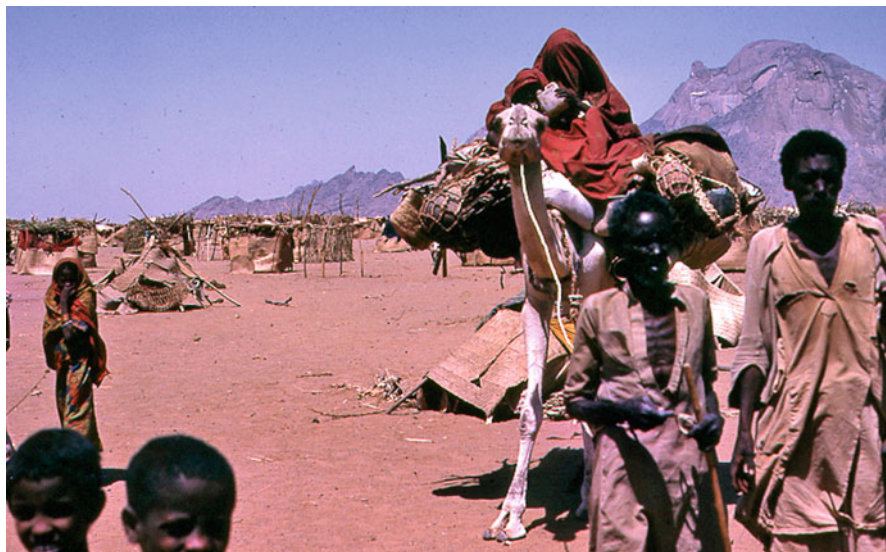


Fig. 12.4 Improvised shelters, Sudan

- To treat common diseases effectively
- To have an understanding of local endemic disease
- To have surveillance, recording and health information ability, matched to local Ministry of Health protocols and those of UNHCR or equivalent organisation
- To be able to cope with high demand
- To be sensitive to the host population's needs
- To have flexibility to cope with sudden disease outbreaks or environmental changes
- To be able to adapt from emergency to post emergency care, such as the setting up of reproductive health services, Extended Programme on Immunization (EPI), HIV/AIDS protocols and TB treatment
- To have appropriately trained health workers, including doctors who are familiar with tropical diseases and the effects of malnutrition

The unique features of an acute emergency, high morbidity, high levels of mental stressors and comparatively easy access to health care often lead to unexpectedly large demand, where many may have self-limiting disease. The importance of adequate triage, the ability to screen rapidly, assess and treat the more serious cases, is an important requirement for any health system.

The accepted form of health-care facilities is based on four levels. The following guidelines can be used, but may need to be adapted to the specific context:

1. Basic care and screening from a local home visitor from the refugee population, for every 500 people.
2. A small health post with a trained health worker, with a limited dispensary, working to agreed protocols for common diseases, for up to 10,000 people.

3. A more central health centre, with a doctor and nurses, with limited inpatient facility, for every 50,000 people. This facility is capable of seeing referrals from health posts, treating more complex cases and providing simple surgical procedures and uncomplicated obstetric and midwifery care. This will have simple laboratory services, such as malaria blood film screening and microscopy for parasites.
4. A referral hospital facility, for every 250,000 people, which can carry out emergency surgery, treatment of wounds, complex obstetric care and with a referral laboratory.

A balance must be kept on where scarce health-care resources should be provided. Although large referral hospitals are important, they tend to treat those smaller numbers who are seriously ill; the converse is that attention to clean water may prevent serious outbreaks and prevent a larger morbidity and mortality in the longer term. Clearly such difficult planning questions need to be approached sensitively, with the focus on effective public health measures. The aim, however, is that each of the four levels of health service should be set up at the same time. Different agencies may be mandated to different areas, and this is where the coordinating organisation, such as the health cluster lead can advise and if necessary direct where the priority areas are. Often the solution is to set up a central health centre and recruit local home visitors from the refugee population, while at the same time organising small health posts in further areas of the camp.

It is vital to be coordinated with the existing health services of the host country. They may require particular forms of diseases reporting, which should be adhered to, and if necessary the local health facility should be supported and improved. Good relations with the local community and the Ministry of Health are vital to success.

Standardised case management protocols for the most common diseases should be established, taking account of national standards and guidelines. These are valuable for use by health workers who will see the majority of morbidity, noting that the single doctor may only have time to provide guidance on preventive medicine policy, to undertake training and to see complex cases, as well as attending coordination meetings.

WHO has developed emergency health kits, suitable for a displaced population emergency situation, to treat a population of 10,000 for 3 months with protocol-based medications and dressings. These have been in use worldwide for many years.

The importance of providing reproductive health services and mental health services is increasingly recognised as being valuable, early in an emergency. In terms of reproductive care, a field manual has been developed, which stresses the use of a Minimum Initial Service Package (MISP) [11]. It is a range of core RH activities to be carried out from the beginning of the emergency, which comprises managing gender-based violence, HIV/AIDS precautions, simple obstetric care, availability of condoms, post-coital emergency contraception and the organisation of an obstetric referral service.

Also for mental health an inter-agency guideline is now available, the IASC Guidelines on Mental Health and Psychosocial Support in Emergency Settings [12].

Communicable Disease Control

The major causes of death in many mass displaced person setting following a natural disaster or complex humanitarian emergency are made up of malaria, measles, acute respiratory infection (lobar pneumonia) and diarrhoeal diseases, particularly when there is a background of malnutrition. Some studies attribute 60–90 % of all deaths due to these illnesses. In addition, typhoid, meningococcal meningitis, yellow fever, typhus, plague, dengue, leishmaniasis, polio and viral hepatitis may cause major outbreaks. In terms of more chronic disease, TB, particularly when multidrug resistant, and HIV/AIDS can cause much morbidity and mortality.

Disease may be caused by the new environment, illnesses endemic in the indigenous or newly arriving population, or may present due to overcrowding and hygiene failures. The principle is that many diseases tend to be more severe and more easily spread in a refugee population. In order to combat this, therefore any communicable disease control system must include proper case finding and surveillance using home visitors, accessible health services that can treat the main four diseases and an underlying effective hygiene system that minimises disease risks and transmission.

Preparing and planning for epidemics, which are likely to occur, requires good background health intelligence of the area before arrival. It also requires the use of standard protocols for case finding, diagnosis and treatment that can be easily taught to more junior health workers, simple laboratory facilities and access, identifying sources and the logistic implications of mass vaccination campaigns and identifying sites for health facilities within the camp. Communicable disease control requires thought, planning, training and situational awareness. It may be one of the most difficult areas of refugee health, and ready access to trained epidemiologists and public health physicians is very helpful. WHO has published a field manual for the control of communicable diseases in emergencies [13].

When an outbreak arises, the cases must initially be confirmed. This requires proper history taking and examination, followed by laboratory confirmation if at all possible, of initial cases of a suspect disease. If confirmed, successive cases may be diagnosed based on standardised field definitions. For example, the case definition for measles is generalised erythematous rash lasting three or more days, fever and one of red eyes, cough or runny nose. Systematic outbreak investigation and control measures need to be adopted. These include case registration, plotting an epidemic curve with geographic locations, targeting case finding and treatment to high-risk groups and assessing likely sources of the epidemic.

Control of any outbreak will include finding and minimising the sources, such as robustly maintaining water purity in a cholera epidemic; interrupting transmission of disease, such as vector control measures in malaria; and the protection of susceptible groups, the classic example being measles vaccination of all children. Cooperation with the local Ministry of Health protocols and WHO reporting systems is important.

Diarrhoeal diseases are a principle cause of morbidity and mortality in refugee situations. *Shigella*, rotavirus, cholera and *E. coli* are significant pathogens. Bloody diarrhoea with fever is a strong indication that *Shigella* is present, which needs laboratory confirmation. Adequate oral rehydration therapy (ORT) networks and

trained workers, attention to camp and personal hygiene, clean water supply, adequate food rations and the promotion of breast-feeding for infants are key control measures. ORT needs significant effort; not all refugee populations nor health workers are convinced of its efficacy.

Acute watery diarrhoea, particularly when arising in patients above 5 years, resulting in severe dehydration, must be presumed to be cholera. The WHO case definition includes these features. Cholera in epidemic form requires significant additional resources and the set-up of a “cholera treatment centre”: an inpatient area, “cholera cots”, buckets to collect diarrhoeal fluid, stocks of ORT (or ability to make this up), i.v. fluids, trained nursing care and large amounts of clean water and strict hygiene measures, as well as an adequate reporting and case finding system. A cholera outbreak in any camp consumes significant resources and must be planned for. Cholera can have a case fatality rate of up to 50 % without treatment; with an adequate control system, the CFR can be well under 2 %. The attack rate of cholera in a population may be around 5 %, with outbreaks commonly lasting around 4 weeks. It is important to note that bodies of those who have died from cholera are one of the few examples of bodies being particularly dangerous to public health. Kits to treat cholera outbreaks are available from some major NGOs.

Many acute respiratory infections (ARIs) are upper respiratory and more mild, but serious disease is common in conditions of overcrowding, particularly when associated with poor shelter, wet climatic conditions and malnutrition. To differentiate mild ARIs from more serious ARIs (pneumonia) that would need antibiotic treatment or hospital admission, an algorithm can be used based on breaths per minute and chest indrawing, which can be taught to basic health workers. Case finding, use of field definitions and adequate training for health workers are important in controlling ARIs.

Malaria can be a major problem, particularly with refugees that have migrated to an area of higher endemicity. For example, in the Ethiopian famine (1984–1985) many highland communities, who were protected by reason of living at high altitude, moved to Sudan or other lowland areas and suffered from significant *P. falciparum* disease. Malaria protection is based on controlling the vector: by minimising standing water areas, larvicide spraying, use of permethrin-impregnated mosquito nets (where resources permit) and periodic spraying of shelters. Chemoprophylaxis is usually advised for pregnant women through intermittent preventive treatment (IPT) with an effective antimalarial drug delivered in the context of antenatal, from the second trimester onwards. Malaria may be suspected in any patient with fever, but is normally confirmed where possible by a simple laboratory test. At the most basic level, microscopic examination of thick and thin blood smears can be performed. Treatment policy should be based on knowledge of drug resistance patterns in the area.

Public Health Surveillance

Information is vital in measuring effectiveness of a response. This must be systematically collected, standardised enough to be collated, appropriate to the local situation and acceptable to the Ministry of Health, acceptable to those affected and regular and

timely enough to be useful. It is important to be consistent, rapid and repeatable, rather than always absolutely exact. Many NGOs, donor organisations and other international organisations may base their response on the available health data; it is therefore a core and important part of any response. The following data is typically required:

Demographic data.

Crude Mortality Rate (CMR). This is the key mortality indicator, upon which many resources and audit of programme performance is often based.

Under-five mortality rate.

Morbidity – key reportable diseases.

Nutritional surveillance data.

Use secondary data as far as possible from the UN, Govt, MoH and NGOs.

Integrate with local surveillance systems where possible.

Use local reporting chains as well as NGO systems and UN Cluster coordination.

In order to perform consistent data collection, local health workers should be employed if available. Population estimates are politically sensitive, as numbers lead to resources. Both providers and host nations may have interests in maximising or minimising figures, so they cannot always be regarded as accurate.

In the early stages of disaster situations with mass population migration, rough estimates of the population, using cluster sampling and extrapolating data to estimate the total PAR, may be required. This can then be refined over time. It is important that within the entry screening facility for new arrivals, those numbers arriving are also counted.

In the later stages of a refugee camp, in the post emergency phase, increasing health data can be considered, such as:

Extended Programme on Immunization (EPI) data

Maternal and Child Health Clinic (MCH) data, including reproductive health data

Consultation rates

Treatments against core diseases

Reproductive health consultations

Mental health activity

TB clinic activity

Access and barriers to access

Health promotion activity

Human Resources and Training

Most NGOs responding to a relief programme will tend to send a small group of expatriates who will support their own locally recruited resident personnel who may have worked in the country for some years. An intervention programme will often mean a rapid recruitment of a significant number of local staff, with a variety of logistic, medical, engineering or administrative skills. Western military forces may be one of the few groups that are relatively self-sufficient in terms of manpower;

however, even they are increasingly recruiting interpreters and other key staff to support the relief component of their military mission.

Recruiting local staff may be fraught with administrative procedures, costs, negotiations with local government officials and the need to determine pay rates such that it does not destabilise the local economy. For this reason many organisations try to minimise the numbers they recruit, which may compromise the effectiveness of the programme itself. Some NGOs have estimated numbers required to support particular types of programmes. For example, a qualified health worker can manage about 50 consultations per day and that a home visitor should have between 500 and 1,000 people to look after. A single doctor may be able to oversee a small team of health workers in an outpatient setting while also medically supervising a therapeutic feeding centre of about 200 children. Qualified health staff in a local country may be contracted to the local MoH, and some negotiation may be required in order for them to be released to look after a displaced community. UNHCR will often provide advice to NGOs and others into the best means of recruiting and screening staff, together with advice on pay rates and local employment law. It is important to be sensitive to local issues such as employment of women and tribal quotas.

Expatriate staff, in order to perform to SPHERE guidelines, are increasingly required to have appropriate training and supervision when they deploy to an emergency. This effectively means that elements of “Clinical Governance” and increased accountability are of greater importance and are welcome features of relief programmes. Finally, recruiting local and expatriate staff must fall within the principles that most NGOs work within. These are enshrined within the Code of Conduct: Principles of Conduct for the International Red Cross and Red Crescent Movement and NGOs in Disaster Response Programmes.

Coordination

Coordination by the various agencies responding to a common humanitarian goal does in theory sound a simple proposition. However, in past decades this has been problematic and has resulted in major system failings; the performance of the international community following the genocide in Rwanda being one example. There have, however, been some recent improvements in inter-agency cooperation. A well-coordinated relief effort has a number of features: leadership, normally from a UN agency such as UNHCR or UNOCHA, working closely with the host government, an effective coordinating body with some lower-level executive authority, agreed inter-agency priorities and rationalisation of activity such that “economies of scale” can be achieved. Where donor organisations, international military forces and other IOs are present, it is useful for them to have a seat at the coordinating meeting; this of course may create tensions in some areas but has also been seen to work effectively.

The cluster approach is now in operation since a number of years. Cluster leads are responsible for standards and policy setting, building response capacity,

operational support and establishing surge capacity. Although this is a recent development, there are early signs that the cluster approach is a major advance in the coordination of all agencies, from NGOs, IOs, UN agencies, donors and military forces.

Security

The provision of adequate security is fundamental to all other public health and welfare interventions. The control of violence between tribes or ethnic groups, gender violence and fear within a displaced community are immensely harmful to population health and well-being. Population movements are often as a result of complex humanitarian emergencies, with war and lower-level violence being a causative part. The imposition of security can occur from a range of actors: the host population Police or Army; a NATO; UN or other Western peacekeeping force; a more local military force, such as one from the African Union; or militia within the refugee population themselves. The effectiveness of these forces may be variable, with political influences often present. Behaviour and interaction with the refugee community, for example, trading sought after goods for donated food rations or labour, may give rise to a number of ethical and moral questions. However, if the overall effect is that a population can exist in relative peace, with access to the main health interventions discussed previously, and being able to live without fear, this may be a price worth paying.

If Western or UN military forces are present, they will normally have a seat at senior planning meetings, alongside senior UNHCR or UNOCHA officials. Their military contribution to logistics, intelligence, provision of security, engineering and medical skills have contributed significantly to many humanitarian crises in the past decades, for example, the NATO effort in Pakistan following the 2005 earthquake and support to Macedonia and Kosovo following the Balkans wars in 1999. Humanitarian workers need to accept that military peacekeeping forces are an increasing presence in many complex humanitarian emergencies as well as providers of humanitarian assistance following natural disasters.

Conclusion

There has been considerable progress in the evidence base for the health management of a major humanitarian disaster, whether naturally caused or due to conflict. Initial assessment and priorities for intervention are well established with increasing cooperation and integration of the relief effort becoming evident, although much progress is still required. The need for health workers in this area to be adequately trained, with an understanding of both the requirements at field level and a higher strategic appreciation of how an aid effort is coordinated and delivered are key

skills, which when effective can significantly improve health care of displaced persons and therefore reduce their morbidity and mortality.

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Chapter 13

Responding to Acute Humanitarian Crises: The Role of Health System Levers in Response, Recovery and Rebuilding to Protect Population Health

Claire Bayntun

Abstract The health system can be defined as ‘comprising all the resources, organisations and institutions that are devoted to producing interdependent actions aimed principally at improving, maintaining or restoring health’. The WHO document ‘Strengthening health systems to improve health outcomes’ describes six components – (1) service delivery; (2) health workers; (3) health information; (4) medical products, technology and vaccines; (5) health finance; and (6) governance and leadership. These components may be described as ‘levers’ due to the interdependent and dynamic nature of the health system’s functioning.

Keywords Health system levers • Operation Phoenix • Sarajevo • Care of prisoners and detainees

Objective

- To review the role of healthcare levers (service delivery; health workers; health information; medical products, technology and vaccines; health finance; governance, leadership) in disaster recovery and management

Background

The World Health Organization’s 64th World Health Assembly (WHA) in May 2011 adopted a resolution on *strengthening national health emergency and disaster management capacities and resilience of health systems* [1]. There has been an

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emphasis on approaching health management using a holistic health system approach since the World Health Report in 2000 [2]. Disaster management is a topical issue globally, with considerable developments in related funding, training and institutions over a similar period. However, these developments have been local or isolated in nature, rather than progressing a holistic health system approach to disaster management as is now advocated by the WHA [3]. A holistic approach to managing the health of a population is essential during and after an emergency situation for sustained and effective recovery.

The WHO promotes ‘all-hazards’ disaster management, incorporating both man-made and natural disasters. By identifying and strengthening its different components, the whole health system can better meet the demands of any type of disaster, enabling a coordinated, rapid and effective response and recovery. Thus, to function effectively during and after disasters, a health system must have resilience built in to its structural components.

The Role of Health System Levers

The health system can be defined as ‘comprising all the resources, organisations and institutions that are devoted to producing interdependent actions aimed principally at improving, maintaining or restoring health’ [4]. The WHO document ‘Strengthening health systems to improve health outcomes’ describes six components – (1) service delivery; (2) health workers; (3) health information; (4) medical products, technology and vaccines; (5) health finance; and (6) governance and leadership [5]. These components may be described as ‘levers’ due to the interdependent and dynamic nature of the health system’s functioning.

Integration of all health system levers during disaster recovery limits wasteful duplication of resources and activities and promotes the cooperation of programmes and infrastructural capacity. Health-related investment, training and rebuilding should be managed through the relevant Ministry of Health, where possible. This approach allows long-term continuity of healthcare development, resulting in sustainable population health improvement.

Case Studies

Recent disasters illustrate the practical application of the levers and how strengthening across the health system is necessary to secure sustained improvements in population health.

Governance, Finance and Health Workers

On the 12th of January 2010, an earthquake in Haiti left 1.5 million people homeless. Haiti’s health system was inadequately prepared to manage the disaster. A cholera outbreak followed the initial disaster, causing morbidity in 450,000 people and mortality figures of 6,300 [6]. The earthquake destroyed governance and health infrastructure, and thus the disaster effort was led by

international organisations through the Health Cluster. Many local health workers were recruited to work for these organisations who were offering more reliable salaries, depleting the state system of capacity. Further to this, promised donor funds failed to arrive and investments in the health system were delayed.

Health Information, Governance, Service Delivery and Medical Products

In July and August 2010, floods in Pakistan affected 200 million people and destroyed health facilities. In spite of the overall challenges and losses, prior investment in disaster management in Southern Punjab region allowed effective evacuation and medical management of communities, mitigating further deaths [7].

Health System Resilience: Across Levers

On the 11th of March 2011, an earthquake and tsunami shook Japan. In spite of disaster planning, the affected rural communities suffered initial shortages of food, water, fuel and aid materials. However, health workers were recruited from neighbouring regions to support the 400,000 people evacuated in to shelters. Japan's health system was resilient in spite of the challenges due to investments in disaster preparedness [8].

Health System Building

The famine in the Horn of Africa in 2011 demonstrated how major international disasters require emergency practical action across the six health system levers. This famine affected ten million people across several countries, creating mass population displacement. These countries have poorly developed health systems and lack disaster preparedness. Immediate priorities included provision of water, sanitation, shelter and malnutrition management (service delivery); recruitment and training (health workers); surveillance for outbreaks (health information); vaccine programmes for preventable diseases (vaccines, medical products and technology); funding (finance); and inter-agency coordination (governance) [9]. Investment is needed in these countries to build health systems that will be better prepared for future disasters.

Health System Priorities in All-Hazards Disaster Management

To maintain sustained improvement in a population's health after a disaster, each of the six health system levers should be strengthened to ensure a well-coordinated recovery and build resilience against the next potential emergency.

Leadership and Governance

- Develop international, national and cross-boundary systems of governance, coordination and response for all-hazards disasters [10–13].

- Ensure ethical decision-making embedded in disaster management with special consideration given to legal preparedness [14–17].
- Adopt strong leadership to manage the political issues associated with disaster management [18, 19].

Case Study

Strong leadership is required for post-conflict planning and decision-making. The reconstruction process in East Timor was complex due to the involvement of multiple agendas:

Let us not be tempted to build and develop modern hospitals that are costly and in which only half a dozen people benefit from good treatment. Let us concentrate above all on planning intensive campaigns of sanitation, prevention, and the treatment of epidemics and endemics for the whole population.

Xanana Gusmão, President of East Timor

Childhood immunisations were quickly implemented as they improved not only health but were also popular with the public. In 2001 it was suggested that good leadership had resulted in the provision of basic healthcare through the countries' own health sector, the establishment of a new public health service, and that there was planning for the future health system [20].

Health Workforce

- Develop a programme of disaster management training [21–25].
- Ascertain specific needs of the health workforce during disasters, such as their protection, welfare and commitment [26].
- Invest in an accreditation system giving disaster relief workers recognised status to enable organised assistance in disasters [16].

Medical Products, Vaccines and Technology

- Stockpile disaster-related medications and equipment, with designated distribution arrangements [19, 27, 28].
- Establish a policy for implementing disaster-related mass vaccination based on an understanding of previous controversies [29–31].
- Ensure practical measures are in place to manage the impact of technology failures in health facilities, such as power failures [32–34].

Health Information

- Implement strong health surveillance systems in disaster preparation, during a crisis and throughout recovery [35].

- Ensure access to relevant research and developments [36].
- Adopt reliable systems of communicating between agencies and with the public during disasters. This should include the involvement of the media as part of disaster management [13, 18, 37, 38].

Health Financing

- Implement effective policies to minimise financial barriers to healthcare [16, 39].
- Adopt transparent and equitable management of disaster funds, understanding the implications for national and global health [29, 40].
- Attempt to integrate recovery funding streams into longer-term models of health system finance as appropriate for each specific country [21].

Service Delivery

- Develop disaster preparedness, acute response and service continuation plans [31, 41, 42].
- Increase community preparedness and resilience through engagement and training [43–48].
- Establish plans to manage a surge in numbers of patients, both within and beyond healthcare facilities [19, 26, 49].
- Develop consensus policies regarding crisis standards of care and guidance on clinical priorities [17].
- Safeguard patient medical records and medications during each disaster [39, 50].

Implementing Disaster Management Using the ‘Service Delivery’ Lever in the Field

The ‘service delivery’ lever is of direct practical importance to health practitioners working in the field. Key areas for consideration are as follows: acute disaster response, crisis standards of care, managing surge capacity and building community resilience to future disasters.

Acute Response

Service delivery involves having acute disaster-response services, as well as managing the interruption to, and continuation of, essential services. This requires a breadth of expertise, resources and contingency management plans to enable services to cope

with differing population demands and challenging environmental circumstances during disasters. Effective disaster response depends on anticipating common patterns of morbidity and mortality after certain disasters [31]. A useful tool can be the Geographic Information System (GIS) which integrates environmental factors and pre-disaster population information to create a map of the distribution of populations at risk. It can be used to predict morbidity and mortality patterns, thus having an important role in resource allocation decisions immediately after a disaster [51].

Regardless of the specific situation, priority is given to ensuring adequate provision of clean water and sanitation, alongside outreach services to identify the sick and prevent diarrhoeal disease spread. In the case of refugee or internally displaced population camps in developing countries, relief measures will usually include measles immunisation through the assistance of the international community [52]. Emergency feeding programmes – prioritising children, the elderly and pregnant or lactating women – may be required with food rations containing a minimum of 2,100 cal, protein, fat and micronutrients [31]. Children may be a particularly vulnerable group in a disaster, particularly if they are exposed to noxious agents. They are at particular risk of rapid deterioration, and there may be a limited availability of weight- and age-specific treatments and antidotes [53]. In those countries at risk, malaria can emerge as a secondary problem within displaced communities due to overcrowding, lack of bed nets and insecticide, poor water supply and sanitation and poor surveillance and clinical facilities [20]. These crucial public health preventative measures must be prioritised as part of the acute response.

Crisis Standards of Care

The health system may become overwhelmed during a disaster requiring adjustments in standards of care and the triaged allocation of limited resources. Gostin defines crisis standards of care as ‘the optimal level of health care that can be delivered during a catastrophic event, requiring a substantial change in usual health care operations’ [17]. Population displacement, whether due to an organised evacuation to shelters or ad hoc development of camps, constitutes a major emergency that may require ‘crisis standards’ and implementation of disaster operations. Protocols about patient management can be provided for use in a disaster to guide practitioners during the acute phase [17]. A tiered system of resources (such as health workers and medical equipment) can be implemented, in which an inadequacy of resources at one level (such as community) activates the next tier of response (such as regional) [19]. Systems can be established to allow for immediate requests for assistance from neighbouring regions and arrangements made to facilitate the transfer of patients. Legal mandates may be helpful in this regard, particularly with mutual aid agreements to transfer special care patients, such as those from nursing homes or that require kidney dialysis [50]. Special shelters to cater for preregistered patients with chronic disease should be planned, with recommendations for patients to take a caregiver with them, durable medical equipment (such as walkers, wheelchairs, oxygen tanks) and medications [50]. In the case of a highly contagious disease or

contamination, the required medical equipment, tents and personnel may need to be brought in to the affected area rather than patients moved out [19].

Case Study

Chi-Chi Earthquake, Taiwan, Post-disaster Evacuation: An Example of Well-Planned Evacuation and Disaster Management in Practice

A Disaster Surveillance Team was tasked with implementing evacuation procedures to reduce adverse health consequences. This involved conducting a community needs assessment, disease surveillance, providing improvements to water supply, sanitation and education to the community.

Community resilience was further enacted through a ‘buddy system’, allowing unaffected regions to support the disaster areas, continuing routine preventative measures for infectious diseases. A reliable communications system with neighbouring cities was established. These service delivery plans resulted in an efficient, targeted disaster response [54].

Services need to be developed to reflect the specific needs of a disaster-affected population. For example, the incidence of mental health problems increases, following disasters causing disability in all age groups [55]. Abuse of illicit drugs and prescription medications and increases in domestic and elder abuse are common issues requiring the delivery of robust community health services in the aftermath of disasters [56].

Surge Capacity Planning

Surge capacity planning is a key component of disaster preparedness and requires a flexible approach to deal with different types, scales and duration of incidents. Health workers within healthcare facilities can anticipate a 1:5:7 ratio of critically ill/urgently ill/well casualties and a ‘second-wave’ phenomenon as the more critically injured arrive later than the ‘walking wounded’ [57]. Security procedures may be required to prevent the entry of contaminated victims or other unauthorised persons. Resources and mechanisms must be made available to label, track and reunite patients, including unidentified children, with their families.

Healthcare facilities should complete an inventory of sites that can provide critical care. Approximately 10–20 % of a hospital’s operating bed capacity can be mobilised in an acute situation using strategies listed in the following section. An additional 10 % may be assured through conversion of ‘flat space’ areas such as lobbies, waiting rooms, physical therapy areas and hallways [19].

Increasing Hospital Surge Capacity

- Clear emergency department of ambulatory patients.
- Cancel elective procedures and admissions.

- Increase the number of clinical screening areas.
- Admit patients from the emergency department into ‘hallway’ beds.
- Ensure early discharge of stable inpatients.
- Convert private side rooms to double occupancy.
- Use non-patient care areas (lobbies, classrooms) for patient care.
- Use temporary external shelters (tents, mobile trailers).
- Use alternative care sites (sports halls, community halls, schools) [19].

During the acute phase following a disaster, intensive care provision can be overwhelmed. In anticipation of this, practical planning must enable specific ward areas to be dedicated to critical care [58]. The Hospital Disaster Life Support Course can enable health workers to manage critical care patients beyond the intensive care unit [59].

Alternative sites for health service delivery may be required in a disaster. There are many challenges in finding an appropriate location for surge health services beyond established health facilities due to issues such as accessibility and suitable hygiene amenities [49]. An alternative approach is to facilitate home and family-based care [19]. Thus, individuals and agencies providing home care should be formally involved in disaster planning [26].

Resilience in the Community

By integrating local health disaster management with community preparedness, conventional threats will be met with more resilience [60]. The International Federation of the Red Cross suggests building community resilience by providing education about risk mitigation directly to the lay public at community events, health fairs, schools and via mass media. Communities can be provided with training in first aid and cardiopulmonary resuscitation [42]. With the appropriate preparation, a community can become an empowered ‘resource’ rather than a ‘victim’, with residents trained in search and rescue, first aid, fire suppression, care and shelter, emergency communications and disaster mental health [43].

By planning and investment in rebuilding across all six levers, a population and its health system may become more resilient in the face of all-hazards disasters. These levers are interdependent and services need to be actively supported by the other levers to optimise disaster response, post-disaster recovery and rebuilding. For instance, service delivery depends on the availability of trained health workers at suitably resourced facilities, coordinated through a strategically governed health system.

Challenges to Rebuilding a Health System Fit for All-Hazards Disasters

Health systems that are ill-prepared for disasters can be destroyed by catastrophes or conflicts. Weakened institutions will struggle to provide an effective relief effort or adequate service provision, while private actors will exploit opportunities in healthcare provision that were previously provided as a public service.

With central infrastructures affected, government health worker salaries are at risk of becoming unreliable. Health workers may seek employment in private practice or with NGOs/IGOs to maintain their income [6]. Further, threats to financial security or personal safety can result in the loss of health workers to other countries. Retraining of health workers is costly and takes years. These factors can significantly deplete the state health system of capacity, resulting in previously public-funded health systems becoming more privatised and influenced by the specific programme agendas of NGOs. Thus there can be a failure to invest in rebuilding a holistic health system for the immediate and long-term benefit of the population's health.

Case Study

Mozambique began to successfully rebuild its health system after the civil war for independence in 1975. The new government unified private, public and military health facilities in to an integrated health system, prioritising providing the population with access to primary and preventative services. Large numbers of health workers were trained, and the country boasts high vaccination rates for children under 5 years.

Implications for Public Health, Policy and Disaster Management Multi-professionals

Health emergency preparedness has been described as ‘the capability of the public health and health-care systems, communities, and individuals to prevent, protect against, quickly respond to, and recover from health emergencies, particularly those whose scale, timing, or unpredictability threatens to overwhelm routine capabilities’ [61].

The WHO Regional Office for Europe has adopted health system strengthening as the approach to support emergency preparedness and enhancement of crisis management capacities of member states. In response to international requests, a practical, action-oriented toolkit was developed and refined in a series of expert consultations [4]. This toolkit identifies how practitioners can address disaster management across each health system lever, building resilience in to the health system.

Health system capacity varies across the globe, and thus the postemergency strategy will need to reflect the situation and resources available. Disaster-response management and infrastructure are lacking in large parts of the developing world. These health systems in particular need to be strengthened across all levers to enhance population health and ongoing resilience to all-hazards disasters.

Summary

Rebuilding health systems after a disaster provides an opportunity to integrate all levers of the health system to promote sustainable population health and protect against the effects of future all-hazards disasters. During the disaster recovery period, communities need to be able to manage a surge in need, conduct timely

surveillance and prevent secondary consequences to minimise morbidity and mortality. They need to be able to coordinate agencies, collaborate with other countries, communicate effectively and maintain trained health workers. This requires reflecting on previous disasters, being abreast of developments in disaster management, accessing the most useful tools and exercising continuous strategy planning across all health system levers. In spite of the challenges, practitioners involved in rebuilding health systems should prioritise these objectives to maximise efficiency and protect population health long term.

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Chapter 14

Responding to Acute Humanitarian Crises: Health Planning in Action “Operation Phoenix” – A British Medical Aid Programme to Sarajevo

Anthony D. Redmond and John F. Navein

Abstract Sarajevo has two main hospitals, the Koševo Hospital (a tertiary teaching hospital with 3,000 beds) and the State Hospital (420 beds), which had been a military hospital until the war. Hospital practice had developed as a mixture of local, Russian and European techniques. Emergency medicine as such did not exist. Before the war, at the Koševo Hospital, emergencies were admitted directly to one of the several specialty clinics that ran independently of others on the same site. Each surgical clinic had its own anaesthetists and ICU. Paediatric surgery, including aspects of children’s plastic surgery, ran in isolation. There was no Emergency Room at the Koševo Hospital. Although the shortcomings of this system were recognized, it took the pressures of a war to effect a change. At the start of the war, casualties were taken into “Traumatology” (orthopaedic trauma), where plastic surgery alone was in the same building.

Keywords Health system levers • Operation Phoenix • Sarajevo • Care of prisoners and detainees

Operation Phoenix started in 1994 but it serves well as a timeless medical example for humanitarian assistance. It offers many practical examples and the lessons identified from this operation are still valuable for the present and future planning of similar operations.

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Objective

- To demonstrate healthcare planning in action in the case of a British Medical Aid Programme to Sarajevo

Background

In February 1994, a mortar bomb exploded in a crowded market place in the centre of Sarajevo. 64 civilians were killed and many more were severely injured. The horrifying televised images transmitted around the world provoked a wave of revulsion culminating in a ceasefire agreement achieved against a backdrop of the threat of air strikes. Prime Minister John Major and President Bill Clinton announced a “UK/US initiative” for Sarajevo to balance the stick of air strikes with the carrot of substantial aid. It was hoped that by capitalizing on the ceasefire and rapidly returning the city to some semblance of normality, the momentum for peace would gather quickly and eventually become unstoppable. Tony Redmond, who had previously worked in the city, was a member of the UK/US mission dispatched to Sarajevo in March 1994 to identify those areas where further aid would be most effective in quickly restoring the life of the city. Included in its report were a number of recommendations concerning health that had been agreed in full consultation with the Bosnian Ministry of Health and World Health Organization (WHO) in Sarajevo. The British Government, through its Overseas Development Administration (ODA), agreed to fund a number of these initiatives, including a medical programme that became known as “Operation Phoenix”.

Introduction

Sarajevo has two main hospitals, the Koševo Hospital (a tertiary teaching hospital with 3,000 beds) and the State Hospital (420 beds), which had been a military hospital until the war. Hospital practice had developed as a mixture of local, Russian and European techniques. Emergency medicine as such did not exist. Before the war, at the Koševo Hospital, emergencies were admitted directly to one of the several specialty clinics that ran independently of others on the same site. Each surgical clinic had its own anaesthetists and ICU. Paediatric surgery, including aspects of children’s plastic surgery, ran in isolation. There was no Emergency Room at the Koševo Hospital. Although the shortcomings of this system were recognized, it took the pressures of a war to effect a change. At the start of the war, casualties were taken into “Traumatology” (orthopaedic trauma), where plastic surgery alone was in the same building.

Because of a recognition of the need for a multidiscipline approach to the severely injured patient and also to conserve heat and reduce the size of the target

Table 14.1 Rules of engagement for foreign medical teams

Only go if you are asked
Only do what you are told
Prepare, practise, and have a plan
Cooperate and do not compete

for snipers, after about a year of war, the casualties were received in one central “Emergency Room” in the Department of General Surgery. And casualties there were many. The doctors quickly became adept at life- and limb-saving surgery. Before the war, the Department of General Surgery at Koševo Hospital had a well-recognized European Centre; however, the Professor and leading members of his team were Serbs, and after a year of war, many of them, with their equipment, moved to the Serb side, while others went to Austria and the USA. Therefore, when the need for reconstructive surgery was greatest, the city had few who could help.

There had been understandable resistance within the medical community in Sarajevo to outside interference. Some of those who had come to help in the past proved to be less experienced than local doctors, and some attempted surgery beyond their capabilities or when it was inappropriate to the circumstances. Furthermore, their need for material medical aid made them very sensitive to any inference that they might need aid in professional development. Not unreasonably, they considered themselves at least the equal of those who came to help. However, the dire need for reconstructive surgery and the loss of local specialists provided a unique opportunity for foreign specialists to work alongside local doctors without any implied criticism of competition. There was simply no alternative.

British plastic surgeons have been associated with the Department of Plastic Surgery at the Koševo Hospital for many years [1]. After 1992, several British plastic surgeons worked in Sarajevo prior to “Operation Phoenix”, while others worked in Tuzla in 1993. Médecins Sans Frontières (MSF) had also tried to address the problem of reconstructive plastic surgery in Sarajevo but had difficulty recruiting surgeons and anaesthetists of sufficient experience and in sufficient numbers. The concept at the core of “Operation Phoenix” was that the British NHS had the numbers and the experience, and any limitation on their availability might be compensated for by running short-term missions, back to back, with a small resident staff to coordinate work there on the ground. This approach was very different. One of the tenets of foreign medical aid has been that if you cannot stay for at least 6–12 months, then it is not worth doing. Any shorter stay is likely to mean that by the time you have begun to settle into things, it is time to go home. However, experience in other large-scale emergencies has revealed that well-aimed specialized medical aid can be effective, even if applied over a relatively short period of time [8, 10, 11]. The key to success lies in the skills and experiences of those who give and the cooperation and receptiveness of those who receive. The rules of engagement in all foreign disasters/emergencies still apply (Table 14.1).

You are unlikely to achieve very much if the local authorities have not recognized the need for your services or agreed that you can enter their country and work

Table 14.2 The principal aims of “Operation Phoenix”

Support plastic surgery
Develop the emergency room at Koševo Hospital
Supply specialist drugs
Support ophthalmology
Supply dental materials
Support postgraduate medical education
Supply specialized material aid

in their institutions. The importance of working with local health systems and building on established local resources, co-coordinating relief efforts and cooperating with other agencies has been stressed by others working in the former Yugoslavia [2]. You will only antagonize and confound the work of local people if you follow your own agenda. You have to discuss their needs with the local people and do what they ask. You must already have some experience of working in a hostile environment or foreign country and understand the waste of effort that follows when aid agencies compete rather than cooperate with each other.

Operation Phoenix

Once it was established with the Bosnian Ministry of Health, the WHO, and the ODA that support should be given to reconstructive surgery, the British Association of Plastic Surgeons (BAPS) was approached and responded immediately and enthusiastically to the request for further volunteers. The Association of Anaesthetists of Great Britain and Northern Ireland was approached and responded the same way.

In addition to supporting reconstructive surgery in the city and developing the Emergency Room at the Koševo Hospital, “Operation Phoenix” would seek to tackle areas not covered by other agencies (Table 14.2). The WHO, MSF, the International Committee of the Red Cross (ICRC), and Pharmaciens sans Frontières had supplied emergency drugs. However, the priorities enforced by war had meant that those with rarer but curable conditions, such as some forms of cancer, had failed to receive treatment. It was agreed to respond to a request by Bosnian doctors to supply certain cytotoxic agents.

There were many “hidden” casualties of war. In addition to those with facial injuries, many elderly patients who did not get cataract surgery because of the war had increasing blindness added to the terrors of snipers and shelling. Ophthalmic surgeons and equipment could help local surgeons reduce the number waiting for operations. Nutritional deficiencies increased dental disease in a city with an already high rate of dental decay. The war prevented dental supplies getting into the city and increased their price out of the reach of most when they did. There is an association between oral hygiene and stress [6]. Re-establishing a dental service was also intended to have a simple but significant effect on morale. The provision of dental materials was included in the mission.

The war had greatly threatened medical education in the city. Local doctors were killed, conscripted, or escaped. Opportunities for teaching took second place to the needs of the injured. Medical students found themselves acting as doctors and junior doctors as specialists. Everyone was hungry for knowledge and training. The professional achievements of the war were dulled by an uncertainty brought on by isolation from the rest of the medical world. Every member of the mission was asked to give a lecture or tutorial and provide continuous on-the-job training.

Modern warfare exposes the vulnerability inherent in our dependence on technology. Clinical Centre Koševo was a modern high-tech hospital, relying on a high turnover of sterile disposable items and equipment that needed regular and sophisticated maintenance. The mediaeval siege of the city made anaesthetic and monitoring equipment an early casualty of the war. An earlier ODA-funded mission had identified the spare parts needed for all the equipment in the hospitals. “Operation Phoenix” included the purchase of these parts and the dispatch of technicians from manufacturers in Europe.

The Mission

“Operation Phoenix” began in May 1994, with the first team of surgeons, anaesthetists, and nurses working in both the Koševo and State hospitals. A senior advisor to the Ministry of Health was appointed as liaison officer and interpreted when necessary. A Head of Office was appointed in September 1994. These, and two local secretaries, were the only paid members of the mission. The Ministry of Health supplied an office, and after the first month, an apartment was rented near the Koševo Hospital. Medical training in Bosnia required knowledge of English but communication was not a problem. Local doctors interpreted for those patients who did not speak English.

Each team was briefed several weeks before dispatch, both in person and in writing. They were given information on the historical and the political background to the war and their mission. The content of the briefings was well received but some would have liked still more information. Some team members visited on more than one occasion and were the greatest source of information and reassurance for others, both before departure and while on the ground. As the operation progressed, each team briefed its successor, specialty by specialty.

Although there was a ceasefire in name, it was very fragile. The world’s media may have turned their gaze away from the city for a while but not so the snipers. The airlift into the city was still a target and likely to be halted at any time. Any sudden breakdown of the ceasefire could result in a rapid assault on the city. All these factors were a source of continuing stress for the teams. There were only two relatively near misses, ironically involving those more used to the city. Conveying the degree of risk to volunteers was difficult. The city was safer than it had been for some time but was still dangerous. The risks were described before leaving the UK but only a few people dropped out. It was important to maintain confidentiality and only the

programme director and the individuals involved knew who they were. The reasons were always pressure from family.

In addition to equipment already identified as requiring replacement, team members were instructed to take in other items they required or had been told by previous teams were missing, e.g. disposable theatre equipment.

After further consultation with the WHO and local oncologists, certain cytotoxic agents and other highly specialized drugs were transported into the city. The cases chosen for treatment would have been treated in Sarajevo in normal times and could still be treated there if these drugs were supplied. An added benefit was the avoidance of medical evacuation for these patients with all the problems of split families and repatriation that follow. The decision to supply cytotoxic drugs was criticized by some as a relative waste of resources, given the small number of patients involved. In the context of the ceasefire, however, it was another window of opportunity that could close without warning or herald a return to normality. The arguments in favour were taken to outweigh those against. The doctors and patients involved had no doubts and this particular action had a very powerful effect on morale. The local media vociferously echoed their sentiments.

In July 1994, a British anaesthetist held the first postgraduate medical symposium in the city since the outbreak of the war. The 2-day event drew its faculty from the British doctors in the city and was considered a great success by the more than 60 local doctors who attended. Of perhaps equal impact was the introduction of Advanced Trauma Life Support (ATLS) techniques and teaching. In the same month, a modified ATLS course was held in the Koševo Hospital and run by an eight-person faculty of the Royal College of Surgeons of England. The constraints of war and local unfamiliarity with this type of teaching precluded a formal ATLS course. Before the war, there had been no resuscitation training programmes and no co-coordinated approach to the reception and care of the critically ill and injured. The course was run as a demonstration of a style of teaching and was greeted with enthusiasm by the 40–50 local doctors who attended over the 2-day period.

The remit of the mission was to provide medical aid to Greater Sarajevo, which included those areas then under Serb control. A principle of the mission was that aid would be given according to need and not according to any arbitrary or politically motivated quota. Contact was made with the Serb-held areas and assessments carried out. The level of need between the two sides was incomparable.

Any shortcomings in medical care on the Serb side were relatively few and related to long-standing prewar problems that affected the whole of the former Yugoslavia [9]. Their situation could not be compared to a people who had suffered the inhumanity of a siege that choked off supplies of water, fuel, electricity, food, and medicines. Nevertheless, considerable attempts were made to see and be seen on both sides of the divide. These efforts initially appeared to bear fruit with the first meeting of senior health officials from both communities since the outbreak of the war taking place at Sarajevo Airport in July 1994. On the previously agreed agenda were “the future development of highly specialized medical services in the two communities” and “the exploration of areas where highly specialized medical services can be exchanged between the two communities.” However, the Serb position

of only accepting a separate healthcare system confounded any further developments. They were intransigent in their view that Sarajevo should be divided and all services, including healthcare, duplicated on either side of that divide. This was contrary to the principles of the mission and an obvious waste of the limited funds available to both communities. Cooperation with the Serb side was further compromised by the stealing of equipment. Early on in the mission, a consignment of aid destined for Sarajevo was confiscated at the last Serb checkpoint into the city. High-level negotiations eventually led to its release but not without a period of threat to certain team members. An even more serious incident occurred later.

As described previously, the Koševo Hospital was struggling to cope with the casualties of war in a makeshift receiving room. Refurbishing the room was to be carried out as part of the mission. £100,000 worth of emergency department equipment was dispatched from the UK under the aegis of the WHO. The convoy was stopped at the same checkpoint. The drivers were arrested at gun point and the shipment confiscated. Demands by the Serb authorities that the stolen consignment should be divided between the two communities were unjust, impractical, and ultimately insincere. The equipment has never been returned, either in whole or in part, and the incident marked the end of further involvement of the mission with the Serb side.

The mission had an added twist. An independent television production company had asked if they could film the team members and patients throughout their mission. This would (and did) add a further strain to the burden of working in the city, but after discussions with the Bosnian authorities, the ODA, and WHO, it was agreed that there might be considerable advantage for the people of Sarajevo if another side to their suffering was shown to the world. Every team member and patient had the right to refuse to be filmed and/or withdraw their permission for broadcast later. No one did. In fact the opposite was the case. Patients and their relatives were so desperate that they seized every opportunity for broadcasting their plight.

From May 1994 until December 1994, the British medical aid workers of “Operation Phoenix” made more than 60 persons to journey into the city to work alongside their Bosnian colleagues in the operating theatres, classrooms, clinics, physiotherapy department, and wards.

Ten surgeons and eleven anaesthetists performed/assisted at/were involved in over 200 surgical procedures and over 1,000 consultations. Many of these patients could not have received treatment without this programme. Furthermore, the British doctors contributed to the training of local doctors and plastic surgery has since been maintained in the city.

One of the most prominent symptoms among residents of Sarajevo at that time was exhaustion [4]. Team members were surprised at how exhausting the constant high level of arousal provoked by living in a still dangerous city and the pressure of working in a strange environment proved to be for them. Rest and relaxation, “R & R”, is an important part of any mission. One of the advantages of “Operation Phoenix” was that “R & R” was taken back in the UK while a fresh team carried on the programme. Nevertheless it was important that members were allowed to

unwind together with an overnight stop en route home and express their feeling to each other before meeting their families. Debriefing is a very important part of any mission, even those of a relatively short duration. We have found that informal debriefing is just as effective as a more formal approach. One or two weeks after their return, contact was made to talk through the experience in safe and social environment. There were no significant psychological problems consequent upon the mission. Two members had suffered coincidental psychiatric illness that had preceded their mission, which they only revealed after the mission.

The mission was conceived in optimism and a hope that the ceasefire would hold. Initially efforts were directed toward supporting healthcare reform in the belief that the coming peace would allow development. A programme for healthcare consultants was established with senior managers from the public and private sectors in the UK and recruited as volunteers to enter the city and brief officials of the Ministry of Health. The chief executive of BMI, a British private healthcare company, was extremely well received, and it was hoped his visit would herald the start of a larger management programme. Sadly the slide back into war made it inappropriate to consider changes in the healthcare system, and efforts were concentrated instead on shoring up what was left in place.

As the months went by, the fragile ceasefire slowly crumbled into war. Moving large numbers of people into, around, and out of the city was difficult and dangerous. The airlift was frequently cancelled, living up to its epithet of "Maybe Airlines". The numbers in a team were reduced accordingly at times. The deteriorating security situation at the end of the year finally put a halt to the airlift altogether. Relatively safe and reliable overland access to the city was not available at that time and the mission had to be suspended. The NHS was lending its staff on the understanding that they would be back at a certain time. Once no guarantee could be given regarding the duration of the mission, it was impossible to continue.

The mission was monitored and guided throughout by the Overseas Development Administration and its impact and relevance continuously evaluated. Senior advisors to the ODA made regular visits to the city to carry out these on-site assessments. Contacts with the city were maintained, and both authors returned in September 1995. The mission was resumed in January 1996, with groups of British ophthalmic surgeons and anaesthetists helping local colleagues with the backlog of ophthalmological conditions that had accumulated during the war. Once again, the replacement of worn out and damaged equipment and on-the-job training was an integral part of the mission.

Of the £1.8 m donated by the ODA to implement the medical recommendations of the UK/US mission, £1.2 m was allocated to "Operation Phoenix". The specific costs of supporting the reconstructive and ophthalmic surgery services in Sarajevo reached about £300,000. The remaining money has been spent on drugs and equipment for the hospital service in general, including a small amount to purchase computers for the Ministry of Health. These have been placed in health centres throughout the city to improve data gathering.

Those considering such work must recognize the special costs incurred by working in a war zone. In addition to the car purchased at the start of the mission, the

safety of team members demanded that we purchased a specially armoured vehicle, sophisticated communications systems, flak jackets, and helmets. Taking expensive and precious healthcare workers, equipment, and armoured vehicles into a war zone demand appropriate insurance. Securing any, let alone adequate, life, goods, and vehicle insurance for an active war zone is not easy and already expensive premiums rose as the situation on the ground deteriorated.

The mission was responsible for ordering all its own supplies and delivering them directly to the city. Crown agents proved experienced and reliable colleagues in this regard. Occasionally, by ourselves we reduced the time from agreeing the needs with local doctors to delivering the drugs and equipment to the hospital to less than 2 weeks. The only holdups we encountered were secondary to the logistics of the UNHCR airlift into the city or literal in respect of the Serbs.

Achievements

Like others before [5], these British workers left behind them more than mended limbs. “Operation Phoenix” helped begin the redevelopment of the city’s reconstructive surgery service and provided training in surgery and anaesthesia to the local doctors that will sustain them for the future. Large numbers of medical journals and books have been delivered to the city. Teaching aids, including video players and educational cassettes, have been supplied. The benefits of the mission will clearly be felt long afterward.

Each patient treated was a potential candidate for medical evacuation (“medevac”) from the city. This is a very complex area. Governments at war do not want to lose their population even for treatment. Countries not at war are reluctant to take on the burden of treatment for unknown numbers, for an unspecified time and for a potentially unlimited cost. Even when achieved, “medevac” separates families and makes refugees out of the sick and injured. Treating people in their home cities is usually preferable, and the work of the mission in supplying drugs, equipment, and doctors helped to relieve some of this burden.

Although immeasurable, one of the most obvious achievements was to bridge the siege with the hand of friendship. Local doctors knew they were not forgotten and somebody cared. The frequent journeys into and out of the city brought news of the outside. Team members helped maintain communication between friends and family separated by war.

The mission also showed it was possible to deliver a different type of aid in certain circumstances. Highly skilled professionals can be transported in a “protective bubble” provided by a specialist agency and dropped into an area of need for short but highly productive periods. The NHS is a particularly rich pool of talent and could be drawn on more frequently if this style of aid provision was adopted more widely. There is no shortage of altruism in the NHS. What prevents its members from volunteering their services in aid of those less fortunate than themselves is not a lack of compassion but a lack of opportunity. Those who can take career breaks

are usually in less essential parts of the service or at the start of their career. Those with the most to offer are usually unable to be spared from the service for more than a few weeks at a time. However, the type of work required in Sarajevo called for reconstructive surgeons, anaesthetists, clinicians, and others of the highest skill and experience. There were local doctors available for training. What they needed were trainers. "Operation Phoenix" attempted to square this circle by taking teams of senior doctors for 2 weeks at a time but running them as near as possible back to back to provide an almost continuous service.

The television documentary of the mission appeared to have an overall good effect. It was independent of the mission. The producers selected images to represent their view of the teams' efforts and their relationship to the city. There was a risk that the work could have been misinterpreted or even misrepresented. However, although the films could only show a fraction of what was being done, it was agreed by all who took part in the mission that they gave a valuable and novel insight into the complex problems of the war in Sarajevo. This view was also shared by those in the lay press who reviewed the series. There was criticism in the one medical review of the programme [7] based on a preview of only the first five programmes. This reviewer questioned why the money was being spent in Sarajevo when it could have gone so much further in the Third World. This is an important point and one that all of us in the medical profession must address at some point, because helping others always involves choices. Clearly governments make choices about who receives aid and therefore who does not (Solferino to Goma [3]). But we as individuals also make choices. All of us, when we work in a developed country, have made a choice between the needs of one group and the needs of another. However, choosing between Sarajevo and "the Third World" was not a real option for the members of this mission. They were not presented with an open cheque book or a menu of good causes from which to choose. This money was only available for Sarajevo. They were simply presented with a window of opportunity through which they could help the people of Sarajevo. Their choices were to climb through that window, watch somebody climb through, or simply watch it close. There are many people in Sarajevo whose physical quality of life has been improved dramatically by the work of the British healthcare workers who gave so freely of their time in 1994. This alone made the mission worthwhile. Whether it was cost-effective begs the question "How much is one life worth?" Philosophically this seems unanswerable but we give our answers every day in the choices we make. Every penny we spend on ourselves, both as individuals and as nations, is a choice between our needs and those of others. Perhaps the better question is "How can I make life worth more?"

In a macabre echo of the market place atrocity that heralded the start of this mission, an almost identical mortar attack heralded the events that led to NATO air strikes, the involvement of NATO troops on the ground, and the signing of a peace agreement in Bosnia. These events enabled "Operation Phoenix" to resume in January 1996, reuniting old friends and colleagues and letting others witness for the first time the impact of emergency aid. The next phase of the mission completed the ophthalmology programme. As part of the mission, European engineers were dispatched to Sarajevo to repair and service the anaesthetic and monitoring equipment

in the two hospitals. British plastic and ophthalmic surgeons complemented the work of colleagues from Britain and other countries, which provided support to this much beleaguered city.

Medicine cannot relieve all the suffering from all the sick. It will help some. Humanitarian aid cannot solve all the problems of the entire world. It will solve some. In the end there are probably only ever two choices: do something or do nothing. And doing nothing is never neutral.

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Chapter 15

Responding to Acute Humanitarian Crises: Health Care of Prisoners and Detainees

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Abstract Prisoners and detainees have lost freedom of movement and control over their daily lives. To a very great extent, their health situation is also outside their control. Their lives (food, lodging, sports and work) are in the hands of others – typically agents of government. This has health consequences, often adverse. Provision of health care is the responsibility of the holding authorities, who will decide which health-care system is available and who the care providers are. In conflict or catastrophe environments, NGO or military personnel may become involved in the provision of health care. An example might be where there is an emergency (e.g. a fire) in a prison and medical help from outside is needed or where an NGO is asked to treat (or to not treat) a person who is a prisoner or taken as hostage. It is important to know the different status of people in conflicts and catastrophes, as this status influences their health and health care. To understand the many problems of health care for prisoners and detainees, it is essential to understand some of the terminology used and to be aware of human rights aspects and some other specific problems.

Keywords Health system levers • Operation Phoenix • Sarajevo • Care of prisoners and detainees

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Objectives

- To identify specific problems encountered by health professionals when taking care of prisoners and detainees
- To understand unique dilemmas when providing care for prisoners and detainees
- To provide guidelines for health professionals who are asked to care for prisoners and detainees in conflicts and catastrophes

Introduction

Prisoners and detainees have lost freedom of movement and control over their daily lives. To a very great extent, their health situation is also outside their control. Their lives (food, lodging, sports and work) are in the hands of others – typically agents of government. This has health consequences, often adverse. Provision of health care is the responsibility of the holding authorities, who will decide which health-care system is available and who the care providers are. In conflict or catastrophe environments, NGO or military personnel may become involved in the provision of health care. An example might be where there is an emergency (e.g. a fire) in a prison and medical help from outside is needed or where an NGO is asked to treat (or to not treat) a person who is a prisoner or taken as hostage. It is important to know the different status of people in conflicts and catastrophes, as this status influences their health and health care. To understand the many problems of health care for prisoners and detainees, it is essential to understand some of the terminology used and to be aware of human rights aspects and some other specific problems.

Terminology

It is important to know the terminology used in the prisoner/detainee environment. In particular health professionals need knowledge of the legal status of prisoners and detainees. The health-care consequences of the different groups will be determined by the national laws and may be very different from one situation to another. Terminology is also important because medical personnel can inadvertently become an instrument of a government or even the prisoner or detainee. Health professionals need to know how to act and behave in these situations.

A *prisoner* [1], also known as an *inmate*, is anyone who is deprived of liberty against his or her will. This can be by confinement, by captivity or by forcible restraint. The term may refer to one of the following:

- A person incarcerated in a prison or jail or similar facility (criminal; national law applies).
- A soldier in wartime, held by an enemy (prisoner of war; Geneva Conventions apply)

- Someone held in prison for his or her ideology (political prisoner; national law may apply).
- A person forcibly detained against his will, such as a victim of kidnapping; such prisoners may be held hostage or held to ransom, but not necessarily in a prison or similar facility (hostage).
- People that are held captive for their use as forced labour (slaves).

Other types of prisoner can include those under police arrest or house arrest, those in insane asylums or in internment camps and peoples restricted to a specific area. Sometimes ad hoc rules are applicable in refugee camps or in camps for internally displaced persons (IDPs). It is not clear what the status is of persons in these camps.

Detainee is a controversial term used by certain governments and their military to refer to individuals held in custody, such as those it does not classify and treat as either prisoners of war or suspects in criminal cases. The word became common during and after the war in Afghanistan (since 2001) as the US government's term of choice to describe captured members of the Taliban and al-Qaeda. They were classified "detainees" because there was no consensus about whether the combatants are "prisoners of war" under the definition found in the Geneva Convention. The controversy arises because the Geneva Convention protects "prisoners of war" but says nothing about "detainees". These detainees are allowed a trial, but with important procedural limitations. It is also used to refer to adolescents who are in police custody, in order to note that they are juveniles (as opposed to being placed formally under arrest).

A *prisoner of war* (POW, *PoW* or *PW*) is a combatant who is imprisoned by an enemy power during or immediately after an armed conflict. The prisoner of war status applies only to the captured service members who have conducted operations according to the laws and customs of war: be part of a chain of command and wear a uniform and bear arms openly. Thus terrorists and spies are excluded. In practice, these criteria are not always strictly interpreted. For example, guerrillas may not wear a uniform or carry arms openly yet may be granted POW status if captured. However, guerrillas or any other combatant may not be granted the status if they try to use both their civilian and military status, thus, the importance of uniforms (or as in the guerrilla case, a badge) as identifiers of legitimate status.

Some authorities define POW in accordance with their own internal politics and worldview. Since the special rights of a POW, granted by governments, are the result of multilateral treaties, these definitions have no legal effect, and those claiming rights under these definitions might legally be considered common criminals under an arresting jurisdiction's laws. However, in most cases there is no confusion and POW's rights are recognised. The US Army only uses the term POW to describe friendly soldiers who have been captured. The US Army's term for enemy prisoners captured by friendly forces is Enemy Prisoner of War or EPW.

A *political prisoner* is someone held in prison or otherwise detained, perhaps under house arrest, because his or her ideas or image are deemed by a government to either challenge or threaten the authority of the state. The individual may be a prisoner of conscience and deprived of freedom of speech. In many cases, political

prisoners are imprisoned with no legal veneer and extrajudicial processes are used to detain them. However, it also happens that political prisoners are arrested and tried with a veneer of legality, where false criminal charges, manufactured evidence and unfair trials are used to disguise the fact that an individual is a political prisoner. This is common in situations, which may otherwise be decried nationally and internationally as a human rights violation and suppression of a political dissident. A political prisoner can also be someone who has been denied bail unfairly or denied parole when it would reasonably have been given to a prisoner charged with a comparable crime or the judiciary may invoke special powers. Particularly in this latter situation, whether an individual is regarded as a political prisoner may depend upon subjective political perspective or interpretation of the evidence.

A *hostage* is a person who is held by a captor, originally handed over by one of two belligerent parties to the other or seized as security for the carrying out of an agreement, or as a preventive measure against certain acts of war. However, in the modern era, hostages are more often seized by a criminal abductor in order to compel another party such as a relative, employer or government to act, or refrain from acting, in a particular way, often under threat of serious physical harm to the hostage(s) after expiration of an ultimatum. A person who seizes hostages is known as a hostage taker; if the hostage is present voluntarily, then the receiver is known rather as a host.

A *suspect* is a person not yet convicted of any crime. Consequently the person should not be treated as if he/she is a convicted prisoner already. In trying to find the truth, the police (or others) use different methods of interrogation. Sometimes the gap between interrogation and torture is narrow. A doctor can be asked to declare a person healthy (enough) to go further with interrogation. There are nevertheless international rules about the human rights in these situations [2, 3].

The verdict: The conclusions and the convictions pronounced by a judge are based on evidence and declarations of witnesses and experts. Because a doctor can become part of the judicial system to get the truth or to punish a convicted person, it is important to realise that different nations have different systems in coming to a conviction and punishment. The methods for trial, evidence and conviction depend on national legal systems. After conviction there are four possibilities (sometimes in combination) for the suspect:

1. No punishment (no or not enough evidence, no proven guilt)
2. Personal punishment (for instance, fine, imprisonment)
3. Measurements to protect the society (imprisonment)
4. Treatment and/or rehabilitation of the convicted person

Forced psychiatric treatment: In the case of psychiatric illness being associated with an unlawful act, compulsory medical treatment may be ordered. However, be warned – there are marked variations between countries when making decisions concerning mental health, crime and guilt. Most nations have different laws and rules when dealing with associated psychiatric illness and in deciding on psychiatric treatment in the context of punishment. When a health professional is asked to treat mental illness in prisoners and detainees, he/she should know the specific rules applying in that nation or territory. Specialist medical experts, for example, a

forensic psychiatrist, should make the decision as to whether an illness is the cause of an offence.

Torture is the infliction of severe physical or psychological pain upon an individual to extract information or a confession or meant as punishment. Torture is prohibited by international law and illegal in most countries [2].

Death penalty: There is much controversy about the death penalty as punishment or method to protect society of future crimes. If this “punishment” is regulated by law, doctors can become part of the system, to give information about health status of the person (“fit to die”). Also a doctor should declare someone “dead” or give information about the cause of death. This may well lead to serious ethical and legal dilemmas.

International Law

Several international conventions protect the welfare of prisoners [3]. Prisoners lose liberty but retain certain rights in prison. These include protection from harm and access to a standard of health care equivalent to that provided in the community. In practice, few prison authorities comply fully with these conventions. Low standards of general custodial care and of health care are common. Despite the often-limited information available on the health of prisoners, there is an increasing recognition of the health needs of prisoners.

Human Rights

Some crimes are committed by particular individuals or groups, be they government agents, soldiers, guerrillas or organised gangs. If these activities are directed towards one or more persons, this may constitute an abuse of human rights. A health professional may be a witness to these crimes. Therefore he/she should know which international rules are applicable and how to act in these situations. Human rights refer to “the basic rights and freedoms to which all humans are entitled, often held to include the right to life and liberty, freedom of thought and expression, and equality before the law”. The United Nations Universal Declaration of Human Rights states: All human beings are born free and equal in dignity and rights. They are endowed with reason and conscience and should act towards one another in a spirit of brotherhood.

The United Nations is the only international entity with jurisdiction for universal human rights legislation. All UN organs have advisory roles to the Security Council. Articles 1–3 of the United Nations Charter states, *To achieve international co-operation in solving international problems of an economic, social, cultural, or humanitarian character, and in promoting and encouraging respect for human rights and for fundamental freedoms for all without distinction as to race, sex, language, or*

religion. The United Nations Human Rights Council is tasked with the investigation into violations of human rights. The International Court of Justice (ICJ) in The Hague is the principal judicial organ of the United Nations.

In case of prisoners health professionals should keep in mind that different “rights” (written down in UN treats or conventions) are applicable. Where human rights are adopted by a country, the national legislation commonly contains the specific translation of those rules. There follows some examples of UN agreements focused on (health of) prisoners:

The United Nations Convention Against Torture and Other Cruel, Inhuman or Degrading Treatment or Punishment

The United Nations Convention against Torture and Other Cruel, Inhuman or Degrading Treatment or Punishment (Box 15.1) is an international human rights instrument, under the purview of the United Nations, which aims to prevent torture around the world. The Convention requires States to take effective measures to prevent torture within their borders and forbids States to return people to their home country if there is reason to believe they will be tortured.

Box 15.1. Example of International Humanitarian Law (<http://www.2ohchr.org/english/law/index.htm>)

The Convention Against Torture is one of a series of UN agreements that seek to protect human rights. The most relevant articles on torture are articles 1, 2, 3 and the first paragraph of article 16.

Article 1

1. Any act by which severe pain or suffering, whether physical or mental, is intentionally inflicted on a person for such purposes as obtaining from him or a third person information or a confession, punishing him for an act he or a third person has committed or is suspected of having committed, or intimidating or coercing him or a third person, or for any reason based on discrimination of any kind, when such pain or suffering is inflicted by or at the instigation of or with the consent or acquiescence of a public official or other person acting in an official capacity. It does not include pain or suffering arising only from, inherent in or incidental to lawful sanctions.
2. This article is without prejudice to any international instrument or national legislation which does or may contain provisions of wider application.

Article 2

1. Each State Party shall take effective legislative, administrative, judicial or other measures to prevent acts of torture in any territory under its jurisdiction.

2. No exceptional circumstances whatsoever, whether a state of war or a threat of war, internal political instability or any other public emergency, may be invoked as a justification of torture.
3. An order from a superior officer or a public authority may not be invoked as a justification of torture.

Article 3

1. No State Party shall expel, return (“refouler”) or extradite a person to another State where there are substantial grounds for believing that he would be in danger of being subjected to torture.
2. For the purpose of determining whether there are such grounds, the competent authorities shall take into account all relevant considerations including, where applicable, the existence in the State concerned of a consistent pattern of gross, flagrant or mass violations of human rights.

Article 16

1. Each State Party shall undertake to prevent in any territory under its jurisdiction other acts of cruel, inhuman or degrading treatment or punishment which do not amount to torture as defined in article I, when such acts are committed by or at the instigation of or with the consent or acquiescence of a public official or other person acting in an official capacity. In particular, the obligations contained in articles 10, 11, 12 and 13 shall apply with the substitution for references to torture of references to other forms of cruel, inhuman or degrading treatment or punishment.

The Optional Protocol to the Convention against Torture and other Cruel, Inhuman or Degrading Treatment or Punishment, adopted by the General Assembly on 18 December 2002 and in force since 22 June 2006, provides for the establishment of *a system of regular visits undertaken by independent international and national bodies to places where people are deprived of their liberty, in order to prevent torture and other cruel, inhuman or degrading treatment or punishment*, to be overseen by a Subcommittee on Prevention of Torture and Other Cruel, Inhuman or Degrading Treatment or Punishment (“Subcommittee on Prevention”).

International Covenant on Economic, Social and Cultural Rights, Art. 12

The right to the enjoyment of the highest attainable standard of physical and mental health, to give it its full name, is not new. Internationally, it was first articulated in the 1946 Constitution of the World Health Organization (WHO), whose preamble defines health as “a state of complete physical, mental and social well-being and not

merely the absence of disease or infirmity". The preamble further states that "the enjoyment of the highest attainable standard of health is one of the fundamental rights of every human being without distinction of race, religion, political belief, economic or social condition."

The 1948 Universal Declaration of Human Rights also mentioned health as part of the right to an adequate standard of living (art. 25). The right to health was again recognised as a human right in the 1966 International Covenant on Economic, Social and Cultural Rights.

Since then, other international human rights treaties have recognised or referred to the right to health or to elements of it, such as the right to medical care. The right to health is relevant to all States: every State has ratified at least one international human rights treaty recognising the right to health. Moreover, States have committed themselves to protecting this right through international declarations, domestic legislation and policies and at international conferences.

The real challenge is to combine these different human rights principles in respect to prisoners and detainees. The "United Nations Basic Principles for the Treatment of Prisoners" indicate how the entitlement of prisoners to the highest attainable standard of health care should be delivered:

"Prisoners shall have access to the health services available in the country without discrimination on the grounds of their legal situation" (Principle 9). In other words, the fact that people are in prison does not mean that they have any reduced right to appropriate health care. Rather, the opposite is the case. When a state deprives people of their liberty, it takes on a responsibility to look after their health in terms both of the conditions under which it detains them and of the individual treatment that may be necessary. The translation of that starting point in practice is laid down in a pocketbook [4]. There it states, for example:

- It is a basic requirement that all prisoners should be given a medical examination as soon as they have been admitted to a prison or place of detention.
- Any necessary medical treatment should then be provided free of charge.
- Prisoners should generally have the right to request a second medical opinion.

The World Health Organization (WHO) has also produced a guide for the health (care) in prisons [5]. Based on the experience of many countries in Europe and the advice of experts, this guide outlines some of the steps prison systems should take to reduce the public health risks from compulsory detention in often-unhealthy situations, to care for prisoners in need and to promote the health of prisoners and staff. This especially requires that everyone working in prisons understand well how imprisonment affects health and the health needs of prisoners and that evidence-based prison health services can be provided for everyone needing treatment, care and prevention in prison.

Other essential elements are being aware of and accepting internationally recommended standards for prison health; providing professional care with the same adherence to professional ethics as in other health services; and, while seeing individual needs as the central feature of the care provided, promoting a whole-prison approach to the care and promoting the health and well-being of those in custody.

Health and Health Care

Statistics show that, although 57 % of inmates in state prisons reported using drugs during the month before committing their offence, only 20 % participated in substance abuse programmes while in prison. Federal prisons echo this trend with reports stating that of 63 % of inmates being held for drug offences, only 15 % participated in prison-based drug treatment programmes. HIV/AIDS and hepatitis (often related to the drug scene) are also frequent in prison population. Furthermore, alcoholism and other addictions are often seen as medical problems among inmates. Moreover, tuberculosis is common in many prisons worldwide and treatment is often ill-informed and inadequate. Prisons form a reservoir of tuberculosis, including drug-resistant tuberculosis. Tuberculosis is a problem both inside prisons and outside in the wider community, since people enter, leave and re-enter prisons. Also other communicable diseases are often seen in prison, where people live close to each other. Finally mental health problems, including self-harm and suicide, are common among prisoners. The specific physical and psychosocial environment has great influence on the health status of many prisoners.

These special problems require health-care personnel who understand the situation of prisoners and know the routes to provide optimal care. In many countries there are specialist doctors or specialised centres for health care for prisoners [6]. There is a growing knowledge on the impact on health in prisons and on the health of prisoners. Specialised centres investigate the effect of prison on the health and well-being of prisoners and the influence of prisoner culture (e.g. forced sex and hierarchy). They encourage research into health issues experienced by the whole prison population including women, migrants and ethnic minorities. They consider the impact of prison conditions on staff health and look holistically at the prison setting in the context of public health and in terms of a health promotion approach as developed by the World Health Organization. They bring together research and practice to inform the development of health policy and practical approaches within the prison environment, using evidence-based studies [7, 8]. Reliable and good comparable global data are rare. This also applies for data about the health status of prisoners and data about effects of different prison/punishment systems on health and rehabilitation. However in recent years much has been done for better quality of prison health care [9]. The information that is available indicates that this substantial group is mostly from a disadvantaged socioeconomic background, often has poor physical and mental health status, frequently engages in risk-taking behaviour and, as result, has specific health needs.

Important findings from some surveys [10] include more than half of all male and female prisoners surveyed reported a history of injecting drug use. Regular drug use at the time of incarceration, which may include injecting, was reported by 67 % of male prisoners in New South Wales (NSW), Australia, as well as 74 and 63 % of female prisoners in NSW and Queensland respectively. In both surveys, a high proportion of prisoners tested positive for communicable diseases, particularly hepatitis C, which is strongly associated with injecting drug use. The NSW survey found 40 % of males and 64 % of females had Hepatitis C, while the Queensland survey found 45 % of females had hepatitis C. Approximately 80 % of prisoners were

current smokers, which was over four times the rate of the general population. Mental health concerns were common among inmates. In NSW, 41 % of males and 54 % of female inmates reported having received some form of psychiatric treatment during their lifetime; while in Queensland, 61 % of female inmates had received treatment. National data on causes of deaths in prison are published for instance by the Australian Institute of Criminology. In 2002, there were 50 prison custody deaths.

Advocacy

Experts in the field of health care for prisoners [11] believe that physicians are an essential component of correctional institutions and that they should have a responsibility to advocate for effective and humane treatment for inmates. While looking at the steady increase of incarcerated individuals in the United States, which has resulted in record high inmate numbers, some authors point to the inadequate treatment of mental illness and addiction in the community as a source of the increase – especially among women. They note that the natural history of untreated addiction and mental illness often results in illegal activity, and persistently inadequate treatment perpetuates a cycle of crime and incarceration. The correctional system should view incarceration as an opportunity to link inmates with effective therapy such as mental health services, high-quality drug treatment and support services for re-entry into society upon release, if society is ever expected to decrease recidivism rates. Punishment is often favoured over rehabilitation in many prisons, which may cause harm to a prisoner's physical and mental health. In addition, in situations where effective therapeutic services are available, they are often underused. Health professionals should encourage a campaign for sentencing laws, policies and procedures that directly affect the health and well-being of their patients and encourage more humane and effective treatment alternatives for addiction and mental illness.

Forensic Medicine

“Forensic” comes from the Latin word “forensis”, meaning forum. During Roman times, a criminal charge meant presenting the case before a group of public individuals. Both the person accused of the crime and the accuser would give speeches based on their side of the story. The individual with the best argument and delivery would determine the outcome of the case. In other words, the person with the best forensic skills would win.

Forensic medicine [12] is the medical knowledge that is used to help in finding out what/who caused the death, wound or unlawful act. This may include the findings of torture. In most countries this needs a special education training and credentialing. In other countries a general doctor may be asked to give his opinion about the circumstances that caused the illness, wounds or death. It is good to know exactly

what the limits of the doctor's responsibilities are, regarding his (former or unknown) patient, police and the lawyers or government. A formal opinion in court may be asked. The doctor has sometimes the right or even the obligation to remain silent. Also doctors can be asked to give advice concerning punishment. For instance, if one is "healthy enough" for the death penalty or if one should get psychiatric treatment.

Ethical Dilemmas

There is a natural controversy between being a prisoner and having (all) human rights. Especially in health there is always the question how the prison regime influences health and health care. Because there are so many ethical dilemmas in health care for prisoners, it is essential to have some guidelines. Several organisations have produced guidelines for specific situations. For instance, the World Health Organization (WHO) and the International Committee of the Red Cross (ICRC) have joined forces to produce some guidelines [13] for tuberculosis and guidelines for HIV infection and AIDS in prisons. The guidelines apply wherever people are in custody: prisons, police stations, remand centres, detention centres for asylum seekers, secure hospitals, penal colonies and prisoner-of-war camps. Other examples of situations with ethical dilemmas are health care for people on hunger strike [14] and asylum seekers [15].

Since 2003 the UN has a special rapporteur on the "right of health" to focus on the dilemmas of health and health care [16, 17].

Practical Guidelines

When a health professional is confronted with a health-care problem of a prisoner in an emergency situation, he/she must not be overconcerned with the myriad of dilemmas. He has to act. The following approach is suggested:

1. Treat the prisoner as a normal patient. Use professional skills to diagnose and to propose treatment.
2. Keep in mind what the background problems of prisoners are and what the epidemiological situation is and the prison or place of confinement.
3. If your treatment of choice cannot be given, because prison officials forbid it, try to adjust the treatment within the limits of what is possible.
4. If you think that the health situation cannot be properly dealt with, find out who is in authority and try to give your professional opinion. Try to adopt a collegiate approach in these situations. Avoid angry confrontation.
5. Stay alert for specific health signs suggesting torture or physical mistreatment.
6. In emergency and disaster situations, there is no time for much discussion. Saving life is the first priority. The focus should not be legal debate or argument in urgent situations.

Conclusions

Health professionals may well become involved in health problems and health care of prisoners and detainees. It is important to know the different positions in the judicial position of the suspect, lawyer, judge and the health-care provider. There are many (international) rules about the legal processes and the rights of the prisoners and detainees. The health situation of a person may have influenced the actions, which led to the judicial situation. Remember also that the conviction can have influence on health status. Governments regulate the health care of prisoners. Health professionals, of necessity, are an essential part of this whole system. In emergency situations the focus should be on professional medical treatment and care for the prisoner.

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Chapter 16

Standards of Care in Catastrophic Emergencies

Dan Hanfling and Craig H. Llewellyn

Abstract Recent events, including the tragic earthquake in Haiti (2010), the devastating tsunami and radiation emergency in Japan (2011) and the threat of highly pathogenic, easily transmissible pandemic influenza, demonstrate that widespread loss of infrastructure combined with excessive demand for healthcare services will affect the ability to deliver medical care in a crisis and the quality of deliverable care. The intent of this chapter is to highlight the implications and impact that complex humanitarian emergency (CHE) and catastrophic disaster events will have on existing medical standards of care. Proactive planning for response in such austere environments will be required to limit ad hoc responses producing inconsistencies in the delivery of care and uncertain medical outcomes. Guidelines for how and when to make the difficult transition from individual-based outcomes – the focus of care in normal settings – to population-based outcomes that emphasize benefits to the greatest number will be examined. The context in which standards of care may be affected in a disaster medical response will be described. How will these change based upon whether they occur in developed, developing or failed states? In addition, planning guidance for catastrophic disaster response related to the allocation

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of scarce resources will also be discussed. This will include a description of a proposed framework for catastrophic response, including implementation of a healthcare surge capability response spectrum that delineates options for decision making in austere environments.

Keywords Standards of care • Catastrophic emergencies • Response framework • Ethics

Objectives

- To highlight the implications and impact that complex humanitarian emergency (CHE) and catastrophic disaster events will have on existing medical standards of care
- To describe a proposed framework for catastrophic response, including implementation of a healthcare surge capability response spectrum that delineates options for decision making in austere environments

Introduction

Regrettably, medical planning does not always take place. A project in a remote area will then rely on the existing local medical support, whatever its standard.

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Recent events, including the tragic earthquake in Haiti (2010), the devastating tsunami and radiation emergency in Japan (2011) and the threat of highly pathogenic, easily transmissible pandemic influenza, demonstrate that widespread loss of infrastructure combined with excessive demand for healthcare services will affect the ability to deliver medical care in a crisis and the quality of deliverable care. The intent of this chapter is to highlight the implications and impact that complex humanitarian emergency (CHE) and catastrophic disaster events will have on existing medical standards of care. Proactive planning for response in such austere environments will be required to limit ad hoc responses producing inconsistencies in the delivery of care and uncertain medical outcomes. Guidelines for how and when to make the difficult transition from individual-based outcomes – the focus of care in normal settings – to population-based outcomes that emphasize benefits to the greatest number will be examined. The context in which standards of care may be affected in a disaster medical response will be described. How will these change based upon whether they occur in developed, developing or failed states? In addition, planning guidance for catastrophic disaster response related to the allocation of scarce resources will also be discussed. This will include a description of a proposed framework for catastrophic response, including implementation of a healthcare surge capability response spectrum that delineates options for decision making in austere environments.

Defining Crisis Standards of Care

Complex humanitarian emergencies in which tens or hundreds of thousands may fall victim to a sudden onset disaster or steadily progressing public health crisis demand a framework for health and medical response that provides the best possible care to the most victims. Such events raise troubling concerns regarding some very basic questions; (1) Who should receive care when not all can be treated? (2) How should limited resources be applied to managing traumatic injury, illness and disease, when resources are inadequate to care for all? (3) Who should make decisions related to the delivery of available care? (4) Should the standards of care change due to the catastrophic circumstances? These and related questions have been the subject of a growing body of medical literature over the past few years, catalysed by the few global events demonstrating that a paradigm shift is required in order to provide a cogent, fair and sustainable approach to such events [1–3].

In the immediate aftermath of the global SARS crisis, efforts focused on the judicial use of mechanical ventilators to support hospitalized patients in respiratory failure were developed independently by American [4] and Canadian [5] authors. Independently each set of authors focused on the importance of using an evidence-based screening algorithm to attempt to select patients most likely to benefit if put on a ventilator. This and similar discussions were the first bona fide recognition in the medical literature that some degree of medical care rationing might need to occur, if there were a catastrophic event of significant magnitude. In the late summer of 2009, with the second wave of a global influenza pandemic due to AH1N1 about to begin, the (US) National Academy of Sciences, Institute of Medicine (IOM), was requested by the (US) Department of Health and Human Services to convene a committee of experts to address the issue of “establishing standards of care in disaster situations”. In its initial Letter Report and follow-up second report, recommendations for the response to and management of extreme public health emergencies were put forth [6, 7]. These documents were primarily focused on helping healthcare providers decide how to provide care fairly and efficiently when there would not be enough resources to give all patients the same medical care expected under normal, non-disaster, circumstances. The IOM defined crisis standards of care as:

...a substantial change in usual healthcare operations and the level of care it is possible to deliver, which is made necessary by a pervasive (e.g., pandemic influenza) or catastrophic (e.g., earthquake, hurricane) disaster. This change in the level of care delivered is justified by specific circumstances and is formally declared by a state government in recognition that crisis operations will be in effect for a sustained period.

Of note is the focus on hospital and out of hospital-based care in a developed country with intact critical infrastructure, for a select population of patients, and the call for a formal crisis declaration by an appropriate level of government based on data and situational awareness. This situation is unlikely to exist during an international response to a major disaster in a developing country or a failed state.

Unlike the normal approach to patient care needs, in which outcomes are measured by the benefits delivered to each and every individual patient, the goal of crisis standards of care are focused on populations – how to save as many lives as possible given the limitation of critical resources, including expert staff, required medical supplies, equipment, pharmaceuticals, and the space required to manage an overwhelming crush of patient demands.

In the international arena this focus has been recognized by the World Health Organization, the United Nations High Commissioner for Refugees, the International Committee of the Red Cross, Médecins Sans Frontières and the Sphere Project as demonstrated by published manuals that detail the response to disaster events in the resource poor environments [8–12]. Through these documents and other related efforts [13, 14], attempts have been made to provide evidence-based guidelines for international medical responses in countries and regions where pre-event standards of care and both government and health infrastructure are weak. Rather than focus on a subset of hospitalized patients, these documents attempt to provide a basis for healthcare planning and delivery across the full spectrum of the affected population – again by focusing on saving as many lives as possible with limited resources in austere settings.

Supply and Demand Influences on Catastrophic Disaster Response

In the acute phase of a catastrophe such as the response to the 2010 Haiti earthquake, the immediate post-event situation may only permit delivery of medical services under crisis standards of care. The shift to crisis standards of care may occur less abruptly in developed counties with robust pre-event healthcare infrastructure, especially with slow onset complex health emergencies such as a pandemic. Delivery of care under such extraordinary circumstances should be expected to occur along a continuum of care that ranges from conventional surge response to contingency and crisis surge response [15] (Box 16.1). The hallmarks of such a response will include increasing demand for patient care, increasing resource utilization and supply consumption and increasing demands placed on available health and medical staff. Additionally these demand requirements will likely occur in the context of critical infrastructure disruption or destruction.

Therefore, the shift from conventional standards of care to crisis standards of care can be thought of in the context of a basic supply and demand relationship. Demand for health and medical services is plotted against a simultaneous shortage or exhaustion of resource availability, defined as staffing, supplies and space for patient treatment. This will result in a shift in the standard of care delivered (Fig. 16.1a). The area under the curve is influenced by the conditions under which demand for healthcare services are exceeded by available supplies, and therefore the transition from conventional standards to contingency and crisis standards of care ensues. Existing preparation for disaster response in the affected nation, in addition to the coordination of the international disaster response efforts, will have a significant impact on this supply/demand mismatch. An event that occurs where a strong

Box 16.1. Definitions of the Surge Capacity Continuum in International Disaster Response

Conventional Surge Response – Space for delivery of patient care, staff and supplies used are consistent with daily practices of healthcare organizations in the host nation. These spaces and practices are used in response to an extensive mass casualty incident that may or may not require the mobilization of international HA/DR response organizations.

Contingency Surge Response – Space, staff and supplies used are not consistent with daily practices in affected country, but provide care that is *functionally equivalent* to usual patient care practices. These spaces or practices may be used temporarily during a major mass casualty incident or on a more sustained basis during a disaster (when the demands of the incident exceed community resources). This is likely to require the mobilization of some international HA/DR response organizations.

Crisis Surge Response – Adapted spaces, staff and supplies are not consistent with usual standards of care in affected country, but provide sufficiency of care in the setting of a catastrophic disaster (i.e. provide the best possible care to patients given the circumstances and resources available). Crisis capacity activation constitutes a *significant* adjustment to standards of care. This will definitely require the mobilization of national resources outside the region and possibly international HA/DR response organizations. It also implies that they will be operating under crisis standards of care that is different than that which governs care delivered under conventional or contingency circumstances.

Source: Hick et al. [15]

pre-event healthcare infrastructure exists and the response to the disaster is well coordinated and organized is likely to delay or avoid shifting from conventional to contingency or crisis standards. Situations in which the affected country has limited pre-event capability and chaotic, disjointed, disaster response coordination as might be seen in developing countries of failed states are more likely to shift from conventional to contingency and crisis standards earlier and remain under such conditions for a longer period of time (Fig. 16.1b).

Ethics of Catastrophic Healthcare Response and Transition to Crisis Standards of Care

For healthcare practitioners with extensive experience in humanitarian assistance medical missions, conditions faced on a routine basis are often the result of chronic shortages and a lack of sustainable healthcare delivery infrastructure. Particularly in developing countries and failed states, the result may be “an ongoing disaster” that requires significant material, technical and expert support. In this setting “doing the

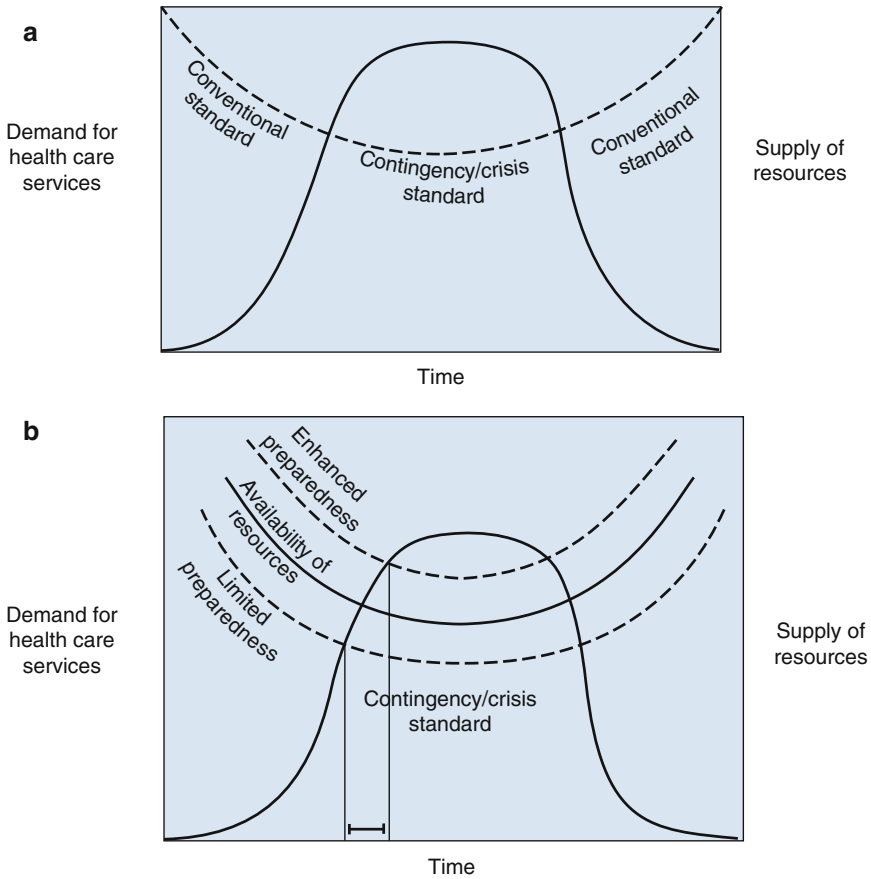


Fig. 16.1 (a) Demand for healthcare and supply of resources plotted over time. (b) Demand for healthcare services and supply of resources, with the added variable of response coordination (preparedness) (Both reproduced with permission from Hanfling et al. [7])

best for the most with what is available” is not a new concept, and the standard of care and the medical practice that evolves occur in the context of the availability of resources and expertise. Diagnostic capabilities, treatment modalities and long-term patient management strategies are tempered by what is available to deliver such care. Existing principles, including adherence to the Sphere Standards, are emphasized expressly in order to improve the quality and accountability of humanitarian response efforts.

However, for individuals and organizations responding to disaster events during the acute phase, familiarity with austere situation medical standards and practice may be very limited, and the notion of what is “best” for those receiving care may be variable, depending upon the mission profile of the responding organization (military, NGO, denominational versus non-denominational, etc.). Therefore, it is important to emphasize a few key ethical principles that should govern HA/DR

response efforts, particularly in relationship to the standard of care which is being rendered. As a starting point for this discussion, healthcare HA/DR responders, both organizational and individual, must adhere to ethical and professional norms in the delivery of care, particularly under crisis standards. Working under the austere conditions of a catastrophic disaster is not reason to abrogate those norms. As was stated clearly in the IOM Crisis Standards of Care report, “conditions of overwhelming scarcity limit autonomous choices for both patients and practitioners regarding the allocation of scarce health resources, but do not permit actions that violate ethical norms.”

Implementing difficult choices in the setting of disaster does not mean that all patients must be managed in an identical way. But the decisions that are taken must be fair, and based on need and the likelihood of benefit. Therefore, efforts should be made to ensure that there is equal access to disaster assistance amongst affected populations, recognizing that those who are most vulnerable before disaster strikes are those most likely to be in need of assistance after an event occurs. Fair treatment includes insuring that the disadvantaged are included in the disaster response effort. However, in dynamic tension with this notion of equal access is the important recognition that distribution of resources be done in a fair and transparent fashion. Allocation of scarce resources must always take into account the larger perspective of the disaster event and should preferentially support the delivery and judicious application of scarce, life-saving resources. It should also address the sustainment and improvement of basic health determinants, whenever possible.

One example of the way in which existing capabilities are adjusted, in line with the importance of pursuing an ethical approach to medical care delivery, can be found in a review of the current WHO Emergency Health Kit, Fourth Edition (2011). This comprises a comprehensive list of the medicines and medical devices that might be used to manage the health and medical needs of 10,000 people for 3 months in the face of an ongoing disaster event. First developed in 1990, and updated in 1998, it reflects the best practice of medicine, based on current knowledge and common practice guidance. An NGO that responds to a disaster event using an antibiotic such as chloramphenicol which is no longer included in the WHO Emergency Health Kit would be practising outside the boundaries of currently accepted practice. Such an approach should not be condoned, even in the setting of disaster, and the notion that “some care” is better than “no care” is not justifiable.

It is also important to recognize that in the context of crisis care, where some patients may not receive life-saving measures because of the focus on providing for the “greatest good”, receipt of medical care remains a fundamental right for all those in need, even if that care is limited to palliation and symptomatic relief and support. Planning for palliative care delivery must be included in preparations for medical practice under crisis standards.

Finally, all of these efforts – above and beyond adhering to basic healthcare ethical principles, including respect for the communities, cultures and traditions of the affected nation – must ultimately take into account the sovereignty and autonomy of the host nation. Response efforts should not be implemented independent of the

request for assistance, and the recognition that the capabilities that are being offered meet a need. In December 2010, select members of the international humanitarian community met to discuss the use of field hospitals and foreign medical teams during emergency situations. The meeting was organized by PAHO/WHO and included representatives from international organizations, NGOs and other key participants. The objective of the meeting was to focus on the existing PAHO/WHO guidelines regarding the use of foreign field hospitals in disaster response, with specific attention paid to the issue of ensuring that field hospitals and responding medical teams meet basic minimal standards and perform in coordination with host nation requirements for assistance [16]. Concerns regarding the timing of service delivery, quality of service and adherence to minimum standards, self-sufficiency and the ability to adapt to and integrate with the local healthcare system all relate to the importance of establishing a crisis response framework, based upon a strong ethical foundation. As an example the US Navy hospital ship *Comfort* established a medical ethics committee during the response to the Haitian earthquake to advise and review types of medical offered [17]. This committee discouraged offering complex medical treatments or surgical interventions which could not be sustained in Haiti after the relief effort. It further recognized the dilemma of short-term solutions such as amputations that could not be sustained after the relief operation. This led to considerations of whether the “lowest common denominator” of care is an ethical solution.

As this discussion continues to evolve, anticipate improvements in the process by which HA/DR response occurs, including the development of a voluntary accreditation system that ensures adherence to minimum standards, akin to the implementation of the INSARAG Guidelines that classify international urban search and rescue teams [18]. A separate, but related, notion includes recognition for a long-term commitment to HA/DR by response organizations, not simply coming in to provide care in the acute phase response. It is important to recognize that the delivery of health and medical care is not sustainable without ongoing supportive care, and those organizations and individuals must be committed to the long-term recovery of the affected nation, not simply the initial response, which occurs under the bright lights of the world’s media.

Developing a Catastrophic Response Framework

Individuals and organizations, both governmental and non-governmental, which respond to a CHE, must take into consideration a number of factors related to the response. What is the status of healthcare delivery in the affected country prior to the disaster event? What are the expectations regarding delivery of emergent and acute care and the resumption of chronic care in the affected country? What is the commitment to ensuring the long-term recovery of the affected nation’s health and medical infrastructure? Delivery of medical aid in many disaster events has been well intentioned but poorly organized, and as a result, the standard of care under

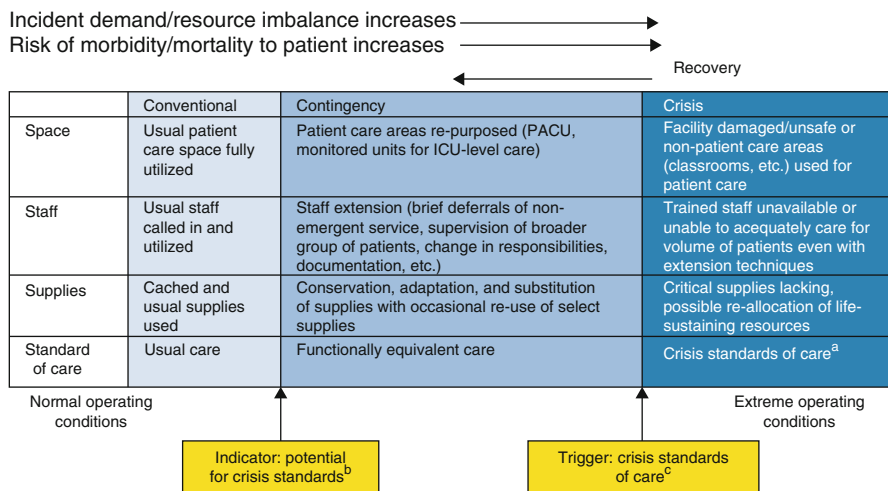


Fig. 16.2 Framework for surge response implementation. *a* Unless temporary, requires state empowerment, clinical guidance and protection for triage decisions and authorization for alternate care sites/techniques. Once situational awareness achieved, triage decisions should be as systematic and integrated into institutional process, review and documentation as possible, *b* institutions consider impact on the community of resource utilization (consider “greatest good” versus individual patient needs – for example, conserve resources when possible), but patient-centred decision making is still the focus, *c* institutions (and providers) must make triage decisions balancing the availability of resources to others and the individual patient’s needs – shift to community-centred decision making (Reproduced with permission from Altevogt et al. [6])

which such care has been delivered has been less than optimal. Special needs that arise from earthquake events, for example, are a case in point. The ability to care for complex orthopaedic cases, including spinal cord injuries, and the need for renal replacement therapy [19–23] are examples in which the ability to deliver care at a conventional standard of care is not likely to be possible. Under such circumstances, then, it becomes important to set clear expectations with regard to the level of care that can, or should, be provided. Implementation of the aforementioned framework for shifting standards of care across the continuum should be coordinated amongst all responding organizations, governmental and non-governmental. Figure 16.2 describes how the use of space, staff and supplies is used or adjusted across the conventional, contingency and crisis continuum. As this shift occurs, so does the corresponding standard of care. It is important to recognize that as the supply/demand imbalance increases, so does the risk of morbidity and mortality. However, steps should be put in place to counterbalance such tendencies, by increasing the level of response required, for example, in order to limit the amount of time during which the disaster response occurs under crisis standards. Efforts to ensure recovery efforts are in place are critical to the success of these missions. However, equally important is the recognition that attempts to coordinate HA/DR missions in the context of this sliding framework will likely benefit a larger number of recipients of care, than would an ad hoc attempt to provide many resources to many fewer

Table 16.1 Reactive versus proactive triage in catastrophic event response

	Reactive	Proactive
Incident type	Early in event timeframe. Often no-notice event (usually static or short timeline, e.g. earthquake, bombing)	Later in no-notice event or anticipated, often dynamic event (e.g. pandemic influenza)
Incident management implemented fully	No (full implementation is transition point to proactive)	Yes
Situational awareness	Poor	Good
Resource availability	Extremely dynamic (over hours)	Relatively static or more gradual changes
Resource shortfall(s)	Provide stabilizing care, may be able to provide definitive care	Provide definitive care, using only select medications or therapies
Triage approach	Primary, secondary	Tertiary
Most likely resource triaged	Operative care (may not be able to provide any operative care if massive event), diagnostic imaging, fluid resuscitation or medications	Mechanical ventilation/critical care (improvised nuclear device is an exception due to delayed radiation illness)
Triage decision maker	Triage officer(s) on initial assessment	Triage team
Triage decision basis	Clinical assessment	Clinical plus diagnostics (decision tool)
Decision making	Unstructured, ad hoc	Structured

Adapted with permission from Hanfling et al. [7]

patients, given the absence of a common operating picture that takes into account the full context of the disaster response effort and the attempt to do the best for the greatest number of victims.

Part of this catastrophic response framework must also include an emphasis on having the means available to shift away from reactive decision making, in which health and medical decisions are made in the context of what is currently known to be the situation, which is often based upon insufficient, non-existent or even false information [24–27]. Such conditions often result in inappropriate, insufficient or unnecessary health aid, waste of health resources or implementation of ineffective health and medical interdictions. Instead, being able to make decisions based upon the best information available, as well as the opportunity to anticipate health and medical needs of the affected country, is important to the overall success of any HA/DR mission. This shift from reactive to proactive decision making is an important additional component of the catastrophic response framework (Table 16.1).

The ability to shift from reactive to proactive triage will in large part be dependent upon the setting of the disaster and some of the attributes of the affected nation. Key considerations include whether or not the country that has sustained a catastrophic disaster is in the developed or developing world. And whether or not

Table 16.2 Considerations pertaining to standards of care in catastrophic disaster events

Context of affected nation
Failed state with limited infrastructure and inability to deliver care (e.g. Haiti, earthquake 2010, Somalia 1990 to present)
Developed nation with intact healthcare infrastructure (e.g. Japan, tsunami 2011)
Type of disaster event
Sudden onset (improvised nuclear detonation, earthquake)
Slow onset, sustained (pandemic, famine)
Chronic (failed state)
Refugee/IDP setting
Recognition of varied settings and conditions and need for “graded response”
Urban response environment
Remote area response

it may be considered to be a failed state, in which case the ability to affect a coordinated health and medical response is made all the more difficult. The type of disaster event and its geographic extent will have a significant impact on the standards of care likely to be implemented, as will the location of the event, with greater difficulties likely to be encountered in having to execute a response to rural regions, than would be the case in providing care in an urban environment with intact infrastructure (Table 16.2). See Hypothetical Case Examples 1 and 2 that follow:

Hypothetical Case Example 1: Sudden Onset Catastrophe in Developed Environment

On a clear summer morning in London, as British Rail and the Underground fill with morning commuters and the ring roads leading to the city are jammed with cars, a sudden, extraordinarily bright flash (“the light of a 1,000 suns”) is seen for miles around. Terrorists have detonated a 10 KT improvised nuclear device at Victoria Station. Equivalent to the detonation of 5,000 Oklahoma City truck bombs, the immediate destruction in a half mile radius from the Station is complete. Most buildings are destroyed, the hazard of prompt radiation and enormous debris initially prevents entry into the area, and the likelihood of survival is very low. In the one half to one mile radius from the epicentre of the blast, there will be a moderate degree of damage, with many patients with serious injuries. Quick rescue and initiation of early medical assistance can help to improve the number of survivors. At one to three miles, there will be light damage – mostly broken windows resulting in minor injuries that are highly survivable. In addition, there will be the effects of delayed radiation exposure, as the fallout cloud meanders in a southerly direction over, Wimbledon and points south, headed towards the Brighton coast.

The Royal Brompton Hospital has collapsed, and St. George’s Hospital is directly in the path of the growing cloud of fallout. Hospitals elsewhere in the city,

and those in concentric rings close to the city, will be inundated with victims, real and imagined. The ability to deliver care to patients under usual, conventional approaches will likely be significantly impaired. In shortest supply will be critical care resources, including access to advanced burn care, trauma care and the management of significant radiological exposure. Rationing of these resources will have to occur in order to provide the best care possible to the largest number of patients.

While hospitals in and around London will be overwhelmed, the remainder of Britain's medical care delivery system will be intact. Once a transportation plan is put into effect, casualties will be able to be distributed across Great Britain and Europe. Nonetheless, until that can occur, there will be changes in patient staffing, and the scope of practice used to care for what may be tens of thousands of casualties will of necessity be changed.

Hypothetical Case Example 2: Slow Onset Catastrophe in the Developing World Environment

Years of civil strife in Zimbabwe have resulted in the loss of an intact health and medical infrastructure, with few acute care medical facilities available to manage the healthcare needs of its population. Moreover, as a result of political instability and civil strife, large camps of internally displaced persons have formed outside of the city of Harare, including one in Mutoko, East Mashonaland, along the road that continues on to the border with Mozambique. There are existing shortages in these camps, including access to basic medicines, clean water and food. HIV is endemic, with some of the highest rates of AIDS infection in all of Africa.

In this setting, the outbreak of a highly pathogenic avian influenza that had been circulating across East Asia begins. Settlers in the camp begin to exhibit symptoms of influenza, with onset of high fevers, respiratory distress and hemodynamic instability. The children and the elderly are affected the most.

There are already existing shortages in the camp, now exacerbated by the slow but steady increase in influenza cases. Medical assistance is very limited, with only a few NGOs operating in or near the camp. Healthcare providers must make hard decisions regarding the prioritization of needs amongst camp residents. There are only a handful of mechanical ventilators available, and those are limited by their power supply, which consists of battery power, only. Intravenous fluids are in short supply, and antiviral medications, which if used in during the initial onset of the influenza and might improve outcomes, are exceedingly rare. Antibiotics, useful for the management of secondary infections, are also in very short supply.

WHO and NGO aid organizations are planning on delivering key resources to support the care of sick camp dwellers, but plans for the care delivered in this camp must be coordinated with those efforts occurring elsewhere across Zimbabwe and across the border in Mozambique.

Conclusion

There is at present no international organization which can establish crisis standards of care for all participants in international disaster responses. And there is no set of evidence-based criteria for crisis standards of care. It is highly unlikely that any such criteria or standards can be established – there is no “one size fits all” solution. This in no way undermines the importance of attempting to develop mutually agreed standards acceptable to the host nation or state government. Responding organizations must be prepared to deliver medical care appropriate to the specific crisis being dealt with, and this care must be coordinated as part of the overall disaster medical response. The preceding discussion provides an orientation to current thinking on this difficult and complex set of topics and indicates the need for awareness and the importance of continuing efforts in this important area of medical response to catastrophes.

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Chapter 17

Programme Management and Assessment

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Abstract Since the turn of the twenty-first century, the world has seen more than its share of devastating disasters. The destruction caused by recent tornadoes, earthquakes, flooding, tsunamis and hurricanes has brought an outpouring of support from domestic agencies, military, non-governmental organizations (NGOs) and individuals wanting to make a difference. Despite their best intentions, stories are found in numerous instances of poor planning: unusable donations of expired medications and culturally insensitive clothing and food, untrained personnel providing medical care and rebuilding shelters inconsistent with social and physical norms, just to name a few.

Keywords Disaster management • Disaster assessment

Introduction

Since the turn of the twenty-first century, the world has seen more than its share of devastating disasters. The destruction caused by recent tornadoes, earthquakes, flooding, tsunamis and hurricanes has brought an outpouring of support from

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Objectives

- To review the principles of disaster and catastrophe management and assessment, including the importance of scanning the local scene and measuring effectiveness

domestic agencies, military, non-governmental organizations (NGOs) and individuals wanting to make a difference. Despite their best intentions, stories are found in numerous instances of poor planning: unusable donations of expired medications and culturally insensitive clothing and food, untrained personnel providing medical care and rebuilding shelters inconsistent with social and physical norms, just to name a few.

Having a better understanding of the principles of disaster management can help to alleviate many of the problems associated with poor planning. The time to plan for a successful intervention is not when the disaster strikes, but long before any assistance is needed. This chapter will provide a discussion on the principles of effective disaster management, background definitions, planning, measuring, outcomes and general concepts associated with effective disaster response.

Depending on the nature of the disaster, when there is significant community disruption, the response often includes multiple actors from a variety of jurisdictions which needs an incredible amount of coordination. By linking disaster management planning with other planning, responders will be more effective in their interventions. While keeping in mind that any disaster preparedness plan should be part of the day-to-day planning, establishment and management of local facilities and resources, the plan should be developed to link with other land use and disaster plans for the community.

Consideration of the following principles of disaster management, based on the handbook for Disaster Management Planning, produced by the Australia and South Africa Local Governance Partnership, will help in planning for humanitarian assistance/disaster response and can improve disaster management capacity.

Principles of Disaster Management¹

1. *Disaster management is the responsibility of all levels of government.*

¹Principles were developed as a product of the Australia South Africa Local Governance Partnership and the Intellectual Property Rights herein are jointly owned by the Governments of Australia and South Africa. All other rights are reserved. For more information visit their website at <http://devplan.kzntl.gov.za/ASALGP/Resources/Documents/ASALGPhandbooks/2-principles-of-disaster.htm>.

While all disasters are local, no single service or department in itself has the capability to achieve comprehensive disaster management. All services and departments must have individual disaster management plans which are coordinated through a central agency. For example, police departments will have a security plan, hospitals will have a health plan, transportation departments will have an evacuation plan and they will all be coordinated to ensure complete coverage and avoid miscommunications.

2. *Disaster management should use resources that exist for a day-to-day purpose.*
Due to the limited resources available specifically for disaster, it is not cost-effective or practical to stockpile large holdings dedicated to disaster resources. While large response organizations will be able to have warehouses full of plastic sheeting and food supplies, local municipalities should ensure that there are enough funds available to enable an appropriate response to incidents as they arise and focus on preparing for and reducing the risks of disasters occurring.
3. *Organizations should function as an extension of their core business.*
In order to use resources in the most effective manner during a disaster, organizations should be employed in a manner consistent with their day-to-day role. The transportation department can be deployed to help with the transportation of patients while the hospital is responsible for the medical treatment during the transport. This recognizes the need to coordinate across all relevant organizations.
4. *Individuals are responsible for their own safety.*
Communities need to communicate to individuals what the hazards are, so the individuals are better able to create their own disaster plans. Education on creating emergency kits, preparing an evacuation plan and planning for disasters helps individuals deal with them when they arrive.
5. *Disaster management planning should focus on large-scale events.*
In planning, it is better to assume the worst case scenario and then scale down when the disaster is on the lower end of the spectrum. By being well prepared for a major disaster, you will be able to respond more easily to smaller incidents and emergencies. In fact, responding to smaller incidents provide good training for large-scale disasters.
6. *Disaster management planning should recognize the difference between incidents and disaster.*
Incidents (i.e. fires that occur in informal settlements and floods which occur regularly) may still require multi-agency and multi-jurisdictional coordination. The scale of the disaster will indicate when it is beyond the capacity of the local jurisdiction to respond and when it needs the involvement of agencies.
7. *Disaster management operational arrangements are additional to and do not replace incident management operational arrangements.*
Incident management operational arrangements will need to continue, whenever practical, during disaster operations.
8. *Disaster management planning must take account of the type of physical environment and the structure of the population.*
The physical shape and size of the jurisdiction and the location of the population must be considered when developing disaster plans to ensure that appropriate prevention, preparation, response and recovery mechanisms can be put in place in a timely manner.

9. *Disaster management arrangements must recognize the involvement and potential role of non-government agencies (NGOs).*

There are numerous NGOs who have significant skills and resources which are needed during disasters. These agencies must be consulted and included in the planning process.

Defining Strategies

Strategies are the actions that need to be taken to combat the risk and harm caused by hazards. They will support the achievement of the outcomes and objectives. The outcome is *safer communities*, and the objectives are improved *prevention, preparedness, response and recovery*. Ideally, strategies should be developed for all:

- Hazards.
- Sectors – particularly where the risk rating is high and the benefits of taking action are high, strategies should be developed for all aspects of disaster management:
 - Prevent.
 - Prepare.
 - Respond.
 - Recover.

Plans

To put the strategies into action, a plan needs to be developed. A plan sets out all of the actions that need to be taken to implement each strategy. Plans set out the actions to be taken and should be exercised and reviewed at least annually. A disaster management plan on the other hand sets out all of the strategies needed to achieve the objectives over the longer term, i.e. 4–5 years.

Individuals, groups and authorities, often called *stakeholders*, will have an interest in or be affected by the plan. You need to decide:

- Who will be affected
- Whose approval will be needed
- Whose support will be needed to ensure the plan is successfully implemented

Plans help to:

- *Test processes and coordination.* By developing detailed processes for disaster response, it might become clear that some strategies cannot be achieved.
- *Organize activities.* When a plan has many objectives and strategies, it is easy for it to become so complex that it does not get implemented. A detailed and

well-thought-out list of actions for each year will help to sort out what can be achieved and who could achieve them and keep the plan on track. It also helps politicians to decide funding priorities in preparing their budgets.

- *Engage community and other stakeholders.* A clear list of actions will help the community understand what is happening and is more likely to encourage participation. It will also help identify those actions that can be undertaken through public private partnerships.

Plans should be brief and easy to understand and include:

- *Processes* – which are clear and specific, so that they are not misunderstood, e.g. “distribute information sheet for the community about flood hazard”, rather than “educate community about flooding”
- *Resources* – (see the next step) which will be available before committing to an action
- *Timing* – for the completion of actions should be realistic and achievable
- *Who is responsible* – should be the person who will be involved in the implementation of the action, e.g. *one* person should be *responsible* for each action

There is no value in reinventing the wheel if there are existing arenas for public participation.

However, you need to make sure that you are not excluding some valuable voices. There are generally three groups of stakeholders who should be involved.

Whole of Society Approach

Community involvement will ensure that local knowledge of needs and priorities has been included. Communities who are involved in the planning process are more likely to take an active interest in the plan and its implementation. It is particularly important to include women in all stages as women are close to the household and community circumstances and often bear the brunt of any recovery or clean up needed after a disaster.

Business and industry involvement will assist you to identify infrastructure that is at risk and to find ways to work together to protect it or reduce any potential risk to essential services including but not limited to security, communication, power production and distribution, transportation and logistics.

Government involvement will ensure that representatives of national, provincial and municipal spheres influence the planning process. The disaster plan should include representatives of agencies that can provide input into the planning process or who may be in a position to support the plan, e.g. fire and ambulance services.

Provinces, provincial departments and municipalities have no option if they are to be prepared – they *must* produce disaster management plans and ideally they will, through a collaborative process, be integrated with each other and with regional and

municipal plans. By following all the steps, planners undergoing a consultative and coordinating process will have:

1. A better understanding of the risks impacting their area and communities
2. A list of all potential hazards, their potential consequences and the likelihood of occurrence
3. An understanding of which ones are high likelihood or high risk
4. Processes and action plans to address those risks

It is not sufficient just to have plans for action, for that alone will not enable communities to be sufficiently prepared for high-risk disaster. Some may be so complex and costly that long-term action is needed over a period of years, such as making buildings resistant to seismic events. In such cases it is quite likely that planners will need to engage partners from the community and or the private sector to participate in actions over time to remedy the high risk through mitigation or better preparedness.

Disaster management plans must therefore incorporate the results of *all* the steps undertaken as previously discussed and must include fiscally supported plans for the short and the long term – ideally, 5 years ahead.

Scanning the Local Scene

Scanning Local Conditions and Issues

Often, communities have different characteristics and issues. Some communities have a greater exposure to risk from disaster. Many houses may be built in floodways or areas prone to fire. Some areas may be in danger from landslide. Some communities could be located close to hazardous industry. It is important, therefore, to consider the main characteristics and issues for a community that may expose it to risk from hazards. It is useful to consider these across the many sectors of the community:

- Social/community
- Economic/infrastructure
- Environmental/physical
- Government/political

Social/Community

Social characteristics are about people and how they live. What proportion of the community is elderly or young, or sick (HIV/AIDS), and who may require particular support during disasters or to avoid disasters? Is the community made up mainly of low-income families who may not have the resources to do much to prepare their homes for disaster? How many of the residents are in rural or semirural areas? How many are in informal housing? What do people know

about hazards and how they could be affected? What would be the impact on women and children?

Economy/Infrastructure

Some economies are more exposed to hazards than others. Agriculture is particularly affected by natural hazards. In rural areas, livestock and crops are critical to people's livelihoods. What local industries and services could be disrupted or destroyed by hazards such as flood, fire or industrial accidents? What are the critical services and infrastructure that need to be protected?

Example of critical services and infrastructure are:

- Hospitals and clinics
- Major roads/bridges
- Power facilities
- Major industry
- Water treatment facilities
- Banks, financial institutions
- Airports/airstrips
- Emergency services buildings
- Railways
- Communication facilities
- Fuel storage depots
- Water storage facilities

Environmental/Physical

Climate, terrain and river systems create exposure to hazards. How often does the area flood? Is there good historical evidence available about fires, earthquakes, typhoons/hurricanes and flooding? What are the major causes of fire? Are flood plains and coastal areas being affected by erosion? Are there communities located in areas likely to experience major hazard? Are there local species of plants and animals under threat from hazard? If you can, map the potential hazards against the geography of the identified area. This might include:

- Maps of known or possible flood levels
- Identification of areas that will be flooded if a dam collapses
- Identification of areas where most fires have occurred
- Identification of areas subject to coastal erosion
- Areas subject to drought

Government/Political

A local disaster management plan should be developed within the context of existing planning schemes and disaster management frameworks.

How Will the Plan Be Developed?

There are a number of important decisions to be made and documented at the beginning of the planning process. These are:

- Setting objectives
- Linking with other plans
- Setting timeframes
- Allocating resources
- Communicating and reporting

Objectives

What results are we aiming to achieve?

- *Longer-term objectives* are often referred to as outcomes. They are the results that are desired over a longer period of time. Outcomes are expressed in broad terms, for instance, *safer communities*.
- *Achievement of outcomes* would be measured in terms of:
 - Community health, safety and resiliency
 - Property security
 - Economic prosperity
 - Environmental sustainability

Metrics and Measuring Effectiveness

Two types of measurements are often discussed in the humanitarian assistance community – measures of effectiveness (MOEs) and monitoring and evaluation (M&E). The volumes written about MOEs and M&E can be a bit overwhelming. Indeed, monitoring and evaluation is a field within its own right, and disaster responders can be well served in their efforts to define which practices to implement and which M&E methods can be used to provide programme managers, countries and other stakeholders with the information and results desired.

Measures of effectiveness (MOEs) are used to describe the overall impact or outcome. MOEs assess changes in system behaviour, capability or environment. They are useful in measuring the attainment of an end state, achievement of an objective or creation of an effect; they are generally not used to measure task performance. Using MOEs in a disaster setting is complicated, and MOEs are more likely to be found in development and capacity building initiatives or those involving long-term complex humanitarian crises.

However, there is a role in disaster assistance for effective monitoring and evaluation (M&E) activities. M&E of development activities provides government officials, development managers and civil society with better means for learning from past experience, improving service delivery, planning and allocating resources and demonstrating results as part of accountability to key stakeholders. These purposes can serve similar goals in disaster response and aid in strengthening existing programme management and to focus on results.

As a whole, M&E is used to measure the performance of particular tasks and is broken down into its individual components:

- *Monitoring* is an ongoing, continuous process and requires the collection of data at multiple points throughout the disaster response cycle, *including at the beginning to provide a baseline, and* can be used to determine if activities need adjustment during the intervention to improve desired outcomes. Monitoring usually pertains to counting, tracking and collecting.
- *Evaluation* measures how well the programme activities have met expected objectives and/or the extent to which changes in outcomes can be attributed to the programme or intervention. The difference in the outcome of interest between having and not having the programme or intervention is known as its “impact” and is commonly referred to as “impact evaluation”. Evaluation is fundamentally an exercise to help decision makers understand how, and to what extent, a programme is responsible for particular, measured results. See Box 17.1.

Box 17.1. The Difference Between Effect and Impact

An Oral Rehydration Treatment project has the *effect* of changing the behaviour of mothers in order to have an eventual *impact* upon diarrhoeal disease, nutritional status and even survival of their children

Measles are consistently in the top five contributors to morbidity and mortality rates in displaced populations following a disaster and provide a fairly descriptive example of other definitions which are important to understand when discussing M&E (Table 17.1)

In any measure of effectiveness, a multistep process of plan development is generally developed. A logic model, sometimes called an “M&E framework”, or logical framework (Logframe) provides a streamlined linear interpretation of a project’s planned use of resources and its desired ends.

Step 1: Information Gathering

This step could involve multiple points of data collection. In this step you would look at the nature of the disaster, who is responding, what is being requested, what you are offering, what you hope to achieve and who shall be served (stakeholders such as donors, victims, partners, response agencies).

Table 17.1 Glossary of monitoring and evaluation terminology

Term	Measles example
<i>Inputs</i> are the resources invested in a programme. They can include people, supplies, equipment or training	Medical personnel, vaccines, needles, syringes, etc.
<i>Outputs</i> are the immediate results achieved at the programme level through the execution of activities	Number of children immunized/target population
<i>Processes</i> are the activities carried out to achieve the programme's objectives	Public information and announcements, site selection and preparation, immunizations administered, data collection
<i>Outcomes</i> are the set of short-term or intermediate results at the population level achieved by the programme through the execution of activities	Measurable data that looks for the decrease in measles cases or risk environments
<i>Effects</i> are changes in the behaviour and practices of individuals and also changes in the coverage and quality of services of public and private institutions, as well as other systemic changes	Measurable data that shows the decrease in deaths from measles and increase in healthy children
<i>Impacts</i> are the long-term effects, or end results, of the programme	Demonstrated improvement in number of healthy children attending school, increased human capacity, improved economic status

Step 2: Define Programme Areas and Programme Goals

This step identifies the areas in which the M&E efforts should concentrate. It becomes the basis of the M&E framework and helps to clarify objectives of any project, programme or policy. It aids in the identification of the expected causal links – the “programme logic” – in the following results chain: inputs, processes, outputs (including coverage or “reach” across beneficiary groups), outcomes and impact. It leads to the identification of performance indicators at each stage in this chain, as well as risks that might impede the attainment of the objectives. The M&E framework is also a vehicle for engaging partners in clarifying objectives and designing activities. During implementation, the framework serves as a useful tool to review progress and take corrective action:

- *Relevance* – was/is the programme a good idea given the situation needing improvement? Does it deal with target group priorities? Why or why not?
- *Effectiveness* – have the planned purpose and component objectives, outputs and activities been achieved? Why or why not? Is the intervention logic correct? Why or why not?
- *Efficiency* – were inputs (resources and time) used in the best possible way to achieve outcomes? Why or why not? What could we do differently to improve implementation, thereby maximizing impact, at an acceptable and sustainable cost?

- *Impact* – to what extent has the programme contributed to its longer-term goals? What unanticipated positive or negative consequences did the programme have?
- *Sustainability* – will there be continued positive impacts as a result of the project once it is finished? Why or why not?

Step 3: Identify Information Needs and Indicators

In this step you identify what you want to know. Different stakeholders have different information needs. For example, the affected population needs food or shelter – what was provided. Funding sponsors need financial statements of how money was spent. This requires discussion and understanding of what information will be tracked and the likelihood that information will be used. Indicators should be:

- Relevant – directly link to project objectives
- Technically feasible – capable of being assessed
- Reliable – verifiable and objective
- Usable – to make decisions or improve their work and project performance
- Participatory – target community, stakeholders, etc.

Few indicators fulfil all these criteria. Selecting appropriate indicators requires knowledge of how best to obtain the data for the indicators and of the limits imposed by both costs and techniques. Bottom line is: would the info be nice to know or need to know? Indicators can be both quantitative and qualitative. They measure inputs, process, outputs, outcomes and impacts. Indicators are clues, signs or markers that measure one aspect of a programme and show how close a programme is to its desired path and outcomes. They are used to provide benchmarks for demonstrating the achievements of a programme.

An important part of what comprises an indicator is the metric, the precise calculation or formula on which the indicator is based. Calculation of the metric establishes the indicator's objective value at a point in time.

In most programmes you would want to develop and collect effect or impact indicators, but in a disaster you would want to consider performance indicators as well. See Boxes [17.2](#) and [17.3](#).

Box 17.2 Impact Indicators

A desired impact indicator in a disaster situation might be a lowered crude mortality rate in a displaced population. This could be the result of multiple performance measures, such as water and nutrition provided or sanitation facilities/latrines constructed

Box 17.3 Performance vs. Impact Indicator

Performance indicators would be number of temporary shelters established in 30 days and/or percentage of people sheltered within 30 days

Effect or impact indicator would be percentage of people in *appropriate* shelter within X number of days. (*Appropriate* is defined by a set of pre-described standards and criteria, such as Sphere standards.)

These types of indicators tell you and your stakeholders everything from performance to desired outcomes and allow you to adjust your effort and/or funding as required.

Step 4: Select Which Data-Gathering Methods to Use, By Whom and How Often

Once it has been decided what information is needed and what indicators will be used, in this step you must decide which methods will be used for gathering the data. In a disaster, your information collection will be generally short term and limited.

Information quality can be assessed by addressing these concerns:

- Accuracy – does the information show the true situation?
- Relevance – is the information relevant to user interests?
- Timeliness – is the information available in time to make necessary decisions?
- Credibility – is the information believable?
- Attribution – are results due to project or to something else?
- Significance – is the information important?

Step 5: Organize Analysis, Feedback and Change

In this final step, in order to ensure that data is used and not just collected, you will need to develop how you will present your information and how that information is going to be utilized. The information you collect is important to your programmes and projects by helping you answer these fundamental questions:

- Achievement – what has been achieved?
- Assessing progress – are objectives being met?
- Monitoring – is the project well managed?
- What are our strengths and weaknesses?
- Checking effectiveness – what difference has the project made?

- Cost-effectiveness – were the costs reasonable?
- What can be done to better prevent, prepare for, respond to and recover from disasters?

M&E has many tools and methods. Some of these tools and approaches are necessary, some are complementary, some are substitutes and some have broad applicability; others are quite narrow in their uses.

Clear definition of the purpose and scope of the intended M&E system helps when deciding such issues as budget levels, number of indicators to track and type of communication needed. Specifying the purpose also helps clarify what can be expected of the M&E system, as it forces one to think about the nature of the project and the implications for information needed to manage it well.

It is important to note when conditions are unfavourable for evaluation as this often is the barrier to utilizing M&E practices in disaster response. These include:

- When the programme has few routines and little stability
- When people involved in the programme cannot agree on what the programme is trying to achieve
- When the sponsor of the evaluation or programme manager sets stringent limits to what the evaluation can study, putting off limits many important issues
- When there is not enough money or no staff sufficiently qualified to conduct the evaluation

Summary

The response to a disaster is a process that should be well managed with a structured approach which includes planning, exercises, review and measures of effectiveness. This chapter briefly describes such approaches that have been effective in disaster response sectors. The goal of managing disaster response begins with preparation and resource planning and allocation. Using an M&E framework early in the planning phase will help determine resource requirements as you shape inputs, processes, outputs, outcomes and impact to determine if your objectives and goals are able to be met when and if disaster should strike.

Chapter 18

Surveillance and Control of Communicable Disease in Conflicts and Disasters

Timothy D. Healing

Abstract

- To describe the principles of health surveillance in conflict and disaster situations
- To assist in organising a health surveillance system in conflict and disaster situations
- To describe the principles of control of communicable diseases in conflict and disaster situations
- To assist in organising a response to outbreaks and epidemics
- To introduce the challenges associated with health surveillance and communicable diseases in conflict and disaster situations

Keywords Health surveillance • Control • Communicable diseases • Conflict and catastrophe • Treatment • Prevention

Objectives

- To describe the principles of health surveillance in conflict and disaster situations
- To assist in organising a health surveillance system in conflict and disaster situations
- To describe the principles of control of communicable diseases in conflict and disaster situations
- To assist in organising a response to outbreaks and epidemics
- To introduce the challenges associated with health surveillance and communicable diseases in conflict and disaster situations

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Introduction

Conflicts and Disasters

The number of conflicts recorded throughout the world has declined since the end of the Cold War, but at least eight active conflicts causing more than 1,000 fatalities/year were known to be occurring in the early part of 2012, together with much larger numbers of smaller scale conflicts, terrorist activities, etc. During the same period the numbers of recorded natural disasters and the totals affected increased dramatically from about 100 per year in 1980 to over 400 in 2011. (This may partly be due to improved communications but also is likely to have been a result of the increase in world population forcing larger numbers to live in areas at risk from such disasters.)

Conflicts, Disasters and Disease

Complex emergencies (involving conflict, large-scale population displacement with many persons on the move, in camps or with host families and food shortages) and natural disasters frequently result in damage to or destruction of large parts of the infrastructures of societies (health care, water and sanitation, food supply) that normally contribute to the health of the population.

Communicable disease outbreaks and epidemics are not inevitable in these situations. Serious epidemics are comparatively rare after rapid-onset natural disasters (possibly because of active control measures by health authorities or aid agencies), but there is a greater risk of epidemics during and after complex emergencies because health care is usually severely curtailed. In most wars more people die from illness than trauma. (e.g. it has been estimated that more than 80 % of the ca. 300,000 deaths that occurred in Darfur in the years 2004–2008 were due to disease.)

Conflicts and disasters often lead to population displacement and the displaced are especially at risk from disease. The numbers involved are very large. By the end of 2011, the total population of forcibly displaced persons was estimated by the UNHCR at ca. 43.7 million people including 15.4 million refugees and asylum seekers and 27.5 million IDPs displaced by conflict (IDMC). Displacement due to natural disasters in 2010 was estimated by the Internal Displacement Monitoring Centre (IDMC) to have exceeded 42 million. Amongst the displaced, certain risk groups are especially vulnerable notably:

- Children (especially <5 years and unaccompanied)
- Women (especially pregnant women and nursing mothers)
- Elderly people
- Disabled people

Women and children account for more than 75 % of the refugees and displaced persons at risk from war, famine and natural disaster. Ca25 % of this population are women of reproductive age of whom one in five is likely to be pregnant.

Limiting the numbers of those affected by disasters or conflicts who are affected by disease and preventing disease outbreaks (or at least limiting their effects) fall on those responsible for the health care of the population affected by the emergency. They need to be able to:

- Assess the health status of the population affected and identify the main health priorities.
- Plan and implement programmes based on the assessment, including:
 - Activities designed to prevent disease including provision of basic health care, mother and child health programmes, shelter, food, water and sanitation
 - Managing cases of disease that do occur with prompt and accurate diagnosis and effective treatment
- Monitor the progress of health interventions and their impact and modify them if required.
- Monitor the development and determine the severity of any health emergency that develops (including monitoring the incidence of and case fatality rates from diseases, receiving early warning of epidemics and monitoring responses).
- Identify and take action to prevent or control outbreaks and epidemics.
- Ensure the provision of appropriate aid (and prevent inappropriate aid).
- Provide information for relevant agencies (e.g. national Ministry of Health (MOH), UN, NGOs, donors) for use in planning, funding applications, reporting to international bodies under the provisions of the International Health Regulations, etc.

Rapid assessment has been dealt with elsewhere in this book as have the treatment of cases of infection and of injury and the preventive aspects of disease control (adequate shelter, clean water, sanitation and food together with basic individual health care). This chapter therefore covers surveillance, outbreak/epidemic control and public health aspects of disease prevention and management. The topics are dealt with in general terms. More details can be found in the references.

At first sight undertaking public health activities in emergencies, especially in conflicts, may seem to be difficult or impossible. The destructive nature of warfare may prevent or inhibit the provision of adequate food and shelter, of clean water and sanitation and of vaccination programmes. Natural disasters can cause infrastructure damage that prevents access, damages communications system, contaminates water supplies and damages dwellings. However, despite these difficulties, especially those imposed by warfare, it is generally possible to undertake at least limited public health programmes including disease surveillance and control activities.

In natural disasters, public health activities may be expected to be less affected by the security situation than in a war (aid workers may be at risk if populations are severely deprived of resources such as food, shelter, water or cash), although with limited access and damage to communication systems and other parts of the infrastructure, assessment, surveillance and control activities can be severely restricted. For example, following the Pakistan earthquake late in 2005 access was severely restricted for some time and the urgent need to treat the injured and provide food and shelter meant that the limited transport available was heavily committed.

Health Surveillance

Features

The surveillance and control of communicable disease require data which can be collected in one of three ways:

1. *Surveillance systems* – covering all or at least a significant proportion of the population
2. *Surveys* – in which data are collected from a small sample of the affected population considered to be representative of the whole
3. *Outbreak investigations* – in-depth investigations designed to identify the cause of deaths or diseases and identify control measures

Whilst the latter two can provide valuable information for disease control and form part of the surveillance process, proper control of disease requires regular monitoring of the overall disease situation which in turn requires the establishment of a properly designed health surveillance system.

It is important therefore that responsibility for surveillance activities is defined at the beginning of planning for an aid mission. Generally speaking teams responding to disasters will need a team leader (often an aid agency health co-ordinator), who should ideally have surveillance experience and clinical workers together with the appropriate administrative, logistic, IT and communications support. In addition specialists in other skills such as water, sanitation and hygiene (WASH) or laboratory diagnostics may be needed. As soon as possible after arrival in an area, the team should seek contact with, and if possible include, representatives of the local health services and communities.

The World Health Organisation defines health surveillance as “The ongoing systematic collection, analysis and interpretation of data in order to plan, implement and evaluate public health interventions”. Data for surveillance must be accurate, timely, relevant, representative and easily analysed, and the results must be disseminated in a timely manner to all who need to receive them. In addition the data collected, the methods used for collection and the output must be acceptable to those surveyed (health-care professionals and the population).

In acute emergencies the time that can be given to surveillance by medical personnel is likely to be limited and surveillance activities will be far from the minds of most of those involved. Therefore, the methods used need to be rapid, practical and consistent, and whilst the greatest possible accuracy must be achieved, “the best must not be the enemy of the good”. It is necessary to strike a balance between collecting large amounts of information (“what we would like to know”) and collecting too little which can lead to an ineffective response. Those responsible for establishing surveillance programmes must therefore try to determine what is really needed (“what we need to know”). However, it is better to err on the side of too much than of too little!

Ideally any existing surveillance system should be used. There is no point in establishing a system if one already exists, unless the existing one is inadequate or inappropriate or has broken down irretrievably.

Table 18.1 Criteria for surveillance systems

Criterion
1 As simple and flexible as possible
2 Appropriate in terms of the information required
3 Capable of providing such information in a timely manner
4 Appropriate in terms of the resources available
5 Sustainable in the long term within local resources
6 Based on standardised sampling methods
7 Based on agreed case definitions
8 Capable of providing regular information from defined sites
9 Capable of covering the whole affected area
10 Compatible with existing systems
11 Use existing systems as far as possible
12 Use existing records as far as possible
13 Involve collaboration between agencies so as to avoid duplication
14 Involve collaboration with local services so as to avoid duplication
15 Acceptable to those surveyed

Surveillance systems for use in conflict and disaster situations should therefore adhere as far as possible to the criteria given in Table 18.1.

Notes on these criteria:

1. *As simple and flexible as possible.*

Complexity and inflexibility are incompatible with surveillance systems generally and particularly when operating in emergencies where collection of data may be difficult and where situations can change very fast.

2. *Appropriate in terms of the information required.*

Defining what you “need to know” will allow you to set up the appropriate data collection methods (questionnaires, sites, etc.) to design the system so that it can obtain and handle the information required.

3. *Capable of providing such information in a timely manner.*

Information that is accurate but out of date is useless for immediate disease control purposes and of little value for immediate forward planning. Effective communications therefore form an integral part of any surveillance system.

4. *Appropriate in terms of the resources available.*

Do not try to overreach when setting up a system. For example, expatriate staff may best be used to recruit local staff for the system and in supervisory activities rather than in collecting data.

5. *Sustainable in the long term within local resources.*

This criterion is certainly a goal to aim for as sustainability must be the target for all aid work. However, there may be situations where an emergency system is needed rapidly and where it cannot readily be integrated into existing systems or be developed as a new long-term system.

6. *Based on standardised sampling methods.*

The sampling system must use the same data collection methods throughout if data are to be comparable. Ideally this should be methods that are internationally

agreed and approved. Agreement should be sought for the methods from the other agencies on the ground to ensure consistency.

7. *Based on agreed case definitions.*

Without case definitions that are agreed by all parties, the likelihood of success of a surveillance system is very low. This is especially so when laboratory support is minimal or absent since clinical case definitions have to be drawn very tightly if different diseases are not to be confused.

8. *Capable of providing regular information from defined sites.*

Routine surveillance requires more than material from ad hoc sources. Sites such as medical centres (in towns, villages or camps for displaced persons), hospitals and/or public health units should be recruited.

9. *Capable of covering the whole affected area.*

The more comprehensive is the coverage of the system, the more likely is it that the data will be accurate and complete and that problems will not be missed. Such coverage can be problematic. The coverage of the different systems that can be used is discussed in the following points.

10. *Compatible with existing systems.*

The data that is collected and the methods used should ideally fit in with systems that are operating or have previously operated in the area.

11. *Use existing systems as far as possible.*

Following from criterion 10, if systems are already in existence or in abeyance but revivable, then this should be done (rather than set up an entirely new system) so as to improve the likelihood that local health-care services will be willing to be involved in the system you are proposing and also ensure continuity of data collection and analysis.

12. *Use existing records as far as possible.*

Existing records are of considerable value for predictive purposes. Knowledge of past problems makes it possible to anticipate future problems and trends and allows for early planning decisions.

13. *Involve collaboration between agencies so as to avoid duplication.*

If several health agencies are operating, it is essential to ensure collaboration between them in surveillance activities to avoid confusion and duplication of effort.

14. *Involve collaboration with local services so as to avoid duplication.*

As previously noted, early involvement of local health and surveillance services will reduce workloads and avoid duplication of effort.

15. *Acceptable to those surveyed.*

If those from whom the data is collected, those who are collecting the data and those who will receive the results are unhappy with the system, the system is unlikely to operate effectively.

These criteria can be used to evaluate a plan for a surveillance system and also, with some additions, to evaluate an existing system. However, failure to fulfil all these criteria need not rule out a system. In many emergencies it can be difficult to meet such a wide range of "best case" criteria and the question that must be

asked is whether the proposed system is capable of fulfilling its purpose – *can it provide sufficiently accurate essential information to those who need it when they need it?*

The emphasis of an emergency surveillance programme may need to be altered as the situation changes especially if a particular item emerges as being of key importance. Those running the surveillance programme should use the data gathered and a continuous assessment of the general running of the system to alter the programme as required (preferably after consultation with relevant stakeholders).

Designing Health Surveillance Systems

When designing health surveillance systems it is essential to:

- Define the population under surveillance
- Determine what type of system can be established
- Set surveillance priorities
- Identify sources of data
- Set up agreed case definitions
- Establish data handling systems
- Establish a protocol for evaluating the surveillance system as a whole

Next, we examine each of these in more detail.

Population Under Surveillance

The population under surveillance may be relatively small and well defined (such as the population of a camp for displaced persons) or in a much less defined group such as mobile groups of refugees or IDPs or the population of a village, town or region, the size of whose population may be unknown or may be fluctuating due to a disaster. In many countries (particularly those that are less developed, where disasters are especially common), population data are very inaccurate. Often censuses have not been held for many years, or if they have their results are suspect. Even camps for the displaced may present a challenge as, whilst the size of the population may appear to be (or actually be) stable, its make-up may vary over time due to movements in and out. If the age or sex make-up of the camp alters, the pattern of disease may also alter. Establishment of denominators may therefore be difficult.

Demography: Numbers vs. Rates

Both the number of cases detected and the rate of factors such as morbidity or mortality per unit of population are important values needed to inform emergency programmes.

Those responsible for all aspects of health care need to know what numbers of cases are involved so as to ensure adequate provision of services (amounts of medicines, numbers of hospital beds, etc.). However, simple numbers are of little value in assessing trends and patterns since increases or decreases in numbers of cases (or numbers of deaths) may reflect changes in population size (e.g. resulting from population displacement) rather than a trend due to, for example, a particular disease. In addition several rates (such as the crude mortality rate) are key indicators in defining health emergencies (discussion to follow).

Knowing the demography of the affected population is therefore important, and all agencies working in an emergency should agree on and use the same population figures.

The essential demographic data needed include:

- Total population size
- Population structure
 - Overall sex ratio and the sex ratio in defined age groups.
 - Population under 5 years old, with age breakdown (0–4 years) – this group has special needs and is usually a key factor in planning the emergency response.
 - Age pyramid.
 - Ethnic composition and place of origin.
 - Number of vulnerable persons (e.g. pregnant and lactating women, members of female-headed households, unaccompanied children, destitute elderly, disabled and wounded persons).
- Average family/household size
- In situations where populations are displaced and extensive population movements may be occurring, it is also necessary to know:
 - The number of arrivals and departures per week
 - The predicted number of future arrivals at the sampling sites

At the outset it is therefore important to establish methods to obtain demographic data. Often the best that can be managed initially is a rough estimate, but this can usually be refined later. It is helpful to use several methods and crosscheck the figures to obtain the best estimate. Surrogates of the whole population (such as those attending a clinic) may be the best that can be achieved early on.

The ease with which such data can be obtained usually depends on the size and scale of the population under consideration. The demography of a well-run refugee camp is comparatively easy to obtain, but that of a larger area may be much more difficult. A lack of knowledge of the size of a displaced group can be compounded by a lack of knowledge of the size of the resident population. In many countries with poor infrastructures, accurate census data are not available. In some instances tax records may be helpful if these can be obtained. It should be noted that demographic data, especially if it involves refugees and IDPs, can be politically sensitive and interested parties may place undue weight on any figures that are given.

Types of Surveillance System

Comprehensive Systems

Ideally, communicable disease surveillance should be nationwide (or at least “affected area wide”), drawing information from a range of health-care centres that cover a sufficient proportion of the population to ensure that the great majority of cases (ideally all) of the relevant conditions are reported. A surveillance system in a refugee or IDP camp is effectively a miniature comprehensive system as it is (at least theoretically) possible to cover the whole population.

Sentinel Surveillance Systems

There are situations where comprehensive surveillance is not possible and these often arise in disasters. Difficulties of access (due to damage or fighting), damaged or non-existent communications and staff shortages frequently mean that only limited numbers of reporting sites (sentinel sites) can be used. As far as possible these should be chosen to ensure a wide coverage of the area and also to maximise the proportion of the population that is covered. Sentinel surveillance systems are inherently less satisfactory than comprehensive systems largely because they provide a much less complete coverage. The calculation of rates can sometimes be difficult or impossible, such systems can be very labour intensive, and important events may be missed.

Both types of system may rely on notification of cases based solely on clinical evidence (and this is the most likely situation in conflicts and natural disasters at least in the early stages) or may include laboratory verification of some or (preferably) all diagnoses. If there is more than one centre involved in establishing the diagnosis (e.g. a clinical department, a hospital laboratory and a reference laboratory), the channels of reporting must be very carefully set up so as to avoid duplicate reporting.

Setting Surveillance Priorities

Surveillance must provide information on key health indicators which should include:

- Morbidity
- Mortality
- Nutritional status
- Immunisation status
- Vital needs
- Health sector activities including local health services
- Activities in related sectors

The selection of information sought in these categories must be done carefully. It is neither possible nor desirable to monitor everything, especially in the early stages of a disaster response. At that stage (the acute phase), the priority of surveillance is

the detection of factors that can have the greatest and most rapid effect on the population. In terms of communicable disease, this means diseases that affect large numbers of people and have epidemic potential. In most instances this also means diseases for which effective rapid control measures exist. Whilst gathering data on other large-scale disease problems should not be excluded (otherwise outbreaks may be missed), the main surveillance and control efforts should be aimed where they can do the most immediate good.

In the very early stages, only clinical information may be available since laboratory diagnostic services will probably be damaged or simply unavailable. However, this need not be a problem if the medical response is also geared to a syndromic approach. As the situation stabilises, laboratory support becomes available and longer-term control measures can be supported, the surveillance can become more refined and additional diseases (e.g. those which can cause severe morbidity and mortality in the longer term – such as tuberculosis, HIV/AIDS and STIs) can be added to the list.

Mortality

Simple changes in numbers of deaths may reflect changes in population size, and it is important to determine rates because mortality rate is an important surveillance indicator in an emergency. Often the first indication that a problem is developing is an increase in death rate especially in particular vulnerable groups. All deaths occurring in the community must therefore be recorded.

The following indicators can provide the essential information to define the health situation in a population:

- *Crude mortality rate (CMR)* is the most important indicator as it indicates the severity of the problem, and changes in CMR show how a medical emergency is developing. CMR is usually expressed as number of deaths per 10,000 persons per day. If the CMR rises above 1/10,000/day (>2/10,000/day for young children), an acute emergency is developing and the emergency phase lasts until the daily CMR falls to 1/10,000/day or below.
- *Age-specific mortality rate* (number of deaths in individuals of a specific age due to a specific cause/defined number of individuals of that age/day). In children this is usually given as the number of deaths in children under and over 5 years old/1,000 children of each age/day. NB: If population data for the under 5s is not available, an estimate of 17% of the total population may be used.
- *Maternal mortality rate*. Maternal mortality is a sensitive indicator of the effectiveness of health-care systems. A *maternal death* is usually defined as the death of a woman whilst pregnant or within 42 days of the termination of the pregnancy (for whatever cause) from any cause related to or aggravated by the pregnancy or its management. The 42 days cut-off is recommended by WHO, but some authorities use a time of up to a year.

Maternal mortality rate = (number of deaths from puerperal causes in a specified area in a year / number of live births in the area during the same year) × 1,000 (or × 100, 000).

- *Cause-specific death rates (case fatality rates)*. Proportion of cases of a specified condition which are fatal within a specified time. Case fatality rate = (no. of deaths from given disease in a given period / no. of diagnosed cases of that disease in the same period) × 100.

Morbidity

The three main morbidity figures that are routinely sought are:

- *Incidence*. The number of new cases of a particular disease reported over a defined period. (NB: *Incidence rate* is the number of new cases of a particular disease reported over a defined period per unit of population.)
- *Prevalence*. The total number of cases of a particular disease recorded in a population at a given time (also called “point prevalence”) (NB: *Prevalence “rate”* is the number of cases of a disease at a particular time / population at risk.)
- *Attack rate (used in outbreaks)*. The cumulative incidence of cases in a group observed over a particular period.

There are a number of ways of estimating morbidity. Health information systems based on health centre attendance are the most common but are passive and rely on who presents to the services. Other ways of gathering morbidity data include:

- *Surveys* – in which data are collected from a small sample of the emergency-affected population deemed to be representative of the whole (or from a particular group for a specific purpose)
- *Outbreak investigations* – which entail in-depth investigations designed to identify the cause of deaths or diseases and identify control measures

Nutritional Status

The following indicators must be measured:

- Prevalence of global acute malnutrition (includes moderate and severe malnutrition) in children 6–59 months of age (or 60–110 cm in height) (% of children with weight for height under two standard deviations below the median value in a reference population and/or oedema)
- Prevalence of severe acute malnutrition in children 6–59 months of age (or 60–110 cm in height) (% of children with weight for height under three standard deviations below the median value in a reference population and/or oedema)
- Prevalence of micronutrient deficiencies
- Estimate number of children needing to be cared for in selective feeding programmes (SFP)
- Estimate number of additional calories per day provided by SFP

Immunisation

Immunisation programmes are a vital part of the public health measures undertaken following disasters. For example, measles vaccination is one of the most important health activities in such situations. The need for campaigns may be assessed on the basis of national vaccination records if they exist. In the absence of such records, questioning of mothers may provide the information required, or children or their parents may have written vaccination histories with them (rare). If in doubt, children should be vaccinated, especially against measles.

The effectiveness of the programmes undertaken can be assessed in defined populations by recording the percentage of children vaccinated. In less well-defined populations, an assessment of coverage may be made using the numbers of children attending clinics as a surrogate for the population as a whole.

Health Service Activities

Indicators such as numbers of consultations/day, numbers of vaccinations, number of admissions to hospitals and numbers of children in feeding programmes are typically reported. Other factors such as effectiveness of the supply chain, maintenance of the cold chain and laboratory activities may also be surveyed.

Activities in Related Sectors

Depending on the circumstances, it may be necessary to monitor activities in related sectors such as water and sanitation; food, shelter and security may also be included as they are essential to maintain a healthy population and prevent communicable diseases.

Sources of Data

The major sources of health data will be hospitals and clinics (both national and those established by aid agencies), individual medical practitioners and other health-care workers. Specialised agencies should be able to provide data on particular needs (e.g. food, water, sanitation and shelter).

Case Definitions

Case definitions are an essential part of surveillance. If the diseases (or syndromes) that are to be covered by the system are not clearly defined, or if the definitions are not adhered to, the results become meaningless – changes from week to week are as likely to be due to changes of definition as to real changes in numbers of cases. This

Table 18.2 Types of cases

Type of case	Criteria
Suspected case	Clinical signs and symptoms compatible with the disease in question, but no laboratory evidence of infection (not available, negative or pending)
Probable case	Clinical signs and symptoms compatible with the disease in question and also epidemiological evidence (e.g. contact with a known case) or some laboratory evidence (e.g. the results of a screening test) for the relevant disease
Confirmed case	Definite laboratory evidence of current or recent infection, <i>whether or not</i> clinical signs or symptoms are or have been present

is especially important when laboratory confirmation is not possible. It is therefore important that all agencies working in an emergency agree to and use the same case definitions so that there is consistency in reporting.

Case definitions must be prepared for each health event/disease/syndrome. If available, the case definitions used by the host country's MOH should be used to ensure continuity of data. Several different sets of case definitions already exist, either in generalised form (e.g. those produced by the Centers for Disease Control in Atlanta) or sets prepared for specific emergencies (e.g. WHO usually prepares a "toolkit" for different crises covering the disease situation in the country(s) affected). Standard case definitions may have to be adapted according to the local situation. It should be noted that such case definitions are designed for the purposes of surveillance, not for use in the management of patients, nor are they an indication of intention to treat the patients.

When case definitions based purely on clinical observations are used, each case can only be reported as suspected, not confirmed (Table 18.2).

Although lacking precision, such definitions can make it possible to establish the occurrence of an outbreak. Samples can subsequently be sent to a referral laboratory for confirmation. Once samples have been examined and the causative organism identified, a more specific case definition can be developed to detect further cases.

Establish Data Handling Systems

The following issues should be considered:

- Methods of recording and transferring data
- Methods of verifying data
- Frequency of reporting
- Who will analyse the data and how often
- Methods for disseminating results

Recording and Transferring Data

Visits to surveillance sites and discussions with staff involved will help define the recording and data transmission systems required. The advances in information

technology (IT) that have been made in recent years have greatly facilitated the collection, recording, transmission and analysis of surveillance data, but care must be taken that the systems put in place are workable. In areas where electricity supplies are problematical and communications poor, it may be better to use a paper recording system and verbal data transmission by radio than a computerised system (or at least maintain a paper based backup).

Verification

Data verification is essential for the credibility of a surveillance system. Those responsible for surveillance systems must ensure good adherence to case definitions if a symptom-based system is in operation and that laboratory quality control systems operate where appropriate. Regular assessments of record keeping and the accuracy of data transfer are required. Triangulation of results from several sources can sometimes help to detect anomalies.

Frequency of Reporting

Frequency of reporting will usually depend on the severity of the health situation. In general daily reporting during the acute phase of an emergency will be needed, although in an acute medical emergency (such as a severe cholera outbreak) even more frequent reporting may be necessary, especially if the situation is fluctuating rapidly. The frequency may reduce to (say) weekly as the situation resolves.

Data Analysis

Who is to analyse the data and how it is to be analysed must be established at the outset. In a relatively defined area such as a camp, a data analysis session may be the last of the daily activities of the person responsible for surveillance. If record keeping and analysis protocols have been carefully worked out initially, this task need not be a large additional burden. Surveillance systems that cover larger areas and bigger and more diffuse populations usually rely on a central data collection point where designated staff analyse the data. Use of such a system requires good data transmission systems.

Output of Surveillance Systems

Output is as important as input. Collecting data without dissemination of results is a sterile exercise and tends rapidly to demotivate those involved. There are some important points to consider:

- The results of surveillance must be presented in a readily comprehensible form.
- Surveillance reports should be produced regularly and widely distributed to aid agencies and to national and international governments and organisations. This will help those involved to understand the overall picture, rather than just that in the area where they are working, and will allow them to take informed decisions about future actions.
- Translators may be needed if different languages are involved.

Evaluation of Surveillance Systems

Surveillance systems should be evaluated constantly to ensure that they are working properly, that the data are representative, that analyses are appropriate and accurate and that results are being disseminated to where they are needed.

Control of Communicable Disease

Introduction

The public health aspects of communicable disease control can be broadly divided into preventive activities (such as vector control and vaccination programmes) and the investigation and control of outbreaks and epidemics. (Treatment strategies are needed both to serve the individual patient and also to reduce the risks of transmission of disease. These are dealt with elsewhere in this book.)

Experience from many emergencies and disasters has made it possible to identify a number of syndromes or diseases that are most likely to occur in such situations (Table 18.3). This makes it possible to plan activities and interventions on the basis of likely occurrences, even before those involved are present at the scene of the disaster, and to make initial purchases and establish stockpiles of appropriate medicines and equipment.

Table 18.3 Syndromes or diseases that occur commonly in disasters

Bloody diarrhoea	Suspected meningitis
Acute watery diarrhoea	Acute jaundice syndrome
Suspected cholera	Acute haemorrhagic fever syndrome
Lower respiratory tract infection	Trauma/injury
Measles	Malnutrition
Acute flaccid paralysis (AFP)	

A few others, such as malaria and other vector-borne diseases (e.g. typhus, plague and Leishmaniasis), are also likely to occur but are region specific. TB and HIV/AIDS can also cause major problems in the longer term

Prevention

“Prevention is better than cure”, and proper attention to preventive measures from the earliest stage of the response to the disaster will greatly reduce the risks to the health of the population from infectious disease.

Public Health Education

Public health education and information activities play a vital role in disease prevention. For example, vaccination programmes will not work unless there is acceptance by the public of the necessity for such programmes. Individuals must be informed as to why these programmes are necessary and also where and when they need to take their children for vaccination.

Such activities are also essential to inform people about particular health programmes (e.g. feeding programmes or vector control programmes) and about the steps they can take to protect their health and that of their families (e.g. good hygiene). Information can be propagated in numbers of ways:

- Posters
- Radio/TV/film
- Lectures
- Songs/poems/drama, etc.
- Leaflets

Staff who are trained in this type of activity therefore play a key role in disease prevention. Social anthropologists and social communicators can help ensure that the messages are appropriate and acceptable to the target population.

Health education also requires transport and equipment (such as video or film projectors, screens, generators, blackboards).

Provision of Appropriate Physical Conditions

Key activities for preventing the transmission of communicable disease and helping people to resist infection include the provision of shelter, adequate amounts of clean water, sufficient safe food and proper sanitation (latrines and facilities for personal hygiene, clothes washing and drying).

Control of Disease Vectors and Pests

Arthropod vectors of disease (mosquitoes, ticks, flies, etc.) can be controlled by appropriate spraying programmes and also by habitat management (e.g. the removal of places where water can accumulate and mosquitoes breed) and the proper disposal of waste. Provision of bed nets, particularly nets impregnated with insecticide, is effective for reducing infection with agents such as malaria and *Leishmania*.

In areas where mosquitoes are important vectors of disease, individuals need to be made aware of the need to cover themselves properly, especially in the evenings and at night, so as to reduce the risks of being bitten, and also of the value of insect repellents.

Control of rodents by proper control of rubbish, by rodent-proofing food stores, by attention to domestic hygiene and by use of rodenticides will reduce the risks of transmission of rodent-borne diseases such as plague and Lassa fever.

Cutting down vegetation around buildings will also help to reduce rodent infestation (they do not like to move around without cover) and will also reduce the risk of snakes entering dwellings.

Disposal of Rubbish

Accumulations of domestic rubbish should be cleared from around buildings and either burned or buried. If rubbish is buried, it needs to be covered with at least 0.5 m of earth to prevent it being dug up by scavengers and to prevent certain types of insect from reaching it for use as a breeding site. Any middens for rubbish disposal should be sited well away from dwelling areas.

Disposal of Contaminated Materials

Medical waste includes laboratory samples, needles and syringes, body tissues and materials stained with body fluids. This requires careful handling, especially the sharps, as infectious agents such as those causing hepatitis B and C, HIV/AIDS and viral haemorrhagic fevers can be transmitted by these materials. Used sharps should be disposed of into suitable containers. (Proper sharps boxes are ideal, but old metal containers such as coffee or milk powder tins are adequate.)

Medical waste (including sharps) should ideally be burned in an incinerator. This should be close to the clinic or hospital but downwind of the prevailing wind. A 200 l oil drum can be used for this purpose with a metal grate halfway up and a hole at the bottom to allow in air and for the removal of ash. Larger scale and more permanent incinerators can be constructed if necessary. Burning pits can be used in emergency. If burning is not possible, items should be buried at least 1.5 m deep. This is more suitable than burning for large items of human tissue such as amputated legs. Ensure there is no risk of groundwater contamination.

Dealing with the Dead

This is a complex process involving not just considerations of infection risk but also legal, sociocultural and psychosocial factors. There are a number of specialist publications which can be of help.

Health Aspects

After almost every natural disaster, fear of disease has encouraged authorities rapidly to dispose of the bodies of the dead, often without identifying them, and this sometimes seems almost to take precedence over dealing with the living. However, in sudden impact disasters (such as the Haitian earthquake in 2010), the pattern and incidence of disease found in the dead will generally reflect that in the living. The situation is much the same in wars and other long drawn out disasters, although these may affect disease patterns and create vulnerable groups.

In fact dead bodies pose little risk to health (with some exceptions listed next) since few pathogenic microorganisms survive long after the death of their host. The diseased living are far more dangerous as organisms can multiply in them and be transmitted to others. The decay of cadavers is due mainly to organisms they already contain and these are not pathogenic.

Those most at risk are those handling the deceased, not the community. The most likely risks to them are:

- Blood-borne viruses (hepatitis B and C, HIV)
- Some enteric pathogens (especially cholera)
- Respiratory pathogens (e.g. TB)
- Spore-forming bacteria (anthrax, tetanus)
- Some vector-borne diseases (plague, typhus) because the vectors may be present on the cadaver
- Acute haemorrhagic fevers (Ebola, Marburg, Lassa)

Those handling cadavers should:

- Observe universal precautions for blood and body fluids
- Dispose of or disinfect used gloves
- Avoid contamination of personal items
- Wash hands after handling bodies and before eating
- Have hepatitis B vaccination
- Ensure disinfection of vehicles and equipment

Mortuary facilities may need to be provided where the dead can be preserved until they are identified and appropriate legal proceedings have been undertaken and where relatives may easily attend to identify and claim the deceased. Cold stores and refrigerated vehicles can be employed as temporary mass mortuary facilities. Alternatively such facilities can be provided in buildings, huts or tented structures, but refrigeration will be needed.

The dead must always be treated with dignity and respect. As far as possible the appropriate customs of the local population or the group to which the deceased belonged should be observed. This may not be possible. For example, in a situation where cremation is the normal disposal method, shortages of fuel may prevent the use of this method.

If the dead have to be buried in mass graves, then the layout of the cemetery must be carefully mapped to facilitate exhumation if needed. When an individual may

have died of a particularly dangerous infection, then a body bag should be used (and also for damaged cadavers). In general bodies should be buried rather than cremated as exhumation for purposes of identification, for other forensic reasons or for repatriation may have to be undertaken at a later date. Bodies should be buried at least 1.5 m deep or, if more shallowly, should have earth piled at least 1 m above the ground level and 0.5 m to each side of the grave (to prevent access by scavengers and burrowing insects). New burial sites should be at least 250 m from drinking water sources and at least 0.7 m above the saturated zone.

Chloride of lime is frequently used as a disinfectant when dealing with the dead, especially when dealing with extensive numbers of cadavers trapped under rubble. This should be avoided. It is of little use (except possibly partially to mask odours) and is dangerous to those using it.

Vaccination Programmes

Vaccination programmes are an essential part of disease prevention. Information about existing vaccination programmes must be obtained during the assessment process, and this should include information from external assessors (e.g. WHO, UNICEF, NGOs) as to the effectiveness of the vaccination programmes that have been undertaken in the past. It cannot be assumed that simply because children have received vaccines that these vaccines were effective. Information about vaccine supplies and the existing cold chain should also be obtained.

Vaccination Priorities in Emergencies

Measles kills large numbers of children in developing countries and is one of the greatest causes of morbidity and mortality in children in refugee and IDP camps. Mass vaccination of children between the ages of 6 months and 15 years should be an absolute priority during the first week of activity in humanitarian situations and should be accompanied by the distribution of vitamin A. Either monovalent measles vaccine or MMR vaccine can be used.

If there is good evidence that the children involved have received a full course of vaccination against this disease, then vaccination may not be necessary, but if there is any doubt, a vaccination programme should be undertaken.

A system for maintaining measles immunisation must be established once the target population has been covered adequately in the initial campaign. This is necessary to ensure that children who may have been missed in the original campaign, children reaching the age of 6 months and children first vaccinated at the age of 6–9 months who must receive a second dose at 9 months of age are all covered.

Some of the children vaccinated during such a mass campaign may have been vaccinated before. This does not matter and a second dose will have no adverse effect. It is essential to ensure full coverage against measles in the population. Other EPI vaccinations for children are not generally included in the emergency phase

because they can only prevent a minor proportion of the overall morbidity and mortality at that stage. However, should specific outbreaks occur then the appropriate vaccine should be considered as a control measure. For example, polio has caused outbreaks in refugee settings.

Vaccination programmes require:

- Appropriate types of vaccines.
- Appropriate amounts of these vaccines.
- Equipment (needles, syringes, sterilisation equipment, sharps disposal). Emergency immunisation kits, including cold chain equipment, are available from a number of sources including UNICEF and some NGOs (e.g. MSF).
- Logistics (transport, cold chain).
- Staff: a vaccination team may be quite large. It will need to include:

A supervisor.

Logistics staff.

Staff to prepare and administer vaccines.

Record keepers.

Security staff (to maintain order and control crowds) may also be needed.

The Cold Chain

Maintenance of the cold chain is particularly important. This is the system of transporting and storing vaccines within a suitable temperature range from the point of manufacture to the point of administration. The effectiveness of vaccines can be reduced or lost if they are allowed to get too cold, too hot or are exposed to direct sunlight or fluorescent light. Careful note should be taken of the conditions needed to transport different vaccines because these can vary.

The essential cold chain equipment needed to transport and store vaccines within a consistent safe temperature range includes:

- Dedicated refrigerators for storing vaccines and freezers for ice packs at the correct temperatures. (Domestic fridges and freezers are not generally suitable for this purpose.) Note that fridges and freezers powered by gas or kerosene are available as alternatives to electric machines, and solar-powered fridge/freezer combinations specially designed for vaccine storage are also available.
- A suitable thermometer and a chart for recording daily temperature readings.
- Cold boxes for transporting and storing vaccines.
- Cold packs to keep vaccines cool.
- Insulating material to separate cold packs from the vaccines when in the cold boxes (e.g. bubble wrap or expanded polystyrene foam).

If possible, vaccines should be stored in their original packaging because removing the packaging exposes them to room temperature and light. Check the temperature to ensure the vaccines have not been exposed to temperatures outside the normal storage ranges for those vaccines (Table 18.4).

Table 18.4 WHO recommended storage conditions for different vaccines

Vaccine	Primary	Region	District/health centre
OPV	-15 to -25 °C	-15 to -25 °C	+2 to +8 °C
Freeze-dried vaccines (BCG, measles, MMR,MR, yellow fever, Hib freeze dried, meningococcal A and C)	+2 to +8 °C	+2 to +8 °C	+2 to +8 °C
Other vaccines (HepB, DTP-HepB, Hib liquid, DTP, DT, TT, Td/IPV)	+2 to +8 °C	+2 to +8 °C	+2 to +8 °C

Max storage time at the different levels

Primary 6 months, *region* 3 months, *district* 1 month, *health centre* 1 month, *health post* daily use – max 1 month

Diluents must never be frozen. Freeze-dried vaccines supplied packed with diluent must be stored at +2 to +8 °C. Diluents supplied separately should be kept at +2 to +8 °C

Vaccine Storage

Vaccines must be kept at the correct temperature since all are sensitive to heat and cold to some extent. All freeze-dried vaccines become much more heat-sensitive after they have been reconstituted. Vaccines sensitive to cold will lose potency if exposed to temperatures lower than optimal for their storage, particularly if they are frozen. Some vaccines (BCG, measles, MR, MMR and rubella vaccines) are also sensitive to strong light and must always be protected against sunlight or fluorescent (neon) light. These vaccines are usually supplied in dark brown glass vials, which give them some protection against light damage, but they must still be covered and protected from strong light at all times.

Only vaccine stocks which are fit for use should be kept in the vaccine cold chain. Expired or heat/cold damaged vials should be removed from cold storage. If unusable vaccines need to be kept for a period before disposal (e.g. until completion of accounting or auditing procedures), they should be kept outside the cold chain, separated from all usable stocks and carefully labelled to avoid mistaken use.

Diluents

Diluents for vaccines are less sensitive to storage temperatures than the vaccines with which they are used (although they must be kept cool), but may be kept in the cold chain between +2 and +8 °C if space permits. However, diluent vials must never be frozen (kept in a freezer or in contact with any frozen surface) as the vial may crack and become contaminated.

When vaccines are reconstituted, the diluent should be at same temperature as the vaccine, so sufficient diluent for daily needs should be kept in the cold chain at the point of vaccine use (health centre or vaccination post). At other levels of the cold chain (central, provincial or district stores), it is only necessary to keep any diluent in the cold chain if it is planned to use it within the next 24 h.

Freeze-dried vaccines and their diluents should always be distributed together in matching quantities. Whilst the diluents do not need to be kept in the cold chain (unless needed for reconstituting vaccines within the next 24 h), they must travel with the vaccine at all times and must always be of the correct type and from the same manufacturer as the vaccine which they are accompanying. Each vaccine requires a specific diluent and therefore diluents are not interchangeable (e.g. diluent made for measles vaccine must not be used for reconstituting BCG, yellow fever or any other type of vaccine). Likewise, diluent made by one manufacturer for use with a certain vaccine cannot be used for reconstituting the same type of vaccine produced by another manufacturer.

Some combination vaccines comprise a freeze-dried component (such as Hib) which is designed to be reconstituted by a liquid vaccine (such as DTP or DTP-HepB liquid vaccine) instead of a normal diluent. For such combination vaccines, it is again vital that only vaccines manufactured and licenced for this purpose are combined. Note also that for combination vaccines where the diluent is itself a vaccine, all components must now be kept in the cold chain between +2 and +8 °C at all times. As for all other freeze-dried vaccines, it is also essential that the “diluent” travels with the vaccine at all times.

Effectiveness of Vaccination Programmes

The effectiveness of a vaccination programme will need to be assessed. The programme can be evaluated both by routinely collected data and, if necessary, by a survey of vaccination coverage.

Routine data on coverage is obtained by comparing the numbers vaccinated with the estimated size of the target population (and clearly depends on accurate assessment of the latter). A coverage survey requires the use of a statistical technique called a two-stage cluster survey details of which can be found in the appropriate WHO/EPI documents.

Information about the effectiveness of the campaign should be obtained from routine surveillance of communicable disease. If, for example, large numbers of measles cases continue to occur, or there is an outbreak, then data on coverage should be re-examined. If this is shown to be good (over 90 %) then the efficacy of the vaccine must be suspected. If the field efficacy is below the theoretical value 85 % (for measles vaccine – data on efficacy of other vaccines can be obtained on line), then possible causes of a breakdown in the vaccination programme must be investigated (failure of the cold chain, poorly respected vaccination schedule). Methods for measuring vaccine efficacy can be found in the WHO/EPI literature.

Chemoprophylaxis

Mass chemoprophylaxis for bacterial infections such as cholera and meningitis is not usually recommended except on a small scale (e.g. the use of rifampicin may be

considered to prevent the spread of meningococcal meningitis amongst immediate contacts of a case), but the difficulties of overseeing such activities and the risks of the development of antibiotic resistance generally outweigh any benefits that might be gained. The use of chemoprophylaxis for malaria must be undertaken with care. It may be indicated for vulnerable groups of refugees/IDPs (e.g. children and pregnant women) arriving in an endemic area particularly if they come from a non-malarious area, but care must be taken to provide drugs to which the local strains of malaria are sensitive. The spread of resistance means that many of the standard drugs are ineffective and the replacements are both costly and may have unwanted side effects.

Treatment

Details of the treatment of individuals for various infectious diseases and the facilities needed are covered elsewhere in this book and in many textbooks covering disasters and disease response. In terms of the population aspects of the treatment of disease, important requirements are to ensure that there are:

- Adequate supplies of appropriate antimicrobial agents available and the facilities to transport these, store and distribute them under appropriate conditions (e.g. controlled temperature) together with relevant instruction for use
- Appropriate laboratories (microbiological, parasitological, haematological, biochemical) available to confirm diagnoses and monitor treatment

(Details of the use of laboratories and the storage and transport of specimens are given elsewhere in this book.)

Antimicrobials

Treatment of disease requires good supplies of appropriate antimicrobial agents. It is important to ensure that the agents chosen are suitable for use in the area and are licenced for use in the country(s) involved. It is common for doctors in affected areas to ask for the latest therapeutic agents. However, these agents, whilst effective, are often expensive and not part of the normal treatment programmes in the region. The local doctors may not therefore be familiar with the use of these agents nor may laboratories be capable of monitoring their use. It is better to use funds, which are often limited, to supply larger amounts of older (generic) agents. One caveat is the possibility that regular use may have allowed resistance to certain agents to develop in a country. Data on this may be available from local surveillance records. Antimicrobials should always be supplied with relevant guidelines in a language that can be understood locally. If local laboratories are unable to test microbes for resistance to antimicrobials, isolates or specimens should be sent as soon as possible to appropriate national or international reference laboratories for testing.

Response to Outbreaks and Epidemics

Features

Outbreaks of communicable disease may occur before preventive measures can take effect or because the measures are in some way inadequate or fail. An epidemic is generally defined as the occurrence in a population or region of a number of cases of a given disease in excess of normal expectancy. An outbreak is an epidemic limited to a small area (a town, village or camp).

The term *alert threshold* is used to define the point at which the possibility of an epidemic or outbreak needs to be considered and preparedness checked. The areas where vaccination campaigns are a priority need to be identified and campaigns started.

The term *epidemic (outbreak) threshold* is used to define the point at which an urgent response is required. This will vary depending upon the disease involved (infectiousness, local endemicity, transmission mechanisms) and can be as low as a single case.

Infections where a single case represents a potential outbreak include:

- Cholera
- Some viral haemorrhagic fevers (Ebola, Marburg)
- Yellow fever
- Measles
- Plague
- Typhus

Infections where the threshold is set higher, usually based on long-term collection of data, and will vary from location to location, include:

- Shigellosis
- Typhoid
- Hepatitis A
- Malaria
- Meningococcal meningitis
- Human African trypanosomiasis
- Visceral Leishmaniasis

A surveillance system that is functioning well should pick up the signs that an outbreak or epidemic is developing and should therefore allow time for measures to be introduced that will prevent or limit the scale of the event. However, this may not always work and it is essential therefore that plans are made to combat outbreaks or epidemics. This planning process can be aided by reference to any available information about prevalent diseases that have epidemic potential that are known to occur in the area in question. Equally, there is a great deal of literature about the types of epidemics and outbreaks that have accompanied disasters in the past and which are therefore potential causes of problems.

In addition to the establishment of surveillance, outbreak preparation involves:

- Preparing an epidemic/outbreak response plan for different diseases covering the resources needed and the types of staff and their skills that may be needed and defining specific control measures.
- Ensuring that standard treatment protocols are available to all health facilities and health workers and that staff are properly trained.
- Stockpiling essential supplies. This includes supplies for treatment, for taking and shipping samples, other items to restock existing health facilities and the means to provide emergency health facilities if required.
- Identifying appropriate laboratories to confirm cases and support patient management, make arrangements for these laboratories to accept and test specimens in an emergency and set up a system to ship specimens to the laboratory.
- Identifying emergency sources of vaccines for vaccine preventable diseases and make arrangements for emergency purchase and shipment. Ensure that vaccination supplies (needles, syringes, etc.) are adequate. Make sure the cold chain can be maintained.
- Identifying sources for other supplies including antimicrobials and make arrangements for emergency purchase and shipment.

Confirmation of the Outbreak

If the number of reported cases is rising, is this in excess of the expected number? Ideally work with rates rather than numbers (see earlier discussion) because, for example, the numbers of cases in a refugee camp could increase if the number of people in the camp increases, without an outbreak occurring. Verify the diagnosis (laboratory confirmation) and search for links between cases (time person and place). Laboratory confirmation requires the collection of appropriate specimens and their transport to an appropriate laboratory.

Outbreak Control Team

In the case of a limited outbreak a local control team should be set up. This is frequently done by the lead agency, generally in consultation with the MOH and with membership from other relevant organisations including WHO, other UN organisations and NGOs. In the case of an epidemic, the MOH will probably take the lead or may ask WHO or another UN agency to do so. The team will need to include a co-ordinator, and specialists from the various disciplines needed to control the outbreak. This may include clinical and other health workers, laboratory staff, water and sanitation, vector control and health education specialists, representatives of the MOH or other local health authorities, representatives of local utilities (e.g. water supply), representatives of the police and/or military and representatives of the local community.

This team should meet at least once a day to review the situation and define the necessary responses. It has additional responsibilities including implementing the response plan, overseeing the daily activities of the responders, ensuring that treatment protocols are followed, identifying resources (both material and human) to manage the outbreak and obtaining these as necessary and co-ordinating with local, national and international authorities as required. The team should also act as the point of contact for the media. A media liaison officer should be appointed and all media contact should be through this individual. This will allow team members to refer media representatives to a central point and reduce interference with their activities. It will also ensure that a consistent message based on the most complete data is given to the media.

Information

The appropriate national authorities should be informed of the outbreak. In addition to their responsibilities to their own population and to any refugees within their borders, they have a responsibility under the Revised International Health Regulations (2005) to report outbreaks of certain diseases. These include four diseases regarded as public health emergencies of international concern:

- Smallpox
- Polio (wild type)
- New strains of human influenza
- Severe acute respiratory syndrome (SARS)

In some cases, Member States must report outbreaks of additional diseases: cholera, pneumonic plague, yellow fever, viral haemorrhagic fever, West Nile fever and other diseases that are of special national or regional concern (e.g. dengue fever, Rift Valley fever and meningococcal disease).

Investigation

Once the diagnosis has been confirmed and the causative organism identified, then there are a number of steps that must be taken in addition to continuing to treat those affected:

- Produce a case definition for the outbreak. This is primarily a surveillance tool that will reduce the inclusion of cases that are not part of the outbreak and prevent dilution of the focus and activities of the main control effort.
- Collect and analyse descriptive data by time, person and place (time and date of onset, individual characteristics of those affected – age, sex, occupation, etc., location of cases). Plot maps of case distribution (can locate source(s) of an outbreak and determine spread) and plot outbreak curves (which will help estimate of how the outbreak is evolving).

- Determine the population that is at risk.
- Determine the number of cases and the size of the affected population. Calculate the attack rate.
- Formulate hypotheses for the pathogen about the possible source and routes of transmission.
- Conduct detailed epidemiological investigations to identify modes of transmission, vectors/carriers and risk factors.
- Analyse data, report results and make recommendations for action.

Outbreak Investigations

The two main statistical tools used to investigate outbreaks are:

- *Case-control studies* in which the frequency of an attribute of the disease in individuals with the disease is compared to the same attribute in individuals without the disease who are matched to the cases in terms of age, sex and location (the control group)
- *Cohort studies* in which the frequency of attributes of a disease is compared in members of a group (e.g. those using a particular feeding centre) who do or do not show symptoms

However, the design and methods involved in such studies are often too complex and demanding of staff and of time for the environment of conflict and disaster.

Control Activities

- Implement prevention and control measures specific to the disease organism (e.g. clean water, personal hygiene for diarrhoeal disease).
- Prevent infection (e.g. by vaccination programmes).
- Prevent exposure (e.g. isolate cases or at the least provide a special treatment ward or wards).
- Treat cases.

Evaluation

- Evaluate the outbreak detection and response – were they appropriate, timely and effective?
- Change/modify policies and preparedness to deal with future outbreaks if required.
- What activities are needed to prevent similar outbreaks in the future (e.g. improved vaccination programmes, new water treatment facilities, public health education)?

- Produce and disseminate an outbreak report. The report should include details of the outbreak including:
 - Cause
 - Duration, location and persons involved
 - Cumulative attack rate (number of cases/exposed population)
 - Incidence rate
 - Case fatality rate
 - Vaccine efficacy (if relevant) (number of unvaccinated ill – number of vaccinated ill/number of unvaccinated ill)
 - Proportion of vaccine preventable cases (no. of vaccine preventable cases/no of cases)
 - Recommendations

Epi Info™ 7

This is an easy-to-use tool, available for Microsoft Windows, which is of great value for handling epidemiological data and for organising study designs and results, which can be downloaded free of charge from the Internet. It is produced by the Centers for Disease Control (Atlanta) and is a series of computer programmes which can be used both for surveillance and for outbreak investigation. The statistical tests available include t-tests, ANOVA, nonparametric statistics, cross tabulations and stratification with estimates of odds ratios, risk ratios, and risk differences, logistic regression (conditional and unconditional) and survival analysis (Kaplan Meier and Cox proportional hazard). The software is in the public domain and can be downloaded free from <http://www.cdc.gov/epiinfo>. (Earlier versions of the software, suitable for older computers, are also available on line.)

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Chapter 19

The Sword of Damocles: Whither the Next Pandemic

Robert F. DeFraités

Abstract This chapter discusses the nature and characteristics of infectious diseases, the particular circumstances in which they can produce epidemics, and how outbreaks can be detected and mitigated in a timely manner. Factors favoring epidemics include the innate capability of the infectious agent to infect individuals, the ease with which the agent is transmissible from one individual to another, and the susceptibility of the population for outbreaks to occur. Susceptibility to outbreaks is increased when the immune defense mechanisms of individuals are degraded through malnutrition and stress, and large numbers of people are crowded together in an environment lacking basic public health protections. Such circumstances often accompany disasters and complex emergencies. The public health community worldwide has developed mechanisms for earlier recognition and response to epidemics, and is striving to refine techniques and approaches to better anticipate them.

- To describe the historical impact of epidemics and pandemics
- To understand risk factors and conditions favourable for pandemics, epidemics, including natural disasters
- To describe responsibilities and activities of the World Health Organization and other international bodies in preparing for and responding to pandemics and epidemics
- To describe actions to be taken in responding to these events, including the discrimination of “naturally occurring” outbreaks from synthetic, or man-made ones

Keywords Pandemics • Epidemics • Risk factors • Control • Intervention • Predictions

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Objectives

- To describe the historical impact of epidemics and pandemics
- To understand risk factors and conditions favourable for pandemics, epidemics, including natural disasters
- To describe responsibilities and activities of the World Health Organization and other international bodies in preparing for and responding to pandemics and epidemics
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Background***Epidemics, Outbreaks, Pandemics Defined***

An epidemic is defined in Last’s Dictionary of Epidemiology as incidence of a condition or a disease “clearly above” the expected rate for the population and time frame being considered. In popular usage, the term evokes images of widespread pestilence and serious illness; some in public health (including the World Health Organization) refer to these circumstances with terms such as “cluster” or “disease outbreak” reflecting somewhat the dread associated with the term “epidemic”. Pandemics are large outbreaks that occur over a broad area and may involve a substantial proportion of the population. Infectious causes of global pandemics include cholera, typhus, plague, influenza, and HIV.

Infectious Diseases and Pandemics/Epidemics in Culture and History

Epidemics and pandemics occur only if there is a sufficiently large population of susceptible persons available for sustained transmission. Early hunter-gatherer societies were generally spared from plagues since small, mobile groups could not support the chain of transmission for very long; infrequent contact between groups prevented easy transmission from one group to another. The development of agriculture and resulting urban centres provided stable and concentrated populations of susceptible individuals allowing introduced infections to spread. Many infections causing outbreaks in these early civilizations were zoonotic agents transmitted from newly domesticated animals, especially swine, cattle, sheep, and poultry.

Flourishing of industry and trade resulted in denser urbanization and facilitated the plagues associated with crowding, through person-to-person transmission, sanitation, faecal-oral transmission, and increased contact with rats, lice, and fleas as vectors of disease in cities. There are lists of outbreaks, “plagues”, and pandemics noted through history of every human society. In more recent history, seven pandemics of cholera have been described since the first in the early nineteenth century. The current (seventh) pandemic started in Asia in 1961, spread to Africa by 1971, and the Americas 20 years later. Cholera remains an endemic disease in many countries around the world, including its original home in South Asia. Pandemics of influenza occur every several decades, the most recent caused by a H1N1 strain originating in North America in 2009 and rapidly spreading around the world.

Structure of Pandemics and Epidemics

The pandemic/epidemic potential of an infectious disease is influenced by characteristics of the agent, such as mode of transmission, requirement for a vector (such as a mosquito), and resistance to environmental conditions; the host, by behaviour and immune status; and the environment, by temperature, humidity, and salinity of water. All of these factors are brought to bear in a simple conceptual model for pandemic/epidemic potential: whether, on average, the infection in a single host/person is transmitted to more than one susceptible person. This tendency is summarized in the basic reproductive rate, commonly abbreviated as R_0 (“ R subzero”)—the need for the disease to propagate itself in the host population to survive and grow. The higher the R_0 , the more readily disease propagates through the population. An infection with $R_0 < 1$ will not persist. If $R_0 = 1$, the infection can be sustained in a steady state as long as susceptible persons remain to be infected. A condition with $R_0 > 1$ will spread through the susceptible population in an exponential manner. The R_0 is a function of the ease of transmission (a low vs. high infectious dose, efficient means of transmission through aerosol, direct contact, or food and water), the length of time that an infected person remains contagious, and the likelihood that an infectious person will achieve effective contact with a susceptible person during that time. Some infections, such as measles, varicella, pertussis, and other infections are extremely transmissible, with large amounts of infectious particles being shed over an extended period by the host and result in infecting well over 60 % of susceptible household contacts. On the other hand, ingestion of a very small inoculum (a few dozen to several hundred bacilli) of *Shigella* is required to cause dysentery. Hepatitis A virus survives in the environment and can remain viable on surfaces for many days. Emerging and re-emerging infectious agents such as viruses newly adapted to humans (or having developed new immune characteristics) may spread quickly and with devastating effect in populations of susceptible hosts.

Pandemics and Epidemics Occurring in Conjunction with Natural Disasters and Emergencies, Including Myths and Misconceptions

Concern about potential outbreaks and rumours of pandemics/epidemics often accompany natural disasters, although this risk is mostly overstated. One of the more common misperceptions is that of the risk of infection posed by numbers of unrecovered human remains. With the rare exceptions of deaths caused by cholera and certain hemorrhagic fever virus infections, dead bodies require no special precautions to preclude customary, respectful, and documented disposition. Several key factors determine the likelihood of infectious disease outbreaks as a consequence of natural disasters. The type of disaster is important. Water-related disasters such as floods may provide ideal conditions for outbreaks of waterborne diseases such as leptospirosis, cholera, and enteric viral hepatitis. Conversely, other disasters such as earthquakes may alter habitats of vector arthropods or increase the risk of exposure to vector bites causing malaria and dengue. The size, nutritional and immune status, and living conditions of populations affected or displaced by the disaster may predispose to outbreaks of infections associated with crowding and person-to-person transmission, such as measles, acute respiratory infections including influenza, meningococcal infections, and noroviruses. Finally, the absence or prolonged interruption of public utilities such as electrical power, fuel, potable drinking water supply, and sanitary waste disposal services will increase the risk of food- and waterborne infections. Therefore, to mitigate the risk of outbreaks following a disaster that involves a large population of displaced persons, focused effort should be directed toward rapid provision of sufficient and sanitary accommodations, vector protection, and safe food and water. Other interventions, such as immunization programmes against specific pathogens, such as measles and tetanus, should also be considered.

Outbreaks and Mass Gatherings

Massive gatherings of people create conditions favourable for outbreaks. Planned mass gatherings include events such as the Olympics, the World Cup, and the annual Hajj in Saudi Arabia. Persons from all over the world converge for these events, burdening local food, water, and sanitation infrastructure. Although participants in these kinds of events are usually fairly healthy, some can be expected to be incubating potentially contagious infections; outbreaks of meningococcal disease have occurred in conjunction with the Hajj. Other mass gatherings occur as unplanned consequences of conflicts or natural disasters; the persons displaced by such events can be expected to include a greater proportion of those with impaired immune

systems due to poor nutrition, underlying illnesses (including contagious diseases), and extremes of age.

How Does a Pandemic/Epidemic Start? Can They Be Predicted/Forecasted?

Most outbreaks cannot currently be predicted with adequate accuracy and timeliness to permit specific countermeasures to be employed in advance. However, a series of observations suggest a framework upon which prediction might be focused. First, the majority of agents comprising newly emerging infections of humans since the middle of the twentieth century are zoonoses, and second, most of these have been transmitted from wildlife. Some have suggested that more vigorous ongoing monitoring of zoonotic activity, especially among equatorial populations with frequent contact with wildlife may provide early warning of potentially devastating epidemics of emerging zoonoses, especially viruses.

To cause large outbreaks in humans, these infections must not only possess the ability to infect a single human, but then to become well enough adapted to the new host so that person-to-person transmission can be sustained free of the need for repeated contact with the original animal host. In the future, systematic and reliable determination of genetic and other intrinsic factors of emerging agents that might predispose them to cause epidemics may be possible.

Once these infections are established in humans, earlier detection of epidemics may be possible by monitoring reports of prodromal symptoms or illness-related behaviour patterns tracked through Internet searches, telephone use, or other proxy means. Finally, regional and global detection and response efforts would benefit from a more unified and better integrated rapid communication and analytic capability.

World Health Organization Pandemic Response Framework and Public Health Security

International Health Regulations (IHR) 2005

With the 2005 update of the International Health Regulations, the WHO members greatly expanded the scope of infectious disease reporting and surveillance activities. Under the legacy regulations adopted in 1969, WHO member nations were legally bound to track and report four diseases of international interest: yellow fever, plague, cholera, and smallpox. The expansion of infectious disease reporting

under the 2005 IHR reflected the realization of the significance of emerging and unanticipated infectious diseases and their potential to cause disruptive and destructive epidemics. Under IHR 2005, WHO conducts global surveillance to detect and assess significant public health risks. The WHO has established the Global Outbreak Alert and Reporting Network to support outbreak detection and response preparedness. Members of the network support IHR 2005 by establishing global surveillance and response standards, creating networks of partners for preparedness and rapid response, strengthening laboratory capacity and laboratory networks, providing training in field epidemiology, and assessing and strengthening national surveillance systems. Once detected, outbreaks or clusters must be verified and assessed for potential international public health significance. Based on this assessment, WHO must inform member states about the threats and, upon request, assist members in outbreak investigation and control. A declaration of a Public Health Emergency of International Concern (PHEIC) is to be considered in rare and “extreme” cases. On April 25, 2009, the Secretary General of the WHO announced the H1N1 influenza outbreak as the first PHEIC to be declared under the IHR 2005.

Influenza Pandemic Phases

The WHO developed a pandemic staging system uniquely for influenza, last updated in 2009. In anticipation of a predictable ongoing threat of global outbreaks of influenza, the WHO describes six phases of response to potential influenza pandemics, as a basis for coordinated planning and national, regional, and global response. These pandemic phases reflect the model of influenza manifesting itself as initially an infection of birds, swine, or other animals with varying degrees of threat to humans. Once human infection is documented, the phases reflect the occurrence of person-to-person transmission and regional and global distribution of the infection. Phases 1 through 3 are characterized by zoonotic influenza, with rare human infections and no sustained transmission by humans. Documentation of sustained person-to-person transmission characterizes phase 4, the pandemic alert phase. Transmission in at least two countries in the same WHO region initiates phase 5; the pandemic phase 6 is declared when at least one country in another of the six WHO regions is affected, in addition to the conditions for phase 5. There are two additional phases: the “post-peak” phase, in which surveillance and preparation is focused on a possible “second wave” of cases, and a post-pandemic phase, when influenza rates revert to the level typical of seasonal infection. While the phases generally reflect the temporal pattern of influenza pandemics, they are intended as a guide for nations to increase their public health and national readiness, and not to predict the course of an epidemic. There are no comparably mature systems for preparing for or tracking of other infections with pandemic potential.

Response Activities During Outbreaks/Epidemics

Outbreak Investigation Technique, Goals, Steps

The recognition of an unusual number or distribution of cases of disease or injury should trigger an investigation of the event as a potentially significant outbreak. The extent of this investigation will vary based on circumstances, from a cursory checking of facts to a more formal investigation with extensive data collection and field work, usually supported with laboratory resources. More aggressive and complete investigation is indicated to identify sources or causes and to mitigate or interrupt the outbreak, especially for unusually severe or extensive cases, unusual presentations, or potential for rapid spread. An essential initial step is confirmation of the existence of the outbreak, which entails comparing the number of cases in the cluster compared with the number that would be expected to occur in the population during the time interval under consideration. This step requires a clear statement of the definition of a “case” including consideration of time and geographic area constraints. The initial case definition should be more inclusive and less specific “diarrhoea with fever among children in neighbourhood X between dates Y and Z” may suffice. Accurate comparison with baseline cases rates may be difficult using such non-specific case definitions. During the course of the investigation the definition is usually refined. The introduction of more specific case criteria (including results of laboratory tests identifying one or more likely causative agents) can allow for accounting for “suspected” or “possible” and “confirmed” cases, and allow for more accurate comparison of case rates. Initial descriptive statistics include demographic data (age, sex, race/ethnicity) and a plot of case counts over time to create the “epidemic curve” histogram. The shape of this curve reflects key information about the outbreak: a single “peak” with a long “tail” reflects an outbreak that was caused by one-time exposure from a single “point” source. Cases emanating from a continuous or prolonged exposure will yield a broader curve with no single peak. A curve with multiple peaks classically represents an outbreak sustained by waves of person-to-person transmission. Causal hypotheses of risk factors, dose-response relationships, potential confounders, etc. can be analysed using case-control studies or other methods. Any resulting hypothesis of a causal relationship between risk factor(s) and the condition of interest (“caseness”) must account for all or almost all cases. Cases lacking the suspected causal risk factors, i.e. “outliers”, deserve additional scrutiny. Occasionally, characteristics unique to these case-persons are critical to identifying the source of the outbreak. Additional studies may be needed to confirm initial findings; all pertinent results must be provided to responsible authorities in a timely manner to direct actions to control the outbreak and communicate with the public. As control measures are implemented, surveillance for additional cases must continue in the population at risk and instituted elsewhere as indicated.

Table 19.1 Outbreak control: breaking the chain of transmission

The importance and priority of these varies with the infectious agent and circumstances:
Treat and isolate cases
Quarantine and prophylax potentially infected contacts
Sanitize or eliminate contaminated sources of food and water
Protect against arthropod vectors with barriers, repellents, and vector control interventions
Enhance personal hygiene (hand-washing, cough hygiene)
Dispose of waste
Immunize susceptible persons (measles, meningococcal, influenza)

Natural vs. “Unnatural” Outbreaks

In the course of investigating a disease outbreak, one is sometimes confronted with the question of whether the epidemic could have been generated by specific human activity, as opposed to “natural” forces. There are few specific indicators of such activity, aside perhaps from communication of a specific threat. Many infections and outbreaks emerge as unintentional consequences of human activity; these events usually follow well-established epidemiological patterns. The presence of several characteristics not encountered in most outbreaks should raise suspicion. The discovery of a truly novel agent will certainly warrant additional scrutiny. Similarly suspicious is a well-documented infectious agent that manifests markedly atypical clinical manifestations, for example, pneumonia as opposed to gastrointestinal symptoms, increased severity, or transmissibility. Extremely large point-source outbreaks, multiple simultaneous outbreaks, and those which reflect downwind spread of airborne infectious agent suggest a possible man-made source. Unnatural features of zoonotic disease outbreaks include the concurrence of large numbers of ill or dead animals, or evidence for reverse transmission (human to usual animal host) of well-known zoonoses.

Outbreak Intervention (Table 19.1)

Actions needed to mitigate or control an outbreak are typically related to factors which caused the outbreak in the first place. For example, the response to an outbreak caused by introduction of a vaccine-preventable disease (such as measles) into a susceptible population must include immunization (or re-immunization) programmes among other measures. The route of exposure will also suggest mitigation and control measures—food- and waterborne outbreaks respond to interruption of transmission through sanitary countermeasures directed against the offending medium.

For example, cholera transmission can be halted by providing safe drinking water and sanitary disposal of waste, and taking enteric precautions when caring for case patients and handling remains of fatal cases. Although antibiotics may have a

role in treating case patients, mass antibiotic prophylaxis is contraindicated. Cholera immunization has likewise been considered to have limited use as a disease control measure; however, with the introduction of oral cholera vaccines, immunization may be a useful adjunct in some situations, such as reducing the incidence of disease in endemic areas or protecting a well-defined population against an imminent epidemic.

For an agent with antigenic variability like influenza A, outbreaks are often caused by subtypes and strains of the virus for which there is no effective vaccine. In other cases, outbreaks occur in population with poor vaccine coverage. Even with immunization with an effective vaccine, protection may be delayed for several weeks, allowing outbreaks of illness to occur after immunization. Although antiviral prophylaxis and treatments are effective for preventing illness or blunting the clinical course of influenza, widespread use in large communities is unfeasible. Other mitigation strategies include social distancing (including hand and cough hygiene) and quarantining of potentially infected persons. Respiratory and droplet isolation of cases can stop transmission as well. However, in practice, use of social distancing to interrupt transmission of influenza is complicated by several characteristics of the virus and the illness. Influenza has an incubation period of only several days to a week; rapid laboratory diagnosis of cases (if available) early in the illness is hampered by relatively low test sensitivity, so infected persons may not be identified before transmitting the infection. Once infected, an ill person can shed infectious viruses for over a week; effective isolation for the duration of viral shedding may be difficult to maintain.

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Part III

Living and Working in Austere Environments

Adriaan P.C.C. Hopperus Buma

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This important section has been brought up to date since the publication of the second edition in 2009. It looks at the deployed experience from the perspective of the individual who now operates in an increasingly austere and hostile environment. It begins by considering how to become involved. It looks at the potential implications for a conventional career path, the threats and stresses within the deployed environment, and how to remain safe.

The authors were asked to write from personal experience and encouraged to use their own writing styles. Some overlap between the chapters is inevitable, but hopefully a lesson emphasized here will mean an error, or even a tragedy, avoided out in the field.

Chapter 20

Getting There and Being Involved: Getting Involved

Steve Mannion

Abstract When questioned, many a medical student or nursing student will profess a deep desire to work in the field of international humanitarian aid overseas at some time in their future career.

In practice, for a variety of reasons, only a small proportion ever gets to realise this ambition. Some will accrue family and financial commitments which prevent it; others will feel that such work may be detrimental to their career progression; yet others may perceive that the personal safety risks associated with such programmes are too great.

Keywords Motivation • Preparation • Team building and maintenance

Objectives

- To consider important issues before getting involved
- To provide essentials tools for preparation

Introduction

When questioned, many a medical student or nursing student will profess a deep desire to work in the field of international humanitarian aid overseas at some time in their future career.

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In practice, for a variety of reasons, only a small proportion ever gets to realise this ambition. Some will accrue family and financial commitments which prevent it; others will feel that such work may be detrimental to their career progression; yet others may perceive that the personal safety risks associated with such programmes are too great.

Even for those who maintain their enthusiasm and ambition for such work, getting a first foot in the door can be a difficult and daunting prospect. This chapter aims to examine some of the issues associated with making this first step and tries to offer some practical advice.

Getting Involved

This first part of the work is concerned with how to get started and how to begin working in the field of humanitarian assistance in a hostile environment, be that working in the field of humanitarian medicine overseas, or in other potentially hostile environments such as the oil and gas industry.

Motivation

Before embarking on the quest for an overseas post, it is wise to consider your own motivation for doing so. These may include the points listed next:

- Altruism – a determination to help needy populations.
- Religion – medical missionaries undertake this work as an expression of their religious faith.
- Career – to gain experience that will help NHS practice and advancement.
- Adventure – the chance to see and do unusual things.

In practice, most people undertake aid work for a complex combination of these factors and others [1].

It is perhaps unwise to pursue this work purely out of disaffection with NHS practice. Only a small proportion of expatriate health professionals will find their true long-term vocation in aid work [2]; the remuneration is often poor, living conditions are difficult and there is no security of tenure. The majority, therefore, will be obliged to return to a NHS or equivalent practice which, if they found it to be unsatisfactory prior to departure, will no doubt be more so following their return.

Care should also be exercised with regard to one's personal life [3]. In crisis situations, it is rarely appropriate for aid workers to be accompanied by their partners and children. With the minimum duration of a first mission for many agencies being 3 months or longer, the strain of separation needs to be considered. Where partners can live in the country, their needs should also be addressed. For example, the difficulties of social isolation can be reduced if your partner is professionally qualified; some agencies will offer dual appointments at one location if both parties hold appropriate qualifications.

Qualifications and Skills

Increasingly, aid organisations are demanding greater levels of experience, qualification and evidence of accreditation from their candidates for overseas posts [1]. This is appropriate, as the expatriate must be able to contribute significantly to the programme concerned.

Most agencies will not consider newly qualified or immediately post-registration doctors (in a medical role; people with additional qualifications in, say, logistics may be suitable for other roles). The minimum for doctors is usually 2 years post-registration experience including senior house officer (SHO) work in accident and emergency, paediatrics and/or obstetrics and gynaecology. This proof of experience will also be demanded of other health professionals.

There are additional courses and qualifications that make the candidate more attractive to potential employers. These include the DTM&H (Diploma in Tropical Medicine and Hygiene, a 3-month full-time course offered by the London and Liverpool Schools of Tropical Medicine), the DMCC (Diploma in the Medical Care of Catastrophes, a modular diploma qualification run by the Society of Apothecaries of London) and Master's degrees in aid-related subjects such as public health, international community health and epidemiology. (Further details of courses and institutions can be found in the resources section.)

The requirements for specialists (such as surgeons and anaesthetists) are more exacting. Médecins sans Frontières (MSF) looks for a minimum of 2 years experience at Specialist Registrar (SpR) level. The International Committee of the Red Cross (ICRC), who recruit for their surgical programmes via Red Cross National Societies, usually look for people at Senior Resident/Consultant level.

The prospective first-time candidate cannot be expected to have direct experience of humanitarian aid work, but previous overseas trips (such as a medical elective or independent travel) are well looked upon by employing agencies.

Most of the employing agencies offer some form of further training before sending anyone into the field. MSF run a Preparation Primary Departure (PPD) course. The British Red Cross runs an introductory course for potential delegates. These courses cover aspects of professional skills, general skills and the individual agency's health care and aid philosophy.

Integration of Overseas Experience with an NHS Career

As long ago as 1995, a circular from the NHS Executive [4] drew the attention of NHS Trusts to the potential professional development obtained by medical staff who participate in humanitarian aid work overseas. The document sought to encourage trusts to develop schemes whereby staff could be allowed time off to undertake such projects, with a guarantee of re-employment on their return. (Current procedures for the mobilisation of reserve military personnel include such agreements with employers.) More recently, similar sentiments have been echoed [5]. Whilst some trusts have

made local initiatives, it still remains difficult to integrate overseas work with mainstream career progression. This situation contrasts sharply with that in many other European countries, where time off for aid work is encouraged and facilitated.

So, how to combine aid work with career progression?

Discuss your plan with mentors and referees. It is helpful to have someone within the system who understands what you are doing and why and who can explain it to their colleagues and support job applications.

At a junior professional level, it is possible to engineer a 3- or 6-month gap between appointments. (Ideally, arrange a job to come back to in order to avoid losing time searching on your return or having to take an unsuitable position.)

For more senior trainees, it can be more difficult. Particular times may be more suitable for taking time out, such as after successfully passing a membership or fellowship examination. Negotiate with the local Director of Training and College Tutor. They and the trust will need time to adjust the training rotation allocations in your absence and arrange internal cover or appoint a locum. Some programmes factor in OOPE (Out Of Programme Experience), and it may be that aid work can be seen as suitable.

The possibility of doing research during the mission may also help your negotiations with the NHS or similar employing body. Talk to people who have recently been in the country to see what projects are running or could be set up. The best options are to carry on a project that is already running, or have people in the country begin preparations before you arrive. (It is also important not to be too ambitious and to remember that many field projects cannot be completed due to a multitude of different factors so do not be too disappointed if this happens.)

Unfortunately, owing to minimal/absent levels of supervision, overseas aid work is unlikely to count towards higher surgical or medical training (although some specialities do permit up to 3 months for professional development or specialist military medical training if agreed in advance with the relevant training authority), and accreditation dates will probably be put back by an appropriate period. Another possibility is to combine annual and personal study leave allocations, but this will only allow limited durations of deployment.

For consultants and general practitioners, contracted sabbatical periods are a good way of participating in overseas missions [6]. A number of senior people realise their overseas aid work ambitions after retirement, but a clean bill of health will be required.

Which Organisation?

There are an ever-increasing number of non-governmental organisations (NGOs) employing health-care professionals in aid projects. Each will differ in a number of aspects, such as:

- Type/duration of project
- Qualifications required
- Pre-deployment preparation and briefing

- Pre-deployment medical/vaccinations (and who pays for these)
- Salary (or no salary)
- Living conditions in the field
- Insurance
- Communications (to and from the field)
- Medical evacuation in the event of illness or injury

These factors are *critical* to the individual deploying. Talk to people who have worked for the organisation(s) you are considering and ask if their expectations were met. This will be considered further in the preparation section next in this chapter. Find out if the organisation adheres to the “People in Aid Code of Best Practice in the Management and Support of Aid Personnel” (<http://www.peoplein-aid.org/>).

After deciding which organisation(s) you would prefer to work with, the next step is to make contact and register with them. This is often an interview-based process, after which references will be taken up. For some organisations, a successful interview leads to a further assessment and training course before a decision on your suitability for working with them is made.

Appointments to a programme depend on a number of factors. If you are multi-skilled and available for an unlimited period at short notice, you are likely to be placed quickly. If your availability is more limited or for short periods and your skills are specialised, it may be more difficult. Keep in regular contact with the organisation’s head office/personnel department so they will consider you when vacancies arise (see Resources section).

Preparation

Once appointed to an overseas programme, gather as much information about the country and programme as possible.

A good organisation will assist by providing briefing sheets, including post-mission reports from previous volunteers.

Speak to someone who has recently returned from the same programme to discuss the nature of the work and get recommendations regarding personal clothing and equipment.

Read guide and travel books about the area you are going to. Remember, however, that areas and routes recommended before a conflict may not be safe or usable during and after a conflict.

Look at Internet sites, particularly those of reliable news services working in the country.

One delegate’s report is worth reiterating:

I was due to deploy with an NGO but read in *The Economist* that the place I was going was back in rebel hands. The organisation could not confirm this but did admit they were having difficulty contacting their people on the ground. I decided not to go.

Decide in advance what degree of personal risk you are prepared to accept.

Dealing with Families

There is a degree of risk of injury, illness or death in most worthwhile activities. Not all overseas missions are fraught with danger, but some are. You will have to judge for yourself how much to discuss with your partner and family, although for many a rational and realistic discussion is far more reassuring than leaving them wondering and filling in the blanks for themselves. Emphasise how much you will rely on them when you are away for moral support, mail and just knowing that matters at home have been left in capable hands.

Leave your partner/family/solicitor a list of:

- Contact names, addresses and telephone numbers for the employing organisation (both UK and overseas)
- Contact names, addresses and telephone numbers of your employer in case your plans change whilst you are in the country
- Bank details
- Passport number/photocopy of passport
- Travel plans/photocopy of travel documents
- Location of important documents (e.g. the car may need taxing in your absence; insurance premiums may need to be paid; General Medical Council (GMC) registration must be maintained)

Make a will and leave it with someone who will be notified in the event of your death. Give the employing NGO the contact details for this person.

Medical Preparation

A good organisation will assist with pre-deployment medical preparation. The independent worker should consider contacting specialist organisations such as Interhealth, the Travel Clinics run by Hospitals of Tropical Medicine, or those run by travel companies (see Resources section).

Here is a list of areas to consider:

- General health advice for the country or area you are travelling to.
- A dental check-up.
- Vaccinations and supporting certificates (remember: if a number of vaccinations are required, they may need several separate visits to the clinic).
- Yellow fever vaccination certificates are required at the port of entry in many African countries.
- Personal medical supplies (enough for the duration or until the next guaranteed resupply).
- Antimalarial precautions and chemoprophylaxis.
- Check that the medicines you are taking will be allowed into the country.

- Consider the purchase of a traveller's IV pack, which contains needles, syringes and IV cannulae: most countries will let you bring these in provided the seals on the packs are unbroken.

Possession of recreational drugs carries life imprisonment or the death penalty in many countries.

If you have a pre-existing medical condition (such as asthma, diabetes, or ischaemic heart disease), discuss this with the organisation or their medical service. It can be very difficult to manage even mild medical problems when working in the field. If your health deteriorates, you may put yourself and others at risk. Remember that the health service in a conflict area or developing country may be limited or non-existent.

Ask what arrangements the organisation has for medical treatment and evacuation (both in-country and for repatriation) and if pre-existing illness is covered.

Keep copies of the relevant policy documents and contact telephone numbers to hand.

Insurance

There are two main types of insurance – for yourself and for your personal effects. Again this should be provided by your employing agency, but find out. Check that the level of cover is suitable for your needs and that the type of work you are intending to do is covered.

Contact details for insurance and repatriation agencies are given in the Resources section.

Passport and Visas

Your passport must be up to date with at least 6 months to 1 year until expiry.

Visas and travel arrangements should be handled by the employing agency. Keep photocopies of the key pages of your passport in case it is lost or stolen as this helps the local embassy if a replacement is needed.

If you are travelling independently, remember it takes time and effort to get visas.

Special visa agencies can be employed to do the queuing and leg work.

Visas may be needed for transit countries, especially if you need to stay overnight before travelling onward.

Check the political situation regarding existing stamps and visas in your passport.

Once in-country, travel permits or local identity papers may be needed. Having extra (about 20) passport-size photographs with you speeds this up.

Travel Documents

Travel in the developing world and in conflict areas is subject to disruption and delay. Transit through isolated or dangerous areas is unpredictable. A competent NGO will plan your travel arrangements accordingly.

Check tickets when you receive them.

Check that accommodation is booked for overnight transits and stays.

Check that connecting arrangements are satisfactory and that there is adequate time between connections.

Ask if you are being met at the airport or other point of entry to the country and by whom.

Take photocopies of travel documents in case the originals are lost or stolen.

What Clothing and Equipment to Take?

Here is another quote from an experienced delegate:

In 1992 I set out for Afghanistan to provide medical support for the HALO trust, a mine-clearing charity. It was my first trip abroad in the "aid game." I was, however, confident I could look after myself in Afghanistan. Unfortunately when I arrived in Kabul airport my rucksack was still on the tarmac at Heathrow and still at Heathrow when I got back 3 months later. All I had was my hand luggage and duty-free. I learned never to put all my eggs in one basket, how few items you actually need to survive and the trading value of duty-free.

What to take depends on the type of job you are going to do, the duration, the likelihood of resupply, the quality of your living conditions, the security situation, the climate, access to communications, luggage allowances and whether or not you will have to carry everything around in-country on your back.

The organisation you are working for should brief you on these points. Travel light if possible. There is a 20-kg weight restriction on most aircraft, and you will probably want to bring souvenirs back, so leave space.

In most places, there will be shops (of some sort).

In most circumstances, you will get the chance to wash yourself and your clothes.

If you are not deploying with the military, DO NOT take clothing or rucksacks that look even vaguely military (particularly olive green, camouflage or with military insignia and patches) or you may be mistaken for a mercenary and killed.

Remember the local culture and customs where you are going and that revealing clothes may cause offence, particularly around religious sites.

Luggage

Luggage will get rough treatment by baggage handlers, by being dropped from vehicles and by being squashed under other loads or people.

Options include strong trunks, suitcases or rucksacks. A trunk is good for working in a static location, but take a suitcase or rucksack if lots of moves/carrying belongings are expected.

All should be lockable but easily opened by you for customs inspections and check-points. Rucksacks can be protected by lockable covers or metal meshes.

A small day sack is useful for hand baggage and day trips in-country.

Clothing

Additional clothing can usually be bought in-country if needed. Clothing needs to be practical, hard wearing, easily washed in a bucket and *non-military* in appearance. Several layers that can be put on/taken off according to the climate are practical.

Some suggestions are given herewith:

- *Boots*. Robust good-quality lightweight boots (broken in beforehand) that can be worn all day but are suitable for difficult terrain if necessary.
- *Training shoes*.
- Flip-flop-type *sandals*.
- *Trousers*. Lightweight walking or climbing trousers with lots of zipped pockets.
- *Thermal vests*. Silk or polypropylene.
- *T-shirts/cotton shirts*.
- *Shorts/tracksuit bottoms* (e.g. Ron Hill-type very hard wearing).
- Good-quality *fleece jacket* or (if very cold) down jacket.
- *Waterproof clothing* (depending on the area of work).
- *Sun hat*.
- *Sunglasses* (prescription ones are useful).
- Individual *mosquito net* (although most organisations set them up in the residences, the ones in hotels/transit areas may be full of holes).
- Some people use *ops waistcoats* with lots of pockets, but these can look military again.
- Surgical *scrub suit(s) and shoes* (if not supplied by the organisation).
- Coordinators/delegation heads may need a *jacket and tie* (or the *female equivalent*).

Personal Kit

This can make all the difference between comfort and misery. Remember that personal kit is just that – personal so it is your choice. Here are some suggestions:

- *Wash kit*. Soap/shampoo/shaving kit. Soap can be purchased/bartered for in most places.
- *Sleeping bag*. Depends on the quality of accommodation in-country.
- *Glasses*. Take spares and a copy of the prescription (and leave a copy of the prescription with family/partner).

- *Contact lenses.* Remember that working conditions may be unhygienic and dusty, and a new supply of contact lens fluids cannot be guaranteed.
- *Books/journals.* Check that these are not banned in the country of destination (some medical texts are). Books and journals are of two types – those specific to your task and those for leisure. In the Resources section, there is a list of medical books that contributors have found essential. The rule with paperbacks for leisure is take as many as you can, they can always be left in-country and if you don't read them someone else will.
- *Torch.* Take a high-power head torch. Power supplies are frequently erratic. A head torch can also be used to operate by when the theatre lights fail.
- *Radio.* Get a good-quality compact short-wave radio (cost around £70) that will pick up the BBC World Service.
- *Camera.* The use of cameras will depend on the organisation's rules and the security situation. For medical workers, photographs are the key to presenting your work on your return (and impressing the medical establishment so they will let you or a colleague do this work again in the future). Make sure that the camera is of sufficient quality. Remember the need to get consent to use clinical pictures.
- *Batteries.* May or may not be available in-country. Think of batteries for your camera(s), radio, personal audio equipment, torch (and laptop computer for the discerning/well-paid aid worker).
- *Personal stereo.* Great for delays/waits/periods of isolation/mentally recharging after a hard day.
- *Personal computer.* Good for data collection and e-mail (although modems are not permitted in some places), but risk damage or theft. Some electrical items are subject to import taxes in some destinations unless the original receipts can be produced. (Check with the employing agency.)
- *Dictation machine/tapes.* Good when compiling reports or making rapid comments when assessing the scene of a disaster or major incident.
- *Airmail paper/envelopes/address book.* Still important despite the e-mail dominance. Even if there is no local postal service, other expatriates will take letters out for you and post them when they get home.
- *Sewing kit.*
- *Nail clippers* (especially for surgeons).
- *Inflatable neck pillow.*
- *Swiss Army Knife/Leatherman* or equivalent.
- *Games.* Travel chess/backgammon/cards.
- *Gifts.* Tea/coffee/chocolate/cheese/processed meats/wine/recent video releases/recent newspapers. Any or all of these will start you off well with your new colleagues, but be aware of cultural sensitivities. Small gifts of sweets/pens and pencils/cigarettes may be useful en route.
- *Postcards/photographs* of your home area (if appropriate) to show local people how and where you live.
- *Money.* Travellers cheques in dollars or sterling can be exchanged in most major cities, although they have very limited use out in the field. The US dollar is

widely accepted (even in places hostile to America). Take small-denomination notes for taxis, tips and other expenses (see section on arriving). Most organisations will provide pocket money in local currency, and money spent as dollars/euro/sterling will usually get change. Take a credit card for emergencies (such as needing a night in a hotel if flights are delayed or cancelled). Do not carry all your money in the same wallet/pocket or bag.

- *Communications.* Find out in advance what communications facilities are like. If you are taking a mobile phone, check that the area concerned is served by your network. E-mail is rapidly becoming available even in the most austere locations. There is further discussion about this in the communications chapter (Chap. 26).

Packing

Lay all the kit out on your floor and prioritise it. Try packing the rucksack/case and see what will and what will not fit in.

Pack your pockets, bum bag and hand luggage with essentials (e.g. travel documents, passport, medical kit, essential books, camera, film).

Assume hold luggage may be delayed or at worst lost en route, so pack this with items that are desirable but not essential (at least for the first few days).

Arriving

Arriving and negotiating ports and airports can be a tedious and trying part of the mission. Here is a quote from experienced delegates:

I don't smoke but I buy cheap cigarettes at the airport as they are useful to give as presents. When you pack your rucksack leave a couple of packets on top of all the stuff. If you get searched at the other end the guard will often just pocket the fags and let you through without rummaging through your other stuff. (Ed C, medical aid worker.)

Individual organisations will have their own advice and policies for how they want their employees and representatives to negotiate their way through customs and immigration. Generally, this boils down to “just show your ID and explain who you are working for; they know us and you will have no problems”. Sometimes this works. Most state officially that you must not offer presents however hard the officials press you, but in practice may acknowledge privately that small-denomination dollar bills or cigarettes are an unofficial arrival and departure tax. If this is the case, do not be too generous as people coming through after you will get pestered all the more.

Ideally, the organisation should send someone to meet you, and it is a major bonus if they can meet you before customs and immigration with a translator to smooth your arrival.

It is valuable to question co-workers and returnees in detail about what to expect and what procedures need to be followed at your destination. Check with up-to-date travel guidebooks or Internet groups.

General Advice

- Always be polite and very patient. Do not rise to any provocation. Do not ignore official's questions. Answer clearly and precisely, backing what you say with documentation if available or necessary. Do not be over friendly, but do not appear cold and arrogant.
- Always be ready to have your property searched and have keys to cases readily available.
- Keep a vigilant eye on your property whilst you are waiting.
- Talk with your companions quietly and do not laugh loudly or shout to avoid drawing unnecessary attention to yourselves.
- As soon as possible make contact with your organisation's local representative.
- Check that nothing is missing from your luggage before you move on to your accommodation.

Coming Home

If you take mail out for your friends when you leave your mission, it is a *sacred duty* to post it as soon as possible. It is also helpful to ring the relatives of your friends to let them know everything is OK.

Do not take mail out for strangers or carry packages when you do not know what they contain.

The return home from an overseas mission can be traumatic for some volunteers. Initial euphoria on being reunited with family and friends often gives way to a feeling of mild depression and a desire to return to the overseas project. Having a job to come back to undoubtedly helps in this regard, enabling the individual to refocus their efforts on new tasks and challenges. However, there is the potential for psychiatric morbidity among returned volunteers. Adjusting to coming home may be aided by a debriefing process organised by the employing agency. MSF has the psychological support (PS) network under which returned volunteers are contacted by a member of the network (who has previous field experience) so that emotions and concerns can be discussed confidentially with someone who has insight into the types of situations that have been encountered. Note that the British Red Cross runs "Homecoming Seminars".

In the first part of this chapter, the question of combining aid work with career progression was considered. Presenting clinical cases and a summary of your experiences to colleagues on your return to the UK helps make this work acceptable to the medical establishment and may even inspire others to undertake something similar.

A small proportion of returnees go on to pursue careers in the field of international health care. Whilst no defined career path exists, this may involve further missions with the same or other non-governmental organisations, progressing to become a location manager or country project manager, working in a head office and maybe obtaining a paid position with a governmental or international organisation [7].

Conclusions

International medical humanitarian aid work has the potential to be very challenging and professionally rewarding. Very few of those who engage in such projects regret doing so, and there is increasing recognition of the potential benefits of having undertaken such work to one's First World medical practice [8].

The degree of experience and qualifications needed to participate in these programmes is increasing.

It is difficult to integrate this work with standard medical employment and career progression, but with determination and single-mindedness it can be achieved.

Overseas work has its downside. It can be very hard work, living conditions are Spartan and there may be risks to personal health and security.

The chance to make a real difference in a challenging environment is very worthwhile.

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Chapter 21

Getting There and Being Involved: Team Building and Maintenance

Kenneth I. Roberts

Abstract The provision of effective medical care to conflicts and catastrophes is essentially a team effort, since no single individual can provide all of the skills involved. As will be discussed, although true teams can be a very efficient type of group, they can be relatively delicate, especially during the early stages of their formation and require nurturing and maintenance. This is important, given that teams for this type of work are frequently formed at relatively short notice.

Keywords Motivation • Preparation • Team building and maintenance

Objective

- To discuss the principles of team building and maintenance

Introduction

The provision of effective medical care to conflicts and catastrophes is essentially a team effort, since no single individual can provide all of the skills involved. As will be discussed, although true teams can be a very efficient type of group, they can be relatively delicate, especially during the early stages of their formation and require nurturing and maintenance. This is important, given that teams for this type of work are frequently formed at relatively short notice.

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Teams and Groups

A *team* is essentially a *group* of willing and trained individuals who are:

- United around a common goal
- Dependent upon each other to achieve that goal
- Structured to work together
- Empowered to implement decisions
- Sharing responsibility for their task

The team itself is important, since (in addition to providing an appropriate mix of skills):

- It meets the psychosocial needs of its members and, once formed, can be relatively self-sustaining and satisfying.
- It provides mutual support to its members.
- It enables division of tasks amongst its members.
- It can produce originality.

Groups are characterised by an evolutionary life cycle, which must be understood if they are to deliver their task effectively without damaging their members. The stages of group evolution are summarised in Table 21.1.

Team Building

The potential risk in the evolution of the team (and the time taken for the team to form) can be reduced by a number of considerations.

Table 21.1 Life cycle of groups

Stage	Characteristics	Outputs
Forming	Shyness, uncertainty, tentativeness	Little visible output Members are attempting to orientate themselves within the group
Storming	More open, complaining, criticising, disagreeing, questioning of goals	Little visible output Members are confronting others within the group
Norming	Resolution of internal conflicts, division of responsibilities within group being resolved, emergence of group norms	Little visible output Nature of the group beginning to emerge
Performing	Collaboration, commitment, self-regulation	Group productivity increases. Group has evolved into a <i>team</i>
Dissolving	Sense of loss and lack of worth	When tight-knit groups/teams dissolve Little visible output

Team Selection

Procedures must be put into place to ensure that the appropriate individuals are selected for the team. Although, clearly, this will be on the basis of the skills required, this should not be the only criterion. It is important that team players with an enthusiasm for the task are chosen, and any selection procedure must take this and any health considerations into account.

Team Building

Teams must have mutually agreed ground rules if they are to thrive and be effective. These should include:

- The recognition of equal respect for all members
- The recognition and acceptance of differences between individuals (whether that be on the basis of gender, religion or ethnicity)
- The absolute intolerance of non-team behaviour, such as dishonesty and inappropriate sexual behaviour

Further, everyone needs to understand and accept procedures within the team for emergencies and for the reporting of perceived grievances and difficulties.

Team Training

The team needs to be confident in its individual and collective competence, and this can be nurtured by appropriate training. This should not merely involve ensuring that individuals' professional skills are kept up to date, but should also include basic survival techniques such as safety, personal and collective hygiene drills and defensive driving. Training in the correct use of protective equipment and communications systems is vital, and a degree of cross-training between team members can be useful.

Team Maintenance

It is important that all members of the team are aware of its mission, goals and what outputs it should be achieving. Everyone needs to be aware of their contribution to the overall effort and what their responsibilities are. The team can be further maintained by a fair division of tasks (i.e. everyone does some of the seemingly menial chores, irrespective of who they are). Regular progress discussions ("what have we done today?" "What went right?" "What went wrong?" "What will we do

tomorrow?") are useful, provided they are conducted in a non-confrontational way. A good idea is to structure these around communal meal times, when everyone can relax somewhat. The morale and cohesion of the team will also be enhanced by attention to administrative issues such as the provision of contact with home (by mail or telecommunications). Leadership (not necessarily in the traditional hierarchical sense) is an important "glue" for any team, although these aspects would be the subject of a separate book!

Dissolving Teams

It is important to reduce the stress of the grieving process by dissolving teams sensitively. Members should be encouraged to celebrate the team's achievements and to keep in touch after the team has dissolved.

Further Reading

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Chapter 22

Safety and Security: Staying Safe and Effective-In a Humanitarian Context (Or as Safe as Is Reasonably Possible when You Know You Should Have Stayed at Home!)

Garry M. Vardon-Smith

Abstract Without doubt, this is one area where you will never and can never stop learning. The uniqueness of each humanitarian disaster or mission means that you will need new processes and plans to overcome the problems you encounter. That said, underlying principles and procedures can be applied provided you adopt a principle of constant checking, refocusing and reorientating yourself and your decisions. Little external formal training can adequately prepare you for this, and most develop their skills through experience with NGOs and/or official government, military or other humanitarian organisations. Some professional companies do provide suitable (although expensive) training, and checking with your parent organisation and experienced professionals and colleagues will help you identify the best products for your money.

Keywords Safety • Security • Personal and Organizational • Checkpoints • Roadblocks • Hostage Taking • Ambush • Ballistic Protection • Individual protection • Housing protection • Vehicle protection • Mines • Health Risk Management

This chapter contains contributions from various experienced workers in the field dealing with personal and collective safety and security. To retain the unique and personal messages from these highly experienced authors, no attempt has been made by the editors to impose a uniform style.

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Objectives

To get a feel for:

- Personal and organisational safety
- Driving and getting about safely
- Checkpoints and road blocks
- Local corruption
- Hostage taking and ambush

Personal and Organisational Safety

This is a huge topic that can only be hinted at here and will be mentioned elsewhere in the book under various headings, but one key message is that it is often briefed but rarely practised. It is important that you see your education in personal safety as an ongoing feast with many flavours and regional differences. Like all types of education, it will also never end, you will never be expert enough, there will always be gaps and to remain proficient requires practice and reflection, there are also a few good books on the subject, and developing an all-round knowledge of survival skills will help your confidence in staying alive, even if no-one is trying to kill you.

Your organisation shares responsibility for your safety and should ideally run “Hostile Environment Training” for you before you deploy; failing that, many private security companies offer bespoke training in exactly this topic. Make sure that it is contextually relevant for your circumstances and that the bona fides of the company are verifiable and it has a proven reputation.

Your organisation also needs to take your health and safety seriously as well; do they have a response mechanism that works 24/7, or failing having their own, do they have security and evacuation insurance policies that provide for an emergency single point of contact for rescue or medical repatriation?

The travel insurance/security market is flooded with either “also-rans” or hugely expensive “pay-as-you-go” schemes; neither makes any sense; get an insured product with a major provider and check out their capabilities before you go, and make sure you have their number memorised as well as in your mobile.

Should your organisation “gloss over” its capabilities to get you back or “medically treat you” under any emergency or even “normal” circumstances, be very careful that they actually understand their duty of care towards you; if they don’t, then leave immediately. Duty of care means that the workplace laws that keep your workplace or factory safe in the UK or USA still apply when you are deployed to foreign lands; they can’t just pay you more or expect you to get on with it. Expect to be told about risk assessments, mitigation procedures and health and medical procedures for each location, any vulnerable movement and for daily briefings. Anything less than this suggests that they haven’t thought things through or are being cheap, both are a recipe for disaster in any emergency or humanitarian context.

You also need to listen to your own advice; a colleague reported attending a briefing about working in the former Soviet Union, it included a warning about being met at the airport by a luxury limousine, this pleasing occurrence concludes with the hapless aid worker being abandoned shortly after, stripped of all valuables and clothing, the “limousine” being a cover for a kidnap gang. Sometime later the speaker himself fell victim to this ploy, fortunately only to his eternal embarrassment! I reminded my colleague of the old proverb that if it looks too good to be true, it probably is! Any experienced aid worker or even military or civilian specialist that have deployed would know that that a luxury limousine ride only ever happens to the chairman or the general, never to the workers! However, the arrival, meet and greet and travel to/from the airport can often be the most dangerous and harrowing part of your journey but is often ignored, or accepted casually, it shouldn't. I do not recommend taking taxis from or to any ports, the risk of being compromised is too great and unless highly experienced (with language skills) you are likely to be caught completely unawares. I always recommend that a local driver or security professional, already being used by the company or NGO, is used to collect and drop off from airports, at the very least a driver from the hotel is much preferred over an unknown taxi driver. Carrying out some form of contact recognition drill is also recommended. Ideally the traveller should have a picture and name of their escort, have a codeword to share and an agreed location to meet and at all costs avoid being the only westerner arriving and having your name in English or the company name in English emblazoned on a card by your escort. Agree to a symbol or other sign that you will instantly recognise and won't be confused locally.

From the outset it is also worth emphasising that personal guarantees from local leaders, movers and shakers and religious leaders aren't worth the paper they are written on; never rely on them or acknowledge them. You may have to identify a deflection tactic or strategy to defend your “no go” rule; I invented all sort of rules and protocols, and this ruse works fine. If you choose to ignore this key fact, don't bother reading the rest of the book, put your affairs in order, and don't worry about that credit card bill, because you're not coming back!

Secondly, there are places in your home town—wherever that may be—where you wouldn't go at night and would think twice about during the day. Where you are about to deploy is no different and most likely far worse; it is your duty to find out where these areas are and never ever go there. If you do, then you deserve the fate that may well await you and no-one should be endangered to recover your arrogant or naive carcass. That may offend some of you; if it does, I'm glad because it may cause you to stop or reflect for a brief second before you commit to a course of action that will embarrass your organisation and your family or endanger your life unnecessarily. Simply by deploying you have raised the risks and threats to your health anyway, so remember those first 2 weeks where you flinched at every noise and your eyeballs resembled those of a referee at a ping pong (table tennis) game, and never forget them; ideally keep a diary and reread the first 2 weeks whenever you feel safe and or comfortable!

Clothing

As a basic rule don't wear ex-military fatigues, don't look like a mercenary or Indiana Jones, and don't show more flesh than is culturally acceptable, and this may include bare legs for the guys, as well as the more often exposed "female" flesh. As a good contingency have extra "discrete" clothing for all travellers including head coverings; being able to cover up quickly may placate an angry guard or militiaman and save further grief. When you are off duty, the same rules apply; it can be very offensive to have sunbathing partying aid workers when locals and their relatives may still be recovering their dead or looking for their next meal!

Sunburn and insect-borne disease can also be substantially mitigated by proper clothing; no-one has the excuse that they couldn't foresee the weather (unless you are in the UK or Seattle). The Internet is full of country guides that can give you a good indication of sunburn and disease and many other threats. I would recommend a top quality mosquito and bug spray or wipes that you can tolerate directly on your skin, so try before you fly and bring enough of it with you for your trip.

Footwear is often overlooked and it is important that you have at least one pair (I recommend two) of well broken in but substantial, comfortable walking boots or shoes, spare laces and the special rubber glue that will allow you to stick the sole back on when the stitching disintegrates in the heat. I have a colleague who spent days walking around Iraq in an expensive pair of shoes with the sole flapping front and rear like coco the clown. I made much of it at his expense, but realistically, he was severely hampered in his mobility until he could locate the "glue". "Ladies, yes you" also have a tendency to wear shoes that are fashionable rather than practical and often minimalist in sole and support. A deployment is the last place you want to exercise your favourite designer shoes or anything with a heel, so go comfortable, go flat and have something that laces up with socks—you never know when a 5 mile hike might turn up, and generally it's always better to wear something on your feet than nothing at all.

Camp Safety

Where you are billeted or based should be within a "safe" zone or encampment; if it isn't, ask difficult questions of your senior staff members or of your parent organisation. It may not resemble a 4-star hotel but basic sanitation, water and physical security are some minimums that will allow you to carry out your task more easily. Continually looking over your shoulder or waking scared at night every night will have a disabling effect on your capacity to help others and ultimately will defeat the objectives of your mission. It may be good practice locally to share security facilities with other aid organisations, but do be careful about having the local military or militia providing security or being too close, unless they are seen as a supportive agency within the cultural context in which you are operating.

I think it is also important that your organisation gives you some expectations of what sort of accommodation you can expect: if you will mainly be under canvas, then you should consider a mosquito net—also good for spiders and beetles—and a lightweight sleeping bag designed for the temperatures you will encounter and warm enough to compensate for whether you sleep cold or hot. I personally sleep very cold and am comfortable in a bag at least 1 season warmer than normal. I also carry a silk or fine cotton liner; this can be used as sheets in an overnight stay in a bed of unknown provenance, alone as a very lightweight bag and inside the sleeping bag to keep it cleaner and warmer. The liner makes it much easier to keep a bag sanitary as you can wash the liner easily, sleeping bags not so much. I always carry several small zipped bags to carry my gear in plus stuff sacks and compression bags. In a hotel or villa, it's convenient and when camping imperative to keep your gear clean and safe.

I must admit to a small fetish, and that is lighting. I always carry a (two actually) top quality small LED flashlight and several changes of batteries and a head torch; manoeuvring around the camp at night or in portaloos (portable toilets) is much easier with two hands and realistically without light you can do very little; even putting on shoes may be difficult and finding all your kit impossible without good quality lighting.

Information Security

I am inherently suspicious. It may well be in your interests to be the same; all too often sensitive information is left lying around or pinned on noticeboards in plain view. I would recommend in-country that you maintain a “security” office and that all personal information, plans, maps and codewords are protected by lock and key. I will discuss more under the driving section but travelling is your most vulnerable time in mission and often when you will be at your most complacent. Airports are key areas where you will be vulnerable for compromise and most obvious as a new arrival. Details and arrangements for your transport need to be kept secure. If you have been given arrangements, stick to them, have keywords and codewords by which you can identify your proper arrangements, or best of all arrange to be met by an experienced colleague who is already “in-country” and “acclimatised” to the security situation. The “other side” “does intelligence” just as well as we do and, locally, better!

Organisationally I am regularly disappointed to see sensitive travel information to “difficult” countries or villa locations broadcast on the corporate websites or in CEO's presentations and reports. Responsibility for InfoSec and CommSec does not solely rest with the field office; home offices and Chiefs of Party have a responsibility to treat travel patterns and locations with equal security, and you need to remind your PR people that men and women may be placed in jeopardy for a quick sound bite or inch of print. If you see it happening, report it and stop it immediately.

Food

Traditionally western travellers take many of their culinary customs with them wherever they travel! It may be useful if you at least attempt to explore aspects of the local cuisine before you fly, and if you have any “sensitivities”, then you should try and overcome them or identify strategies that may help. If you have food intolerances or allergies, then you should consider whether you will be able to manage them whilst away or you should defer going. I always travel with a lot of curry powder, Oxo/Bovril, bouillon cubes and decent tea bags just in case they will be all I recognise at dinner! Remember the rule about peeled, boiled or sterilised fruit and vegetables, no ice in your drinks, and make sure you use sterilised water for all cooking and washing of food. I also recommend keeping to a fairly bland diet of meat and veggies until your system can adjust to the different foods.

Always take responsibility for food hygiene personally until such times as you are satisfied that it can be safely delegated, ideally under a western-trained cook! This can also include where you eat; human excrement is often used to “fertilise” crops or allowed to dry in the sun; that “dust” that is often blowing around may not be sand, so don’t leave your food out or eat outdoors!! Get into the habit of always washing your hands and face before a meal, before using the bathroom and afterwards. It also helps if you don’t bite your nails anymore and consider, especially in airports, what and who may have previously touched that surface you have just touched with your hands!

Weapons

Even basic culinary items can cause you problems: (a) getting them out of your own country by plane and (b) importing them into your place of operations. So in short don’t bring them; a small pocket knife may be permissible but be guided by your deploying organisation. Most organisations will insist on a full inventory of equipment carried both operationally and personally; this will include personal medical kits.

Some equipment, medicines, etc. will require letters of authority to travel or enter your destination from the host nation or at least your sponsoring NGO. You may well end up being arrested at the entry port if you don’t comply with this requirement or even if you do, so my advice is don’t take anything expensive or personal that you won’t mind disappearing! Most incidental things can still be bought locally even in the most difficult of circumstances, and you will be contributing hard currency to the local economy.

Don’t carry weapons for personal protection; be guided by your local security officer on this, but if you personally need to be armed to do your mission or think you do, you are on the wrong mission, the mission is badly prepared, or you are in the wrong frame of mind.

Fraternisation

Always sticky. You will all be aware of stories or colleagues who have arrived home with (a) a partner or (b) a child or (c) both, or in anxious anticipation of the latter! This is of course a personal choice but one that will inevitably involve much heart-ache, form filling and problems back home. At a professional level, it may even cause severe problems for your mission and NGO. Internationally several NGOs have faced severe criticism of staff who have committed criminal acts including rape, acts that would be considered child abuse, encouraged prostitution and spread sexual diseases. From a perspective of reputational management, all of these acts are gross misconduct of the highest order and should result in your instant removal from any mission and preferably prosecution. However, true love does blossom in the most obscure and trying of circumstances; if this is the case, then absolute transparency and honesty are required both with your supervisors and with local leaders and officials. My advice would be to try and avoid any compromise of your integrity or impartiality at all costs, avoid the risk of innuendo about any such liaisons and concentrate on the mission! Bring a good book and exercise!

Health and Mental Health

This will be dealt with more completely elsewhere in this book, but every mission requires a medical component and this ought to include staff experienced in counselling, critical incident management and debriefing. You cannot complete your mission if you are too involved in your own issues, psychologically troubled by what you encounter or what you bring with you. If your psychological health isn't as robust as your physical health, don't go; send money or provide support back at home base, as a nervous breakdown is unpleasant wherever you are; in a disaster or aid mission, it may well be life-threatening and incredibly disruptive for your colleagues.

Most travellers fear kidnap and terrorism as their biggest threat; however, it is extremely unlikely or just unlikely, depending where you are, that this will happen to you. You are most likely to be killed by a vehicle or in a transportation accident, murdered, fall ill or drown (US DoS 9/24/11). That apart, a large proportion of travellers are taken ill, some seriously, and it is essential that your organisation has considered this, and either has the independent means or substantial travel accident insurance to cover medical costs when you are deployed for: medical evacuation, repatriation of remains and ideally emergency evacuation separate from an Embassy-based evacuation order (should the country start to descend into chaos with you in it). It is also recommended that you check that any insurances or assurances remain valid during the period of your deployment as some may have exclusions that reduce or decline to pay out for war or insurrection, or even for foreign travel.

It is important to be fit before you travel and to stay fit whilst deployed; extremes of temperature, altitude and weather can all affect your fitness and contribute to your succumbing to a foreign disease or illness. Basic hygiene regimes, multivitamins and good clean fluid intake are essential when travelling and will make your travel much more comfortable. Sleep is also very important so always include an eye shield, ear plugs and anything else that you need to sleep whilst away from home.

Driving and Getting About Safely

If there is any activity guaranteed to bring conflict, it is driving; just imagine the familial arguments that occur on a road trip, the logistic nightmares of toileting, fuel and feeding, forgetting for the moment the possibility of mechanical breakdown of your vehicle (or mental breakdown of the driver). If you take these daily demands that at home we take for granted and then apply them to the rigours and inherent dangers of driving in a humanitarian, NGO or disaster relief context, then the problems multiply exponentially.

In order to approach this huge subject in a fashion that will hopefully make for an easier read, I have broken it down into several key areas. Like any topic, each has a subjective element that requires the reader to put themselves in the position of the “reasonable man” or “woman”; however, “gender” does add an additional and significant dimension that we will look at later in this chapter.

Drivers

One way that many NGOs get around a lot of the difficulties of driving in a foreign climate is the use of local drivers. This is often a useful way of circumventing some problems, but it can create many more. A simple list of “positives” seems to highlight the benefits:

- Local knowledge of roads
- Local knowledge of customs
- Local maintenance/provision of vehicles
- Local language speaker

These positives can easily be seen as negatives:

- Overenthusiastic driving, eagerness to “show off”.
- Local knowledge of whose customs? What about other tribes, ethnic/religious groups, are you dealing with a “westernised” individual that may not be popular locally?
- Risks for corruption in maintenance or poor standards of safety.
- Do you know what your driver is telling everyone about your habits safety and security?

Plus:

- How much are you paying him (yes, it's likely to be a him)? Will this make him popular or a target for the huddled masses?
- How much do you really know about his alliances and allegiances?
- How much do you really know about his habits: drink, drugs and weapons?

If you do use a local driver, it is highly recommended that you establish their credentials, provenance and career history at least as much as those you put your trust in for your compound or camp security. As when you leave your safe location, your very lives and those that you intend to care for will be in the hands of your driver.

Now there are places in the world where under no circumstances should you drive; if you have any form of armed security, then don't; you need a local driver and close protection officer, listen to their briefings, and do as you're told. Also carry your own bags; that isn't why they are there!

So do you drive yourself? Well, that's a decision that you may have to make and should make in consultation with the Local Emergency Management Agency if one exists or representatives of the local government. You will be less tempted to wander off, you will stick to the highways and better known areas and you won't be tempted to drive recklessly through unfamiliar locations. Also the provision as an absolute must of a high quality GPS system means that you will never actually be lost; you may just not know where you are in relation to where you have been or want to go!

Of course, driving yourself means that you may be ignorant of local customs and the language. These can often be overcome by taking a translator with you or "terp" (short for interpreter). The benefits of having someone who can speak your language and the local at least main dialect cannot be over emphasised; it is also likely that the provenance of the "terp" will be easier to establish, they may well have worked with agencies such as yours before and you will probably have or be spending a significant amount of time in their company to get to know them. Now, often many "terps" are women, and this does need to be judged locally with some circumspection; it is unfortunate but a harsh reality that the status of women throughout the world is "different" than that in the west, and although locally well educated, they may be less well connected or respected, dependent on the local culture! Well, if you're reading this book and keen on providing humanitarian assistance, you can obviously "cope" with the complexities of such a mission or are with colleagues who can and no-one ever said it would be easy.

So let's just assume that you have identified a good local interpreter or driver interpreter that you believe you can trust. You have sat them down and explained how you would like them to behave, not driving recklessly, not taking risky short cuts and not "showing off" the "financial" benefits of working with an aid agency or group, established that your whereabouts, routes and equipment are not to be divulged nor discussed with his friends or posted on noticeboards. What else do you need to do?

Well, here's a not exhaustive list of additional requirements:

Vehicles

The vehicles, notice I said vehicles: you should never, never travel in a sole vehicle, a minimum of two is required at all times with backup support available. The vehicle must be suitable for the terrain and weather. An open top car may be fine for the city road, but on a cold night, lost, off-road, it will be much less appealing than a sturdy covered 4×4.

Vehicle Equipment

This depends on the terrain but must include water and food for at least twice as long as the worst-case scenario you have envisaged for your trip, extra fuel, spare tyres and wheels, jacks and self-recovery equipment, bedding, clothing, basic mechanical consumables, lights, bulbs, oil, coolant, emergency repair kits for radiators, oil coolers, brakes, tools, hammers jimmys and more. If you have excellent recovery plans and capabilities, you may be able to cut some of these down; however, your life may depend on it being there when you need it.

Vehicle Servicing

If possible, have this supervised by a member of your group with the mechanical knowledge to do so; corners are often cut in remote climes, and the provenance of genuine parts will be suspect. As a minimum, brakes, tyres, fuel, coolant and radiators, all fluids, steering and suspension mountings, gearbox and drive shafts should be checked before each journey.

Vehicle History and Colour

It is pretty much standard practice to try and avoid travelling in anything that was, is or looks like it was a military vehicle unless you absolutely have no other option, or the local environment and culture would accept and not take a dim view of this type of travel. There may be a well-established Emergency Management Agency that has its origins in the military (International Civil Defence Organisation), or it may be a military-led humanitarian operation where the military are not seen as internal oppressors. Either way, check and recheck, and if in any doubt, then don't do it.

Radios (and GPS)

As a minimum, handhelds (plus extra batteries) that are effective for the distance you will be travelling from your base of operations are my recommendation and preference, along with vehicle-mounted antennas and radios, plus handhelds and a satellite phone. It's pointless knowing where you are if you can't tell anyone about it! An often overlooked point here is that although ex-military and police personnel may be familiar with radios, it is absolutely necessary that all staff know how to use all the radios and technical equipment on the vehicles, plus call signs and emergency contact numbers.

Regular radio drills and practice are necessary to allow your staff to be comfortable with radio communication, including "discrete" communication and brevity; you never know who is listening nor why.

Driving

In the developed world (for the most part), we have such niceties as driving licences, speed limits, vehicle safety testing, road signs, good roads and "highway codes". In the humanitarian context, never assume that any of these are present. In fact driving may be the most dangerous part of your mission other than flying in old soviet era helicopters and aircraft!

Consequently unlike at home you should consider each journey as a mission and should not undertake journeys lightly. Each trip should be properly planned, with contingency plans, written and established, resources and permissions obtained and all equipment tested. Ideally, an advance party of trusted locals in radio contact should go down your route first; in radio contact they can spot trouble before you get to it and identify road hazards, checkpoints and the "temperature" of local feeling towards outsiders.

On one deployment, I was asked if all this was really necessary as some NGOs may not be able to deploy such resources and take such precautions; this was during a discussion with nearly 20 different NGOs, none of whom had any response plan for kidnapping of their staff in a country renowned for kidnapping/hostage taking. I stated that I believed that it was, and if an NGO or organisation is incapable of such basic preparations, they should not be "in theatre" at all! This advice still stands!

You should obey all speed limits and drive courteously and defensively; if in convoy, you should drive at the pace of the slowest vehicle and on difficult terrain take regular breaks. Off-road driving is inherently dangerous and slow! Never assume a quick turnaround or journey. Often you will be confronted by oncoming heavier, faster moving vehicles on narrow roads, the driver needs their wits about them and needs to be well rested; you do not want someone who has just worked a double shift or is holding down three jobs in that position. They also need to "know"

their vehicle and be comfortable and competent with all the controls, obvious but often overlooked criteria in an era of automatic gears!

The Route

This should not be announced beforehand, and details of your journey should be part of your information security plan. If you make the journey regularly, you should vary the route if possible, definitely vary the timings and preferably restrict your visits to make interception more difficult. In most countries where you can envisage being deployed, you as a westerner will be seen as a potential hostage and opportunity for acquisitive crime. Your religious, humanitarian or other status is unlikely to provide any protection from theft or kidnap or possibly worse!

Driving Companions

You will most likely be some distance from the civilised niceties such as a Police force you can trust, ambulances and major trauma centres, fire brigades, main dealerships for your vehicle, radio technicians, cooks and diplomats. Consequently, unless you have a superb support network, your team, yes team, not just you and your driver/interpreter, will need to have these skills when you travel. Plus, all of you will need to understand how the vehicle equipment works for breakdown and self-recovery. As a basic minimum, everyone should also be first aid trained to a fairly high standard for high-risk situations; have some knowledge of fire fighting, basic vehicle mechanics and how to use a radio, GPS, satellite phone, etc.; and be able to explain the humanitarian aspects of their mission whilst remaining calm, impassive and culturally tolerant during what will probably be “trying” circumstances.

Mines and IEDs

Knowledge and awareness of unexploded ordinance and weapons that might be present are also to be highly recommended as unless you are in a disaster area of natural occurrence, humanitarian need is often accompanied by civil war, insurrection, criminal/military gangs or warlords or fierce intertribal conflict. At least knowing what a mine looks like may stop you driving over one or picking it up!

Never be the first to use a road that “was” mined and never kick/run over cans or boxes or anything else in the road. If there is a significant threat on your route, I suggest you (a) shouldn’t be on it and (b) you need to review your security arrangements. If the threat is active and directed at westerners, then peacemaking is probably still ongoing and humanitarian aid efforts will be severely hampered; make contact discreetly with Western forces and seek their advice and intelligence. They will welcome this and normally be able to provide some form of reassurance by way

of points of contact or even some form of QRF (quick reaction force) or route assessments.

Departure

Before leaving your base of operations and in addition to everything already discussed, you must search the vehicles. Now this may sound crazy but unless you do search the vehicle yourself you don't know what any further checks by others may find! Examples of "stuff" to ensure you leave behind include:

- *Alcohol*: not just a no-no in Islamic countries, but you don't want to get lured into providing it to locals, local cops or militia or drink it yourself when on a mission.
- *Pornography*: that western magazine that you can buy in the airport may be considered pornography or at least insensitive if not illegal where you are, remove it.
- *Weapons*: if you are unarmed by charter, it will only damage your reputation if not your chance of survival; if you have a weapons cache in your vehicle, you will also need to search your driver/interpreter other locals before they travel with you for similar items.
- *Drugs*: Now you may think your national drug policy to be flawed and an affront to your personal choice; however, you risk death and imprisonment for life if you are in possession of prohibited drugs let alone drugs that you may have in your medical inventory. It is necessary to have a full checklist of authorised drugs in your possession including medicines for every trip; again don't forget to search your locals travelling with you.
- *Contraband*: now that local artefact may be a bargain, but it may also be stolen, or prohibited for sale for export, or be made from a protected species of any genus. Save your souvenir hunting for the airport on your way home, and remember that it may be legal to export but illegal for you to import it to your home country.

Also check any tapes, CDs or laptops you have with you in the vehicles for banned music, pornography, political comments especially local politics, compromising photos of yourself or team with political figures, opposition members, certain tribes or leaders of warring religious/military factions, pictures of military installations, airports, military equipment or poses of you with weapons. At gunpoint, you have no rights to privacy, any of the amendments to the US constitution, nor a phone call!

Checkpoints and Road Blocks

If you don't think you will encounter these, then you are most likely ill-prepared; Western aid groups are viewed as easy targets for almost any group to harass, steal from or take hostage if they choose to and one of the most popular opportunities to

do any of the acts presents itself at the checkpoint. If your planning is good, you will be aware via your local contacts where the official checkpoints are and what cultural niceties you will have to observe to pass through unmolested. If there is law and order and a system of legitimate government, then the roadblocks may hold little fear for you; however, they are opportunities for disaster to strike the unwary, and false or compromised checkpoints are often used by criminal groups and opposing factions to impose control or the appearance of legitimacy of their actions. It is always good policy to approach checkpoints slowly and deliberately; if you have the opportunity to avoid them, take it, providing you know where you are going and what lies ahead. Communicate quickly and discreetly the facts and location of the checkpoint to your remaining convoy members, your control base, any escort or security detail by radio (radios can often look like weapons so do not put them on view but do so out of sight), lock your doors and roll up your windows and smile. Have your flag or aid group identification and passes ready to hand and possibly even hold them up to the windscreen so they can be seen, stop when you are told to do so. If you are unarmed and unarmoured, you will have no success in “running” a well-prepared checkpoint. If the circumstances are believed to be a cover for a kidnapping, it may be better to stop short and attempt to “bug out” the way you came. This contingency should have been discussed and planned for with the remainder of your team long before this eventuality happens as part of your contingency planning processes. However, a well-placed checkpoint will make this potentially difficult to achieve.

If you can avoid opening or unlocking windows and doors, do so; try and communicate through the glass or at the most a crack. If ordered at gunpoint to get out, you will have no choice but to cooperate, and this is where having a team leader will become a necessity. The tendency to panic must be overcome, most illegal checkpoints and some legal ones will be an opportunity for the locals to assert their influence and independence, and some may resent your intrusion and interference in “sovereign” issues. Now is not the time to hold a political dialogue; you are most likely “a stranger in a strange land” and your sole thoughts should be achieving your humanitarian mission safely and espousing that exactly and clearly to your would be tormentors. Seeing that they can exert influence and control over the “interlopers” who are cooperative and nonthreatening may be enough for the checkpoint to let you go as they have achieved “satisfaction”.

If they insist in searching your vehicle, you will have been glad that you have done so before them, but you must still accompany the searcher or at least one of you will need to, in order to avoid anything being planted and to reduce the likelihood that something will be stolen during the search.

The Legitimate Checkpoint

This may be your first taste of this, but it is likely that “sweeteners” have been employed before you even arrived in-country, at immigration control and locally to

set up your base. However, you will need to establish the local pecking order of politicians, guards, commanders and the “police”. You do not want to waste your “friendship” on someone with little or no influence over you or your ability to roam freely. So everyone bring your “duty-free” cigarette allowance to the next crisis you attend, and make sure you have plenty of cigarettes on board your vehicle.

Local Corruption

Bribes

It is almost a universal policy among all humanitarian agencies to prohibit the giving of bribes by its staff. It is also probably true to say that most aid staff provides “bribes” one way or another when deployed. The simple reason for this is that there is often no other way around it. In many parts of the world, this is just such a common practice that to deny it would fly in the face of the realities you will encounter. So compromise your moral and professional horror up front and get used to the idea of a little “sweetener” being part of your daily business. Thankfully in the main, this will revolve around cigarettes, especially the most famous American brands; a few cigarettes will often be all that’s needed to smooth your way and “make friends”.

Of course “bribing” a local official is probably illegal and may cause even more of a problem for you so it is highly desirable to have done your homework beforehand about what you can and shouldn’t do, what other “influencing” strategies you might be able to employ and to always start out “innocently” with cigarettes and don’t pay too much too quickly. If you flash a lot of cash the price will go up, you will get stopped more often and you may make the problem worse for those who come after you.

Money

Unfortunately there are times when you may need more than a cigarette break with a local to “overcome” some perceived slight or cultural faux pas you or your team have committed. Then I’m afraid you will need money, money already broken up and strategically placed so you know how much is where and which pocket to go to under what circumstances. Each member of the team will need to be aware and understanding of what the team leader will be trying to achieve. During negotiations for your safe passage is not the time to engage the locals in an argument about the benefits of anti-corruption measures in local government and freedom of speech for oppressed minorities.

The amount will vary, but you should have an awareness of a day’s pay for a “police” officer or soldier, a day’s pay for a local commander, a week’s pay for more difficult encounters and everything you have when you may be paying for your lives.

The circumstances when a bribe is or becomes payable will differ; however, one thing is universal: never ever call it a bribe; you may want to make amends for causing offence, you may want to make a contribution to a useful charity or project that the target of your affections may be interested in, you might want to contribute something for the feeding of the “group” as you have delayed them from going home by making them hold you up at gun point and they will have missed out on a meal, etc. The target will need to be the “man in charge” not an underling, you will need to do this out of earshot of the underlings and in such a way that you both know it is a bribe without ever saying so. The cigarette packet is also a useful prop in delivering the bribe discretely.

If your lives are threatened, you will need to have planned beforehand with one speaker, with access to all the money and the wit to lie, negotiate and ignore any personal issues with helping a military unit, militia or torture gang; compromising your values against having one of your team being killed or kidnapped is a “no brainer” or at least should be.

Hostage Taking and Ambush

For most aid workers, this causes the most fear and panic. Sometimes this is with good reason as in parts of the world it can be commonplace and regularly ends up in the murder of the “innocent” hostage. That said, even in Iraq and Afghanistan around 80 % of western hostages ended up released by negotiation or military intervention and formed only a tiny fraction of the overall numbers kidnapped. Compared to the local community, most western hostages are treated relatively well, and in some parts of the world, hostage taking, whilst an anathema to western feelings, is a “businesslike” arrangement designed to bring disagreeing parties to negotiations. If you can, please never legitimise kidnapping and murder by referring to it as an execution; only a state backed by its own laws can execute someone: everything else is murder plain and simple!

The most dangerous time for the hostage is in the initial ambush/contact with the hostage takers and transport to the place of confinement. If things have already got to this stage, then you will have little opportunity or option to do anything other than cooperate. If you have anything on you that is compromising, now would be a good idea to get rid of it discretely but quickly; even a tie tack can get people killed or a commemorative coin or picture in your wallet! You will be surprised that if you appear accommodating—remember, you really have no choice—most untrained attackers will forget to search you. If, however, you can’t smell alcohol, have been quickly reduced into captivity, are expertly searched handcuffed/tied up, hooded and not excessively manhandled, you are probably in the hands of a ex-military or fairly professional gang or group, and your short-term survival is probably guaranteed as you have become a commodity with a value; the downside is they probably have a plan for you and you may not like it.

On the road, a particularly well-placed ambush will be disorientating and disabling. Most likely you won’t know what is happening until you are being led away;

if ex-military or well-trained paramilitary units are used, you may not even see your attackers until all your guards and drivers are dead. In one case, over ten guards and two drivers were killed in under a minute by hostage takers and two workers kidnapped unharmed. Don't become complacent about your security.

If things go less well and you have time to react, then attempt to get away. This will of course depend on your mindset, your drivers and any guards. Having an advance detail of locals will give you the warning you need to deviate, detour or abort your mission.

I have no experience of an "ambush" personally; sound advice would include not getting caught in the first place, remembering to keep your route and timings a secret, listening to local intelligence and heeding local advice about where not to go. If ambushed, leaving as quickly as possible, if at all possible, is recommended. If in an armoured civilian vehicle, consider how safe it is to stay in the vehicle if it becomes disabled; they may be armoured but that will not stop a rocket-propelled grenade. Stay calm and become aware of the situation developing around you. If in an unarmoured or "soft skin" vehicle, then try taking solid cover from gunfire first, or soft cover from your attackers view second. A full-size tree will stop a bullet, not much else will, and I include single-brick walls, adobe, breeze blocks/cinder blocks or wood panelling. The only "bulletproof" parts of your car are the engine block and possibly the suspension parts directly behind the hub of each wheel. Ignore "Hollywood" misperceptions, hiding behind a car door is like hiding behind a sheet of paper when being shot at; also you are highly unlikely ever to outrun bullets or dodge them or survive being shot by even a single round.

Try inconspicuously calling for help via your radio or emergency beacons if equipped, and if captured, look as helpless and nonthreatening as possible. Removing any headgear is meant to be useful in looking less threatening, and not moving quickly when challenged may help avoid your being shot when the adrenaline/drugs (or alcohol) fuelling your attackers is at its peak. Moving slowly and obviously rather than panic stricken may also be personally calming and help you focus on survival or escape. Eye contact does depend on culture, but as a rule avoid it as it can be perceived as threatening or aggressive; minimising your stature and attempting to make yourself as weak as possible may discourage some attackers from further hurting you. You may attempt to appeal to their better nature and emphasis the humanitarian nature of your mission; don't force this as they will probably get bored and use your bleatings as an opportunity to chastise you. If you can think of a subterfuge to convince them to release you, then go for it, including knowing where all the money is or handing over vehicles, goods, drugs, radios, etc. If professionally carried out, then they already know what you are worth, and unfortunately, it will be a lot more than what you have on you.

If you are in the boot/trunk of a car (a surprisingly common mode of transportation), you may want to consider removing the access panels to the rear lights and removing the bulbs (a police car may stop them), removing or breaking the rear lights if possible and signalling for help. Some cars boots/trunks can be remotely opened by a cable; you could attempt to find it and open the lid if you can wait until you are stopped or travelling very slowly. Leaping out of a car trunk travelling at

high speed is most likely very fatal with the added risk of following traffic, so look and gain your bearings if you wish to attempt to escape. I have no experience of a rescue attempt but from the stories the bottom line is keep your head down, lie down and wait for a western voice to tell you what to do. Jumping around like a headless chicken is guaranteed to attract completely the wrong kind of attention.

Much western philosophy and experience in how a hostage should behave is based on western kidnap gangs that have no interest in adding a murder charge to their kidnap. In the west, provided you cooperate, you are most likely to be released or be discovered unharmed after the event. Little or none of this experience may be of any benefit with extreme fundamentalist groups or the lawless paramilitaries. You personally will have little idea whether you have been kidnapped for ransom or for another “theatrical” purpose with your fate already sealed.

Ideally if you are working or preparing to work in a country where there is a risk of kidnap, then you must prepare for that eventuality. The organisation must have contingency and response plans for such an occurrence, your team should have drills and have rehearsed procedures, you should have completed an “isolated personnel” information sheet which will have your picture, personal details, proof of life questions and answers already prepared, with next of kin details and a press strategy. A kidnap and ransom plan and its associated insurance are a must for most countries where you are likely to operate. Having a trained professional managing your kidnap almost guarantees a successful outcome, plus the costs and ransom are paid for by the insurance rather than you having to have family sell everything they own. Of course having a plan and insurance and ever talking about it are two different things; never admit to having insurance: doing so will increase the costs and reduce the options the consultant will have to get you out quickly.

Ideally, if you become a hostage, your kidnap will only involve a negotiation for money, a media release to make some use of your humiliation and capture, normally to embarrass your organisation, your government and your country. Unfortunately, some kidnappings are merely devices to carry out the pretence of any of these before they kill you. Ideally your “in-country” briefing should identify the most likely scenario you may encounter. That may change your mind on (a) staying, (b) how you do your job or (c) trying to escape!

It is unfortunate but stands repeating again and again, that in many places in the world your humanitarian or independent/religious or neutral status will afford you no protection whatsoever and dependent on your country of origin may even make you more attractive as a target for kidnap, often based on how your organisation/country deals with ransom. It is unfortunate that many organisations and some countries believe that by paying up and not involving “organisations or consultancies” that could assist will somehow help. It has been my experience that this was never beneficial. Paying up quickly just means you will have to pay more; paying what you asked just means you have raised the stakes for the next member of staff and you will inevitably be funding a criminal or terrorist organisation intent on murdering people, including your colleagues, friends, countrymen and women, a sobering thought perhaps?

In conclusion, if there is ever any doubt about your safety, then don't do it, for your own sake, your family and those who may have to come and rescue you or at least recover your remains. You may be saving my life as well as your own!

Further Development and Reading

Without doubt, this is one area where you will never and can never stop learning. The uniqueness of each humanitarian disaster or mission means that you will need new processes and plans to overcome the problems you encounter. That said, underlying principles and procedures can be applied provided you adopt a principle of constant checking, refocusing and reorientating yourself and your decisions. Little external formal training can adequately prepare you for this, and most develop their skills through experience with NGOs and/or official government, military or other humanitarian organisations. Some professional companies do provide suitable (although expensive) training, and checking with your parent organisation and experienced professionals and colleagues will help you identify the best products for your money.

That said, I would recommend a broad reading of campcraft, survival guides and techniques that you can find in good bookshops; however, in my experience, there is little substitute for actually being there and doing it, progressively, safely and in a gradual manner. That may mean you start at home in the organisation office, working on logistics, something that can kill you just as quickly if you get it wrong in the field as not being able to cook a hot meal or prepare clean water for drinking.

Personally speaking, I believe we will be called on to carry out more humanitarian assistance in the future rather than less, so be prepared, volunteer and learn your trade now so when the time comes you are ready and able and not a liability to yourself or those that may depend on you.

Best wishes and stay safe!

Further Reading

http://travel.state.gov/law/family_issues/death/death_600.html?country=0.

Chapter 23

Safety and Security: Thinking Ballistic – Aspects of Protection

Kenneth I. Roberts

Abstract

- To give a brief introduction to ballistic protection – for the individual, vehicle and dwelling
- To provide information on housing issues that need to be considered when choosing a team base

Keywords Safety • Security • Personal and Organizational • Checkpoints • Roadblocks • Hostage Taking • Ambush • Ballistic Protection • Individual protection • Housing protection • Vehicle protection • Mines • Health Risk Management

Objectives

- To give a brief introduction to ballistic protection – for the individual, vehicle and dwelling
- To provide information on housing issues that need to be considered when choosing a team base

Ballistic Protection

Ballistic protection can be provided for both individuals and vehicles, but in neither case is this an inexpensive, entirely effective or uncomplicated issue.

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Individual Protection

So-called bullet proof (more accurately “ballistic”) or “flak” jackets are designed to give some protection against blast and (with the addition of ballistic plates for the chest and back) against small arms ammunition of up to 7.62 mm. There are, however, a number of negative issues associated with their use:

- They will only provide protection to limited parts of the body (i.e. those covered by the jacket).
- They can provide the wearer with a false sense of security and may encourage unnecessary risks to be taken as a result.
- They are heavy (approximately 12 kg) and can reduce mobility.
- They prevent heat loss and can therefore contribute to heat illness and injury.
- They are expensive.
- A direct bullet strike can still produce serious bruising and effects of shock even if the plates are not penetrated, although this can be reduced by the use of (even more expensive) “trauma” plates.

Helmets are an important piece of individual protective equipment and should always be worn when the use of a ballistic jacket is indicated. Although they will protect the wearer against blast, shrapnel and general jolts and bumps, they will not stop a direct bullet hit. They must be worn with the neck strap securely fastened.

It is important that those who may need to wear these types of items are trained in their use and that they are aware of the circumstances under which they should be worn. Further, these items should be individually issued, as they need to fit properly.

Vehicle Protection

The cabs and other vulnerable parts of a vehicle can be protected by armour if required, although this can incur a significant weight penalty. This can reduce stability and make driving more difficult. This is also an expensive option.

A compromise can be to cover the floor of a vehicle with sandbags or specially designed ballistic protection blankets, although both of these options will not afford significant protection against antitank (AT) mines, but only against grenades or anti-personnel (AP) mines. The added weight burden should not be underestimated.

Choosing Housing

Accommodation (particularly in a conflict or catastrophe setting) serves a number of purposes. Clearly, the most important is protection from the elements, but other considerations need to be taken into account. What follows is a description of the

requirements tending towards the ideal, and inevitably there will be a necessity for compromise based on a consideration of the risks to which your team is exposed.

Location

The following should be taken into account:

- Proximity to vehicle access routes. Consider if these could be affected by adverse weather conditions and/or by conflicting parties. Also identify potential evacuation routes.
- Proximity to active conflict areas, and the implications for collective safety/security.
- Availability to electricity, water and sanitation.
- Proximity to potential targets (such as military installations).
- Availability of secure parking for vehicles.
- Implications for radio/telecommunications reception.

Building

- Is the building big enough to accommodate your team and its stores and vehicles, and to provide whatever services you are there to deliver?
- What is the state of repair of the building, and what repairs would need to be carried out to make it fit for purpose?
- Can the building provide appropriate protection from the threat of locally available weapons?

Enhanced Protection

The threat from small arms, bombardment, air attack and even chemical, biological, radiological and nuclear (CBRN) weapons will need to be considered. An area of the building may need to be identified as a shelter against direct attack or collateral munitions strike. This could be an interior windowless corridor or (ideally) a cellar. However, the latter should be avoided if a chemical threat is considered to be likely, since many chemicals are heavier than air. The protection of areas of the building with windows can be enhanced by the use of:

- Heavy net curtains
- Heavy adhesive transparent tape to prevent the shattering of glass panes
- Existing shutters
- Wooden planking across windows

Consideration should be given to increasing protection to the shelter area, using such items as sandbags and beams, although this is a specialist area, and expert advice should be sought. In addition, it is manpower and material resource intensive and may take some time to complete effectively. This type of shelter should be made as small as possible (to encourage intrinsic strength) and should have at least two entry/exit points, preferably protected against blast. Those accommodated in the building will need to be aware of when to occupy the shelter. This implies that an agreed alarm system will need to be used and that the location of the shelter is known by everyone.

The shelter may need to be occupied for some time and should be provided with:

- Food and water
- Torches, lamps or candles
- Sleeping bag
- Means of heating
- Portable radio
- Chemical toilet or other appropriate sanitation
- Medical/first-aid kit.
- Fire extinguishers.

Further Reading

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Chapter 24

Safety and Security: Mines and Weapons Awareness

Kenneth I. Roberts

Abstract

- The give an introduction to the threats posed by mines and other explosive weapons in the conflict environment

Keywords Safety • Security • Personal and Organizational • Checkpoints • Roadblocks • Hostage Taking • Ambush • Ballistic Protection • Individual protection • Housing protection • Vehicle protection • Mines • Health Risk Management

Objective

- The give an introduction to the threats posed by mines and other explosive weapons in the conflict environment

The Threat

The inherently indiscriminate nature of the widespread use of mines is well recognised, and both the Ottawa Convention¹ and the 1980 Convention on Certain Conventional Weapons² attempt to control this threat. However, the conventions are only binding on states and not on non-state actors, and even then not all states

¹ The 1997 Convention on the Prohibition of the Use, Stockpiling, Production and Transfer of Anti-personnel mines and on their Destruction.

² Strictly Protocols II and V.

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have ratified them. The threat from mines and uncleared weaponry and ordnance is very real: it has been estimated that 110 million mines (mainly, but not exclusively, antipersonnel types) remain in 68 countries. Although attempts are being made by a combination of national, international and NGO agencies to clear this threat, the sheer size of the problem (allied with the economics involved, since a landmine costs \$3–30 to manufacture, but \$300–1,000 to clear) suggests that it will be around for the foreseeable future. Indeed, the problem is currently assessed to be increasing: for each mine cleared, 25–30 new ones are thought to be planted!

Types of Mines

There are essentially two types of mines: antipersonnel (AP) mines and antitank (AT). The former, which (as their name suggests) are designed to cause injury to people rather than to vehicles, are the ones that pose the most acute threat to aid workers. There are a number of variants:

- *Pressure mines* explode if stepped on. They tend to be circular in shape, made of metal (or plastic, to help avoid detection) and typically coloured to blend into their surroundings.
- *Air-delivered AP mines*³ are typically winged to facilitate their dispersal from the air. They tend to be blue or green in colour, but can also be camouflaged. They pose a particular threat to children who are attracted to their unusual shape. They explode when disturbed/picked up.
- *Bounding/jumping mines* are of two major types: those triggered by a very fine tripwire and those triggered by direct contact. The mine springs up to approximately (adult) waist height and then explodes, thereby scattering fragments over a wide area.
- *Fragmentation mines* also tend to be triggered by tripwire. They are typically cylindrical and placed into the ground by means of an integral stake or spigot, leaving approximately 20 cm of the casing above ground. When triggered, the perpendicular grooves in the exposed casing cause the dispersal of razor-sharp squares of metal in all directions around the mine.
- *Antitank mines* are much larger (up to 300 mm in diameter) than AP variants and are designed to disable vehicles. They tend to be circular or square in shape and made of metal or plastic. They require the relatively heavy weight of a vehicle to trigger them, but this can be reduced if they have been laid for some time. AT mines are often laid in large numbers (frequently in conjunction with AP mines to prevent their removal) and observed or covered by fire. Some have anti-handling devices built into them.

³Sometimes referred to as “Butterfly Mines”.

- *Directional mines* are also referred to as “Claymore” mines and are convex in shape supported on its own set of legs. They can be triggered by tripwire or remotely by command wire and are designed to spread fragments in a limited arc of about 60°.

Danger Areas

The following pose particular risk areas, particularly for AP mines:

- Old front line and defensive positions
- Deserted houses (particularly undamaged ones)
- Tracks
- Gardens/cultivated areas

Dealing with Mines

AP Mines

The most important precautions are *avoidance* and *awareness*. Always seek local advice before entering a new area. In particular, do not be the first to use a track and do not drive at night. Take the following specific precautions:

- Be aware of any local signs used as warnings of mined areas. These tend to be red and triangular, with “Mines” in the local language/alphabet in the centre.
- Never touch what appears to be a mine.
- Stay well clear of mines.
- Let others know that mines are around. Place signs at a safe distance from any suspected mined areas.
- Do not use any radio devices within 100 m of a mine.

AT Mines

Again, take local advice. Specifically:

- Do not leave marked roads and tracks. In particular, do not attempt to drive around obstructions or onto verges.
- If you inadvertently drive into a minefield, do not get out of the vehicle (there may be AP mines) or turn the vehicle around, but reverse slowly out retracing your own tracks, guided by a team member looking out of the rear window and guiding.

Unexploded Military Ordnance

Inevitably, a proportion of ammunition fired during a conflict will fail to explode. These are known as “explosive remnants of war”. In addition, stockpiles of munitions may have been abandoned. This type of material can become very unstable and must be avoided and reported to anyone else who may be affected.

Further Reading

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Chapter 25

Safety and Security: Health Risk Management – A Tool for Planning Force Health Protection

Martin C.M. Bricknell and Gareth Moore

Abstract The spectrum of hazards and threats which confront a military force varies widely depending on the environment, mission type and intensity of conflict. In a deteriorating security situation, an increasing threat of violence against the force may also be accompanied by an increase in other hazards. A breakdown in law and order can lead to criminality, public health and sanitation measures may fail and potentially dangerous industrial, agricultural or medical facilities can become neglected. If these are accompanied by the outbreak of conflict, the number of hazards and threats multiply, requiring more significant force protection measures to deal with them. Natural or man-made hazards may well present the most likely threat to the military force even if the actions of adversaries are the most dangerous. In common with other aspects of military operations, force protection is ultimately a balance between risk (sometimes poorly quantified) and finite resources. Force Health Protection (FHP) is the collective term for activities that reduce or eliminate the incidence of battle injuries, disease and non-battle injuries, thus enhancing the operational health readiness and combat effectiveness of the military force. FHP consists of actions taken to counter the debilitating effects of environment, disease and selected special weapon systems through preventive measures taken by individuals, units and operational formations. Health Risk Management (HRM) is an analytical process that facilitates the creation of the FHP plan. As such, it is also a key element of the Health Services Support contribution to the overall estimate process.

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Keywords Safety • Security • Personal and Organizational • Checkpoints • Roadblocks • Hostage Taking • Ambush • Ballistic Protection • Individual protection • Housing protection • Vehicle protection • Mines • Health Risk Management

Objective

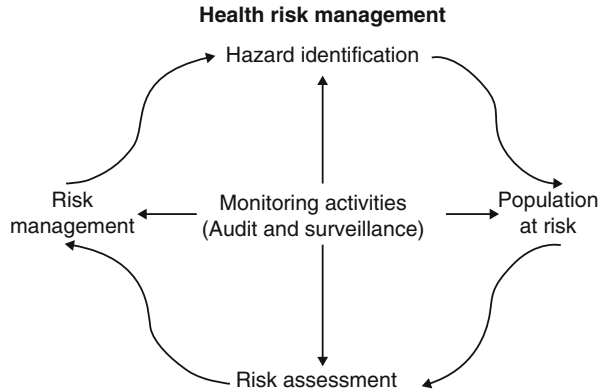
- To describe the Health Risk Management analytical process that enables military medical personnel to identify, assess and manage risks to the health of a military population

Introduction

The spectrum of hazards and threats which confront a military force varies widely depending on the environment, mission type and intensity of conflict. In a deteriorating security situation, an increasing threat of violence against the force may also be accompanied by an increase in other hazards. A breakdown in law and order can lead to criminality, public health and sanitation measures may fail and potentially dangerous industrial, agricultural or medical facilities can become neglected. If these are accompanied by the outbreak of conflict, the number of hazards and threats multiply, requiring more significant force protection measures to deal with them. Natural or man-made hazards may well present the most likely threat to the military force even if the actions of adversaries are the most dangerous. In common with other aspects of military operations, force protection is ultimately a balance between risk (sometimes poorly quantified) and finite resources. Force Health Protection (FHP) is the collective term for activities that reduce or eliminate the incidence of battle injuries, disease and non-battle injuries, thus enhancing the operational health readiness and combat effectiveness of the military force. FHP consists of actions taken to counter the debilitating effects of environment, disease and selected special weapon systems through preventive measures taken by individuals, units and operational formations. Health Risk Management (HRM) is an analytical process that facilitates the creation of the FHP plan. As such, it is also a key element of the Health Services Support contribution to the overall estimate process.

Existing UK legislation [1] and government Policy [2] on Health and Safety (H&S) determines that commanders at all levels have a permanent responsibility for ensuring that military activities are undertaken in the safest possible manner and with due regard to any risks to their personnel. This responsibility applies in barracks, during training and on operations. Thus, Health and Safety policy is subordinate to, but an integral component of, the concept of force protection [3]. The application of HRM should ensure that medical staff provide commanders with the necessary advice and practical support to enable them to meet their legal responsibilities under the Health and Safety legislation consistent with the practical realities of military operations. This part describes the HRM analytical process that enables (military) medical personnel to identify, assess and manage risks to the health of a military population.

Fig. 25.1 Health risk management process



Health Risk Management

HRM is a cyclical process with four stages. This is shown in Fig. 25.1. The lines connecting the central monitoring activities emphasise the continual feedback loop required to ensure that any adverse changes in the health of the population at risk (PAR) are accompanied by actions to improve the management of the health risks identified during the HRM process. The key to the application of HRM is not only awareness of principles and policies in regard to FHP for specific hazards but the conversion of this knowledge into a practical plan for implementation. The sequential process of HRM is underpinned by monitoring activities that audit the interventions designed to reduce risk in addition to the health surveillance systems designed to detect adverse health effects from exposure.

The HRM process is supported by a matrix tool for the collation of background information that generates a list of positive actions. The use of the matrix aligns these actions with the monitoring activities that ensure that the FHP plan is implemented. Figure 25.2 shows the HRM matrix completed for malaria at unit level involved in a disaster relief operation in Africa for use by a regimental medical officer or a unit health adviser. The completion of each element of the HRM matrix is discussed next.

Identification of the Hazard

The first stage in HRM is to identify all of the potential hazards to the health of the PAR. The medical intelligence assessment and the medical warning notice should provide this information, but this may need to be complemented by other sources of information. Hazards should be considered in the following hierarchy:

1. Conventional battle hazards, e.g. bullet, bomb and blast
2. Non-battle traumatic hazards, e.g. road accidents, training accidents

Hazard		Population at risk <i>Op and activity dependent</i>	Risk assessment <i>Theatre, Op and activity dependent</i>
Malaria Refs: SGPL 10/10. JSP 371. Theatre MIA Med Wng Notice	Risk Assessment	(Humanitarian Op)	Very High -1
		All Own Tps/Pers C2 / C3 and Specialist Friendly Forces/NGOs Locally Employed Civilians Displaced Persons/Refugees Displaced Persons/Refugee Children	Very High -1 Very High -1 Medium -3 Medium -4 High -2
		Control activities	Monitoring activities <i>(Audit and Surveillance)</i>
Risk management	General controls	Communal vector control Physical <ul style="list-style-type: none"> Avoidance or removal of breeding sites: <ul style="list-style-type: none"> Drainage or removal of mosquito breeding sites. Camp/unit dry day – once a week. Camp siting and segregation. Use nets on windows and doors of accommodation/tents Chemical <ul style="list-style-type: none"> Residual insecticide on structures, harbourage or resting areas. Knockdown insecticides: <ul style="list-style-type: none"> Swing fog dawn and dusk Knockdown aerosols in accommodation. Larvicidal treatment of mosquito breeding sites (Abate). Vector control carried out as per JSP 371. Individual bite avoidance Physical <ul style="list-style-type: none"> Bite prevention: <ul style="list-style-type: none"> Use of bed nets. Clothing - long sleeves and trousers at dawn and dusk. Chemical <ul style="list-style-type: none"> Peripel for clothing and nets (JSP 371 – Chap 46B). Insect repellent on exposed skin. 	<ul style="list-style-type: none"> Local Med int. Case identification/reporting. Breeding site surveys. Bite rates/reports. Camp/site inspections. <ul style="list-style-type: none"> Op Sanitation and Camp Hygiene Screening/Netting Knockdown insecticide use Hygiene Diary/Vector Control Log entries: <ul style="list-style-type: none"> Unit dry days. Swingfog routines. Site inspections. Peripel issue/treatment: <ul style="list-style-type: none"> Clothing Nets Abate dosing. Residual spraying. Use and serviceability of bed nets. Pesticide application recorded and effectiveness assessed. Check dress states/SOPs.
	Information training and policy	<ul style="list-style-type: none"> Health intelligence and med recce. Health education (MHIT pre-deployment). <ul style="list-style-type: none"> Bite avoidance Communal measures Chemo-prophylaxis regimes Vector and hygiene control specialist trained personnel. Divisional SOP's to be prepared, according to health intelligence. In-theatre reinforcement of health ed/trg. 	Local med int. Arrival/induction trg Vector control operatives. Examples of reinforcing information sources, SOPs and orders. Warning cards carried.
	Medical counter-measures	<ul style="list-style-type: none"> Appropriate chemo-prophylaxis for own tps. (MWN or DCI JS 172 / 2001), incl alternative regimes. Removal of individual from theatre if severe reaction occurs to C-P. Warning cards. 	<ul style="list-style-type: none"> Chemo-prophylaxis issue/parades. Monitoring of drug related adverse effects. Warning cards carried.
	Treatment	<ul style="list-style-type: none"> Early identification of suspect cases. Appropriate symptomatic treatment/care. Diagnostic sample and analysis to confirm parasite. Definitive treatment/care. Treatment arrangements for DPs. 	<ul style="list-style-type: none"> Case Notifications – FMed 85 UNHCR/NGO/HN case reports. Lab IDs/reports. Morbidity returns (J97). Adherence to treatment protocols. Evac of cases. Post deployment – case ID and tracking.

Fig. 25.2 Health risk management matrix completed for malaria

3. Infective hazards
4. Chemical hazards
5. Radioactive hazards
6. Environmental hazards
7. Psychological hazards
8. Ergonomic hazards

A HRM matrix should be generated for each of the hazards identified. It is suggested that these should be organised on paper or electronically so that they can be readily reviewed, updated and retrieved for audit. At this stage, background reference material and policies should also be obtained and reviewed for each of the hazards identified. These might include Surgeon General Policy Letters (SGPLs), Joint Service Publications (JSPs), the theatre Medical Intelligence Assessment (MIA), the theatre Medical Warning Notice (Med Wng Notice) or other publications.

Definition of the Population at Risk

The PAR should cover all populations for which the military medical services are responsible. The definition of the PAR may need to be categorised in order to distinguish between different levels of exposure or vulnerability to a threat or to distinguish the significance between different levels of impact of failures in medical force protection measures. Examples of such PAR groupings might include:

1. National forces (e.g. headquarters, acclimatised/ unacclimatised, occupational or trade groupings (e.g. catering staff, staff in special protective equipment, medical staff)), specific operational tasks (reconnaissance, guarding, flying)
2. Grouped joint and combined forces (e.g. other international forces, indigenous security forces)
3. Civilians, e.g. UK civil servants, UK contractors, non-government organisations, locally employed civilians and local liaison personnel
4. Enemy forces, prisoners of war and captured personnel

This stage of the process may include plotting locations of hazards and PARs on a map to provide a graphical illustration to support the risk assessment process.

Risk Assessment

Risk assessment helps commanders and their staff to prioritise and allocate resources for FHP. The primary purpose is to evaluate the importance of health hazards and to compare the risk between different hazards. These will normally be expressed as a composite of qualitative judgements regarding the likelihood of exposure to a hazard and the potential severity of the outcome. The two-dimensional matrix described for the general assessment of operational risk shown in Table 25.1 may be utilised for this purpose. In the example shown in Fig. 25.2, the risk to deployed forces and NGOs from malaria is considered to be both very high and high priority. The risk to children in the displaced population is the next highest risk and priority and so on.

Under the Health and Safety legislation, commanders have a general duty to reduce all risks “so far as is reasonably practicable” which in turn will depend greatly on the prevailing operational circumstances and imperatives. As an example,

Table 25.1 Matrix for assessment of operational risk

Likelihood/severity	Frequent	Likely	Occasional	Seldom	Unlikely
<i>Catastrophic</i>	Extreme	Extreme	High	High	Moderate
<i>Critical</i>	Extreme	High	High	Moderate	Low
<i>Marginal</i>	High	Moderate	Moderate	Low	Low
<i>Negligible</i>	Moderate	Low	Low	Low	Low
<i>Chronic</i>	<i>Differed</i>				

many communal antimalarial measures are impractical when conducting a reconnaissance patrol in the jungle where the consequence of being discovered and shot at by an enemy is greater than the consequence of catching malaria. However, individual measures such as the use of insect repellents and taking antimalarial drugs are therefore extremely important and should be actively supervised.

Other legal standards may apply such as for occupational exposure to chemicals where “exposure should be reduced so far as is reasonably practicable and in any case below the Maximum Exposure Limit” [4], or for exposure to ionising radiation when the standard is “as low as reasonably achievable and must not exceed certain exposure limits” [5]. The extent to which control measures can be implemented and enforced will be highly variable dependent on the nature, phase and intensity of operations. Commanders therefore need to be aware of the inherent risks in order to make valid risk decisions and place proper emphasis on implementation and monitoring of remedial control measures.

Risk Management: Control Activities

There are a number of components to control activities listed within risk management. These have a defined hierarchy in UK legislation. The components are shown next.

General Control Measures

This describes measures taken to reduce the probability of personnel suffering ill-health from the hazard. Table 25.2 shows the hierarchy of control measures that should be considered and examples of their application for malaria.

Information, Training and Policy

The provision of information, instruction and training is a critical element of the implementation of UK legislation that must be reflected in military FHP. All personnel will need to be educated and trained in regard to the health hazards of a specific

Table 25.2 Hierarchy of control measures

Control measure	Malaria control
Remove the hazard	Use of Swingfog or other insecticide to kill mosquitoes. Avoid or remove all standing water
Remove personnel from the hazard	Deploy only those personnel strictly needed for the operational task. Exclude those for whom malaria would be medically catastrophic such as pregnant personnel and those who have had a splenectomy
Isolate or enclose the hazard	Put high-risk areas (e.g. undrainable standing water) out of bounds
Isolate or enclose personnel	Fit insect screens to fixed accommodation Use bed nets
Control exposure (e.g. work/rest cycles)	Withdraw personnel from high-risk areas from dawn to dusk
Provide personal protective equipment	Issue permethrin-impregnated clothing Use insect repellents

deployment and how to minimise the risk of personal ill-health. Military training policies specify mandatory health promotion training that all army personnel should receive each year. This should provide a background level of knowledge. The mobile health instruction team will supplement this with a “just-in-time” pre-deployment health brief covering the health hazards specific to a particular military operation. This can be reinforced during the theatre arrival brief. Individual aide-memoires and entries in Theatre and Unit Standing Orders may also be used. Finally, health warning cards such as the Malaria Warning Card may be issued to all personnel prior to their return to the UK.

Medical Countermeasures

Medical countermeasures are prophylactic immunisations or medications that can be prescribed to reduce the risk of an adverse health event. This may involve immunisations (e.g. tetanus, typhoid and polio), pre-exposure drug treatment (e.g. antimalarials) and postexposure prophylaxis (e.g. after a needlestick injury). This will be promulgated in the medical warning notice with medical staff being responsible for the prescription and supply of these drugs. In the worked example, the medical intelligence assessment will advise on the choice of antimalarial drugs for a particular region and population.

Treatment Resources Required

The amount, nature and disposition of the treatment resources required will relate to the risk assessment. Medical staff will need to ensure that a robust plan is in place to treat any individual who succumbs to the health hazard. Treatment resources may be

tailored to a specific casualty estimate or may be considered as an “insurance policy” which requires a critical mass whatever the magnitude of risk. In the worked example at Fig. 25.2, specific arrangements for the rapid investigation and treatment of febrile service personnel in case of malaria are required. The medical facilities need to have appropriate therapeutic and supportive therapies (possibly including intensive care and access to urgent aeromedical evacuation) readily available.

Risk Management: Monitoring Activities

The effectiveness of FHP must be measured by monitoring activities based on a combination of audit of policies and procedures and health surveillance to detect failures in risk management. As an example, Unit Environmental Health Duties personnel may be tasked to inspect camps for standing water and other potential mosquito breeding sites as part of their duties in pest control. Individual blister packs of drugs can be checked at random to check tablets have been used. Nominal roles can be used as registers to record the application of insecticides to issued equipment in accordance with policy.

There are a number of tools that assist health surveillance including EpiNATO, and F Med 85 communicable disease reporting. In the example, individual cases of malaria should be reported using a F Med 85 and any local case-reporting system with “J97” being used to record cases of febrile illness on a population basis. Commanders and their staff must ensure that they make maximum use of such tools to provide feedback on the effectiveness of medical force protection measures.

Conclusion

This part has described a practical approach to HRM using a structured matrix as a prompt to assist a medical planner in the production of a medical force protection plan. This is demonstrated as a worked example using malaria. This chapter contains material previously published in the Journal of the Royal Army Medical Corps (www.ramcjournal.com) and is used with permission.

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Chapter 26

Applied Communications for Medical Professionals in Conflict and Catastrophe Situations

F.J.A. van Meeteren

Abstract In developed societies, we are generally used to good communications. In fact we consider it a fundamental requirement of everyday life. There is such an abundance of information offered to us by all types of communications, but we only use a small part of it on a daily basis. Moreover, we are more and more dependent on modern communications: banking, communicating with our energy supplier and booking our holiday are all tasks for which we use the Internet. By cell phone we can reach or be reached instantly at any given moment wherever we are. The professional life of medical personnel is also filled with sophisticated means of communication and information. It is therefore hard to imagine that we could be placed in situations with restricted or (temporarily) total absence of communication under austere situations or during an emergency or disaster situation. This is even more problematic because uncertainties increase under these kinds of conditions and with this the need to communicate. During a crisis, we often see that the available communications infrastructure becomes overloaded or crashes altogether. It is therefore a truism that good communications are essential to enable effective and comprehensive disaster management. This chapter will look at aspects of communication in conflict and catastrophe situations.

Keywords Communications • Technology • Internet • Radio • Satellite • GSM

Objectives

- To provide an overview of the different communication systems
- To consider the options for use in conflict and catastrophe situations

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Introduction

In developed societies, we are generally used to good communications. In fact we consider it a fundamental requirement of everyday life. There is such an abundance of information offered to us by all types of communications, but we only use a small part of it on a daily basis. Moreover, we are more and more dependent on modern communications: banking, communicating with our energy supplier and booking our holiday are all tasks for which we use the Internet. By cell phone we can reach or be reached instantly at any given moment wherever we are. The professional life of medical personnel is also filled with sophisticated means of communication and information. It is therefore hard to imagine that we could be placed in situations with restricted or (temporarily) total absence of communication under austere situations or during an emergency or disaster situation. This is even more problematic because uncertainties increase under these kinds of conditions and with this the need to communicate. During a crisis, we often see that the available communications infrastructure becomes overloaded or crashes altogether. It is therefore a truism that good communications are essential to enable effective and comprehensive disaster management. This chapter will look at aspects of communication in conflict and catastrophe situations.

Communications

Communication is the ability to exchange information. This can be done unilaterally with the sole purpose of informing others, such as press-related information or two or more parties to exchange information either directly or remotely. Means of communication can be divided into accessories or equipment for:

- Professional use only such as the military or emergency services
- Use by the general public

As medical professionals, we use all types of communication to acquire the necessary information:

- Professional accessories or equipment for medical diagnosis and communication or command and control or logistic issues
- General accessories or equipment for accessory or emergency command and control, collecting medical data and communicating with third parties or patients

Communications can be either synchronous or asynchronous. This is an important distinction. Synchronous communication occurs when both parties are communicating in real time with each other, such as when people talk to one other over the telephone. Letters and e-mail are asynchronous. Asynchronous communication is easier to manage as it does not mean two people being in a given place at a given time, an important practical point when the link is poor or when they are in different time zones.

An example of asynchronous communication is paper-based communication such as newspapers or letters. It is cheap and easy to produce and can be easily archived as a permanent record. On the other hand, paper-based information to communicate is, compared to other ways of communication, slow to transmit and time consuming.

Voice can be synchronous and is the most basic form of communications. It is real time and can be interactive. Voice, however, has disadvantages. Unless recorded, there is generally no “hard copy” for the record. Also voice messages can easily be misunderstood, especially during a crisis situation. Simple one-way voice communications are by broadcast, either by radio or by TV. Although broadcast can be a useful information source, it is also a very effective way of projecting information to affected populations in time of crisis, radio being less powerful but also less fragile and more ubiquitous than television.

Communications Planning

Adequate planning and preparation is essential in all aspects of conflict and catastrophe medicine, none more so than with the communications plan. In any conflict and catastrophe situation, communication planning is of utmost importance. The key to good communications is choosing the right equipment for the job. When starting to plan the necessary communications for conflict and catastrophe situations, one has to assume that communications infrastructure is non-existent or that all infrastructures of the existing available communications has crashed or is overloaded. The acquired communications infrastructure should be applicable in the austere environment of the conflict and the catastrophe situation. Also all technologies have to be taken into account to create the desired communications infrastructure.

Given the rapid pace of change in technical capabilities, it is not helpful for here to define what the communications solution should be for a given situation. The process should produce a prioritized list of capabilities on the one hand and constraints on the other. Planning as such should include the rule of the 8 Rs (Table 26.1). Any temptation to add capability just because it is possible should be resisted especially if they make the solution less robust or more expensive.

To make a communication system robust during disaster relief operations or during crisis management, it is not sufficient only to concentrate on the initial creation of the communications network itself. Logistic support both in hardware and software is of utmost importance to keep the communication system on line in an austere environment. Logistics comprises transporting and physically setting up communications infrastructure, but also maintenance and repair, communicating with local authorities and communications companies and troubleshooting during operations. Therefore, specialist input will be needed. This is not only to convert the initial user requirement into a technical solution, but also during the actual execution of the operation.

When planning communications you must be aware of the fact that eavesdropping can be a serious problem. Eavesdropping is the concealed listening in to your

Table 26.1 The rules governing a communications plan in austere environments

The rule of the 8 Rs	
A communications solution must be appropriate for the situation in which it is expected to operate. Specifically it should be	
Required	It should be designed around a user requirement, i.e. those who will use the system should define what they will need it to do and the technical solution should answer that requirement
Reasonable cost	Communications costs can be high, both in terms of equipment and call charges and the capability it provides must justify the cost. Sometimes, however, high-bandwidth equipment may provide better value over low bandwidth because it transfers higher volume of data per minute and, beyond a certain breakeven point, can be cheaper
Robust	The equipment and its supporting network must be robust yet light and portable
Reliable	Network overload can be a particular problem, especially across mobile phone networks
Really easy	To use with no requirement for technical support in country
Resource constrained	Equipment and networks must be appropriate to a resource-constrained environment. Equipment should be able to operate from multiple power sources including batteries and generators, be weather proof and not rely on local infrastructure if that is likely to be destroyed or overloaded
Routine	Communications systems should be used routinely, preferably as a part of daily work practices, but at least on regular exercises if they are to be expected to work in the event of a disaster
Reviewed	The capabilities and costs of communications solutions are changing at an increasing rate and therefore plans should be regularly reviewed

communications by a third party without your consent. This can be done by governmental organizations for reasons of national security. But also other parties, including terrorist organizations and insurgents, can tap into your communications network. Also medical networks can provide valuable information, such as transport of expensive medication and medical equipment or vital drugs or vaccines to covert listeners. The problem of securing your communications networks requires technical assistance which needs constant input and monitoring by a specialist.

Principles of Communications Technology

Wire and Wireless

The answer to the question of wire vs. wireless varies considerably according to circumstance. Normal wire-based telephone networks are notoriously unreliable in areas afflicted by conflict or catastrophe and may be subject to eavesdropping. However, they are usually also one of the first utilities to be repaired. An area with a telephone network, especially if linked to the Internet, can provide the basis for a very reliable, cheap and comprehensive range of capabilities.

Table 26.2 A rough idea of the functional capability for a given bandwidth

Bandwidth	Capability	Typical medium	Time to transmit A4 page (s)
2.4 kbit/s	Voice, fax, data	Mini-M satphone	90
9.6 kbit/s	Voice, fax, data	Thuraya/iridium	30
33.4 kbit/s	Voice, fax, data	Standard phone	8
64 kbit/s	Voice, data, VTC	ISDN	3.5
128 kbit/s	Voice, data, VTC (good)	RBGAN	2
1.34+ Mbit/s	Broadcast quality video	Fibre optic/VSAT	0.2

Wireless communication can be either via GSM (Global System for Mobile Communications) or via satellite links. Satellite phones are independent of local infrastructure and relatively secure from eavesdropping. GSM (mobile) phones are less secure and coverage is very unlikely in an area where the telephone network is not working. Where telephones are available, GSM can be more convenient and more reliable than the traditional telephone network as the infrastructure is generally much more modern.

Bandwidth

Bandwidth is a key concept and describes the communications capacity of a transmission line. From Table 26.2 it becomes clear that bandwidth and time are on opposite sides of the same equation. If you increase the bandwidth, you both increase the capability and also reduce the time it takes to transmit a given amount of data. Less time generally means less cost. For instance, a high-speed data link across a satellite link transmits 64 kbits of data every second, but it costs about 4× as much per second as a low-speed data link transmitting one-seventh the amount of data. The message is that bigger may, in fact, be cheaper in the long run.

Broadband

Broadband is the definition given to higher magnitude bandwidth obtainable using digital asynchronous transfer modes (ATM), which greatly improves the bandwidth of copper conductors. If broadband is available, then virtually everything that you need to do can be delivered across it.

Fixed Wire Links

Fixed wire links can be divided into either analog or digital. Simple digital circuits and the more common analog systems both generally operate across ordinary

copper wires. The more advanced modern fibre optic cables usually have very high-data transport capacities, or bandwidth, well into the Mbit/s (megabits or a million bits of information per second).

Analog vs. Digital

Communications technology can be either analog or digital. Analog equipment transmits the flowing energy sine waves of amplitude vs. time. Digital equipment transmits information as the ones and zeros of computer language, and each one or zero is called a “bit” of information:

- The traditional telephone systems generally use analog circuits where the bandwidth is expressed in hertz (Hz).
- The capacity of a digital system to transmit data is its bandwidth and is expressed as the data transmission rate, measured in bits of data transmitted per second (bit/s).

Analog

A conventional analog telephone line operates at the digital equivalent of around 9.6 kbit/s. This is fine for telephone conversations and transmissions from a fax machine. Although the early telephone equipment restricted the data flow to a digital equivalent of around 9.6 kbit/s, modern technology now enables multichannel ISDN and broadband to operate over a simple pair of copper wires.

It is also possible, however, to transmit digital data from a digital device across an analog network by passing the data through a modem, which converts the digital signal into one recognizable by the analog network. Fax machines use internal modems to operate across standard telephone systems. Standard modems and fax machines sample the input signal about 6,000 times/s, leading to a digital capacity over a conventional telephone line in the region of 33 kbit/s. This is ample for most domestic applications including e-mail as well as for the live transmission of basic vital signs used in telemedicine. At 33 kbit/s, a 1 Mb file will take around 10 min to transmit. VTC is possible at this bandwidth, e.g. webcasting. This can provide a very cheap (the cost of a local call at both ends) and imaginative method of communication, but the quality is currently not good and is referred to as “talking heads” VTC.

Digital

Analog communications have their limitations and the more advanced user may need additional bandwidth. This can be achieved by the installation (where available) of an integrated services digital network (ISDN) line. Many companies also

use their ISDN lines for voice and fax as well as data, so be aware that while the voice element will almost certainly work every time, fax and data may experience difficulties to certain destinations.

An alternative to the standard “dial-on-demand” service is to pay a rental or lease fee for the line with no additional charges for the traffic across them. This is known as a “nailed up” or leased line and is ideal for a point-to-point connection such as one organization office to another, or from hospital to health centre. Once installed, any calls made across the link are effectively toll free, and so the more it is used, the better value it becomes.

Emergency Override

The UK mobile phone networks operate a system called ACCOLC. This stands for ACCess Over Load Control and is a way of ensuring the emergency services, and other priority personnel such as local authorities and coastguard can have a priority access to the network during an emergency. Invariably a local disaster will attract a great number of media operators that also require telephone lines to their offices in order to keep the world up to date with developments. Journalists’ standard practice when there is the opportunity for a scoop is to establish a link with their office and then keep the line open in order to guarantee it is there whenever they need it. As there are a finite number of lines in any given area, this type of practice could easily flood the network and prevent the emergency services from getting any access to the system. There is a procedure for gaining access to the ACCOLC system and applications need to be approved by the Home Office. They decide who is eligible for the service in order to control numbers. Similarly, ACCOLC is not in automatic operation all the time. It has to be invoked by an authorized police officer or local authority representative.

Cost

Calculating costs of communication is always difficult due to its complexity. The main elements of cost are the capital cost of the equipment, the bandwidth/time equation discussed previously and the cost to use per minute. GSM is often cheaper than satellite and increasing coverage may take in an area where you are operating making a changeover sensible. However, you must remember to include in the equation that GSM operators usually charge you for the cost of incoming calls when roaming on your GSM phone which may be the international element of the whole call. Incoming calls on a satellite phone are free. Beware of the pricing structure. On some systems (e.g. Inmarsat), you will get charged a fixed rate regardless of the destination or time of day, whereas in others (GSM, Thuraya and Iridium), the price will vary considerably depending upon where the call is to and where you are

calling from. The costs can also vary dramatically depending on which way you are calling. This is particularly the case when calling into an area from a “first world” landline. Check out the differences, in and out, for the areas in which you are working and adjust your communications plans and procedures accordingly.

Types of Communication

Radio

Radio communication is the oldest type of wireless communication and still used as private mobile radio (PMR) networks in the military and by the emergency services. Although expensive to install and generally restricted by their regional coverage, there are no call charges and so the operational costs are limited to maintenance and servicing.

Radio connections are always point to point; in other words, you must have at least two transceivers on the same frequency to be able to communicate. Local networks will be VHF or UHF and come as either hand portable or mobile (to be installed in a vehicle). The range is limited to 4–5 miles in open countryside and significantly less in a built-up area. It is possible to extend this range with repeaters and high-level antennas, but it is still essentially a local network.

UHF provides higher penetration through obstacles such as buildings or dense forestry, but the overall range is reduced.

There are products such as iconics that enable individual radio networks around the world to be linked to each other using the Internet as the long-distance carrier. Access to the Internet is provided either by local terrestrial suppliers or by using a satellite terminal such as Inmarsat BGAN. In essence, this means a local radio user can communicate to another iconics subscriber anywhere in the world regardless of frequency or type, simply by using his hand-held portable radio.

HF radio provides an ideal solution for remote, emergency and security communications needs and is capable of communicating over distances of 3,000 km or more.

Unlike conventional, voice over IP (VoIP), cellular and satellite telephony, which all rely upon land-based infrastructure, an HF radio network that requires minimal infrastructure is simple and quick to deploy and provides communications capability for users no matter where they are. It can even be used to communicate with existing VHF and UHF radio systems, cellular telephones and land-based telephones through developments in cross-patching technology that make this as easy as dialling a telephone number. Once the initial investment in equipment is made, there are no call costs or ongoing monthly line or equipment rentals, making the ongoing use of HF very economical.

Where communications are sensitive, HF radio offers technologies to ensure the security of voice and data transmissions. The military uses HF radio as its primary

communications medium and from the military have come a number of enhancements in voice encryption and frequency hopping which guarantee secure communications. For nonmilitary use, different levels of encryption are available to suit the individual organization's security requirements.

VTC adds a two-way, real-time video image, which can be valuable in certain circumstances. Although VTC is possible at low bandwidth, the quality is poor; clinically useful VTC needs to be at 64 kbit/s as a minimum. VTC is difficult between people who do not know each other but is a good tool for enhancing communications between those who do. The addition of video is reassuring to people at the distal end and can provide a valuable "situational awareness" tool for reporting purposes.

VTC is used increasingly as a routine means of holding virtual meetings and obviating the need for the participants to travel. As with voice-only teleconferencing, up to 32 different sites can call in simultaneously. Input can be via wire, GSM or satellite links. Costs can be high, but so can the costs in time and money of moving up to 32 people to the same place for a meeting. Nevertheless, the question should also always be asked whether the video element is worth the extra cost relative to a voice-only link. VTC can also be used for clinical consultations (telemedicine), distance learning and a variety of administrative functions such as career interviews.

GSM and Satellites: A Comparison

With reference to security, which was dealt with earlier in this chapter, an important difference between GSM mobile phones and satellite phones is that GSM is under the control of the country that you are in when you make or receive calls. An important practical consideration for satellite phones is that, although they work virtually anywhere in the world, they have a low building penetration. This means that they do not work indoors and will not work without a direct line of sight from the aerial to the satellite. GSM phones on the other hand work well indoors but suffer from poor geographical coverage. We cover this important factor in more detail under the relevant section.

The way the billing works means that the local mobile phone company (and therefore the local economy) gets a share of the revenue. Satellite communications are under the control of international companies, and the billing generally excludes a contribution to the economy you are in. The practical consequence of that is that many governments are not at all keen on satellite phones and may confiscate them on entry. This is potentially a serious problem, and the situation in a given area changes frequently with time. Therefore, if you are planning to go to a country that you do not have recent practical experience of, contact your supplier or the network operator before deciding which system and manufacturer to choose.

GSM

The usage of GSM mobile telephones is widespread. Present day life in the western world is nowadays almost unthinkable without them. The GSM network in a given area will operate on different bands (400, 700, 850, 900, 1,800 and 1,900 MHz) and whereas there is usually a single bandwidth for a given country, some countries have a number of operators who operate on different frequencies. Most used GSM networks are 850, 900, 1,800 and 1,900 MHz. Primary GSM (GSM 900) works at a frequency between 925 and 960 MHz, 925–935 MHz being an extension to this network. GSM 1,900 has a frequency between 1,930 and 1,990 MHz and is generally used on North American continent.

Currently GSM usually operates at low bandwidth with data transmissions for e-mail and Web surfing possible at up to 15.4 kbit/s for standard mobiles, although the emerging 3G networks provide up to 384 kbit/s. From the telemedicine perspective, ECGs and photographs have both been successfully transmitted across the GSM network [1] and videoconferencing is commonplace across 3G. GSM networks are beside voice communication currently also used for data communication.

GRPS (General Packet Radio Service) and EDGE (Enhanced Data Rates for GSM Evolution) are techniques to send data in an efficient, quick and cheap way. EDGE is actually an extension of GPRS with speeds up to 384 kbps. UMTS (Universal Mobile Telecommunications System) is generally the successor of GSM/GPRS and originally works between 2.0 and 2.15 Ghz. In 2009 Europe decided that the 900–1,800 MHz band could also be used. Most handsets are dual band or tri band and will work anywhere in the world where there is a network. Dual band means the mobile phone is able to work on two frequencies (900 and 1,800 MHz). Tri band enables the use of three GSM networks, 900, 1,800 and 1,900 MHz. A tri-band telephone is necessary to cover both Europe and North America. In Asia and South America generally the 850 MHz network is used. For coverage of this network, a quad-band telephone is needed. Where you can communicate using your domestic mobile phone therefore depends on the handset you have, which service provider you are signed up with and which overseas networks they have reciprocal arrangements with. GSM connection is always made through a base transceiver station (BTS), the so-called GSM mast. From the BTS, the message goes to a central point where the signals of several BTS come together, to the base control station or BSC. In the BSC, further connection is made in the direction of the receiver. In this process, a difference is made between voice communication (mobile switching centre or MSC) and the serving GRPS. A recent development is femtocells. These are small cellular base stations with a low send capability, specially designed for usages in a domestic environment or in smaller companies.

When you are abroad and away from your home network, you are deemed to be “roaming”. This works with little or no input from the user and often provides a choice of host network providers. But, beware of call costs. When you roam, you as the subscriber are responsible for all your outgoing calls, which are charged at the

local cellular rate *plus* the international call charge to your destination. In addition you will also be charged for the international leg of any *incoming* calls. This presents most of us with a new billing concept that is easily forgotten at the time of a call but comes flooding back when the bill arrives! The advantage, however, is that anyone at home can call your mobile number as normal and get through to you wherever you are, at the cost to them of a normal national mobile call. However, check costs for both incoming and outgoing calls before you go.

The big advantage compared to other ways of wires communication is that GSM has excellent building penetration. This means that it can be used easily in cities and on the move, a great advantage over satellite systems, which require a clear line of sight to the satellite. GSM is terrestrial based and requires a sophisticated and intact infrastructure in the area where the phones will be expected to work. GSM will therefore not be suitable for many conflicts or during the acute phase of disaster, although they may have a place in the pre- and post-disaster phases in many countries, and in the management of the acute phase of an isolated catastrophe in an otherwise functioning locality. GSM coverage during the active phases of conflict or catastrophes is and often very poor or non-existent. Take this into consideration when you plan your communications and/or communications network.

Satellite Networks

Since the first Sputnik satellite was launched in 1957 over 4,000 satellites have been launched. Satellite communications offer substantial advantages over GSM, and satellite telephones (satphones) are now cheap enough to buy and use and to be considered the technology of choice in many situations. Building penetration is poor, but coverage is more or less worldwide regardless of infrastructure on the ground. Broader bandwidth systems offer greater bandwidth than GSM up to 432 kbit/s and beyond. The potential functionality of a satellite-based system is therefore now much greater than GSM.

Although their main application is in support of conflicts and catastrophes overseas where other forms of communication are not available, satellite communications may be appropriate in first world catastrophe situations too. They are independent of the GSM and radio networks and rarely get overloaded. They also operate effectively in GSM black spots where GSM coverage is patchy or absent altogether.

Traditional satellites orbit at an altitude of some 35,000 km above a specific point on the equator. In this position, they will orbit the earth once every 24 h and therefore appears to remain stationary in the sky when observed from the earth. This is known as a geosynchronous or geostationary earth orbit (GEO), and the footprint of each satellite is over a fixed region of the world's surface.

The footprint of geostationary satellites often overlaps and so in many parts of the world it is possible to access two satellites. This can be important in the emergency situation when multiple users are accessing the same satellite at the same

time. Rarely the satellite will get overloaded and by simply turning around and accessing the next satellite around you can regain connectivity.

Some hand-held systems operate via low earth orbit (LEO) satellites, which will be on the edge of space at an altitude somewhere between 640 and 1,600 km. At this height they have an orbital period of around an hour and therefore move very quickly relative to the ground. Visibility is limited to a few minutes at a time so LEO systems operate a “hand-off facility” whereby calls are handed on to the next satellite in the orbit to provide an uninterrupted service.

Unlike GSM, most reputable satellite operators will not charge for either incoming calls or unsuccessful calls such as unobtainable or busy. Most are subscription-based services with monthly access fees to pay.

Inmarsat Mini-M

Mini-M originally bought satellite communications within reach of most global travelers. Launched in 1995, the combination of a light portable terminal at an affordable price, with worldwide coverage and ever reducing airtime rates, this has been the forerunner of the newer hand-held systems. Although no longer in manufacture, there are thousands of Mini-Ms still in regular use throughout the world.

The Inmarsat-based service is dial on demand, which means you pay for what you use in 1 s increments at a rate which should be under US\$2.00 per min which, in many parts of the world, is cheaper than a hotel phone. Call charges do not vary with time of day or destination, provided the call is to a fixed line phone and not to another satellite telephone.

Inmarsat B

Inmarsat B portable systems come in a number of different shapes and sizes, and in its basic form, data is transmitted at 9.6 kbit/s, with an option to expand this to high-speed data (HSD) at 64 kbit/s. Although referred to as a portable system, the Inmarsat B is really a transportable system, with a basic volumetric size equivalent to a tea chest, or large packing case. Although there are a number of these terminals still in active service, they have generally been superseded by the RBGAN and BGAN.

Inmarsat M4

Originally launched in the final quarter of 1999 with a full service available during 2000, the M4 provides a considerably enhanced capability over the Inmarsat B and is considerably smaller and cheaper too. Designed to provide data at 64 kbit/s on a terminal about the same size as the Mini-M, it gives subscribers full and portable access to the Internet, connection to their local or wide area network, transmit real

time and store and forward video, and send pictures and broadcast quality voice on a plug and play platform.

Inmarsat then added the Inmarsat packet data service (IPDS). IPDS offers a full-time data connection to the network which is only charged when it is used, and the tariff is per transmitted Mbit of data rather than by the minute in much the same way that ADSL or broadband works. Most users of M4 have now migrated to the Inmarsat BGAN due to its lower cost and greater ease of use, but many are still in operation in specialist applications such as media and military where an ISDN-based link is required.

Inmarsat RBGAN

Launched as an interim system to the now developed BGAN, Regional BGAN or RBGAN is smaller and lighter than a notepad PC and is very easy to use. Data are sent using the RBGAN's "Always on" technology which means that you are charged for the amount of data you send and receive rather than the amount of time you are online.

Originally hosted on the Thuraya satellites, the RBGAN service was transferred to Inmarsat during 2004, but then as the BGAN service developed throughout 2005 and beyond, it has become somewhat obsolete and will be switched off at the end of 2008, leaving the now matured BGAN service as the option for high-speed data and voice.

Inmarsat BGAN

BGAN effectively provides a global broadband service, enabling access for data applications at speeds up to half a megabit with simultaneous voice calls.

BGAN terminals are compact and lightweight and can be carried as easily as a laptop – the smallest BGAN terminal weighs less than 1 kg. A fully functional broadband mobile office can be set up and shut down in minutes.

BGAN supports the latest IP services, as well as traditional circuit-switched voice and data offering seamless integration with other networks.

Terminals start at US\$2,000 and the price of the airtime is around US\$7.00 per Mb with a monthly subscription of US\$35.00. As with any airtime there is always a deal to be struck and so you should always see what is on offer as this is a very competitive market that has seen prices tumble to a fraction of where they were 10 years ago in order to compete with the growth of the terrestrial GSM networks.

Iridium

Iridium was the first hand-held satphone operator, operating 66 LEO satellites in a birdcage pattern around the earth. Because these satellites orbit every hour or so, it

is necessary for the system to perform some quite complex interspatial hand-offs to pass your call from one satellite as it sets over your horizon to the next as it comes into view.

Iridium terminals are hand-held and a little bulky compared to GSM mobile phones. As with Inmarsat there is little building penetration and so they cannot be used indoors or between tall buildings without the addition of external antennas.

This is a subscription-based service plus then a call charge per minute for calls to landline telephones wherever they are in the world.

Thuraya

Designed to complement existing GSM networks and expand usage beyond conventional network coverage areas, Thuraya's mobile satellite services offer a broad range of services that include voice, data, fax, short messaging and GPS through its dual mode handsets.

Thuraya has the fastest growing subscriber base of all the satellite networks due to its effective and reliable service, albeit with limited coverage. If you are operating within the coverage area and require voice and basic data services, then this should be your first choice. With two geostationary satellites the service is very robust.

Table 26.3 summarizes the relative merits of the various options available for communicating around the world.

The Internet

The Internet is rather like the road network but for information. It is a collection of public and private networks that are linked together using a set of protocols called transmission control protocols/Internet protocols (TCP/IP). The Web is the Internet with pictures. It is that bit of the Internet that exchanges multimedia information, pictures, sound and video using hypertext transport protocol (HTTP).

The Internet has transformed our lives and specifically our capability to prepare for and manage humanitarian and emergency projects. Cyber cafes, where anyone can gain access to the Internet, are available worldwide and enable anyone to gain access to vast amounts of data for educational, research or planning purposes or to share and develop ideas, good or bad. Real-time news is available through newspaper and news corporation sites, and it is possible to use the Web as a modality for telephone calls and talking heads VTCs, all for the price of a local phone call.

There are concerns about security on the Internet, especially if you are using local Internet service providers, but for practical purposes, the Web is a safe and reliable means of communications; it was after all designed to pass around nuclear secrets and it certainly beats telephones and the mail on both counts. The Internet can be used to communicate as well as to gather information. Services such as

Table 26.3 The relative merits of the various options available for communicating around the world

	Bandwidth ^a (kbit/s)	Capability	Time (s) to transmit one page of A4	Needs intact local infrastructure	Building penetration	Geographical coverage
POTS	15	V, D ^b	12	Y	N/A	++++
GSM	9.6	V, D	28	Y	Y	++
PMR radio	9.6	V ^c	N/A	N	N	++
VHF/UHF radio	9.6	V, D	32	N	Y	++
HF radio	9.6	V, D	32	N	Y	+++
Inmarsat Mini-M	2.8	V, D	89	N	N	++++
Inmarsat RBGAN	144	D	2	N	N	++++
Inmarsat BGAN	464	MV, D, VTC	1	N	N	++++
Iridium	9.6	V, D	32	N	N	++++
Thuraya	9.6	V, D	32	N	N	+++

V voice, MV multiple phone lines, D data, VTC video teleconferencing

^aOr equivalent for analog services

^bData with the addition of a modem

^cPublic service radio domestically or VHF for overseas links

Skype enable people to talk to anyone else across the Internet who have the same package with little or no additional cost. Conference calls and VTC are also common. Some Web sites include chat sites where people from around the world with a common interest can exchange ideas and develop new concepts. It is transforming the scientific process from one of the peer-reviewed articles and textbooks such as this to the one where ideas are posted on the Web and developed by discussion until a consensus is reached.

E-Mail

E-mail has transformed communications. Although it has been used by military and research establishments since 1973, it is only in the last two decades that it has become a mainstream method of communication. You can access your mail wherever and whenever you want and can reply at your convenience wherever you are. E-mail is generally asynchronous which can be a distinct advantage over the telephone.

E-mail also makes it easy to copy messages to a wide distribution at the click of a button. Its etiquette is much simpler than the traditional written form so that the reply to a message may be a single word. E-mail means less time and no paper and

is much quicker than traditional mail. However, this may lead to problems. Because it is so easy for people to copy messages, they tend to do it without really thinking with the potential for information overload amongst the recipients. It also tends to create an “adhocracy” out of a hierarchy as the normal management chains are short cut by “information” copies.

Telemedicine

The re-engineering of healthcare delivery by telemedicine is a recently developed concept. Telemedicine has been described as the use of communications and information technology to provide health care remotely. Within this definition, there is a broad spectrum of applications some of which are used in disaster situations; however, many others are not. Store and forward is a telemedicine term for clinical e-mail with attachments. In this context, store and forward attachments can include documents, digital photographs, X-rays or video clips. Clinically, store and forward can be used for up to 80 % of telemedicine consults and takes less specialist time and resources than traditional practice. Because distance ceases to be a consideration, store and forward consultations can go to the next available or more appropriate specialist rather than the most local. In time, store and forward will lead to a substantial change in the way medicine is practiced, but in the setting of a conflict or a catastrophe, it provides the vehicle for importing a whole range of expertise into the situation which would not otherwise be available. The same principle also holds for other disciplines such as engineering where the same communications system used to send clinical details and a photograph of a patient can also be used to send the engineering equivalent, say, of a damaged bridge. Administratively, digital photographs can be used in lieu of lengthy descriptions, and the technology exists now whereby a picture can be transmitted and discussed in real time by voice at the same time. White boarding, where the correspondents highlight features on the picture rather like sports commentators highlight a play can be a valuable adjunct.

Audio Teleconferencing

Audio teleconferencing is a cheap, efficient and underused medium, which enables any number of people to share in the same telephone call and to hold a virtual meeting. In its simplest form, it entails using an extension or desktop conference phone, but most teleconferencing utilizes a multipoint bridge into which participants can call on the same number at the same time and teleconference. Audio teleconferencing feels uncomfortable between people who have not met and, in line with traditional conferences, needs a good chair and degree of discipline. Most major telecommunication companies offer this service, and many also offer translation or transcription as an additional service. Although there is a slight premium over normal calls, the host can elect to cover the whole cost, ask participants to pay a local

call charge and cover the difference or ask them to pay for the whole cost themselves. Teleconferencing provides considerable savings in travel time and costs and will work with calls from abroad or from mobiles.

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Glossary

ATM Asynchronous transfer mode: a cell-based data transfer technique in which demand determines packet allocation. ATM offers fast packet technology and real-time, demand-led switching for efficient network resources

B-ISDN Broadband ISDN offering 30×64 kbit/s channels plus two network control channels. Total user rate of 1,920 kbit/s and often referred to as a 2 Meg link

BRI ISDN Basic rate interface allowing 2×64 kbit/s and 1×16 kbit/s channels to be carried over a single pair of copper wires. Through the use of bonding techniques, the 64 kbit/s channels can be aggregated to create more bandwidth

Broadband A term describing any network that can multiplex several, independent network carrier frequencies onto a single cable, thereby producing a high-data transfer capability

CODEC (COder/DECoder) A device that converts analog signals into a form suitable for transmission on a digital circuit. The signal is decoded back into analog form at the receiving end of the link

Ethernet A LAN and data-link protocol based on a packet frame. Usually operating at 10 Mbit/s, multiple devices can share access to the link

GEO Geostationary earth orbit. A satellite orbiting the earth at some 35,000 km and apparently static in the sky to an observer on earth

GSM Global System for Mobile Communications (originally it was the French, Groupe Speciale Mobile, but was changed as it became the global standard)

Inmarsat Now a private company offering global satellite services via a number of land earth station operators (LESO). Inmarsat was formerly a multinational cooperative with some 88 member countries until privatization in April 1999

Internet A group of networks that are interconnected so that they appear to be one continuous network

Iridium New generation satellite operator. First to launch hand-held satellite telephones (November 1998) with true global coverage using LEO satellites

ISDN Integrated digital services network is a switched digital network capable of handling an amalgam of digital voice, data and image transmission

LAN Local area network is a communication system that links computers into a network

LEO Low earth orbit satellite. Typically transiting the world at an altitude of about 800 km, just at the edge of space

LESO Land earth station operator. Usually operated by the national PTT, responsible for landing satellite traffic from space and distributing it to its destination

Packet A collection of bits, including the address, data and control information that are switched and transmitted together. The terms frame and packet are often used synonymously

PMR Private mobile radio such as that operated by the ambulance service

PSTN The public switched telephone network is the ordinary telephone network for switched access to local and long-distance services

Store and forward Clinical e-mail with attachments, not in real time

VTC Video teleconferencing link. Often referred to as video conferencing, this is the ability for a group of operators to be interlinked so as to share real-time conversation and video

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Chapter 27

Psychosocial and Mental Health Care for the Deployed Staff of Rescue, Professional First Response and Aid Agencies, NGOs and Military Organisations

Richard Williams and Neil Greenberg

Abstract This chapter is about understanding and meeting the psychosocial and mental healthcare needs of people who are staff of rescue, professional first response and aid agencies, NGOs and military organisations. We refer to them as “staff”. There is a plethora of terms used to describe conflict and natural and human-made disasters. In this text, we refer to all of them as “major incidents” as a shorthand term.

Keywords Psychosocial and mental health care • Deployed Staff of Rescue • Professional First Response and Aid Agencies • NGOs and Military Organisations • Pressure and Stressors • Resilience • Coping • Risks • Mental disorders • Training • Interventions

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Objectives

- To provide a summary of the main reasons why good psychosocial and mental health care for staff is vitally important to completing missions successfully as well as the wellbeing of the persons who are deployed
- To provide an introduction to the nature of stress and distress and the mental health consequences for staff of aid organisations of their deploying and engaging in work with the survivors of major incidents
- To provide a strategic approach to organising psychosocial support services for deployed staff
- To outline the plans, selection, preparation, training, management and support that staff require in order to develop and maintain their psychosocial resilience and detect as early as possible the possibility of more serious problems
- To enable commanders and team leaders to recognise their staff's short-term distress, which is common, and to know how to differentiate it from mental disorder
- To enable commanders and team leaders to provide prompt responses to the incipient mental disorders, which a small minority of staff develop, in order to treat people who have emerging conditions as early as possible
- To summarise guidelines for peer support for deployed staff

Introduction

The Imperative of Caring for Staff: Psychological and Physical Safety and Consistency of Organisations' Values and Ethics

This chapter is about understanding and meeting the psychosocial and mental healthcare needs of people who are staff of rescue, professional first response and aid agencies, NGOs and military organisations. We refer to them as “staff”. There is a plethora of terms used to describe conflict, and natural and human-made disasters. In this text, we refer to all of them as “major incidents” as a shorthand term.

While this chapter focuses directly on the needs of staff, we advise readers to read it together with Chap. 49, which considers the experiences and the psychosocial and mental health needs of people who are affected by major incidents.

Recognition is growing of the importance to humanitarian missions of all kinds of the topics that are covered in this chapter [1]. Table 27.1 summarises four strong reasons why governmental, humanitarian aid, clinical and military organisations should afford high priorities to developing and sustaining the psychosocial resilience of their staff and to responding effectively and in timely ways to their staffs' psychosocial and mental health needs.

Table 27.1 Reasons for prioritising psychosocial care for deployed staff

-
1. Keeping staff well in the face of their emotional labour and its risks for staff and survivors
 2. Promoting psychological safety of working teams and environments
 3. Promoting ethical and values-based practice
 4. Recognising the emotional needs of deployed staff that arise from threats to their security
-

First, is the importance of staff remaining well and/or receiving effective early care should they become unwell. Second, are the benefits to the organisations and to their work that accrue from them being good employers. They include the importance to achieving their primary aims of them running psychologically safe teams. The importance of organisations that espouse ethical and humanitarian principles acting with or on behalf of their staff in ways that are consistent with the values they apply to their external actions during major incidents is our third reason. Indeed, we take it as axiomatic that organisations, which deploy staff, acquire moral obligations for the wellbeing, health and welfare of the staff whom they ask to accept challenging missions. In our opinion, the consistency or otherwise between the values expressed by organisations' aims for beneficiaries and the values that are reflected in their care of their staff is an important aspect of their moral architecture.

However, our brief introduction about why psychosocial and mental health care for deployed staff are so important would not be complete if we did not face the fourth reason, which is the stark reality that healthcare missions may come under attack if they intervene in conflict zones. This risk and the reality pose potent stressors for deployed staff.

Each of these circumstances frames an important objective for organisations that deploy teams into the field. Next we examine these matters in a little more detail.

Emotional Labour and Its Risks for Staff

Working with people after they have been affected by major incidents is a very unusual job that makes all staff who do so vulnerable to stress and distress, and it may have consequences for the mental health of a smaller, but not negligible, minority.

In 1983, Hochschild defined the term “emotional labour” to describe “work done with feelings, as part of paid employment” [2]. We think that the importance of the concept lies less with the notion of payment and more in the inescapable ways in which staff in all humanitarian and caring roles take on the challenges of experiencing their own intense feelings that are related to witnessing, directly and indirectly, other people’s suffering. It is inevitable that all staff who work with the survivors of major incidents become embroiled in their lives, and the effects of events on them,

if only for short periods of time, and staff of military and aid agencies cannot restrict their actions and reactions to people's physical needs. All-too-often, this aspect of their work goes unrecognised.

Many health services have a long history of responding effectively to major incidents. Their staff are renowned for their resilience and resourcefulness under pressure. However, this work can be challenging and stressful for staff. The work involved and the collective sacrifices that people make while caring are described in the literature, and there has been much research into conditions that are associated with burnout [3–5]. Healthcare practitioners show remarkable resilience, but they are also at risk due to their repeated exposure to noxious events. Consequently, they need support in much the same ways as do the survivors. It is clear from the literature that much can be done to mitigate or moderate the risks falling on staff who intervene by attention to their personal needs and working environments through preparation before deployment, good leadership and care during deployment, and actions that are taken after team members return home.

The organisation People in Aid confirms that aid organisations “... rely a great deal on the expertise and experience of people. Evaluations of the sector's work consistently show that it is staff and volunteers that make the difference between effective humanitarian aid or development assistance and inadequate fulfillment of an NGO's mission”. It has produced a Code of Good Practice for managing and supporting aid personnel [6].

Our adaptation of its seven principles is that aid organisations should:

- Have human resources strategies that are integral to their strategic and operational plans
- Have policies and practices for staff that are effective, fair and transparent
- Provide good management and leadership of staff because these processes are key to organisational effectiveness
- Offer their staff effective consultation and communication
- Aim to recruit and select diverse workforces that have the skills and capabilities to fulfill the requirements of their organisations' commitments
- Promote the learning, training and development of their staff
- Take the security, good health and safety of staff as their prime responsibilities.

This chapter provides an overview of the evidence pertaining to how aid organisations can design and deliver care for their deployed staff to achieve a number of these principles by providing effective psychosocial and mental health care. We cannot provide a comprehensive account here. Nonetheless, we do provide an overview of how people cope with and respond to stress. This account should be read in conjunction with Chap. 49 because the contents of that chapter apply as much to staff of relief agencies as they do to the survivors who are directly affected. While we have endeavoured to keep repetition to a minimum, we have repeated certain points for amplification and ease of reading this chapter.

Crucially, this chapter focuses on providing a framework for actions that leaders should take before any disaster relief team is deployed, during deployment, and after the team has stood down and returned home.

Psychological Safety of Working Teams and Environments

We recommend that all organisations should strive to provide working environments for their staff that are as psychologically safe as the circumstances allow. In particular, psychologically safe environments are ones in which staff can and do ask questions and make suggestions about the best courses of action and the operational policies of the services in which they work without feeling that they have stepped beyond their legitimate roles or acted in ways that are not welcome. A psychologically safe environment should also include limiting exposure of team members to events, circumstances or experiences that are traumatic wherever and whenever possible. There may be, for instance, requests from aid teams to visit the sites of disasters out of interest or for better briefing and understanding. However, we recommend that visits should not be arranged unless there are clear and pressing needs for particular team members to be at those sites. This is because curiosity may lead to people being exposed unnecessarily to distressing situations, which may impair their health for no relevant gain.

Edmondson has described the construct of psychological safety, the processes of team learning, the role of team leaders and how these constructs are related [7]. She analyses research to show how norms, values, beliefs and practices arise in organisations to reduce the anxiety that people feel when they face uncertainty and, we argue, stress. She provides insight into how people's wishes to avoid declaring themselves as ignorant, incompetent, negative or disruptive become reasons why they avoid asking questions, asking for help or seeking feedback. She uses the term psychological safety to capture the degree to which people perceive their work environment as conducive to taking these interpersonal risks. She says that, "... in psychologically safe environments, people believe that if they make a mistake others will not penalize or think less of them for it. They also believe that others will not resent or penalize them for asking for help, information or feedback. This belief fosters the confidence to take the risks described ... and thereby ... gain from the associated benefits of learning". There is evidence that psychologically safe working environments are not only better for the wellbeing and welfare of the staff, but also less likely to result in errors of judgement or mistakes [8].

Edmondson argues "... creating conditions of psychological safety is essential to laying a foundation for effective learning in organizations". She finds that "Team leaders have a powerful effect on psychological safety" and places responsibilities on leaders for creating working environments that are as psychologically safe as is possible. She says, "The actions and attitudes of the team leader are ... important determinants of the team learning process" [7]. This requires leaders to be accessible, acknowledge fallibility, balance empowering other people with managing the tendencies for certain people to dominate discussions, balance psychological safety with accountability and other components of strategic and clinical governance, guide team members through talking about and learning from their uncertainties and balance opportunities for their teams' reflection with action.

Bleetman et al. advocate a similar approach to working in hospital emergency departments, which they style as "... one of the highest risk areas in health

care.” They say, “Emergency physicians have to assemble and manage unrehearsed multidisciplinary teams with little notice and manage critically ill patients. With greater emphasis on management and leadership skills, there is an increasing awareness of the importance of human factors in making changes to improve patient safety” [8]. They examine and draw on lessons learned from aviation, as does the parallel concept of psychological safety.

Bleetman et al. advocate the need for training in dealing with human factors in emergency medicine [8]. We think that, if that argument holds good for hospitals in first world environments, it should also apply in humanitarian operations. Furthermore, Edmondson’s work on psychological safety espouses an approach to leadership that we commend.

Thus, this chapter presents an approach to psychosocial and mental health care for deployed staff that not only takes opportunities to sustain their wellbeing and to provide mental health care when that is required, but which also contributes to promoting safe practice for patients.

Physical Safety and Insecurity of Deployed Services and Their Staff

While it is not the intention of this chapter to disillusion potential delegates for deployment, it is important that we are realistic; it is a truism that attacks on healthcare facilities and their staff occur when military and aid organisations deploy in situations in which there is conflict. We conclude that it is vital that aid and military organisations, and team leaders on the ground, prioritise psychosocial care for their staff in ways that acknowledge the risks they face.

Table 27.2 summarises certain of the types of attack on healthcare teams and their resources during conflict, and their effects on the physical safety, welfare and psychological safety of populations that are affected and the staff who are deployed.

These threats are supported by research [9]. They should be dealt with at several levels including international repugnance at violations of international humanitarian law and international human rights law when attacks of this nature occur. Indignation may lead to steps being taken at the highest levels to better identify the scale of these attacks and their consequences with a view to influencing governmental policies and practice.

However, there are also actions that can and should be taken by organisations that deploy healthcare staff and provide services. They include organisational and team leaders ensuring that they include security in their strategic, tactical and operational plans, reconnaissance, day-to-day management of services and in their leadership of, and psychosocial care plans for their teams. This reminds us that conflict, deprivation and poor security are interconnected. Both disaster relief and humanitarian interventions during and after conflicts have to face the imperative that is posed on deployed staff by endeavouring to create freedom from want and fear for affected people. It also sharpens our awareness of the importance of personal health and public health ethics and attention to sustaining clarity about the roles of humanitarian aid.

Table 27.2 Mechanisms of insecurity of healthcare teams in the field during conflict*Types of event*

Indiscriminate attacks leading to damage to healthcare facilities and injuries to their staff

Looting and destruction of healthcare facilities

Hostage-taking, kidnapping and detention of healthcare staff for material gain

Targeted attacks on healthcare services in order to:

- Influence how the facilities are used
- Persuade staff to treat certain groups of people
- Target the welfare of certain ethnic groups of people
- Attack community leaders who include healthcare staff
- Create a climate of fear as an aspect of terrorism
- Dissuade certain people from using healthcare facilities provided by external organisations and erode trust in the organisations that provide healthcare

Impacts of attacks on healthcare facilities and their staff

Threats to the health and safety of:

- The indigenous population
- Healthcare staff of both deployed organisations and indigenous services

Threats to human dignity

Threats to psychosocial wellbeing

Reduced access for affected populations of people to healthcare, education, food and water because the attacks may persuade staff of deployed organisations and indigenous services to withdraw

Disempowerment of affected populations

Reduction of the trust of affected populations in NGOs

Disillusionment and injury of deployed staff

Summary

Our core assertion is that it is vitally important to plan, design and deliver services that are as safe and effective as they can be and which are consistent with the aims and values that we have identified. This includes considering carefully the needs of deployed staff and this requires attention to:

- Sound strategic leadership, planning and management
- Effective tactical and operational leadership and management
- Messages from the evidence about psychosocial resilience and the importance of psychosocial support
- Evidence on the risks to the psychosocial health of staff
- Overt recognition of, and effective responses to the physical security risks associated with being a disaster worker

Overall, this chapter stresses the core importance of leadership in achieving each of these objectives. In this respect, the contents of this chapter overlap with, reinforce and are reinforced by a number of other chapters in this book.

However, in her recent MSc dissertation on her research into the staff care practices of humanitarian organisations based in Switzerland, Güss says, “There are

wide variations of staff care between organisations” and “Psychological support still follows a reactive approach and lacks adequate preparation of field staff and monitoring. Security training and management is neglected in the majority of organisations” [10]. Research shows that humanitarian aid workers experience significant worsening of their health during overseas missions and that they are at risk of experiencing violence, accidents and injuries. However, despite awareness of the risks, many staff engage in behaviours that could endanger their health. Therefore, this chapter makes practical recommendations for dealing with the gaps between theory, good intentions and practice.

We review a number of contemporary strategic and operational frameworks for providing effective psychosocial care for the deployed staff of aid and other organisations [11–20]. We have used them to underpin the coherent approach that we provide in this chapter (summarised in Annex A at the end of this chapter) and the aide memoire of checklists, which are in Annex B at the end of this chapter. Before we come to these matters, we offer a summary of the psychosocial effects of deployment on the staff of aid and military organisations.

Pressure and Stressors

We offer a short review of the nature of the psychosocial pressures that staff might experience during their work in conflict zones. Readers are referred to Chap. 49 for definitions and a general account.

The Stressors That Affect Deployed Staff of Health Care, Military and Aid Organisations

Staff who deploy to major incidents are likely to be exposed to stressors, which may be both intense and encountered rarely in day-to-day life. These stressors are:

- Inherently a result of the injuries and the needs of the people who are primarily affected and the consequential work that staff have to do.
- Not inherent in the jobs of the staff, but were present and not resolved adequately prior to or during deployment.
- The result of manufactured risk: deployed staff may be vulnerable to non-inherent risks that they or their employers create during their deployment.

The inherent stressors are sometimes referred to as primary stressors; they may be defined as causing stress that is “inherent in particular major incidents, disasters and emergencies and arising directly from those events” [11, 12]. The non-inherent stressors and manufactured risks are called secondary stressors by some researchers.

People who are affected by major incidents are highly likely to suffer emotional and/or physical pain and distress. They, and their relatives, may undergo

great upheavals and short- and long-term changes in their lifestyles as a consequence of their experiences, injuries, physical care, recovery and rehabilitation, and the effects on their families that extend and continue beyond the injuries and illnesses and adversity they experience. Dealing with these situations can be challenging, may tax staff of deployed agencies and can result in high levels of emotional labour that may not be fully recognised. While staff may gain satisfaction from what they do, they are also likely to become tired and to experience frustration with facilities and systems that impair their ability to function optimally. They may also experience highs and lows about their own performance and contributions.

Secondary stressors, by contrast, are circumstances, events or policies that are indirectly related or “non-inherent and consequential” to each emergency, catastrophe or conflict [11, 12]. “Typically, the term is used to describe situations that persist for longer than the events. Some secondary stressors are entities in themselves, whereas others are unresolved and persisting primary stressors. They can include problems such as infrastructure failure and challenges to returning to normality and repairing structures”. They may also include the impacts of policies and plans made prior to events that inadvertently limit people’s recovery or adaptation. However, leaders should be cautious about ascribing the stress that staff experience as, necessarily, resulting from their deployments, what they have witnessed and the work they have done. Bonanno et al. have shown, for example, that a small minority of deployed soldiers has high levels of stress prior to deployment, which tends to improve during their deployments and subsequently [21].

Table 27.3 provides examples of inherent and non-inherent stressors.

Table 27.3 Examples of inherent and non-inherent stressors for staff

<i>Inherent stressors</i>
Exposure to the disease or injury
Exposure to on-site dangers
Exposure to survivors’ suffering and their relatives’ stories
Feelings of powerlessness – inability to provide help at the level and at the time that it is needed
<i>Non-inherent stressors</i>
Lack of skills or training needed to do the job
Lack of materials (supplies, equipment) needed to do the job
Poor role definitions and unclear expectations
Poor organisation of work
Lack of support at work
Unnecessary agency policies and practices
Unnecessarily poor conditions
Poor scheduling of work (long hours, few breaks, lack of leave time)
Lack of opportunities for recreation
Arbitrary leadership and/or management practices
Conflict and mistrust within and between teams
Poor communications (within teams, agencies and with families)

Other non-inherent stressors are universal matters that relate powerfully to the wellbeing of staff of all organisations whether deployed or not. Research has shown, for example, that there are seven general factors that influence the physical, psycho-social and mental health of staff in all organisations [22]. They are:

- Perceived job control
- Career development
- Workplace climate or culture
- The job and workload
- The home-work interface
- Role clarity
- Relationships at work

All of these matters may be accentuated by staff's experiences of major incidents. Their deployment may highlight each one of these features because of the role and environmental changes that they experience, which may be sudden and profound, and their absence from the jobs and roles they have at home. Staff may, for example, worry about their reintegration into the teams at home that they have left and the impacts of their absence on their popularity with colleagues and their careers at home.

Manufactured risks include staff engaging in excessive drinking, dangerous driving and casual sex. The impact of manufactured risk can be significant and some of these risks may continue after deployed people return home [23]. Research on military personnel has highlighted that personnel of armed forces are twice as likely to die on the roads in the year after returning from deployment [23]. Research on humanitarian aid workers has shown that on return from the mission:

- One third reported worse health on return.
- One third failed to follow recommendations on malaria prophylaxis.
- 40 % reported that the mission was more stressful than expected and that this was mostly due to their working environments.
- Nearly one third reported having engaged in casual sexual relationships [9].

Sometimes, staff may experience their absence from home and their ordinary jobs as relieving them of some of the moral and other limitations on their conduct that apply in more ordinary circumstances. However, manufactured risks also arise because staff who have been working in higher-threat environments feel the need to be distracted, by their engaging in risky conduct, in order to relieve their boredom and cope with excessive demands or in attempts to adapt to grossly unusual working and living environments and substantial absences from home. Another mechanism for manufactured risk, particularly for those who have deployed for extended periods of time, is the perception that one is invincible. This situation may be associated with cognitions such as, "If I can survive working in ... , then I can survive anything". This may be an adaptive coping mechanism while deployed, but is not so after returning home.

Planners and leaders must be able to recognise the stressors that may impact on deployed staff and plan and take action to mitigate them. This is an important item for paper and field reconnaissance. Planners and leaders should anticipate the inherent

stressors and include actions in their plans to mitigate or moderate these risks so far as is possible. They should also take active steps to reduce the non-inherent stressors to an absolute minimum and see their responsibilities as including resolving new non-inherent stressors as they arise during deployment. Together, inherent and non-inherent stressors create uncertain and challenging circumstances, which make demands on the fortitude, flexibility and resilience of staff. They, thereby, create a challenge for effective leaders who, morally and legally, have a duty to care for their staff.

The Responses of Staff to the Stress Caused by Major Incidents

The General Responses of Deployed Persons

Preparing for deployments, being deployed and returning from deployments are all stressful. All staff may experience stress arising from inherent and non-inherent sources. They may also be affected by a variety of other secondary stressors. This section explores in outline the spectrum of people's responses to those stressors.

Their responses cover a spectrum that is similar to the effects on the people who are directly affected by major incidents [13, 24, 25]. The psychosocial and mental health consequences for staff include outcomes that are summarised by Table 27.4.

In addition, staff in humanitarian settings may develop new episodes of previous neuropsychiatric disorders, because major incidents impact on the social conditions that shape mental health, through people's exposure to poverty, threats to human rights, domestic and community violence, and changed social conditions. This makes the point that how people respond to major incidents turns on their previous and current experiences and varies with their life narratives. However, good preparation, leadership, camaraderie and post-deployment support can significantly offset the risks associated with working in humanitarian settings. Many people who have suffered with mental health problems previously can perform well in highly pressured environments. Thus, simply having a history of mental ill health should not, in

Table 27.4 The psychosocial and mental health consequences for staff of their exposure to conflict and catastrophes

Psychosocial resilience: This trajectory or pathway describes staff who sustain good emotional, social, psychological and mental health despite their exposure to significant adversity.

Importantly, however, this response includes staff experiencing distress temporarily before they spring back to full capability

Non-disordered psychosocial distress: Some staff experience stress and distress that is not transient and is of longer duration though they may show little dysfunction through their work or relationships

Grief

Increased prevalence of mental disorders

itself, preclude someone from being a humanitarian aid worker. Depending on the nature of a person's past condition and its temporal relationship to the deployment, it can be advisable to (a) seek a mental health professional's view on that person's readiness for deployment and to (b) discuss any concerns frankly with the person concerned.

Deployed Persons' Responses to Specific Events or Agents

It is difficult to predict accurately how a particular person will react to deployment. What is known is that diligent selection of staff for a particular mission, providing high levels of leadership before, during and after deployment, and ensuring a high degree of psychosocial support at all times can minimise the impact of deployments of any sort upon the mental health of deployed people [26]. Next, we discuss two specific events, flooding and emissions of potentially damaging invisible agents, to highlight pertinent issues.

Floods

Frequently, flooding causes severe damage to local infrastructure and the primary stressors are sustained over extended periods, even after the water has receded, and throughout the lengthy period while the damage is repaired. Consequential secondary stressors may result as societies struggle more or less effectively to cope with the primary event and restore communities, and they result in the substantial and long-lasting impacts of flooding.

The secondary stressors also result in extended patterns of impact on the people who are affected. They may have enduring, substantial and, possibly, rising psychosocial and mental health needs that continue well beyond the time it takes for the flood waters to subside. They, and the staff involved, experience frustrations and limitations of the response capacities of services that are routinely available to cope with the extra needs and demands made by communities as a consequence of flooding.

Emissions of Invisible Agents

Our second example is of the psychogenic illnesses that people may experience after possible emissions of invisible, toxic, agents, which may be released accidentally or deliberately by terrorists. There is potential for vast numbers of people to fear that they have been affected and seek assistance from medical and support services and this is particularly so when the symptoms of anxiety are similar to the prodromal symptoms produced by agents of this kind, which may be the case. The Sarin gas attacks in the underground railway in Tokyo killed fewer than 20 people,

but more than a 1,000 attended hospital shortly after the attack with symptoms of what could have been Sarin gas poisoning. The majority was anxious rather than affected physically by the agent.

Psychosocial Resilience and Coping with Stress

The Nature of Psychosocial Resilience

Chapter 49 provides a picture of psychosocial resilience and defines its two principal components: personal and collective psychosocial resilience. Briefly summarised, we use the term to refer to the sum of the processes that people use to help them to deal successfully with adversity. It applies as much to staff as it does to the people who are directly affected by events and adversity. The majority of staff experience psychosocial demands that stem from the nature of their work with survivors of major incidents, the circumstances in which they do that work, and the changes in their lives.

Cumulatively, research has shown that there are five core qualities shown by resilient people [27]. The two most powerful features are the ability of people to accept and use social support and its availability. These features may have greater effects than the dose effect of exposure to events. Thus, what happens after a potentially traumatic event to people's mental health is likely to be as important as the nature of the incident.

Resilient people tend to have greater abilities to accept quickly the realities of the situation in which they find themselves without being overly optimistic or catastrophising. They also tend to have belief in themselves, supported by strongly held personal values, and the ability to improvise. Elsewhere, one of us has written extensively about the nature of the personal and collective components of psychosocial resilience in scenarios involving humanitarian aid and conflict. The other has written extensively about resilience in military personnel. Additionally, research illustrates the important contributions to our understanding that come from social psychology [27–31].

In summary, Southwick, Litz, Charney and Friedman have said, “... resilience develops as a set of abilities and processes including positive attachment, the capacity to attract social support, self-motivating rewards [that are] critical for mastery and self-efficacy [,] effective modulation of the stress response, and successful monitoring and regulation of emotions” [31, p. xiv].

Coping with Stress

Research in the last decade has provided considerable information about how people cope with pressured situations and the stress, which may result. A survey carried

out 5 years after the Bosnian war found four coping mechanisms among adolescents [32]. They are likely to apply to people of all ages and are:

- *Influencing*: efforts made by people to directly influence the stressor or their reactions to it (consisting of emotional expression, problem-solving and emotional regulation).
- *Adapting*: attempts made by people to adapt to the stressor or their reactions to it (comprising acceptance, distraction, cognitive restructuring and positive thinking).
- *Disengaging*: people's coping by avoidance, denial and wishful thinking.
- Developing *involuntary stress responses*: some people suffer poor coping that includes their arousal, rumination, intrusive thoughts and impulsive actions.

Usually, the first two are positive mechanisms. Depending on the circumstances, the third may help people to cope temporarily, but is to be avoided in the longer term, and the fourth is the least helpful to people's responses and recovery.

Rumination is a potent mechanism by which life events and adversity may lead to people experiencing stress. However, that link can be challenged positively by social support. Rumination is linked with low self-esteem and pathological mood states. Dealing with rumination is an important consideration when responding to the needs of people who do become unwell as result of their experiences, and it is a focus for cognitive behaviour therapy. These findings emphasise the importance of recognising and providing support for people if they get caught in circles of nonprogressive thinking and worry, and especially so if that should progress to persistent rumination.

Mental Disorders

The implication of the evidence from research and personal experience about the psychosocial needs of deployed team members and the risks to their mental health is that their employers can be somewhat reassured that the personal and collective psychosocial resilience of staff is the most likely, long-term, anticipated outcome when staff are faced with adversity. However, such a positive outcome is far from inevitable and, therefore, employers should design and implement a model of training and care for staff, which should provide an evidence-informed and values-based approach to mitigate the risks they face and sustain their resilience.

Despite the great resilience of deployed staff, some of them are affected by their duties and experiences, and they may show increased prevalence of mental disorders during deployment but, usually, afterwards. Indeed, their risks remain for some time after return from deployment though there is much that employers and team leaders can do to reduce the risks. The disorders that are most common are:

- Anxiety disorders (including, for example, post-traumatic stress disorder [PTSD])
- Mood disorders, particularly depression
- Substance misuse

In their meta-analysis of research on the behavioural consequences of terrorism, DiMaggio and Galea show that prevalence estimates for PTSD vary greatly and that the results turn on who is being studied, by whom, where and at what interval after the event. There are suggestions that terrorism is associated with higher risks of psychopathology and that rescuers have rates of PTSD that fall between the rates measured in survivors and the general population [3]. Prior psychiatric diagnoses are strongly associated with subsequent PTSD. We emphasise, however, that PTSD is not necessarily the most prevalent disorder that staff may suffer though it is the most studied condition.

The Risks to Staff

Chapter 49 provides a more substantial account of the risk factors for people who are exposed to major incidents developing mental disorders. This section covers risks that are specific to deployed people.

Staff tend to experience a greater impact on their psychosocial and mental health when they are faced by stressors after major incidents in which:

- Children, colleagues, older people and/or disabled people are involved
- There has been death
- They feel they should have done more
- They perceive that they have insufficient support from colleagues, families and friends
- There is lack of actual support from colleagues, families and friends
- When the incidents in which they are involved follow other stressful events [12, 13].

In addition, there is evidence from research on military populations showing that deploying with a team with which a person is unfamiliar, and having perceptions of high risk to self and feeling unsupported on return from a mission are risk factors for higher rates of developing mental disorders as a result of team members' exposure to major incidents [29, 33]. Health personnel in the military appear to be at slightly higher risk compared to their combatant colleagues. Conversely, team cohesion and effective leadership are associated with lower rates of team members developing disorders [29, 33].

Distinguishing Distress from Disorder and the Trajectories of People's Responses During Deployment

Chapter 49 makes the point that the experiences that people have during major incidents are similar to the symptoms reported by people who suffer with anxiety disorders. However, it is important that people who are understandably distressed and

anxious are not regarded as unwell or failing to cope or adapt, and this is particularly so if their reactions:

- Are proportionate to the stress
- Diminish, with social support, over a short time
- Are not associated with professional, social or personal dysfunction [34]

Another important way in which to distinguish staff who develop mental disorders as a consequence of their deployment from those people who remain resilient or who suffer distress that is not of diagnostic severity is provided by research on the trajectories of resilience and symptoms that they suffer over time. Norris et al. have researched this approach as have Bonanno et al. [21, 35].

Recently, for example, Bonanno et al. have reported longitudinal research on military service personnel who have been mobilised to Iraq or Afghanistan [21]. They show four trajectories that emerge from statistical analysis of the results. The majority of personnel (over 80 %) showed a small but significant increase in stress from before their deployments, through their deployment(s) and to a second follow-up later, but they remained stable and resilient. Around 8 % had moderate stress levels prior to deployment, but showed significant improvements with time, while between 4 and 7 % (depending on the numbers of deployments) had low stress levels prior to their deployment but worsening and chronic stress symptoms that reached diagnostic levels at follow-up. The implication of this research on military persons is that most of them are affected to a degree by their deployment. The vast majority suffers pressure that is amenable to social support, but do not become ill. At the other end of the scale, less than 10 % develop chronic stress, anxiety and depressive disorders as a result of their deployment.

This research relates to a particular population of people. While it may not apply in the same way to staff who are deployed in support of NGOs on humanitarian operations, it does offer important lessons that are worthy of consideration about how we distinguish people who experience distress from those who develop disorders relating to their work in hazardous circumstances. It emphasises the vital importance of psychosocial resilience, the need for more longitudinal research studies and the importance of realising that the lasting effects on wellbeing and mental health continue to be manifest, or may not occur until well after staff's deployments end.

Responding to the Psychosocial and Mental Health Needs of Deployed Staff

Our conclusion is that all staff of NGOs and military personnel require psychosocial support. However, when informal, non-professional support does not help, staff who continue to have symptoms, which may be those of an emerging mental disorder, require timely and effective assessment and, in some cases, referral for mental health care.

This means that leaders should be familiar with the importance of distinguishing acute stress and non-disordered distress of longer duration from disorders. The former may be a part of a resilient pattern of response if people's experiences of

distress are temporary and not associated with sustained dysfunction. They should understand the rudiments of what is involved in making the distinction and their medical and/or healthcare advisers should have a more substantial knowledge and capability in this domain.

Additionally, they should be aware of the importance of:

- Providing effective, supportive leadership
- Offering psychosocial support through the ways in which they manage their teams
- Continuing to follow up after deployed staff have returned home by providing them with social support and effective responses to their psychosocial needs

Training for Deploying Staff of Aid Agencies, NGOs and Military Organisations

In 2011, the first author's team completed research on the needs and preparations to meet those needs by education, training and continuing support of staff in the National Health Service in England whose work is to be first responders to emergencies. There are some similarities between the subjects of that research and the work they do and the roles of aid agencies, NGOs and military organisations. Also, the conditions in which the staff of these organisations do their work are very varied. Therefore, we think that the findings from this research conducted in the UK are likely to be of at least some relevance to the training needs of staff who deploy to places where the infrastructure is poor whether due to abiding social conditions or the effects of major incidents. They provide stimulation for thinking and preparations made by leaders of deployed teams and aid agencies, NGOs and military organisations when they formulate training curricula and directives. They fit with the strategic and day-to-day leadership frameworks that follow.

The research found that clinical staff of ambulance services believe strongly that initiating psychosocial care for survivors is an important and necessary part of their work [36]. On the basis of our experience, we believe that many deployed staff of aid agencies, NGOs and military organisations hold similar views. Notions of this nature are inherent in the hearts and minds policies of engaging with people who are affected by events that is included in the philosophies of modern military engagements.

However, the ambulance clinicians felt ill prepared for their work with the psychosocial needs of people who are distressed. Nonetheless, the perceptions of the researchers of the ambulance clinicians whom they met were that they seemed to deal rather better with the psychosocial needs of their patients than the limitations of their training in this domain might suggest. This research showed that ambulance clinicians are very aware that their patients' needs for physical health care occur in a social context and that the emotional and supportive responses of family members and other people contribute to their psychosocial wellbeing and should be addressed.

The recommendations made by the subjects of the research in the UK include their strong consensus on the education and training on psychosocial topics and

Table 27.5 Knowledge and skills that ambulance clinicians perceive themselves as needing*Communication skills*

How to communicate in order to establish good rapport and provide reassurance

How to use body language to create reassurance and trust

Listening skills

How to communicate with people who are bereaved

Methods for defusing hostility and anger

Assessment skills

How to conduct a brief assessment of survivors' psychosocial needs

How to distinguish distress from disorder

Specific skills for meeting the psychosocial needs of sick or injured children

Dealing with distressed children

How to respond to the parents of injured or sick children

Skills in dealing with families and other persons

How to deal with distress in the relatives of survivors

How to deal with distress in bystanders

How to manage other emotional reactions of people in survivors' communities including ways of involving them appropriately in the psychosocial responses that are required

skills that the ambulance clinicians would value. They include knowledge about the topics and skills that are summarised in Table 27.5.

The ambulance clinicians who were the subjects of this research also recommended strongly that their psychosocial needs should be better recognised and that they should be assisted by employers to develop collective, group and team mechanisms for their support. They focused on skills required by teams to:

- Recognise team members who are experiencing considerable stress (self-assessment and for colleagues)
- Create peer support schemes
- Provide physical space and opportunities for peer support

The remaining sections in this chapter deal with providing responses to support and, if necessary, intervene to assess and treat staff.

The NATO Model of Care and Its Implications for Psychosocial and Mental Health Care for Deployed Staff

A Stepped Approach to Employing Organisations, and Team Leaders, Respondes to Team Members' Needs for Psychosocial and Mental Health Care

Research findings are consistent with broad opinion that staff cope better during deployment and recover more swiftly afterwards if they are confident about the

overall plans that are in place for their core tasks and if they perceive themselves as being psychosocially supported. Our work shows that there are two main tasks for employing organisations and team leaders to integrate into their plans for preparing and sustaining teams during their deployment and caring for their members after their deployments are concluded [11–13, 37]. The tasks are providing:

- Psychosocial support for and care of deployed staff of aid agencies, NGOs and military organisations, which consist of:
 - Building and sustaining the psychosocial resilience of team members
 - Providing psychosocial support for all team members, and higher intensity, short-term support for staff who become stressed or distressed
- Providing mental health care for the staff of aid agencies, NGOs and military organisations, who may be developing a disorder, which consists of:
 - Providing more substantial and continuing psychosocial care
 - Arranging mental health assessments and interventions for team members who need them

There is some emerging evidence, albeit of mild strength so far, that people who receive good psychosocial care are more likely to recover if they do develop a mental disorder. However, while this evidence is modest, it does reinforce our opinion that mental health care, if and when required, should build on a platform of good quality psychosocial care that is available to all deployed staff.

All-too-often, employers' and leaders' plans focus on the deployment itself, but do not focus sufficiently on planning and preparing teams. Furthermore, when deployments end and members disperse, the responsibilities of employing organisations and leaders for the psychosocial wellbeing of team members do not close until further time has elapsed.

These tasks suggest a stepped model for approaching these longitudinal requirements, which titrates responses according to team members' needs. The sections that follow outline a stepped approach that is consistent with NATO's guidance.

The Principles of Psychosocial Support for and Care of Deployed Staff

The principles of psychosocial care are based on the evidence we have presented thus far, but also on the recommendations of Shalev, "Early interventions in communities suffering mass trauma should consist of general support and bolstering of the recovery environment rather than psychological treatment" [38]. There are two approaches to supporting staff to sustain their resilience, which are drawn from evidence in the domains of personal and collective psychology. Leaders are advised to create plans to support team members that draw on both sources.

Lessons from Personal Psychology

Practice should focus on the principles formulated by Hobfoll et al. relating to personal psychological tasks [39]. Our version of them is:

- Helping people to normalise their experiences while being aware that some people do develop a disorder
- Enabling people by providing social support
- Providing reflective listening and honest, accurate and timely information
- Helping people to restore their agency and perceptions of themselves as effective persons
- Enabling people to seek further help.

Lessons from Collective Psychology

It is clear from recent research just how important to people's recovery from major incidents are their social identities and social support [27, 30]. Plans to provide psychosocial support should build on principles derived from research into collective resilience and the evidence provided about the concepts of social identity and psychological safety. They indicate that there are important roles for employers and team leaders in organisational planning and team-orientated actions to sustain their staff [7, 16, 40]. They should:

- Attend to culture at work: employers should be aware of, and endeavour to prevent their staff from developing, and plan to assist staff to mitigate their developing acute stress by taking active steps to develop the collective psychosocial resilience of staff teams while encouraging each member of staff to maintain his or her own personal resilience.
- Provide psychologically safe environments in which, for example, staff can ask questions and make suggestions about the best courses of action and the operational policies of the services in which they work.
- Build and maintain teams that support development of trust and mutual support.

Taken together, these principles mean that employers and team leaders should focus actively on the items in Table 27.6.

The Principles of Psychosocial and Mental Health Care for Deployed Staff

Our philosophy for psychosocial and mental health interventions is the PIES model that has been developed by the military. This approach is based on providing services that offer:

- To maintain the *proximity* of team members to the work and environment in which they are involved albeit with a lighter load while they are distressed

Table 27.6 Actions for employers and team leaders to develop psychosocial care for deployed staff based on principles from personal and collective psychology (Copyright R. Williams, 2012. All rights reserved and reproduced with permission)

Focus on good leadership by:

- Ensuring that planning, strategic leadership and management are good
- Providing good day-to-day leadership, management, supervision, information sharing
- Providing clear expectations of team members and transparent and realistic standards for practice

Reduce inherent stressors so far as that is possible

Plan to recognise and intervene to mitigate non-inherent stressors

Provide training to enable staff in discharging the psychosocial aspects of their work even if they are not the main foci of their roles

Provide social support, which includes providing:

- Unforced sharing of experiences
- Informal peer support
- More formal opportunities for peer support
- Opportunities for team members to remain in continuing contact with their families

Base interventions for staff who are more than mildly distressed on the principles of psychological first aid and provide access to more specialised services that are related to need

Take active steps to recognise the threats to the security of staff and healthcare facilities and to deal with them as effectively as possible

- *Immediacy* of response
- *Expectancy* of recovery
- *Simplicity* of responses

Contemporary research shows that military personnel who are managed in accordance with the PIES principles are very substantially more likely to remain in service and have good outcomes than those who are not [41].

Furthermore, there is emerging evidence of the importance of social support not only as a core part of psychosocial care but also as a core component of mental health care. There is some provisional evidence that founding a comprehensive approach to effective mental health care on a platform of psychosocial care in which that care is offered alongside effective treatments for mental disorders is effective in preventing and treating PTSD and reducing its long-term effects [42].

A Model of Psychosocial Support and Care for Deployed Staff

Table 27.7 summarises a stepped model of care, which is intended to show how organisations can implement NATO's six steps for staff who are deployed as well as, importantly, during their preparation before departure and after their deployments have ended [11–13]. It provides a framework for implementing the lessons from research evidence and experience that are summarised in this chapter.

A more detailed version of this six-step model of care is in Annex A at the end of this chapter. The next section in this chapter provides more information about

Table 27.7 A six-step framework for providing psychosocial care for the staff of humanitarian aid and other responding organisations [11, 12]

Step	Type of action	Core task	Nature of the actions
Step 1	Steps 1, 2 and 3: developing and sustaining the collective psychosocial resilience of teams	Strategic leadership and management	Plan and review the psychosocial support, training and interventions required by staff well before any events occur Planning, leadership, management and training sustain services and promote teamwork and therefore help to prevent unnecessary anxiety for staff by creating confidence in the plan
Step 2		Operational leadership, service management and setting standards for practice	Translating plans into action requires excellent management. Plans should be templates that are used to initiate services, which are adjusted later to fit better with events as they unfold. This requires good intelligence, leadership and review Develop the collective resilience of staff (e.g. through team building and effective training)
Step 3		Day-to-day leadership and management of staff and services	Provide a psychosocially safe working culture and environment, good real-time supervision and social support for staff Ensure the psychosocial welfare of all people involved directly with delivering any response to the conflict or catastrophe. Risks to psychosocial wellbeing can be minimised by planning and implementing good management procedures and by ensuring that staff have adequate supervision and access to advice
Steps 4, 5 and 6	Step 4: personal psychosocial care	Psychosocial and mental health care for certain members of staff	Occasionally, members of staff may develop distress that is, most usually, short term, but, less often, temporarily disabling or of longer duration. A much smaller number may develop more substantial problems with their mental health
	Steps 5 and 6: personal mental health care		Therefore, facilities should be available to support staff who are distressed (Step 4) or to enable access to mental health care (Steps 5 and 6) according to need by providing appropriate psychosocial support, and pathways to mental health care in the few instances in which it is anticipated that the latter services are required <ul style="list-style-type: none"> • The stepped approach should include providing: • Supporting interventions that are based on the principles of psychological first aid (Step 4) • Screening, assessment and intervention services for people who do not recover from immediate and short-term distress (Step 5) • Access to primary and secondary mental healthcare services for people who are assessed as requiring them (Step 6)

certain of the interventions that are available to teams and team members. Thereafter, this chapter provides a framework for action for team members and a commentary on practical considerations for team members and their leaders.

Interventions

Psychological Safety, Workplace Culture and Teamwork

The construct of team psychological safety describes a shared belief within a team that it is safe for interpersonal risk taking. There is evidence that in all circumstances, but especially in challenging situations, psychological safety is important to successful functioning of teams.

Team leaders have challenging roles and responsibilities for their staff that are even greater in the improvised working conditions in which aid staff and military organisations work after catastrophes and during conflict. These circumstances emphasise the importance of front-line leaders continually clarifying the content and meaning of their teams' goals and remaining open to input from other team members about ways in which goals must be modified to meet new changes in their teams' environments. This means allowing team members the latitude for innovation while providing the structure needed for learning. This requires enough structure to ensure inclusiveness and teamwork without restricting the spontaneity and creativity that can produce unexpected synergies (i.e. structure without rigidity). It means creating a climate of psychological safety that allows people to feel safe when they take risks, while also setting high standards (i.e. safety without complacency).

Psychological First Aid

Chapter 49 contains a more substantial account of psychological first aid (PFA). It is not a single intervention or treatment, but is an approach that is designed to respond to people's psychosocial needs after major incidents which comprises of a number of elements [14, 23, 24]. It applies to staff and their families at home as well as to people who are directly affected and their families.

PFA is an approach that is intended to reduce people's initial distress, enhance their coping and functioning in the immediate aftermath of traumatic events and foster their adaptive functioning. PFA underpins all levels of care that are described in the NATO model [13]. PFA is entirely compatible with the approach recommended by that guidance. It is commended as the core for approaches taken in local plans for staff care.

In addition, staff of aid agencies, NGOs and military organisations may find helpful in their work the principles and practices of the CALMER model of PFA, which was developed and tested by the British Red Cross [16]. It is described in Chap. 49.

Peer Support for Team Members

The aim of peer support is to ensure that staff are prepared to cope with long-sustained demand. It provides a platform for PFA for staff that is sensitive and responsive to their needs before, during and after emergencies. The International Federation of Red Cross and Red Crescent Societies (IFRC) identifies the following advantages of more formal peer support programmes [17]:

- Support is provided by someone who knows the situation
- Assistance can be provided in a short period of time
- Prompt peer support may prevent other problems from arising
- People under stress may need short-term help, but most of them do not develop major psychiatric problems
- Peer support helps people to develop their personal coping skills

Recently, an authoritative Australian academic organisation has provided guidance on developing peer support programmes. Its recommendations were derived from qualitative research that is based on the opinions of experts. The recommendations cover the roles, selection and training of peer supporters [15]. They include:

- Having clear goals for peer support
- Identifying colleagues who may be at risk and facilitating their pathways to professional help
- Peer supporters being selected from members of the target population on account of their experience and the respect of their peers
- Peer supporters being trained, having access to support and having their work evaluated

Trauma Risk Management (TRiM) is an example of a well-used peer support process, which meets this guidance and the PIES approach.

Trauma Risk Management

In the late 1990s, the Royal Marines Commandos, the UK's elite amphibious troops, began to establish a traumatic incident management process that is attuned to the close-knit culture of that force to meet the needs for personnel to remain occupationally effective in highly challenging conditions [18]. The system is known as TRiM [43]. It was developed before the guidelines of the, now, National Institute for Health and Care Excellence (NICE) for managing people were published in 2005 [44]. The methodology of the TRiM system is in keeping with what NICE later suggested as best practice.

TRiM is a psychological first aid process that is delivered by TRiM practitioners. They are non-medical personnel trained to monitor people who are exposed to

potentially traumatic events in order to assess what support, if any, they might need. Importantly, the TRiM process aims to promote organisational resilience by not assuming that people will become ill. Instead, personnel identified as suffering with early, post-incident, psychosocial reactions are provided with supported management from within their subunit in a timely fashion. Both managers and TRiM practitioners reinforce the normality of early psychosocial experiences and engender an expectation of recovery.

TRiM includes practising a highly useful and adaptable set of tools. Thereby, it provides organisations, which deploy personnel to high-threat locations, with mechanisms to detect early difficulties in staff who have been exposed to major incidents. TRiM practitioners are ideally placed to provide, or at least arrange, early support and to signpost to it those people who might need further help. Now, TRiM is used by a number of UK emergency services and also by other organisations, such as media companies and diplomatic services, which operate in hazardous locations.

Practical Considerations

A Framework for Action for Employers and Leaders

This section provides a systematic approach for implementing action to achieve the agenda set by this chapter. It is based on the four dimensions and three temporal domains that have been identified by the Antares Foundation and which have been tested in healthcare organisations in emergencies [12, 13, 19]. The dimensions, as adapted for this chapter, are:

- Identifying and responding to the needs of particular staff members whereby each member of staff is encouraged to maintain his or her own resilience
- Building teams to develop trust and mutual support
- Agencies selecting managers and professional leaders on the basis of their abilities to maintain team cohesion, and, then, providing them with training on monitoring team members' stress and providing support, as needed
- Agencies analysing internally, and together with other agencies, the strategic and operational challenges that organisations, departments, teams and staff may face when staff return home after their deployments to deliver more ordinary services

The three temporal domains are:

- Preparation and planning before deployment
- Actions taken during deployment
- Actions taken to promote transition back to ordinary circumstances and to promote recovery of services and their staff after deployments have ended

The Responsibilities and Actions of Employers, Deployed Staff and Leaders

Employers should create an agenda for good practice in preparing, selecting, supporting and caring for their staff by using for guidance the principles from *People in Aid* and the contents of this chapter [6].

The approach provided by the six-step model of care that we espouse in this chapter (see Table 27.7 and Annex A) should help leaders to create a table for each step that has the dimensions on one axis and the temporal domains on the other. They should only need to create such a series of tables once because the general principles should apply to all deployments. Subsequently, these tables could be used by leaders as aide memoires for each deployment to which they can add items that are specific to the team members, mission and circumstances of each deployment.

This section summarises core actions according to the temporal domains and introduces the checklists in Annex B at the end of this chapter that are intended to assist team members, team leaders and organisations. They are not comprehensive, but provide reminders of key questions, dimensions and topics for action that we have introduced in this chapter.

The three phases of: preparing for deployment; dealing with the realities during deployment; and adjusting to coming home after deployment are covered in Annex B at the end of this chapter. Leaders should be aware that discharging their roles and responsibilities requires a substantial level of psychological mindedness.

Preparing for Deployment

The important matters prior to deployment include planning, selecting teams, aligning the expectations of employing organisations and team members to the realities of deployment, personal and team briefings and providing personal and team training for team members before they leave. These actions help to build the personal resilience of team members and collective resilience and trust within teams. Employing organisations and team leaders should encourage team members to prepare family members practically and socially for their absences. They should put their affairs in order, write a will, ensure the validity of insurance policies and prepare themselves and close relatives for separation.

It is difficult to give firm advice in this chapter about selecting team members because the evidence on psychosocial criteria about who is likely to cope well with deployment is not conclusive [11, 18]. However, team leaders should be aware that people are likely to cope better if they have: coped well with previous deployments; social capabilities and attachments that are, at least, reasonably good; the capacity and capability for adapting reasonably well to changing situations; and not had a serious mental disorder recently. It is incumbent on potential team members that they should be honest with potential employers about their previous experiences and personal needs.

The book, *Shackleton's Way*, offers Ernest Shackleton's opinions after leading three unsuccessful expeditions to the South Pole [45]. It provides a useful theoretical point of reference for team selection for arduous tasks. Shackleton's *Way* makes the point that teaching technical skills to people who have good interpersonal capabilities is far easier than teaching people with technical skills to have the personal attributes that are necessary to perform well within a team that operates in tough environments.

Dealing with the Realities During Deployment

Dealing with the demands on the staff of aid agencies, NGOs and military organisations requires team maintenance, support for team members and continuing attention to workplace culture and teamwork. Team maintenance requires leaders to provide team members with adequate information, continuing and regular briefings and continuing training.

Support for team members requires active listening, informal social support and more formal peer support programmes. Team members should be reminded of the importance of staying in contact with people at home and be provided with facilities to enable it to occur and maintaining adequate healthcare arrangements.

Attending to workplace culture and teamwork involves maintaining trust and psychological safety within teams, providing adequate professional and managerial supervision and monitoring the physical safety of teams' working conditions.

There is another balance to strike. On one hand, professional practitioners often feel an obligation to assist. Often, they encourage people to seek psychological counselling as an immediate response to feeling distressed. This approach has several drawbacks. First, tendencies to exaggerate personal hardiness and the stigma and shame of seeking help with social, psychological and mental health needs must be carefully managed. Second, providing immediate counselling can risk creating a false belief that there will be no long-term morbidity. Third, certain forms of counselling, and, particularly, single-session critical incident stress debriefing, immediately after disasters, have not been shown to be effective. A Cochrane Review has shown that single-session individual debriefing did not prevent the onset of PTSD nor reduce psychological distress, general psychological morbidity, depression or anxiety compared to controls [46]. Indeed, one trial considered in the review reported a significantly increased risk of PTSD after 1 year in people who received psychological debriefing (OR 2.51 95 % CI 1.24–5.09).

Actions to Take if Concerns Arise During Deployment

However, and from time to time, team members may suffer more severe or persistent distress. Team leaders should assess and explore, manage and act to meet their

needs as well as the safety of patients and other team members. If problems arise for team members during deployment, leaders should:

1. *Assess the situation:*
 - (a) Assessment includes that of the environment, affected team members' needs and whether or not actions are required to improve the psychosocial care and supervision of the team as a whole.
 - (b) Sensitively assess any impact on patients' care and safety.
2. Provide *informal support* – provide active listening and informal support for the affected people.
3. Provide *advice:*
 - (a) Remind distressed team members to take adequate breaks and sleep, eat regularly, stay in touch with team members and only drink alcohol in small amounts.
 - (b) Remind the team to adhere to effective team duty rotas, and to make use of access to recreation, when possible.
 - (c) Discuss with affected team members whether their contacts with their families at home are adequate or contributing to their worries.
4. Ensure *access* for the team to formal peer support.
5. *Review* the needs and safe practice of affected staff at regular intervals.

In summary, team leaders' actions should include listening actively to team members' experiences while not pressing them to share their feelings, checking to see if they show the signs of acute stress, assessing the impacts on team members' abilities to work safely and effectively and assessing relationships within the team.

Leaders should review distressed team members' progress over time, ensure that they have adequate rest and sleep, adhere to shifts and have a managed workload. Deployed staff should be encouraged to remain in social contact with other team members. They should be offered formal peer support according to the circumstances. Team members should use alcohol in moderation at the most. Should concerns about any person's distress persist for 2 weeks, leaders should consider arranging consultation for them with the health services.

Employing organisations and their team leaders should also be aware that communications between deployed staff and family members at home can have both good and ill effects and especially so should crises occur. This means that leaders should assess and be ready to monitor sensitively the effects of communications on team members with a view to mitigating any ill effects should they arise.

Adjusting to Coming Home After Deployment

In preparation for returning home and afterwards, team leaders should review the potential for every team member to develop problems by considering what has happened against the common risk factors that this chapter identifies.

Technical, rather than psychological, debriefing is an important activity as a part of decompression that occurs as the strain of deployment abates, and deployed staff should also be assisted to recognise and deal with dissolution of the teams of which they have been members. Again, this requires active listening. There may be some benefits, in terms of people's overall psychosocial wellbeing, in having a short stop in a safe location prior to returning home. This is known as decompression within the military and is a generally well-accepted process and lasts around 48 hours.

Team members should be aware that their families are likely to have moved on during their absence. They may require reminders about the importance of renewing family relationships and for all family members to cope with their anxieties about team members' safety and the other impacts of their absence on their families.

Conclusions

General Conclusions

This chapter makes the case for developing a continuum of psychosocial and mental health care for deployed team members of military and aid organisations that run from preparation prior to deployment, through deployment and for some time after they return home. It is founded on creating a comprehensive pathway for caring for people who look after and respond to the needs of people who require trauma care, which should:

- Ensure good strategic planning, day-to-day leadership and management of deployed teams so that deployed persons know what is expected of them and have confidence in the plan
- Ensure that team members are well prepared before deployment, supported actively and effectively while they are deployed and given opportunities to learn by providing working environments that are as psychologically safe as is practical in the circumstances
- Ensure that deployed people receive up-to-date information
- Involve and engage deployed persons and their families in the psychosocial aspects of the plan
- Provide a coordinated continuum of psychosocial and mental health care that is an integral part of service design, planning, management and service delivery within healthcare systems
- Deliver universal access to social support, welfare aid, psychological first aid, assessment and intervention
- Engage staff in delivering immediate psychosocial care for their colleagues and enable them to do so through training and support rather than assuming that their colleagues are to be referred early on for specialised assessment and interventions
- Include providing selective access to specialised, psychological and psychiatric services that are titrated against people's assessed needs
- Ensure that the multiple needs and pressures falling on team leaders are not neglected

Achieving all of these requires excellent leadership. Indeed, of all the interventions we cover, good leadership is the most important way of sustaining the wellbeing and mental health of deployed people.

Key Points

1. Good planning, strategic leadership and management are core to good psychosocial care of deployed staff.
2. Good day-to-day leadership, management, realistic standards for practice, supervision, information sharing, unforced sharing of experiences and psychosocial support at work and continuing contact with families are keys to good psychosocial care.
3. Base interventions on the principles of psychological first aid and staff support.
4. Social support is vitally important and can mitigate the risks of developing mental disorders later; peer support programmes can assist in mobilising social support.
5. Provide access to timely mental health care for selected staff who have persisting psychosocial problems that might be disorders.
6. Do not pressure staff to share or re-experience the events and their feelings.
7. Remember that the vast majority of deployed staff have families at home and that they also have needs for information and psychosocial support.
8. There are personal, family and team components to providing adequate support that start before deployment, continue during it and last for a suitable time after the end of missions and staff's return home.

Annex A. Psychosocial and Mental Health Care for the Deployed Staff of NGOs and Military Organisations: The Six-Level Framework of Actions to Support Staff [11, 12]

Level 1

Strategic planning and preparation

Strategic leadership and management: Planning, leadership, management and training sustain services and promote teamwork and therefore help to prevent unnecessary anxiety for staff by creating confidence in the plan

Strategic leadership and planning should start prior to and continue throughout and after each deployment. Although designing and testing a plan for psychosocial care prior to events is very important, no general plan can be assumed to be appropriate to each situation. Usually, plans require adjustment in the light of events and review afterwards is also important in order to learn lessons for the future

Logistic and resource planning	Ensuring that comprehensive planning, preparation, training and rehearsal of the full range of service responses that may be required is undertaken, familiarises staff with the plans, builds their confidence in those plans, allows staff to be engaged through suggesting changes and builds their resilience
Developing models of care	Staff should have confidence in the models of care that are to be offered. This involves reviewing services available to ensure all the relevant providers of care and agencies work to jointly agreed models of care and case management. This includes working to minimise gaps and to ensure clarity about mutual responsibilities
Managing public and professional expectation	Planning and enacting a good public risk communication and advisory plan that involves staff, the survivors and the media and which provides timely and credible information and advice also supports staff confidence and their psychosocial resilience
<i>Level 2</i>	<i>Operational leadership, service management and setting standards for practice:</i> Translating plans into action requires excellent management. Plans should be templates that are used to initiate services and are adjusted later to fit better with events as they unfold. This requires good intelligence, leadership and review
Clarify expectations of practice and practitioners	It is important to be clear about practical and professional expectations of staff and standards for practice should be realistic. This requires effective leadership, recognition of the potential impacts of a major incident on the standards of care and negotiation of mechanisms for decision-making when services are under pressure
Develop an ethical and professionally acceptable triage system and ethical frameworks for clinical and managerial decision-making	<p>Triage should be based on the judgement of the practitioners. Thorough training is necessary to achieve effective triage. Staff should have confidence in the triage systems that are put in place</p> <p>An ethical framework for services and practitioners is summarised in the NATO guidance [13]. It contains the principles of good decision-making. Psychosocial triage should distinguish the following groups of affected people:</p> <ul style="list-style-type: none"> • People who do not have mental disorders or serious clinical symptoms but who are distressed: this is likely to be the largest group of people who are affected • People whose experiences are thought as possibly indicating that they might have serious clinical symptoms that might amount to mental disorder. Information and advice should be given and follow-up should be arranged for people in this group • Those people who have mental disorders or serious clinical symptoms, for whom appropriate diagnosis and treatment should be offered straightaway
Develop ethical guidelines and staff competency framework	Services and practitioners should adopt an ethical framework for planning and delivering services. Managers should also be clear about the competencies required of practitioners, managers and others. Many staff have the necessary competencies as part of their work at home, but others require specific training if they are to contribute appropriately

(continued)

Annex A (continued)

<i>Level 3</i>	<i>Day-to-day leadership and management of staff and services:</i> Ensuring the psychosocial welfare of all people involved directly with delivering aid is a key part of the plan. Risks to psychosocial wellbeing and mental health can be minimised by planning and implementing good leadership and management and by ensuring that staff have adequate supervision and access to advice
Provide accurate up-to-date and relevant information about the situation	Staff must have confidence in the plans made for day-to-day service delivery, and this requires that they are fully informed about them and their anticipated roles. The feeling of being ill informed is a factor that can most erode psychosocial resilience. Conversely, if staff are well informed, consulted and involved, their confidence in the plans and their equipment is enhanced, their uncertainties are reduced and their psychosocial resilience is augmented
Provide opportunities for operational, technical and personal discussions	Ordinarily, informal discussion about clinical experiences occurs in workplaces. In challenging circumstances, the support that comes from having access to team members, peers and others for discussion and advice and to share challenges and frustrations is invaluable. It is important to ensure that opportunities for informal peer support are valued and continue to be available during and after deployment. More formal peer-based reflection on and reviews of practice should also be encouraged
Ensure staff take rest, adhere to duty rotas and have opportunities for recuperation	Whenever possible, staff (and particularly senior staff with substantial responsibilities) must be enabled to take rest and work to realistic rotas to avoid them becoming overtired and burned out
Monitor practice and provide enhanced clinical advice and supervision	The work of staff should be monitored so that they have access to clinical supervision; this is likely to become more rather than less vital in stressful situations in which critical and sometimes controversial decisions may have to be made
<i>Levels 4, 5 and 6</i>	<i>Psychosocial and mental health care for members of staff:</i> Members of staff may develop distress that is, most usually, short term and not associated with dysfunction, but, less often, temporarily disabling or of longer duration. A much smaller number may develop more substantial problems with their mental health. Therefore, facilities should be available to support staff who are distressed or to enable access to mental health care according to need by providing appropriate psychosocial support and pathways to mental health care in the relatively few instances in which it is anticipated that those more specialised services are required. This stepped approach should include: <ul style="list-style-type: none"> • Approaches that are based on psychological first aid • Screening, assessment and intervention services for people who do not recover from immediate and short-term distress • Access to primary and secondary mental healthcare services for people who are assessed as requiring them

Level 4: psychological first aid	PFA is an approach that is intended to reduce people's initial distress in the immediate aftermath of traumatic events and foster adaptive functioning. PFA assumes that the majority of people who are affected psychosocially by adverse and catastrophic events are not likely to develop mental health problems, serious disorders, or long-term difficulties in recovery. Instead, it is based on an understanding that survivors of disasters and staff who intervene experience a broad range of early reactions (e.g. physical, emotional, psychological, behavioural and spiritual). Some of these reactions cause enough distress to interfere with adaptive coping, and people's recovery may be helped by support from compassionate and caring responders
Level 5: offer health assessment and intervention in primary care	The care pathway should rely, initially, on support provided by people's families, colleagues in workplaces and then progress, according to need, to primary or occupational health, and other agencies. Screening, assessment and intervention procedures should take account of local circumstances
Level 6: deliver specialist mental health services for staff	Despite estimates that the numbers of staff who require referral are likely to be small, arrangements should be negotiated in advance for staff to have access to appropriate specialist health care, including mental health care according to their assessed needs

Annex B. To Psychosocial and Mental Health Care for the Deployed Staff of NGOs and Military Organisations: Checklists for Staff and Leaders

Checklist 1: The Responsibilities and Actions of Deployed Staff

Be honest with leaders about your previous experiences and personal needs and ask yourself the following questions:

- What are my expectations of the mission?
 - Why am I going?
 - Where am I going?
 - What information do I need?
 - Have I got the professional skills that are required?
 - Can I take care of myself?
 - What is involved in taking care of myself?
 - What should I do to attend to my personal safety?
 - What do my relatives think about me deploying and who will support them?
 - Whom am I going with?
 - Have I reviewed my relationships with colleagues in my team?
 - Have I taken opportunities to develop good relationships and attended to any problems between me any other people in the team?
 - How will I recognise if I have a problem while I am deployed or after my return?
-

Checklist 2: The Responsibilities and Actions of Leaders

General responsibilities and actions of leaders include providing:

- Effective strategic, tactical, operational and practical day-to-day leadership
 - Adequate information for all team members
 - A psychosocial support plan for the team (which should be practised in exercises and training before deployment)
 - Advice and support for team members if a crisis should occur during deployment (e.g. if the team is attacked, a relative of a team member becomes critically ill or if a team member becomes persistently distressed)
 - Adequate social support for all team members
 - Psychosocial mindedness for the team
-

Checklist 3: Preparing for Deployment

In the preparation phase, it is important to create and take opportunities to align team members' and organisations' expectations to the realities that they are likely to face

The particular responsibilities of leaders in the preparation phase include:

- Planning
 - Selection: although predicting who is likely to cope well with deployment on psychosocial criteria is difficult, people are likely to cope better if they:
 - Have the capacity and capability for adapting reasonably well to changing situations
 - Have reasonable social capabilities
 - Do not have a serious mental disorder at the time or have not had such an illness recently
 - Briefing
 - Team building
 - Briefing
 - Team training
 - Training
 - Personal
 - Teams
 - Reminding team members to attend to the anticipated needs of their families before they leave, while they are away, and when they return
 - Preparing team members' families by:
 - Briefing them about the risks
 - Informing them about where and from whom they can get information and support during the deployment
 - Briefing them about what to expect when their relatives come home
 - Assisting team members to get their affairs in order before leaving and preparing for separation from home
-

Checklist 4: Dealing with the Realities During Deployment

Team members should be offered the following facilities and services while they are deployed:

- Team maintenance
- Professional supervision
- Managerial supervision
- Physical safety and a safe environment
- Adequate healthcare responses
- Information and briefing
- Active listening
- Peer support
- Facilities and opportunities for staying in contact with people at home

Team members should not be offered:

- Critical incident stress debriefing

During deployment, the families of team members should be:

- Provided with information about progress with the mission
 - Provided with information about their deployed relatives if communications are poor and direct contact is not possible
 - Offered social support
 - Provided with information about whom to contact, how and where should a substantial family crisis occur during deployment
-

Checklist 5: Actions for Leaders to Take if Concerns Arise During Deployment

The actions of leaders should include:

1. Assessing the situation
 - (a) Assessment includes that of the environment, affected team members' needs, and whether or not actions are required to improve the psychosocial care and supervision of the team as a whole
 - (b) Sensitive assess any impact on patients' care and safety
 2. Providing informal support – provide active listening and informal support for the affected people
 3. Providing advice
 - (a) Remind distressed team members to take adequate breaks and sleep, eat regularly, stay in touch with team members and only drink alcohol in small amounts
 - (b) Remind the team to adhere to effective team duty rotas, and to make use of access to recreation, when possible
 - (c) Discuss with affected team members whether their contacts with their families at home are adequate or contributing to their worries
 4. Ensuring access for the team to formal peer support
 5. Reviewing the needs and safe practice of affected staff at regular intervals
-

(continued)

This means that leaders must:

- Explore indicators of stress, distress and dysfunction
 - Listen actively
 - Assess at intervals the abilities and capacities of affected staff for work and any risks to the safety of others from them doing their work
 - Remember the core principles for intervening
 - Arrange consultation with health services if staff members' distress persists or gets worse
-

Checklist 6: Adjusting to Coming Home After Deployment

Review potential for developing problems against common risk factors

Technical debriefing

Decompression

Team dissolution

Active listening

Do not offer single-session critical incident stress debriefing

Attend to the impacts on families of team members

Renew family relationships

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Part IV

Hospitals and Health Systems

James M. Ryan

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Part IV focuses on health systems, including hospitals, and illustrates the fate of these systems during and after conflict. Hospitals are particularly vulnerable and frequently fail, and this has been seen clearly in recent conflicts in Iraq and Afghanistan. The section extends to include military health service support in conflict, as this may be the only system still functioning. Two new topics are introduced in this edition. Evacuation and transport, including by air, are covered in view of their importance and utility use in global conflict. The role of the aid agencies in providing hospital care in the face of destruction and failure of local facilities is discussed by an author with unique personal experience.

Chapter 28

Conflict Recovery: Health Systems in Transition

James M. Ryan, Jessica Tucker, and David MacGarty

Abstract The essence of conflict is the actual or implied use of violence. Recovery implies a return to a previous state. Recovery may be rapid (measured in days or months) or may take many years. What may be called the onset of recovery varies – it may begin almost immediately during the acute phase of a conflict or catastrophe. The immediate provision of food, water, sanitation and shelter via humanitarian efforts in the first days is an illustration of a very early manifestation of conflict recovery. However, the process typically begins in the postemergency phase, when a degree of stability and safety allows a more comprehensive approach.

Keywords Health systems • Conflict recovery • Effective response • Emergency response • Transition • Early recovery • Immediate response • Medium-term recovery measures • Long-term recovery measures • Development

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Objectives

- To introduce the concept of conflict recovery
- To describe the transition from the immediate response to medium and long-term recovery measures
- To describe the process using case examples
- To describe the principles underpinning mounting an effective response
- To summarise lessons and pitfalls

Introduction

The essence of conflict is the actual or implied use of violence. Recovery implies a return to a previous state. Recovery may be rapid (measured in days or months) or may take many years. What may be called the onset of recovery varies – it may begin almost immediately during the acute phase of a conflict or catastrophe. The immediate provision of food, water, sanitation and shelter via humanitarian efforts in the first days is an illustration of a very early manifestation of conflict recovery. However, the process typically begins in the postemergency phase, when a degree of stability and safety allows a more comprehensive approach.

The postemergency phase is difficult, of uncertain duration, has little media attention, may be dangerous and is usually open ended and expensive. Yet this is a time that is at least as important as the emergency response period. It is this neglected aspect of medical care in hostile environments that this chapter attempts to examine.

Conflict Environment

Provision of health care and healthcare promotion in the aftermath of conflict or disaster, while a universally agreed priority, is increasingly difficult and, in some areas of the world, positively dangerous. The reasons are many but one event stands out. The last quarter of the twentieth century saw a radical restructuring of the world political arena with the collapse of old alliances and power blocs. Collapse, followed by intrastate conflict, has occurred in the Balkans, Caucasus, North and Central Africa and Asia. From this disintegration have emerged dozens of self-governing entities seeking recognition as sovereign independent states. Many of these lack the means to survive independently and have failed or are failing. The terms “failed”, “failing” and “rogue” states have entered the literature of sociology, politics, journalism and humanitarian assistance.

These unstable regions are characterised by political and economic failure with the collapse of infrastructure and social norms, which in turn has encouraged the emergence of armed militias, paramilitary groups and terrorists. Wars between states have been replaced by war within states. Hand in hand with the collapse of

these new entities is a rise in extreme nationalism, tribalism, transnational religious movements and racial/ethnic intolerance, resulting in lawlessness, forced migration and even mass murder. These, then, are the new wars and conflicts of the twenty-first century.

Further, the environment following a natural disaster may be equally dangerous as increasingly these occur in regions already beset by war and conflict. The recent tsunami involving Indonesia and Sri Lanka and the earthquake in the Kashmir region of Pakistan are striking examples. The historical safety and freedom of movement afforded the humanitarian volunteer in times past can no longer be guaranteed – indeed deliberate targeting of health professionals is increasingly seen in such diverse regions as Chechnya, East Timor, Afghanistan and Central Africa. This, then, is the new platform for the twenty-first century health professional engaged in humanitarian health care.

Timelines and Phases

Emergency Response and Early Recovery

Earlier chapters in this manual are concerned with activities during the acute phase in a conflict or disaster setting. These may range from the aftermath of a natural disaster, such as a tsunami or earthquake, or the dangerous environment caused by war and conflict. For many aid organisations, the acute-phase response is the most attractive and even glamorous. The acute phase is characterised by widespread media attention and television coverage, and a myriad of aid organisations deploy and begin work in the glare of international news cameras. The immediate aim of these agencies is to drive down morbidity and mortality. These activities are exciting and photogenic and occur at a time of international interest and attention. This phase passes, and along with it goes media interest. Further, many of the aid agencies that specialise in acute-phase activities depart very quickly when the situation stabilises.

There follows the postemergency phase, which includes the transition to recovery.

The postemergency phase begins with early recovery. Paradoxically, money, equipment and skilled personnel, so abundant during the emergency response, become scarcer. For complex reasons, budgets are cut, volunteer numbers are scaled down and equipment items are no longer supplied.

The transition from emergency response to recovery varies and no one model exists. It may be lengthy, difficult, dangerous and multifaceted depending on the nature of the conflict or disaster. The university department employing the author pragmatically divides the recovery period into four timelines. The timelines are:

- Transition
- Early

- Medium term
- Late

Recent history reveals abundant examples of each – for brevity a single country case will be chosen to illustrate each timeline.

Transition: Falkland Islands 1982

It is a moot point when, exactly, the emergency phase ends and recovery begins. The transition may be short and clear-cut or may be protracted and blurred. The Falkland Islands, a region in the South Atlantic with a population of 2000, is an example where the transition was short and urgent.

The situation in the Falkland Islands in early June 1982 is summarised herewith:

- Argentine troops invaded the islands in April 1982, taking complete control of the territory.
- All public utilities, including medical, continued to function put under Argentine military control.
- The Governor and all officials were detained and then deported and a military government was installed.
- The health service was taken over by military medical personnel and then functioned as a military hospital for the duration of the war with civilians continuing to be allowed access for care.
- Some of the civilian staff were interned or deported, others were allowed to work.
- Control of estates, utilities and resupply was vested in the Argentine military.

Following an invasion by a British Task Force and a number of ensuing battles, the Argentine force surrendered and quickly returned to Argentina. With the cease-fire, the territory quickly entered a transition to recovery phase with all the problems that might be expected. The situation during this period is summarised next:

- Security and safety: in the absence of a local police or military force, security became the responsibility of the British invasion force.
- Public and community health: the provision of clean water, food, sanitation and shelter for the locals became the responsibility of environmental health specialists from the British Defence Medical Services (DMS).
- Primary health care: joint DMS and civil medical personnel working from the island's only hospital provided this. Medical advice to outlying settlements was provided by short-wave radios.
- Hospital utilities and health care: provided by DMS uniformed surgeons, anaesthetists and physicians supported by professionals allied to medicine (PAMs) in pharmacy, physiotherapy and environmental and public health. DMS nurses made good the civilian shortages.

- Other services and utilities: as an interim arrangement, DMS personnel took responsibility for maintaining estates and utilities such as engineering, communication, policing and education.

Transition to civilian administration and peacetime began within days and was largely uneventful. However, fundamental differences from the pre-war position were evident. Three of the more striking differences were:

- A force exceeding the pre-existing population now garrisoned the islands.
- The island's sole hospital became a de facto joint civil and military facility with all secondary care provided by military medical teams.
- It was now no longer possible to refer patients to Buenos Aires for specialist medical opinion and treatment – a previous lifeline that had existed for decades.

These problems continue to beset healthcare professionals 30 years after the invasion.

Early: Balkans, Pristina/Kosovo 1999–2000

It is arguable whether Kosovo continues to fit the definition of failed state. Prior to and for some time after the NATO led invasion in 1999, it most certainly did. The region had suffered a protracted civil war with large-scale forced migration of one community – ethnic Albanians. Following occupation by NATO there was now a further migration, in part forced, of the remaining population – ethnic Serbs. The health consequences were near catastrophic. Returning refugees and internally displaced persons (IDPs) faced a region without a functioning government, largely destroyed housing stock and failed infrastructure. One of the most pressing needs was health care. The health problems listed next are illustrative but far from comprehensive:

- Collapse of water, power and sanitation. A particular problem was to dispose large dumps of clinical waste in hospitals and health centres. Mortuaries were inundated with bodies dumped in corridors and entrances.
- Rehabilitation of the entire healthcare system was needed, including primary health care, transport, communications and hospital-based systems. There was a particular anxiety related to the collapse of public health surveillance and reporting.
- There was total systems failure at the region's 2,400-bed tertiary referral university teaching hospital in Pristina. This was compounded by a departure of the pre-war hospital staff (Serbs) and an influx of Albanian medical staff, few of which had any proof of identity or qualification.

Such a near-total failure of the instruments of the government required a complete takeover of the functions of the state. The UN Interim Administration became the de facto government with the World Health Organisation (WHO) taking the health portfolio.

Medium: Caucasus, Azerbaijan 1997–2001

The background to the crisis in Azerbaijan can be summarised as:

- 70 years of control by the former Soviet Union
- A disastrous territorial war with neighbouring Armenia, which also involved hostilities with the Soviet Union
- 20 % loss of the national territory with forced displacement and migration of one million people
- Devastation of the territory's agricultural and industrial base
- Breakdown of the national health system
- Creation of dozens of refugee and IDP camps accommodating up to one million men, women and children

The author reviewed in-hospital health care and refugee/IDP health care in this region through 1997 and 1998. The mission findings are summarised herewith:

- All major hospitals, although geographically distant from the conflict zone, suffered from the consequences of financial ruin and loss of social cohesion.
- Major teaching hospitals fared better, retaining staff and supported by a growing private practice.
- The majority of refugee and IDP camps were situated great distances from urban centres and were unable to access secondary and tertiary hospital care.
- Expatriate and national NGOs provided care for those in the camps.

The country has avoided long-term failure by utilising major oil and natural gas resources to rebuild the economy and to build a reformed healthcare system. Primary care, particularly for refugees and IDPs, is also improving but more slowly. Azerbaijan exemplified a point made earlier concerning the departure of the majority of international aid agencies once the emergency response phase was over. In Azerbaijan's case, they were fortunate to be rich in natural resources which in turn attracted new players to fill the gap caused by aid agency departure – namely, multinational oil corporations.

There remains the territorial dispute with Armenia, which, until resolved, risks a resumption of conflict.

Late: Middle East, Iraq 2003 to the Present

While the crisis in Iraq is improving with the departure of the coalition and the formal end of hostilities, it illustrates many of the problems of a failed state. The country's healthcare system, once on a par with middle-income European states, had deteriorated due to the Gulf war of 1990/1991, the decade of sanctions that followed, and finally the invasion of 2003 by a US-led coalition.

One of the authors has visited southern Iraq on three occasions since the invasion, concentrating on health needs assessment and health promotion. The health problems in the post-conflict period (if it can be termed post-conflict) are many and diverse. While there was no mass movement of people or forced migration, there were serious and unforeseen health consequences, mainly caused by sanctions and, to a lesser extent, the recent war. The most pressing needs relate to a failure of the public health surveillance and health information systems. In short, it is still very difficult to quantify the health needs and agree priorities. Maternal and child health schemes have failed with catastrophic maternal and infant mortalities being reported, but these are unverifiable. At the time of writing, the health situation may be worsening with the failure of many hospitals. The causes of failure of hospitals in Iraq can be summarised as follows:

- Loss of physical infrastructure, which is a combination of deliberate and accidental
- Degradation of utilities, especially power, water and food supply and sanitation
- Progressive loss of staff through emigration, kidnap, murder and detention by coalition forces
- Degradation of clinical services resulting in cancellation of planned procedures, failure of chronic care, cancer care, complex surgery and supporting services
- Failure of emergency medical services and referral system resulting in failure to access care, even in those hospitals with residual capacity
- Shortage of consumables, drugs and related materials
- Breakdown in morale and motivation often associated with failure to pay salaries, inability to provide care and continuing threat of kidnap and death
- Forced closure and ejection of staff associated with ethnic cleansing

Until the security situation improves, it is still somewhat dangerous for local or expatriate health professionals to travel widely to all regions and re-establish accurate health information systems – a prerequisite if health care is to be effective.

Principles Underpinning an Effective Response

Other chapters and sections of this manual describe in detail the principles and practice of the act of intervention in conflicts and intervention. The purpose here is to reiterate and emphasise critical aspects in mounting an effective response.

Planning and implementation of an effective response is a combination of art and science. It is underpinned by the necessity of an early and comprehensive needs assessment. It requires, too, an understanding of the dynamics of conflict and disaster events. Much of this information is already in the public domain and is easily accessible, with two United Nations bodies playing a central role. The United Nations Disaster Assessment and Coordination (UNDAC) Agency has expert teams

ready to deploy (typically 2–6 experts drawn from a range of disciplines) to a disaster area to assess and report on immediate needs. Their main task is to determine immediate threats to life and to assess availability of water, food, sanitation and shelter, which are recognised as the four immediate determinants of survival. They also check for evidence of emerging epidemic threats such as measles, cholera and diarrhoeal diseases. Their findings have a critical impact on the size and shape of the emergency response.

The UN Office for the Coordination of Humanitarian Affairs (OCHA) also plays a pivotal role. OCHA can provide detailed epidemiological data for disasters, which have occurred over the last decade. This information allows risk analysis for future events and may also allow crude predictions on the nature and number of expected casualties for an emerging new disaster thus informing emergency teams before deployment.

Other national and international government and nongovernment organisations (GOs and NGOs) also perform assessment functions. Historically, this has led to duplication of effort and competition. A new climate of cooperation and coordination is, however, emerging and was particularly evident during the Pakistan earthquake, which resulted in an unprecedented efficiency in the relief effort.

Preparation and Deployment of Teams

It should be obvious that the objective in deploying aid teams should be to get the right experts and their equipment to the right place at the right time. This requires a good intelligence assessment as outlined earlier. Most expatriate team experts, particularly doctors, will have been trained in a developed European or North American healthcare system and as a consequence will have undergone specialty and subspecialty training and practice in increasingly subspecialty niches. This aspect mainly affects health professionals working in hospitals – apart from emergency medicine doctors, few, if any, general physicians, surgeons or paediatricians remain. Yet the overwhelming need in conflict and disaster settings is for experienced, competent generalists. If specialists are to be deployed, planners must deploy larger teams, and this has led to the expression “hunting in teams”. Training beyond medical care is also vital. Deployed personnel will typically work in unfamiliar and austere environments and will have to care for themselves and each other. A spirit of collaboration, team play and multitasking must prevail. All will have to share in activities such as driving, watch keeping, map reading and food preparation and, on occasion, manual labour.

Pre-deployment preparation is also critical and covers both professional and personal elements. High motivation, physical and mental fitness and leadership skills are vital. Most reputable aid agencies deploying teams will insist on some form of pre-deployment assessment, training and skill verification. Table 28.1 gives a typical “shopping list” of skills and competencies required of a surgical/trauma team

Table 28.1 Required verifiable competencies for deployed surgical and trauma team

Life support qualification (ATLS® or equivalent)
Triage training and skills (MMIMS®)
Trauma team resuscitation skills
Field craft proficiency
Surgical care of the trauma victim (DSTS® or DSTC®)
Critical care competence (CCrISP®)
Leadership and organisational skills/experience

deploying. Other skills and competencies will be required depending on specialty – paediatrics, obstetrics and public health are examples.

Traps and Pitfalls

Expatriate volunteers experience unique and character-building opportunities but face many traps and pitfalls. What follows are rules of engagement learnt (sometimes the hard way) by the author and his colleagues on a variety of deployments.

Have Good Intelligence, Clear Aims and Sound Planning

These underpin military deployment doctrine and are just as vital for non-military agencies. Failure to obey this rule may result in inappropriate deployment with ensuing embarrassment and possible danger.

Deploy Personnel Trained and Fit for Task

A conflict or disaster area is NOT a training ground for junior trainees to cut their teeth. The widely accepted rule is to deploy accredited specialists or senior trainees under supervision. All reputable aid agencies have high standards when choosing teams to deploy and increasingly apply governance standards, evidence of an audit process, and morbidity and mortality returns. Donor bodies that demand value for donated money are driving this.

Donation of Medical and Related Equipment

It is wise to avoid giving equipment and consumables too early in the deployment as your team may need them to perform their allotted tasks. By all means do so prior to departure but ensure medicines and consumables are in date and undamaged. Donated equipment items must be appropriate, well maintained and capable of being repaired locally.

Do Not Become a Casualty Yourself

A clean bill of health is a basic requirement for deployment to austere and dangerous environments. Beware deploying personnel with a history of chronic diseases such as diabetes mellitus, hypertension and other history of cardiovascular disease or peptic ulcer disease. Chronic diseases are prone to relapse under conditions of stress.

Do Not Get Out of Your Depth

“Stay in your lane” is an old adage. One well-known pitfall, which may take you out of your lane, is getting involved in hospital assistance. Hospitals in these settings are a bottomless well of need. Once involved it is very hard to withdraw. Few aid agencies can afford involvement in aid to hospitals – it is better to run limited primary care projects, which are cheaper and less open ended.

Have an Exit Strategy

Decide before deployment how when and when you will withdraw. Withdrawal is often a stressful period for both team members and local people. Make a clean break and try to leave a lasting legacy. A good way to achieve this is to have a teaching and training side to your mission. An old hand in this business states “Teach, then teach again, then teach some more”.

Development

Before concluding, a word about development. This is a vast topic and deserves a book in its own right. There is pretty well universal agreement within the humanitarian aid community that transition from emergency aid and recovery programmes to long-term development is fraught with difficulty. Part of the problem is reaching consensus on meaning and definition. So far in this chapter, discussion has been on early, medium and late phases of conflict and disaster recovery. Where does development fit into this construct? Is recovery and development the same thing? The United Nations Declaration on the Right to Development, resolution 41/128, 4 December 1986, provides a definition of development.

Development is a comprehensive, social, cultural and political process, which aims at the constant improvement of the well being of the entire population and of all individuals on the basis of their active, free and meaningful participation in development and in the fair distribution of benefits resulting there from.

It follows, therefore, for development to commence, a high degree of stability must exist, and the restoration of institutions and instruments of government must

have occurred. There is a risk that development will be attempted before these processes are sufficiently complete. This was well illustrated in Kosovo during 1999 and is evident again at the time of writing in Iraq and Afghanistan. In Kosovo, the medical development programme had to be delayed because insufficient recovery had taken place and instability persisted. This is the situation now in Iraq, Afghanistan and many parts of Africa. It is interesting to note that donors and Western governments are keen to move to development programmes as soon as possible, and long term they may be cheaper than acute recovery programmes. However, if begun too soon, they are doomed to failure.

Summary

International aid agency interventions during the recovery phases following conflict and disaster are typically diffuse, complex and long term. In this, the second decade of the twenty-first century, they are also dangerous and nonpermissive. New strategies will be needed which may involve a developing relationship between military medical personnel and those from the aid agencies. This will doubtlessly result in strife and hostility, but the nettle must be grasped. These new environments are hostile and dangerous, making it increasingly difficult for unarmed and vulnerable aid agency personnel to function effectively.

The coming decades will demand a new mind-set and a new spirit of collaboration and trust. The omens are good – civil/military collaboration was notable in two of the world's most recent calamitous natural disasters, the tsunami in South East Asia and the earthquake in Pakistan.

Recommended Further Reading

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Chapter 29

Eating an Elephant: Intervening in Hospitals (Pristina)

Anthony D. Redmond

Abstract There is little doubt that the hospital was damaged when the Serbs departed, but this was but a last parting shot at an institution that had been run down for years and particularly since 1990. It was about then that Milosevic redeployed Serb staff from Belgrade to replace local ethnic Albanian staff and the slide to the present situation really began.

Keywords Hospital intervention • Pristina • 1992

There is little doubt that the hospital was damaged when the Serbs departed, but this was but a last parting shot at an institution that had been run down for years and particularly since 1990. It was about then that Milosevic redeployed Serb staff from Belgrade to replace local ethnic Albanian staff and the slide to the present situation really began.

I was here myself in 1992. All the senior staff whom I met were Serbs and unhappy at their forced exile from Belgrade. They told me that the Albanians had walked out and set up their own parallel medical school. Those Albanian professors are now back, and while some jumped before they were pushed, and others left in protest at the failure of the Serbs to recognise the Albanian language, they certainly describe a grave injustice.

When NATO arrived, many Serbs left, but not all, and the hospital still had many Serb staff—particularly doctors. The mass return of Albanian staff to the hospital led to a very unstable situation, culminating in the wounding of Serb staff and the

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disappearance of the previous (Serb) occupant of the office where I now work. It was the intervention of the British army that ultimately sounded the call to order. However, the exodus has continued, with only a handful of Serb patients remaining and the last two Serb doctors leaving last week.

The hospital I first saw had dogs running wild, eating the waste, clinical and domestic, which was strewn around the hospital. The mortuary was littered with rotting corpses and the kitchens were filthy and unstocked. The drains were overflowing and discovered to have been blocked with the stock of the hospital pharmacy. The dogs have now been removed, and the British army has cleaned the stinking mortuary and buried the dead. The World Food Programme feeds the sick; Pharmaciens Sans Frontières runs the pharmacy, and Oxfam has cleared the drains and will improve the supply of clean water. There are many nongovernment organisations from around the world working in the hospital, and together we are helping the local doctors and nurses to provide care to the people of Pristina.

I am here as part of an advisory team, funded by the Department for International Development. An international and therefore neutral medical director was thought the best option by all sides, and my appointment has been greeted by cooperation and support. This now predominantly Albanian institution is staffed largely by doctors who have not practised in the hospital for nearly 10 years or trained in the parallel Albanian medical school. Lessons were taken in private houses and exposure to inpatient hospital experience gained by pretending to be hospital visitors and stealing on to the wards to take histories. The effort required to complete this training was considerable, but the doctors are well aware of their lack of hands-on clinical experience. We have to identify training needs urgently while supporting clinicians in their daily activities.

External advisers in all the major specialties have begun arriving to work alongside local doctors. An NHS management team has already visited, and partnership with the NHS is being developed. A management board has been established, and decisions about the future role and direction of the hospital are beginning to be addressed. The semi-autonomous clinic system prevalent throughout hospitals in the former Yugoslavia is about to yield a little to the development of a central admissions and emergency centre. This British-funded programme will supply a single point of entry to the hospital and a focus for the development of clinical training.

The future will not be easy. The only Serb members of the hospital management board were the last two Serbs to leave, and any prospect of reconciliation between the two communities still looks very far away. Yet in spite of, but perhaps because of, the suffering that has brought us to this position, there is around me, at least in the hospital, a palpable air of optimism. The staff remains unpaid, but patients get treated and the hospital looks cleaner every day. The army is still present but in much smaller numbers. A man with severe complications from a gunshot wound had surgery by a local doctor operating with colleagues from Britain and the Lebanon, with anaesthesia and intensive care provided by an Albanian with two French colleagues. The type of operation he required was agreed between all after his details, including digital clinical photographs, were emailed to a surgeon in Salford.

The immediate crisis is, I hope, easing, although the situation remains far from stable and the future is still unclear. The mortuary fills up but now gets emptied, and the fridge is still working. There is still rubbish around the hospital but not as it was before. The trickle of Serb patients has never actually stopped, and I meet regularly with Serb doctors outside the hospital. They remain fearful, but I was told that one will rejoin the hospital board next week.

So how do you eat an elephant? One bite at a time.

Chapter 30

Military Medical Contribution to Indigenous (Military and Civilian) Health Sector Development (HSD) Within Security and Stabilisation Operations

Martin C.M. Bricknell

Abstract This chapter provides a description of the factors to consider and medical capabilities required to achieve the maximum effect for any military medical contribution to indigenous health sector support. It starts by examining the impact of insecurity on health and common issues affecting health sectors in crisis. The main focus is the role of international military medical forces in supporting the development of health services support for indigenous security forces within wider Security Sector Reform (SSR). The closing section considers how international military medical services can support the wider international community in the development of the indigenous civilian health sector.

Keywords Indigenous health services • Military health services • Development and support

Objectives

- To examine the impact of international military medical forces in supporting the development of indigenous health services

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Introduction

This chapter provides a description of the factors to consider and medical capabilities required to achieve the maximum effect for any military medical contribution to indigenous health sector support. It starts by examining the impact of insecurity on health and common issues affecting health sectors in crisis. The main focus is the role of international military medical forces in supporting the development of health services support for indigenous security forces within wider Security Sector Reform (SSR). The closing section considers how international military medical services can support the wider international community in the development of the indigenous civilian health sector.

There are multiple examples of UK military medical services being used to alleviate suffering amongst non-combatant populations in the aftermath of conflict. These include the restoration of hospital services for Turkish prisoners in Damascus in 1918, the inclusion of medical staff in the Allied Military Government of Occupied Territories in World War 2, the restoration of public services in Suez after the invasion in 1956, the humanitarian relief operation in Northern Iraq in 1991, the stabilisation operation in Rwanda in 1994 and as part of military “Quick Impact Project” (QIP) activities in Bosnia and Kosovo in the late 1990s. UK Field Hospitals operating in Iraq saw Iraqi combat casualties, Iraqi civilians and Iraqi children at the accident and emergency department and have provided surgery in an emergency. Similar to Iraq, the UK hospital in Camp Bastion in Helmand province in Afghanistan has cared for detainees, indigenous civilian security force and civilian casualties as well as NATO casualties. The UK military medical services have contributed to the development of indigenous security forces medical services in Brunei, Oman, Saudi Arabia, South Africa, Iraq and Afghanistan. Annex A at the end of this chapter is a short narrative describing OP Gabriel to Rwanda in 1994. This is a case example of how military medical capability was used to both respond to a humanitarian crisis and support a stabilisation operation. Military medical services are likely to require an enduring competence to engage and support indigenous health sectors as part of military medical capability.

The Impact of Insecurity on Health

The absence of security does not just concern national military defence. Article 25 of the United Nations Charter of Human Rights asserts that being healthy and having access to health care are an essential element of human security [1]. This underpins the UN “Responsibility to Protect” agenda that emphasises preventive and developmental interventions in addition to military force for supporting populations within countries in crisis [2]. Three of the eight Millennium Development Goals of the UN Millennium Project are directly related to health [3]. Conflict has a direct impact on population health through injury to individuals caught up in the fighting.

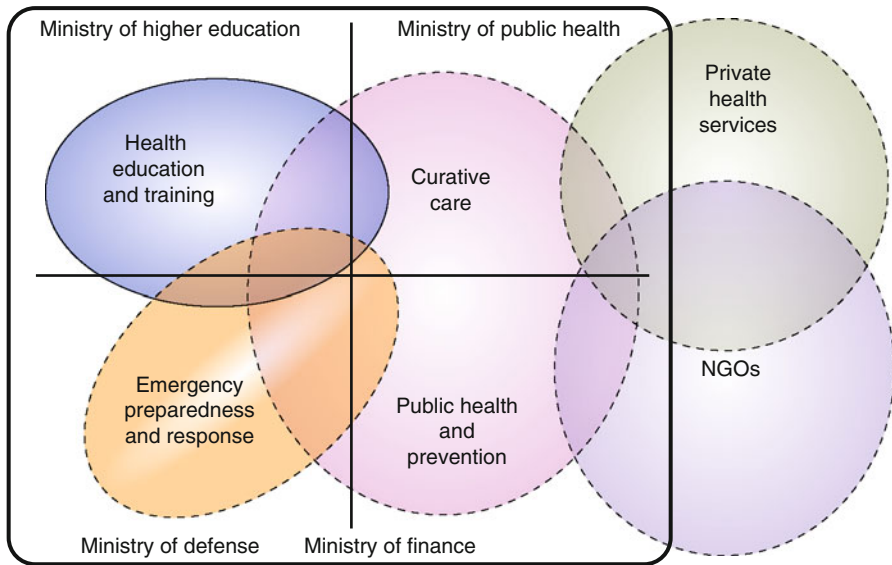


Fig. 30.1 Indigenous health sector relationships

It also has a significant indirect impact through population displacement, damage to health institutions and the collapse of economic activities required to fund health programmes [4]. A study linking health indicators and conflict status across countries in Africa emphasises the consistent need to support basic health and public health services in countries affected by conflict [5] and that conflict is a much more common cause of large-scale epidemics rather than natural disasters [6]. A RAND analysis of nation-building operations after 1945 argues that the health sector has an impact independent of other reconstruction and development sectors (security, economic stabilisation and political development) and that the other sectors have an impact on the health sector [7]. Overall, it is clear that threats to health and health services are significant aspects of security for populations in crisis. Supporting access to health services is an essential component of the restoration of essential services in support of the establishment of governance.

Health Sectors in Crisis

Figure 30.1 it is essential to understand the relationships that influence indigenous health sectors as a holistic concept at a national level. This section is an illustrative narrative of these relationships and is summarised. The precise balance of power will vary and will almost certainly be different to Western, socialised health systems. The Ministry of Finance is likely to be responsible for the allocation of funds

from both national and donor sources to each ministry that provides health services. A Ministry of Public Health (MoPH) is usually responsible for the procurement of curative care, public health and preventive medicine services for the whole population. While the MoPH is a stakeholder in health education and training, this may be the responsibility of the Ministry of Education (MoE). This ministry may also run medical facilities in order to place students into health service delivery environments and to maintain the clinical practice that clinical teachers require to maintain their skills. The MoPH is likely to be the lead ministry for health sector emergency preparedness and response, but both the Ministry of Defence (MoD) and the Ministry of Interior (MoI) may own command and control centres and ambulances that can respond to mass casualty incidents. The MoD is responsible for the provision of health services to the armed forces. The MoI is responsible for medical support to the police and often for the provision of medical care to detainees/prisoners. However, the MoI may have limited medical services and so have to use MoPH and/or MoD medical facilities. While both the MoD and MoI need to recruit members of the health sector workforce, profession-specific training should normally be delivered under the oversight and licensing arrangements of the MoE. The MoD and MoI may have negotiated special access and funding arrangements to cover circumstances where curative medical care for military personnel and their dependants is best delivered through MoPH facilities. Finally, it is essential to consider the private, insurance or informal healthcare market where many healthcare workers may earn the majority of their salary. The size of this market will be affected by the comparative value of government salary levels to the costs of living and the role of “graft” in personal economic influences. There may also be a challenge to dissuade healthcare workers from taking employment as interpreters or migrating from the country. The long-term solution is for the indigenous education system to provide sufficient healthcare workers for the national health economy, including the military medical services. This needs to cover all professions in health care, not only doctors and nurses but also, for example, ambulance technicians, laboratory technicians, radiographers and medical equipment technicians. Overall international military medical activities should complement wider programmes for the development of human and institutional capacity in the indigenous health sector.

Health provision is often an emotive subject and if access is reduced or controlled in favour of different groups may become a destabilising influence. Supporting indigenous health provision may therefore be an important stabilising function [8]. Health and the delivery of health care by a state is a function of governance and a proxy indicator to the government’s expression to protect its population and its view on human rights [9]. At the beginning of any intervention, it is essential that an indigenous health needs assessment is undertaken as part of the strategic estimate for the likely tasks for military medical services in a military campaign. This will need to cover the context of the health sector, the state of indicators of the health of the population, information on health services and a description of the stakeholders in the health sector. A comprehensive health needs assessment at anything above village or district level is a time-consuming technical task that may require dedicated specialist staff to undertake. Ideally this should be conducted by

indigenous health professionals with technical assistance from civilian agencies, but the military medical services should be prepared to assist if requested.

Principles

Medical support to military operations is tailored to the military population at risk (PAR) and the assessed risks to deployed military troops, although it will often be necessary to provide support to indigenous military forces (and captured personnel (CPers)). Support to the military force must remain paramount, together with the provision of emergency care to all casualties where this is urgently needed (in accordance with international humanitarian principles). Well-intentioned but uncoordinated military medical activities, particularly those undertaken for ostensibly humanitarian reasons, risk undermining efforts made by the indigenous government to rebuild its own health system in conjunction with key donors and humanitarian agencies.¹ The likely goal for the indigenous government is a trained, equipped and sustainable health system equivalent to those existing in neighbouring peaceful countries, contributing to overall national political and economical stability. Military medical activity undertaken for perceived short-term gains may undermine the military mission in the medium to longer term, particularly in counter-insurgency (COIN) operations, by reducing confidence amongst the indigenous population in their government's ability to provide these essential services.

The following principles, based on the United Nations Office for the Coordination of Humanitarian Affairs (UN OCHA) guidelines on the use of military and civil defence assets (MCDA) to support UN humanitarian activities in complex emergencies² and the UN "Oslo Guidelines",³ must be adhered to when the military is involved in medical aspects of governance, reconstruction and development (G, R&D):

- *Do No Harm.* The most important principle in providing assistance to health sector development is "to do no harm". There is a real risk that the work of other agencies might be undermined by the involvement of military medical services in direct healthcare provision to the indigenous population, and that their security, and that of those treated, might be compromised.

¹As an example, although the NATO mission in Kosovo had been running for almost 10 years, Kosovo Serbs were still being treated in the NATO field hospital in northern Kosovo in 2009 for nonemergency medical care, a result of continued anxiety amongst minority groups within Kosovo over their care by the Kosovo Albanian majority. The withdrawal of military hospital facilities in this area following the announcement of Deterrent Presence required that an alternative solution be found.

²UN OCHA Guidelines on the Use of Military and Civil Defence Assets to Support United Nations Humanitarian Activities in Complex Emergencies (Rev 1- dated Jan 06).

³Guidelines on the Use of Foreign Military and Civil Defence Assets in Disaster Relief "Oslo Guidelines" (Revision 1 dated 1 Nov 07).

- *Clinically Appropriate.* Any intervention must be clinically appropriate, taking into consideration the capabilities of the healthcare sector and the indigenous governmental institutions' policies and direction. This might include providing short-term support as a component of a development programme. In sub-Saharan Africa, for example, the provision of cataract surgery returns many people to productive lives and thereby improves their health; development activity would aim to support and mentor indigenous ophthalmic surgeons in the necessary techniques.
- *Culturally Sensitive.* The provision of any health sector intervention must be culturally appropriate and socially acceptable to the indigenous cultural, social and religious values, noting the specific issues of gender and gender-specific roles in health care in many nations.
- *Coherent.* The intervention should not be focused on just one aspect of G, R&D, such as buildings or equipment, as these are often unsustainable without attention to other aspects of development, for example, availability of trained staff and mechanisms for meeting recurring costs.
- *Sustainable.* Any intervention should seek to ensure that once the military forces withdraw, the intervention can be sustained by indigenous medical services or NGOs. Any equipment donated must be able to be maintained in the long term using local resources.
- *Civilian Primacy.* Military involvement in civilian healthcare development must be undertaken only where there is *no civilian alternative*. It should always be the option of last resort and explicitly limited in time and scale.
- *Coordination.* Medical engagement must only take place where there is *agreement* with the indigenous government or other appropriate authority; effective liaison and coordination will be essential with the government, NGOs and other agencies.

Although the military cannot be considered a humanitarian agency, there may be occasions during combat or other military operations where there is a requirement to support the delivery of humanitarian assistance. In such cases, the following principles must be respected⁴:

- *Humanity.* The dignity and rights of all those sick and injured must be respected and protected; indigenous cultural requirements must be respected.
- *Impartiality.* Medical assistance must be provided without discriminating as to ethnic origin, gender, nationality, political opinions, race or religion. Relief of suffering must be guided solely by clinical needs, and priority must be given to the most urgent cases. Casualties who are members of opposing forces must be treated in line with this principle; medical personnel have a responsibility to report violations of this principle to an appropriate authority.

⁴UN General Assembly Resolution 46/182 on Humanitarian Assistance as developed by UN Office for Coordination of Humanitarian Affairs.

- *Neutrality*. Military medical services are not neutral (as they are part of the deployed military force) but must treat cases under the impartiality principles discussed earlier.

The Provision of Emergency Care

The Geneva Convention requires medical services to treat casualties from conflict in a priority solely based on clinical need. The military medical plan will define the patient groups who are eligible for access to the international military medical system. This may include cross-government coordination (e.g. Foreign Ministries and Ministries of Health) and bi- or multinational agreements defined by formal agreements. The military medical system comprises initial medical evacuation, entry to first military hospital, in-theatre transfer to either military hospitals or indigenous hospitals and strategic medical evacuation. The PAR is likely to include all international forces, international civilians supporting military forces and opposing forces detained by the international force. It is likely that international coalition forces are eligible for access to all aspects of the military medical system which may include strategic aeromedical evacuation. In a stabilisation or counter-insurgency operation, eligibility may be extended to indigenous security forces and the civilian population. Armed conflict may well result in indigenous casualties at a time when indigenous medical facilities (military & civilian) are underdeveloped and under pressure. In such complex emergencies there may be significant barriers preventing the access, development and delivery of the indigenous healthcare services. These may include insecurity, poor public health measures and governance difficulties. There may be a substantial disparity between the capabilities of the international military medical system and the indigenous health system; however, it is unlikely that the international military medical system can underwrite all of these deficiencies. This may cause moral and ethical challenges for military medical personnel that need to be addressed during pre-deployment training and by in-theatre policy direction.

As a matter of principle, indigenous patients are not normally evacuated from their country except in specific circumstances, perhaps under the care of an international humanitarian NGO. Furthermore, indigenous patients should receive care from indigenous healthcare workers unless there are overriding reasons why the international military medical system should provide this care. Casualties amongst local civilians and security forces may be given access to medical evacuation and medical care in the international military force system but this will be increasingly constrained the further along the evacuation chain that they progress. The military medical system requires a management process that controls entry and can be adjusted according to capacity – this is known as “Medical Rules of Eligibility” (MRoE). Once inside the military medical system, control of medical evacuation through the military medical system system is balanced between increasing levels of care and the complexity for the family for supporting the patient. The reality is

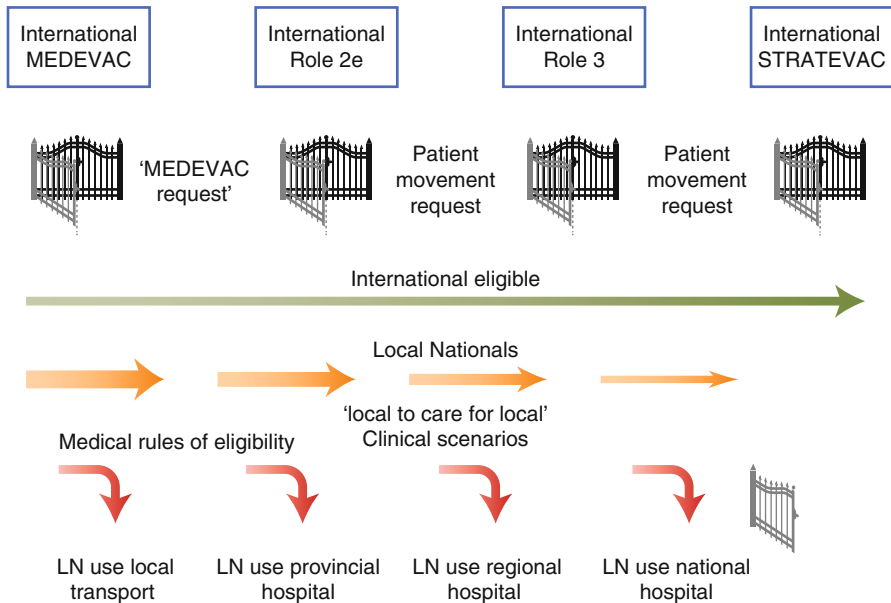


Fig. 30.2 “Gatekeeping” access

likely to be that all personal care for patients in indigenous civilian hospitals is provided by family members and much of the in-patient medical care has to be paid for even in the “free” public hospital system. Therefore, the social costs of health care escalate in direct relation to the distance the patient moves from their locality. This issue is summarised as “gatekeeping access” shown as illustrated in Fig. 30.2.

The MRoE process defines patient groups by their level of access to the international military medical system. International forces usually have right of access to the whole system. Indigenous security forces may have right of access for emergency medical care (LLE – life, limb or eyesight saving care) in order to achieve the same effect on the moral component of their fighting power as the medical system achieves for international forces. It is unlikely that the international medical system will provide routine medical care for indigenous forces. Care for indigenous civilians may follow the same principles but could be further limited to injury from conflict in order to reduce access for normal medical and surgical emergencies. The description and application of these rules have to be carefully balanced to ensure that the international military medical system follows the principles in paragraph 6 and supports consent building without undermining the development of the indigenous health economy. An example of the MRoE for MEDEVAC for a military operation is shown in Fig. 30.3.

Figure 30.3 is colour-coded to allow an adjustment to the MRoE for access by indigenous patient’s dependant on the unoccupied capacity in the medical system. MRoE GREEN describes the normal situation in which indigenous civilian may be

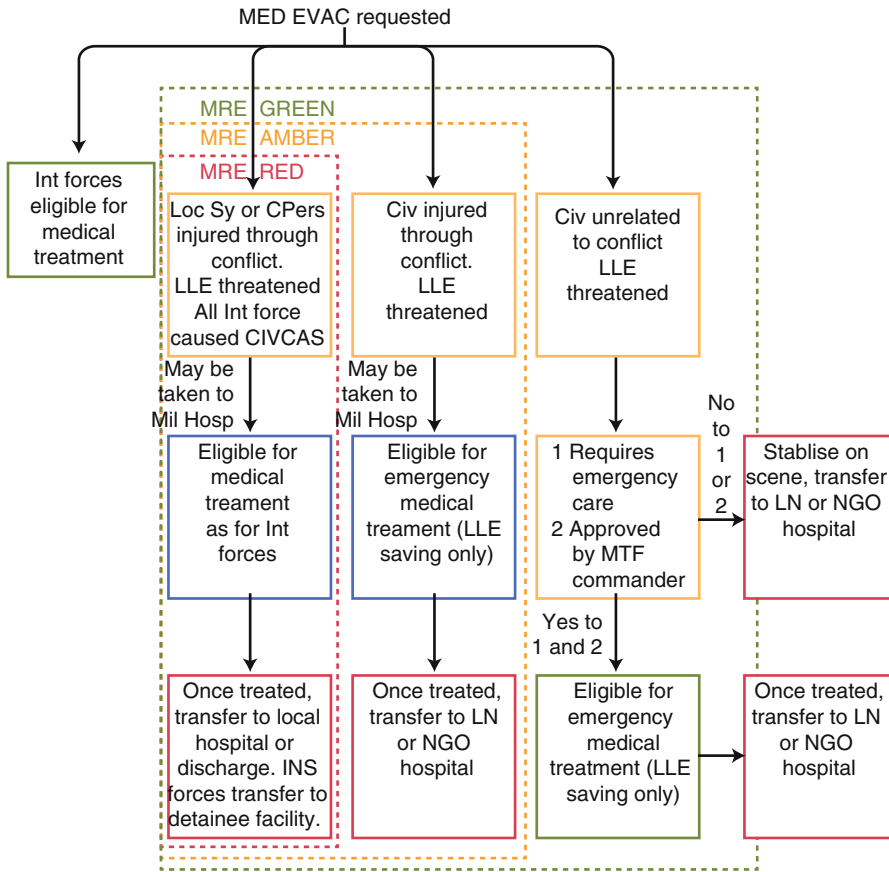


Fig. 30.3 Example of medical rules of eligibility

admitted for emergency medical care to receive LLE-saving treatment. MRoE AMBER excludes those indigenous civilians with LLE conditions that are not conflict related unless by prior agreement with the headquarters medical director and the hospital commander. MRoE RED is imposed when the military hospital system is full and therefore no indigenous civilians can be accepted unless injured as a direct result of international military actions. Local security force casualties and CPers would still be eligible for emergency care. The MRoE may be further refined with medical policy for specific clinical scenarios such as severe burns, closed head injuries with low Glasgow Coma Scales [10] and neonatal emergencies. If the MRoE is insufficient to control access and the deployed medical system is full, it may be necessary to consider whether to curtail security operations in order to reduce the risk to security forces and the potential demand for medical care. This is only ever a short-term emergency response and should be accompanied by demand for rapid medical evacuation to clear the medical system and a review to determine whether medical capacity should be increased.

Building the Capacity of Health Services Support to the Indigenous Security Forces

Military stabilisation operations emphasise security as the bedrock to stability. From the outset, military forces should consider supporting the development of indigenous security forces within the medium-term plan to achieve stability. Comparable to international forces, health services support is a key moral and physical component of fighting power. Health services support is one of the essential capabilities that enable the indigenous security forces to become self-sufficient. Case studies from Oman, Sierra Leone, Iraq and Afghanistan demonstrate that international military medical services may need to provide field medical support to casualties from indigenous forces until the indigenous security forces medical services are capable of providing this capability themselves. Helicopter medical evacuation and initial surgical care are the most sophisticated medical capabilities that international military forces possess and the most difficult to transfer to the indigenous forces. Annex B at the end of this chapter provides a list of tasks that may be considered as activities for UK military medical forces to undertake with indigenous security forces.

Strategic Issues

For military medical engagement, there are considered to be two dimensions to the strategic level of operations in the context of SSR. The “out-of-country” strategic level concerns the integration of national “comprehensive approaches” across the international community in order to achieve coherence in the international stability operation as presented to the recipient country. The “in-country” strategic level is that of the employment of international resources to compliment and support indigenous plans for SSR. The international “out-of-country” effort for military medical services will need to consider how the SSR function should be integrated into the wider in-country international military medical mission and how the medical function integrates SSR activities with wider G, R&D. It is essential that there is an “out-of-country” strategic campaign plan for the development of the indigenous military medical services in order to ensure continuity of the SSR programme between rotating in-country post-holders.

The contribution of international military medical services needs to be coordinated with the “in-country” strategic plan for the indigenous health sector (which includes the security force medical services). This should be balanced against meeting the primary task of providing medical support to international forces. The organisational structure of military medical services, with its emphasis on prehospital and primary care, might also be used as a catalyst for a shift in civilian medical services from hospital-based care to primary care in support of wider development goals.

At the outset it is important to determine eligibility for access to the indigenous military medical system for the different elements of the security forces and their beneficiaries as this has considerable implications on the demand for health services. It is also important to establish whether the medical support arrangements for the security forces are organised as a coherent whole or whether each component has its own system.⁵ The military medical systems may also provide care for dependants of military personnel and veterans. This has substantial implications for the provision of specialist clinical services, such as paediatrics, obstetrics and gynaecology, and may also require the provision of musculoskeletal and psychological rehabilitation services for injured veterans. This issue of eligibility must be interwoven with wider personnel policies for the security forces to ensure coherence with funding allocations from parent ministries and international donors.

The two main factors limiting the overall development of the indigenous military medical services are human resources (numbers and competency) and money. The former is a competition for healthcare personnel with the civilian health sector and the latter is a competition for resources within the security sector. There may be a national shortage of healthcare personnel which could be mitigated by the employment of expatriate healthcare workers as either indigenous contractors or loan service personnel. An intermediate solution could be to maximise education opportunities for indigenous military and civilian healthcare workers by sharing educational opportunities across all sources including those from NGOs and international military forces. The indigenous government could also be supported to sponsor students to study overseas pending the development of sufficient critical mass to establish an indigenous tertiary level education system to train students indigenously. The funding for medical support for security forces is likely to be found from the MoD or MoI. It is highly unlikely that International Agencies or NGOs will provide assistance to military medical services. Furthermore, the medical services compete with other security capabilities such as ground manoeuvre or firepower. The financial support provided will depend on organisational and political factors, but is heavily dependant on the lobbying capability of senior members of the military medical services. This illustrates the need to mentor senior indigenous military medical personnel in military politics and staff procedures in order that they can compete effectively for resources in this environment.

HIV/AIDs are likely to be a significant issue, especially in stability operations in Africa. The UN AIDS programme recognises the potential impact of AIDS on the experience, skills and training capacity within the uniformed services which can seriously affect military readiness. Diminished readiness in the security sector, and particularly in defence forces, as a result of HIV/AIDS-related disease can thus be considered a threat to international peace [11]. The indigenous security forces employ

⁵ As an example, in Oman the Sultan of Oman's Special Force had separate medical arrangements from that of the Land Forces. In South Africa, the medical arrangements for the army, navy and air force were the responsibility of the South African Medical Service (SAMS) of the National Defence Force and organised as a fourth Service. The SAMS also provided medical support to the South African Police Service when conducting combined operations.

a large number of young men who are a potential source of disease transmission. They should be an explicit target audience for HIV/AIDs awareness, testing and treatment programmes. Whether these are funded by the MoPH or NGOs, it is important to ensure that the military population has access to the same HIV prevention and management programmes as the rest of the national population. This is a good example of the impact of wider national health issues upon the capability of the security sector.

Operational Issues

The development of the field medical system is the most important operational level issue. This comprises prehospital care (emergency trauma care and primary care) for the troops in the field, supported by a medical evacuation system that transports casualties to initial hospital care. It may also be necessary to have a medical transfer system to move casualties from the initial hospital to specialist referral hospitals. Counter-insurgency campaigns are primarily fought within national borders. Thus casualties can be taken to fixed medical facilities and so there may be a limited requirement for mobile, deployable field medical facilities. These might be required at a later stage of development if indigenous military forces are to have an expeditionary capability as part of a wider, regional security construct. The network of fixed hospitals required to support security forces could also support the indigenous civilian population, and, again, this might require coordination between military and civilian health agencies.⁶ Overall, the concept for the use of security forces medical services must be aligned to the operational employment of the security forces. This requires the senior indigenous military medical staff to understand the practical issues surrounding planning and managing medical arrangements to support military operations.

Tactical Issues

The most common tactical activity for international military medical assistance is supporting development of prehospital care and medical evacuation through the provision of first aid training and military ambulance vehicles (ideally including helicopters for medical evacuation). This training should to be designed to reflect the educational ability of the indigenous personnel and the medical equipment available aligned to indigenous cultural attitudes. This may require a different training programme from that delivered within the medical training schools of the

⁶ As an example, in Oman the field surgical team (FST) in Salalah provided surgical care for both military and civilian patients until the Ministry of Health was able to open a new hospital. The FST then withdrew from the town to the military airbase and restricted itself to caring for military personnel. In Iraq, the initial plan was for the civil medical system to provide hospital care for security forces, but as the security situation deteriorated, it became necessary to establish protected medical facilities for the security forces.

international forces. In a multinational environment, there needs to be coordination to ensure the syllabus is the same across different national training contingents.

Supporting the Provision of Health Support to the Indigenous Civilian Population

The civilian health sector, indigenous or international, has primary responsibility for meeting the health needs for the indigenous population. The contribution of international military medical services to supporting the indigenous civilian health sector is dependant on the wider context for the employment of international military forces and should always be nested within a civilian plan. The relationship between international military forces and the indigenous civilian health sector will be dependant on the military mandate ranging from an exclusively civilian-military relationship in a humanitarian assistance mission to a “de minimis” relationship during war fighting limited only to fulfilment of international obligations under the Geneva Convention. The end state for civilian health sector G, R&D is for an indigenous civilian healthcare worker to provide culturally and clinically appropriate health care for an indigenous civilian. Where possible, the international military role in the civilian health sector is to do nothing. There is likely to be a finite limit to the number of indigenous civilian educated technocrats who are competent to manage development projects. There is also a finite limit to the number of interpreters who can both facilitate international civilian engagement with the indigenous civilian community but also facilitate the partnership between international military forces and their indigenous civilian-military counterparts. This, compounded with the threats by the insurgents to those who work with government institutions, may create a challenging market for indigenous civilian human capacity. The developmental challenge in an indigenous country will be to convert these resources into practical improvements in the quality of life at community level, especially in the vulnerable rural communities most exposed to the threats from insurgents.

At first glance, military units may believe that the solution is short term, direct provision of nonemergency primary care (often branded as “MEDCAPS”) and building clinics. The term MEDCAP has moved away from the original concept of a “medical civil action programme” developed during the Vietnam War into a description of on-off, nonemergency primary healthcare clinics provided by international military medical forces within an international military security envelope. There is very clear evidence of the ineffectiveness of mobile health clinics in anything other than the extreme short term [12]. Alternatively the construction or refurbishment of health facilities or schools is often selected as a series of military development projects. However, buildings are not health capabilities and success depends on availability of healthcare workers and sustainable funding for medical supplies and equipment within the wider support of the local community. Overall the military role in improving access to health services should be considered within a wider “SHAPE-SECURE-HOLD-DEVELOP (SSHHD)” concept. The slide at Fig. 30.4 illustrates the spectrum of relationships between security forces and health

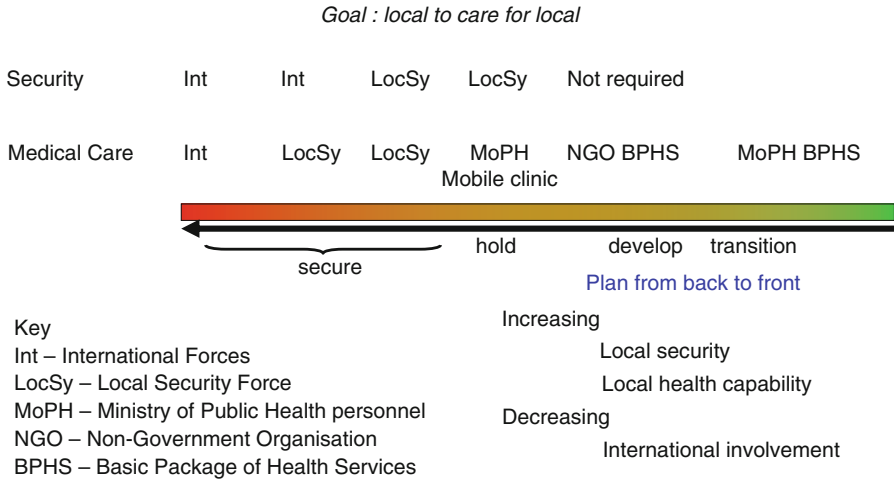


Fig. 30.4 Supporting health sector development

providers according to the security environment. This illustrates the goal of “local caring for a local” using local civilian medical services. There may be occasions where this cannot be achieved because of security or resource constraints and so the options may have to move to the left of the slide. However, this should always be considered to be the short-term solution to meeting an urgent healthcare need and there should be a plan to move the relationships to the right of the slide.

Conceptually, security operations start by “SHAPING” the environment to both build relationships with the indigenous population and also to define and then reduce the opposition. The “SECURE” phase is the surge of tactical operations to physically remove opposition forces from the area. “HOLD” is the transition from military operations to police-led security operations to ensure the population is protected from the opposition. This includes the reestablishment of indigenous governance. “DEVELOP” is the execution phase of reconstruction and development in order to demonstrate to the population the benefits of supporting the instruments of government and so gain their consent. This should include the transfer of governance and security from international security forces to indigenous political actors and security forces. This is not a linear process but requires selection of each of these activities according to the context. Ideally planning should be “backwards” with agreement between stakeholders (most particularly indigenous representatives of governance) of what the “transition” looks like and the resources required to achieve the entire process. This may be consolidated into a Stabilisation Plan. Identification of the causes of civilian morbidity and mortality will point to those determinants of health (water, sanitation, nutrition, housing and education) that may need development assistance. Military activity in the first instance throughout SSHD should always be determinants of health driven before considering health infrastructure. An illustrative matrix of health sector tasks within the SSHD construct is at Annex C at the end of this chapter.

Shape

Military medical representatives should be actively engaged to both build relationships with the indigenous population and key health sector actors during the formulation of a Stabilisation Plan. At the indigenous level, this ensures that the location, capability and capacity of the civilian health facilities are known and that this information can be compared with the reported community's grievances. It may be appropriate to use military transport (e.g. helicopters) to assist indigenous civilian or international civilians to visit local communities in order to conduct "community health meetings". The most important outcome from the SHAPE phase for the security forces medical services is to agree the roles and responsibilities for the management of civilian casualties that may occur during the surge of security operations during the SECURE phase, continuously stressing civilian primacy. As a last resort, it may involve acceptance of civilian casualties into the military medical system, both indigenous civilian and international, but should always include agreement on the hand-off arrangements for these casualties back into the civilian health sector.

The information about civilian medical facilities can be compared with the indigenous director of Public Health's Plan in order to discuss the factors influencing the community's access to health services and ways to mitigate the shortfall. This process can lead to agreement on the priority for refurbishment of clinics and confirmation of the availability of manpower, equipment and funds to cover operating costs once the buildings are ready for use. It may be appropriate to use military development money as funding for capital investment. This may require military engineer reconnaissance to establish the statement of work and the submission of funding applications into a military contracting process. There are ethical and legal constraints on what the military are permitted to gift or formally donate medical materiel, for example, it is not acceptable to gift time-expired medications.

Secure

The focus of this phase is the emergency care of casualties from conflict. It may be necessary to remind the operational planners of their duties under the Geneva Convention, particularly to avoid targeting known healthcare facilities including ensuring that entry of security forces to indigenous civilian medical facilities complies with indigenous and international law.⁷ There will need to be close cooperation across the health sector to ensure all casualties are transported to the most appropri-

⁷ An example was the facilitation of safe passage of casualties across military lines brokered by the ICRC during OP MOSHTARAK in Feb 2010. This generated discussion over the authority of both international forces and indigenous civilian forces to screen these casualties to identify wounded insurgents. It was emphasized that all casualties have right of access to medical care independent of allegiance but the indigenous civilian security forces have the authority to detain them whilst in medical care for further investigation.

ate health facility for both immediate and long-term care. It may be necessary to provide military support to provision of emergency medical supplies to the civilian sector, ideally by assisting with the transport of previously earmarked materiel or by emergency donation.

There should be a plan to medically support internally displaced persons (IDPs) stressing Host Nation primacy with the United Nations Office for the Coordination of Humanitarian Affairs and Humanitarian Cluster. It may also be necessary to arrange for unfettered access for war wounded convoys under the protection of the International Commission of the Red Cross (ICRC). Both activities may require humanitarian corridors to be identified during the planning process and rehearsed with all actors in attendance. UN OCHA has provided guidance [13] in the response to IDP situations where the Host Nation's government has primacy, supported by UN OCHA and the humanitarian cluster that may well include other programmes such as the Global Polio Eradication Initiative [14]. Use of military medical elements to support IDPs is a last resort option that should only be undertaken at the specific request of the Host Nation and only then with close dialogue and advice from UN OCHA and Humanitarian Cluster.

Hold

During the HOLD phase, there may be a gap between the imposition of military control and the ability of the civilian sector to establish routine medical services. During this period it may be necessary to provide access to health care using temporary, mobile services. Ideally this should be done using civilian capacity which would have been agreed with the director of public health during the planning in the shape phase. If there is an obvious unmet health need that is undermining confidence in the security operation, there may be a case for military medical services providing this medical care for the civilian population. Ideally this should be done using indigenous military forces but may require international military assistance. All cases of military involvement should be planned as a bridge to a civilian solution and both the necessity and method should be agreed with the civilian sector prior to military involvement. Military forces should use this period to assess the planned location of clinics in order to confirm the reconstruction and development requirements within the health sector element of the Stabilisation Plan.

Develop and Transition

Ideally there would be no international military medical engagement during the DEVELOP phase because the implementation of the Stabilisation Plan would have been handed back to civilian leadership. In reality there should be continuing dialogue between all the health sector stakeholders to ensure coordination and cooperation. There may be scope for the international military medical community to

Table 30.1 Examples of health sector development performance matrices

Ser	Measures of output	Ser	Measures of outcome
(a)	(b)	(a)	(c)
1	No of provinces with a director of public health	1	Number of hospital admissions due to conflict-related trauma
2	No of provinces with a health sector development plan	2	Maternal mortality rate
3	No of active medical treatment facilities (MTF) as a rate per 1,000 population at risk (PAR)	3	Infant mortality rate
4	No of healthcare staff by MTF. Subdivide by groups (doctors, nurses, midwives, medics, pharmacists)	4	<5 years child mortality rate
5	Vaccination rates	5	Incidence of disease (use epidemiological data as a proxy measure of total burden of disease – should decrease)
6	No of villages participating in specific public health interventions (water, sanitation, nutrition, housing)	6	Incidence of D&V (use diarrheal disease infection rates as a proxy measure of safe H ₂ O supply)
7	No of students at university commencing basic medical professional trg (BPT)	7	Incidence of acute respiratory infection (ARI) (use ARI rates as a proxy measure of improving housing conditions – indoor air pollution)
8	No of students at university commencing higher medical professional trg (HPT)	8	Proportion of children showing evidence of malnutrition
9	No of indigenous civilian MEDEVACs from PoW accepted direct to civilian MTFs	9	Civilian hospital case fatality rates
10	No and type of military medical healthcare engagements (should decrease)	10	Ranking of access to health care as an expressed “grievance”

continue to assist the civilian health sector through training and education programmes, access to capital investment or other capacity building activities.

Measuring Success

It is important to establish performance metrics for health sector development. Ideally these will be the responsibility of civilian agencies though security forces may support the collection of data. This is likely to be based on a combination of measures of output and measures of outcome. This data is likely to be found from a range of sources including Ministry of Public Health and World Health Organisation analysis, local civilian reporting and military reporting. Table 30.1 shows examples of health sector development performance matrices.

Preparation of Individuals for Role

Generic military medical training and education should provide a robust underpinning framework for undertaking military medical activities in support of an indigenous health sector (e.g. first aid training, medical assistance clinics). Medical personnel should be trained and equipped to provide emergency medical care for the whole potential PAR (including paediatric, geriatric and general medical emergencies). However, it is essential that theatre-specific issues are covered during pre-deployment training including medical rules of eligibility, indigenous arrangements for transfer of indigenous casualties, ethical dilemmas and the campaign plan for indigenous health sector engagement.

It will be necessary to have designated subject matter experts if engagement with the indigenous health sector (security sector or civilian sector) is a specified task at the operational or strategic level. The individuals will require significant postgraduate education in public health in conflict including knowledge of the roles of all stakeholders in health sectors in crisis with training in the World Health Organisation's Cluster Approach [15] and minimum standards to the delivery of health and humanitarian support [16]. Ideally these individuals will have prior practical experience before operational deployment. Understanding the culture and context of an indigenous health sector and building relationships with key stakeholders takes time. A "one-off", 6-month tour is probably too short to achieve enduring impact. An alternative model of longer tours for a minimum of 9 months or continued longer-term engagement through reachback/forward is required for specialist personnel working in this field. It is important for these individuals to have sufficient maturity to understand complex issues such as the indigenous relationship between "Western medicine" and traditional medicine, balancing tribal and cultural politics with performance and the pace of change and to balance their own experience of the practice of medicine with culturally sensitive and clinically appropriate advice for the indigenous conditions.

Annex A. The Deployment of Medical Forces on OP Gabriel Rwanda 1994

The British contingent to the United Nations Force in Rwanda (UNAMIR) in 1994 included a medical battalion (23 Para Fd Amb). The main task was expected to be humanitarian relief to operations. The medical regiment initially deployed to the North West to reduce the flow of Rwandan refugees into camps in Goma in Zaire.

As the acute crisis settled, a similar emergency was developing in the South West. The French Army had deployed to this area of Rwanda on Operation Turquoise in June and set up a Humanitarian Protection Zone to stabilise the area and prevent another mass exodus of refugees to Zaire. This had been achieved, and up to a million internally displaced persons were thought to be in informal camps there. The new Rwandan Government was opposed to the French presence in the country, being suspicious of French involvement in the conflict, and the French were due to withdraw. It was believed that many of those taking refuge in the Humanitarian Protection Zone were either implicated in the massacres and would not stay to face the vengeance of the victors or innocent but fearful of arbitrary reprisals or of being caught up in further conflict. Only a small number of IOs and NGOs were operating in the area, with little or no medical activity taking place. There were thus real and perceived threats to human security from disease and violence.

The concern therefore was that the internally displaced would leave the camps to become refugees in Zaire, repeating the Goma crisis and exacerbating international tensions, only this time without the resources to meet it: the aid agencies had already been stretched to breaking point and beyond, and there were scarcely any logistic resources left in the region to be mobilised.

The UN commander decided to move into the area to maintain stability as the French left, and the medical battalion was redeployed to provide medical support to the displaced population, to encourage them to remain in the area. The concept from the start was that the military medical presence would reassure the population, deter potential low-level insurgent threats and prevent large-scale population movement. Following a recce and health needs assessment, 23 Para Fd Amb established health posts in both villages and camps of internally displaced persons and mobile clinics to travel across the area. Stabilisation of the population was achieved, and the responsibility for medical support to the camps was subsequently successfully handed over to incoming NGOs.

While at first sight a purely humanitarian relief operation, the intended effect was to stabilise the region, through promoting human security, and supporting the state as it emerged from conflict. The operation was coherent with the current stabilisation doctrine that the military should only lead on civilian health provision for as short a time as possible, until the appropriate civilian authority can take over. It was thus both at one level a humanitarian relief operation, and at another, a stabilisation operation (in today's terms). Alternatively it can be thought of as at a tactical level a humanitarian relief operation and at the operational level a stabilisation operation.

A fuller account can be found in:

Hawley A. Rwanda 1994: a study of medical support in military humanitarian operations. *J R Arm Med Corps.* 1997;143:75–82.

Annex B. Common Activities in International Assistance to Indigenous Security Forces Medical Services

Ser	Possible military activity	Supporting military medical activity	Remarks
(a)	(b)	(c)	(d)
1	Professional military training as appropriate levels	Establish health training schools Establish accreditation system for professional qualifications	Military medical training and education programmes should be aligned with whole health sector
2	Education in the role of the security forces in a democratic society	Education on universal medical ethics, e.g. impartiality in provision of emergency care, banning of medical involvement in interrogation, oversight of medical research	Security force medical training should focus on the care of trauma and force health protection Security force medical personnel should also receive general military training This is an important aspect of legitimacy for medical personnel employed in the security forces
3	The conduct of national defence reviews	Conduct of reviews of medical services supporting security forces	Should be nested within the wider indigenous health sector
4	The development of defence policies	The development of policies for the security forces medical services including organisational, administrative and clinical issues	Need to be tailored to the local context and not solely an import of the system from a Western nation
5	The provision of specific technical assistance	Applies across the whole programme for the development of security forces medical services	Likely to involve a combination of in-country personnel, short-term project teams, sponsored external visits and sponsored attendance at external training programmes
6	Strengthening defence resource management and increasing accountability in defence procurement	Establish system for procurement, accounting, distribution and sustainment for medical equipment and pharmaceuticals	Will need to link to the wider local health sector. Medical materiel has high intrinsic value and thus at risk of fraudulent management and use

7	Strengthening military personnel management systems	Establish medical staff support to recruit medical screening, administration of preventive medical interventions (e.g. immunisations), a system of medical categorisation and management of personnel not fully fit including medical pension system	Personnel management of security force medical staff has many unique aspects; recruiting and retention in a “seller’s market”, civ/mil mix, professional salaries, private practice, professional development, etc.
8	The development of infrastructure and specialist facilities	Establish and resource the fixed medical infrastructure for the security forces	The size and location of these will depend on the entitled population, the capacity of the civilian health system and the resources available

Annex C. Illustrative Matrix of Health Sector Tasks in Shape/Secure/Hold/Develop

Ser	Domain	Develop	Hold	Secure	Shape
(a)	(b)	(c)	(d)	(e)	(f)
1	Health	Establish professional education programmes Transfer NGO provision to local provision of services Establish financial and equipment account systems for health sector	Introduce bed nets (malaria – MDG 6) Commence MoPH and epidemiological reporting/ stewardship Refurbish basic and comprehensive health centres Facilitate civilian access to health care	Confirm HNA data Ensure provision of emergency care Facilitate movement of district public health officer with district governor and his staff Facilitate “humanitarian corridors”	Health needs assessment (HNA) Gov leads public health messaging – how to stay healthy during clear, where to get health care from during secure phase, IDPs where to go to for assistance Support recruitment of local public health officer and staff
2	Water	Develop public water system	Assess public water system	Supply of potable water to LNs (well, stand pipe, truck, container, bottled) Health messaging on the importance of clean water, how to source and sterilise water	Intelligence preparation of the battlefield (IPB) on potable and irrigation water supplies Proxy indicators to include food production (irrigation), cholera outbreaks (potable water), malaria incidents (still water)
3	Sanitation	Develop public sanitation system	Assess public sanitation system	Identify grey water, sewage and waste disposal systems that have been affected during the clear and affecting the environment Health messaging on where to defecate so as to not cause a health hazard	IPB on sewage and waste disposal Proxy indicators to include cholera outbreaks (potable water), numbers of identified ventilated improved pit latrines, out houses, community refuse areas

4	Housing/ shelter	Support provision of fuel efficient stoves, smoke hoods and chimneys (↓ acute respiratory infection (ARI) morbidity and mortality)	Ensure access to emergency shelter Inform LN population on PERF	↓ Collateral damage to properties ↓ Collateral damage to infrastructure (irrigation, water, sanitation and health systems) Assess access to safe secure housing including IDP locations Assess access to secure and sustainable fuel sources Monitor effectiveness of IDP response	IPB on social infrastructure. Assess access to safe housing esp. for women and children Assess current access to secure and sustainable fuel supplies (for domestic cooking, lighting and heating). Is it wood, dung, agricultural by-product (i.e. poppy stems)? Support IDP response planning (Is an HN Gov responsibility with UN OCHA assistance – coalition c/s in extremis sp only)
5	Food	Support agricultural development	Solar cookers “Strong food” interventions for malnutrition	↓ Collateral damage to crops, food sources, livestock	IPB on location of stores, access to markets, markets, locally produced product
6	Engagement	Withdraw military engagement with civilian health sector	Plan for withdrawal of military medical services from civilian engagement	Support common medical operating picture across all medical services – international, security and civilian facilities	Identify health sector stakeholders Facilitate collaborative planning

The table reflects the plan backwards approach described at paragraph 23, with agreement between stakeholders (most particularly indigenous representatives of governance) of what the ‘transition’ looks like and the resources required to achieve the entire process

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Chapter 31

Military Health Services Support in Conflict

Martin C.M. Bricknell

Abstract This chapter summaries the principles and practice of military health service support in conflict. The language for this chapter is chosen for a non-military audience but is consistent with more detailed descriptions contained in military publications and procedures. The chapter covers the breadth of military health services and includes the practice of medicine, nursing, dentistry and those of allied health professions in the relief of suffering in multinational and joint military operations. The chapter will start by placing health in the context of the military environment. It will then describe the organisation and resources required to provide military health services and the military-specific issues associated with the planning, preparation and deployment of health service support to operations. It will conclude by describing the command and control arrangements for the conduct of military health services support operations.

Keywords Military health service support • Organizations • Resources

Objectives

- To summarise the principles and practice of military health service support in conflict

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Introduction

This chapter summarises the principles and practice of military health service support in conflict. The language for this chapter is chosen for a non-military audience but is consistent with more detailed descriptions contained in military publications and procedures [1, 2]. The chapter covers the breadth of military health services and include the practice of medicine, nursing, dentistry and those of allied health professions in the relief of suffering in multinational and joint military operations. The chapter will start by placing health in the context of the military environment. It will then describe the organisation and resources required to provide military health services and the military-specific issues associated with the planning, preparation and deployment of health service support to operations. It will conclude by describing the command and control arrangements for the conduct of military health services support operations.

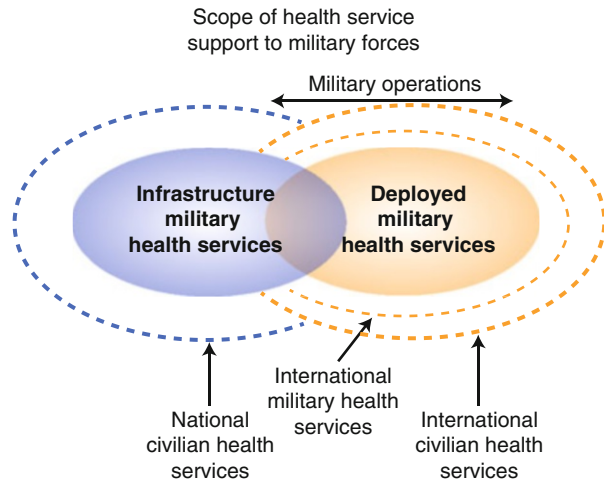
Health Care in the Military Environment

Health is a key element of an Armed Forces military capability: only a healthy force can function at, and sustain, maximum effort. In the context of military operations, health is the ability to carry out duties unimpeded by physical, psychological or social problems. The health services have a substantial role in the prevention of disease, rapid evacuation and treatment of the sick and injured and the return to duty of as many individuals as possible. However, creating and maintaining a healthy force is also the responsibility of commanders at all levels of the Armed Forces. The scope of health services support to military forces is summarised in Fig. 31.1.

Whilst many nations utilise military medical personnel for the provision of health services for military personnel in a wider context, military medical organisations exist for the relief of suffering on the battlefield though the provision of deployed military health services. Although nations have a moral and legal duty to provide health services support for their own troops, not all nations can provide the full capability themselves, and so there may be substantial multinational collaboration to ensure sufficient deployed medical capability and capacity for a military force (possibly including the military forces of the destination country). The deployed military health services may also need to collaborate with national and international civilian health agencies in the destination country. These issues are covered in more detail in Chap. 30 on Military Assistance to the Civilian Sector and Military Assistance to Security Sector Reform.

A residual military medical organisation is required in the home nation in order to generate both a healthy military force and the military health services for deployment. The clinical personnel and medical organisations require both individual and organisational training in order to be prepared for deployment. Clinical training is best achieved through direct patient care and so military clinical staff are frequently employed in the provision of clinical care to military personnel as part of a military

Fig. 31.1 Diagram showing the scope of health service support to military forces



infrastructure health service. This also ensures the delivery of health service support during the pre- and post-deployment phases of operations. In many countries, there is co-operation between the military health service and civilian health services in order to achieve economic efficiencies between the Ministries of Defence and Health. During the recruiting process there will be a handover of clinical responsibility for members of the Armed Forces from civilian to military health services. The range of beneficiaries for military health services varies from country to country with some nations providing full health services to family members and retirees and even civil servants using military resources.

Military health services personnel and organisations are bound by military law, international law and professional ethics and codes of conduct. These separate military health services from combat and combat-supporting forces. There is a general obligation to treat the wounded and sick solely on the basis of clinical need to the extent that it is practicable to do so. There is a specific obligation to treat prisoners of war, internees and detainees and not to engage in any aspect of obtaining information from these individuals. Under the Geneva Conventions, medical personnel and units are to be protected from armed conflict and are only allowed to utilise armed force for the protection of themselves or their patients.

Time is a fundamental factor in patient survival and recovery. Indeed, the history of combat casualty care is the story of getting medical care closer to the casualty in time (evolution of medical evacuation from horses to helicopters) and space (moving surgery closer to the front line). Evidence from accumulated experience in Iraq and Afghanistan and from earlier campaigns shows that there are three key timelines from point of injury (PoI) to first surgical intervention (summarised as the 10-1-2 guidelines). The first is the so-called platinum 10 min in which control of bleeding and the airway is given to the most severely injured casualties by personnel trained in military first aid. Damage control resuscitation measures must be commenced by emergency medical personnel within 1 h of wounding (the “golden hour”). Finally, casualties that

require surgery should be under treatment in a facility manned and equipped for this (noting the complexity of injuries on operations) no later than 2 h after wounding. Additional to this guideline, primary surgery should be provided within 4 h. The 10-1-2 guideline is a pragmatic planning tool that simplifies clinical imperatives to enable synchronisation of the medical plan with the wider military plan. It is not a justification for delaying evacuation but provides a benchmark against which the effectiveness of the military medical support arrangements can be measured.

Military health services support is a specialist area of medical practice because of the environment and conditions in which it is delivered. The aim is to provide a standard of medical care to achieve outcomes of treatment equating to best medical practice delivered using the principles of evidence-based medicine and clinical governance. Clinical care in the military environment differs from civilian practice in that the individual patient may receive care from multiple clinical teams during the course of a single clinical episode. Single clinicians or clinical teams are unlikely to generate the personal experience and case series that usually drive clinical knowledge transfer. Thus, effective clinical governance in a military environment requires the generation of a robust evidence base for clinical practice through medical research, the dissemination of clinical protocols and procedures and an assurance process to measure outcomes.

Military Health Service Support Organisations and Resources

The principal components of operational health service support are medical force protection, emergency medicine, primary health care, secondary health care (hospital services) and medical evacuation (MEDEVAC). Casualties passing through the medical system must be provided with clinical support that is continuous and appropriate.

Medical force protection (MFP) is “the conservation of the fighting potential of a force so that it is healthy, fully combat capable and can be applied at the decisive time and space. It consists of actions taken to counter the debilitating effects of environment, disease and selected special weapon systems through preventive measures for personnel, systems and operational formations”. MFP is based upon 4 principles: measured assessment of the threat, risk assessment, health risk management and audit and surveillance. General medical staff and specialists in occupational medicine, public health, environmental health and veterinary medicine conduct the MFP analysis. MFP is implemented through a combination of individual pre-deployment medical preparation, personnel policies and medical supervision and surveillance.

The roles and organisations that provide health service support on military operations have evolved to reflect developments in clinical technologies and changes in the military operational environment [3–7]. Medical Treatment Facilities (MTF) are defined by their capability and capacity into one of 4 “roles”. The minimum capability of each role is intrinsic to each higher role. Under battlefield conditions, patients generally flow from a lower to a higher medical facility but they can be

discharged at any level and do not have to be evacuated if the clinical capability of the receiving facility is no better than the current holding MTF. As medical capabilities increase so does their demand for support thus increasing the medical and logistic footprint and diminishing their mobility. Definitions of roles and tasks are shown in Box 31.1.

Box 31.1. Definitions of roles and tasks

Role 1. Task: *“provides primary healthcare (PHC), specialised first aid, triage, resuscitation and Stabilisation”*. This includes the provision of basic occupational and preventative medical advice to the chain of command, routine “sick call” and the management of minor sick and injured personnel for immediate return to duty, casualty collection from the point of wounding and preparation of casualties to the next MTF, primary dental care. Additional capabilities may include minimal patient holding capability, basic laboratory testing and initial stress management.

Role 2 Light Manoeuvre. Task: *“provides triage and advanced resuscitation procedures up to damage control surgery (DCS)”*. It will usually evacuate its postsurgical cases to Role 3 (or Role 2 E) for stabilisation and possible primary surgery (PS) prior to evacuation to Role 4. This includes DCS with postoperative care, field laboratory, basic imaging, reception, regulation and evacuation of patients and a limited holding capacity.

Role 2 Enhanced MTF. Task: *“provides basic secondary care facility built around PS, intensive care (ICU), and beds with nursing support”*. A Role 2 E facility is able to stabilise postsurgical cases for evacuation to Role 4 without the need to put them through Role 3 MTF first. This includes surgical and medical ICU capability, beds with nursing support, enhanced field laboratory including blood provision, casualty decontamination facilities (dependent on operational risk assessment).

Role 3 MTF. Task: *“provides theatre secondary health care within the restrictions of the Theatre Holding Policy (THP)”*. This includes primary surgery, intensive care, surgical and medical beds with nursing and diagnostic support. A Role 3 MTF can include mission-tailored clinical specialities (specialist surgery (neurosurgery, burns, ophthalmology, etc.)), advanced and specialist diagnostic capabilities to support clinical specialists (CT scan, sophisticated laboratory tests, etc.) and major medical and nursing specialities (internal medicine, neurology, etc.).

Role 4 MTF. Task: *“provides the full spectrum of definitive medical care that cannot be deployed to theatre or is too time consuming to be conducted there”*. This includes definitive specialist surgical and medical procedures, reconstructive surgery and rehabilitation. This care is highly specialised, time consuming and usually provided in the casualties’ home country either in military or civilian facilities.

Medical evacuation (MEDEVAC) is the process of moving a casualty to and between MTFs under clinical supervision. It forms part of the continuum of a casualty's treatment and care and should be managed under medical oversight though often requires close co-ordination with other military functions such as ground and air operations staff. An effective MEDEVAC system includes:

- A 24-h all-weather transport capability able to operate over all terrain and in any operational environment. These should have the same mobility and protection as the military forces that they are supporting.
- Appropriately trained clinical staff equipped for in-transit medical care to enable rapid and safe transfer between aircraft, ambulances and MTFs.
- A system of command and control, patient regulation and patient tracking so that the flow and types of patients can be managed throughout the medical system.

Planning and Mounting Medical Support to Military Operations

Medical planning is about achieving the optimum efficiency and effectiveness between capability, capacity and evacuation to support the military mission to achieve the best outcome for the patient. Chapter 55 describes the military approach to medical planning. In the military context, the medical function exists to support the military operation, and so medical staff must be fully embedded with the military planning process. There should be medical representation on any reconnaissance visit to the potential area of operations and the timing for deployment of medical capabilities should be matched to the increase of the deployed population at risk.

Military doctrine describes 4 levels of military activity. The highest level is the grand strategic and is concerned with inter-ministerial co-ordination to implement national policy in a comprehensive approach integrating all of the instruments of state (diplomatic, economic and military activities). The military strategic level is concerned with the allocation of military resources to support the grand strategic plan. The operational level is about the employment of military forces to achieve strategic goals through the design, organisation, integration and conduct of campaigns. The lowest level, the tactical level, is the level at which actual combat is orchestrated and battles are fought. Table 31.1 summarises key medical planning and execution activities for each level.

Conducting Military Health Services Support Operations

There will be a formal military command and control (C2) structure on any military operation. This defines the responsibilities, authorities and communications support for the military commander at each level of military activity. There will be military

Table 31.1 Medical activities at each level of military activity

Level	Activities	Remarks
Grand strategic	Balancing health resources between civil and defence requirements Generating health manpower to support national requirements Integrating military and civilian resources to care for military casualties at Role 4	National health service resources are finite. In WW2 a national committee managed mobilisation of civilian medical staff in the Armed Forces to ensure balance between military and civilian requirements
Strategic	Allocation of resources to the medical function Determining the medical support capabilities and capacities required to support campaigns Balancing medical resources between active duty and reserve forces Predicting the casualty load for campaigns	The medical function has to compete with all other military functions for defence resources
Operational	Determining the medical resources required for specific operations Balancing medical resources between nations and between army, navy and air force medical services on operations Establishing and monitoring the medical evacuation chain from point of wounding to Role 4	This requires an understanding of the medical implications of operational design and balancing economy with risk. This is about allocation of medical resources (especially Role 2E and Role 3, and MEDEVAC airframes) for a particular operation
Tactical	Assigning missions and tasks to individual medical units Planning for and managing casualty evacuation and care during and after battles Responding to medical emergencies	This requires an understanding of military and medical tactics and the potential casualty flows. This is about siting of Role 2E and Role 2LM units and managing MEDEVAC from point of wounding to Role 4

medical staff embedded into the C2 structure who will be responsible for the planning and execution of the health services support arrangements for the operation. These medical staff have a combination of military functions for medical units and specialist medical functions for both medical units and the whole force. This multi-agency approach is very similar to the arrangements for the management of major incidents in civilian practice involving command and co-ordination arrangements

Table 31.2 Military medical command and clinical functions

Medical command and staff functions	Clinical functions
Supporting casualty tracking and casualty notification	Developing and communicating clinical policies specific to the operation
Managing MEDEVAC and patient regulation	Clinical governance of medical system
Oversight of medical logistics	Conducting health intelligence assessments and producing medical force protection advice
Developing and communicating the medical plan	Epidemiological health surveillance
Oversight of medical information systems	Co-ordination of the management of specific clinical cases
Managing military medical contribution to humanitarian relief and civilian reconstruction and development	
Medical contribution to crisis management	

between health, police, fire and rescue, civil government and other agencies. See Table 31.2.

Commanders of medical units and medical personnel embedded with military units will be responsible for the execution of the health service support plan. These units and individuals need to be able to operate in the military environment (including personal survival skills and organisational skills such as camouflage and protection) and also deliver their medical skills (both generic professional skills and also military-specific clinical skills such as the management of chemical casualties).

Summary

This chapter has summarised the principles and practice of military health service support in conflict. The chapter links Chap. 55 on Military Approach to Medical Planning, Chap. 30 Military Assistance to the Civilian Sector and Military Assistance to Security Sector Reform. This chapter considered the context of health in the military environment, discussed the organisation and resources required to provide military health services and examined the planning and mounting of health service support to operations. The chapter concluded by describing the command and control arrangements for the conduct military health services support operations.

We would like to acknowledge that Roderick J. Heatlie was a co-author of this chapter in the previous edition and that chapter served as the starting point for this updated and revised chapter.

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Chapter 32

Evacuation and Transportation

David L. Bruce

Abstract Aeromedical evacuation (AE) has become an important element of healthcare systems within the developed world and is a key enabler to military operations conducted in austere environments. The existence of a reliable AE chain allows commanders to reduce the medical assets in the operational theatre while remaining assured that injured personnel will get prompt advanced medical care. Moreover, the soldier on the ground is assured that he will get advanced medical care and speedy repatriation. The role within humanitarian operations may be more limited apart from the support of the deployed aid worker, but aeromedical evacuation can still contribute further management options.

Keywords Aeromedical evacuation and transportation • Physics and physiology • Equipment • Organization • Medical conditions on medical evacuation flights • Humanitarian operations

Objectives

- To detail the origin, principles, physiology, physics, organisation, equipment, work environment and function of aeromedical evacuation and transportation

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History of Casualty Movement

The movement of casualties from the battlefield is a relatively recent development and has only been addressed as an important issue for the last two centuries during which time it has undergone significant development for both humanitarian and operational reasons. Prior to the late eighteenth century, there was little organised care for those wounded in battle. The ancient Romans and Greeks had military surgeons who were skilled in the management of war wounds within the constraints of their knowledge of physiology and available remedies. In 200 BC, the Romans had military medical personnel or “*medici vulnerarii*” [1], while the Greeks used personnel called “*Latros*” or “*extractors of arrows*” in 4 BC. However, the focus was on those patients who had been able to get to this care by either removing themselves from the battlefield or being aided by a companion once the fighting was over. Thus, only a selected group of survivors ever reached medical care. The first recorded organised military medical system which included an evacuation capability within the army of the Byzantine Empire in 500 AD where scribes were located behind the forward edge of battle and were tasked with rescuing the wounded while the battle was in progress [2]. These individuals were paid for each casualty that they rescued although there is no mention as to whether they were paid on the basis of a successful outcome.

Evacuation systems in Western Europe attracted little attention since the seriously injured were expected to die regardless of medical care, and even if they survived then they would be unlikely to return to fighting duties. Moreover, such casualties required transport and personnel that could be used to further the battle and may therefore have been assessed as a hindrance to the military objective. This Darwinian approach to survival and triage changed due to the initiative of Napoleon’s Surgeon General, Baron Dominique-Jean Larrey. He took an interest in the time from wounding to surgical intervention, thus predating the twentieth-century maxim of the Golden Hour. As Surgeon-Major of the Army of the Rhine, he highlighted that “wounded were left on the field until after the engagement and were then collected at a convenient spot to which the (field hospitals) repaired as speedily as possible”; many of the wounded “died from want of assistance” [2]. He addressed this by introducing ambulance volantes or flying ambulances which were light vehicles designed to transport surgical teams forward to treat casualties. In time, these evolved into patient-carrying vehicles to take casualties away from the battlefield to field hospitals; he also introduced en route care within the vehicles to fill the therapeutic vacuum. Development prior to the Italian campaign (1796–1797) resulted in 3 divisions of ambulance services with supporting vehicles, staff and equipment, and the evacuation system was further refined during the Egyptian, Syrian and Polish campaigns in the late 1700s and early 1800s. Unfortunately, most other armies did not introduce a robust evacuation system largely because the personnel and vehicles needed to be “borrowed” from the general army rather than being medical resources.

Nevertheless, military casualty evacuation systems did start to develop more widely in the nineteenth century albeit with challenges. The US National Museum

of Health and Medicine [3] described the 1st battles of the American Civil War as revealing “gaping holes in the capabilities of the medical commands to evacuate wounded men from the battlefield”. Outdated military regulations relied on regimental musicians to remove the wounded, and surgeons were only allowed to treat the wounded of their own regiments. As a result, and due to the chaos of battle, some men lay on the battlefield for days; townspeople became nurses, and their carts and wagons served as ambulances to convey casualties to their homes which became makeshift hospitals. Both the public and medical personnel were outraged by these events which led to a review of medical evacuation and the use of specially equipped wagons, trains and ships to move the casualties to field hospitals and then general hospitals. Two military physicians were largely responsible for the development of the evacuation systems. Union Surgeon Letterman was the Medical Director for the Army of the Potomac and authorised training for ambulance companies responsible for moving the wounded from the battlefield to field hospitals. Dr. Stout of the Confederate Army organised effective evacuation for wounded Confederate soldiers backed up by aid stations and mobile field hospitals. Large general hospitals specialising in particular diseases and conditions were built and surgeons planned the location of evacuation points, evacuation lines and field hospitals before battles started. Many of the principles established in the US Civil War remain part of the current process of care used by the US military.

Evacuation also developed within the British military medical services in the nineteenth century particularly following the failure of the medical system during the Crimean War [4]. Regiments were supported by a medical officer and 2 Royal Army Medical Corps (RAMC) “Orderlies”; in addition, the regiment provided 16 stretcher bearers to assist in the recovery of the wounded to the Regimental Aid Post. Subsequent evacuation was by the RAMC Bearer Company to the field hospital and then by a logistic unit of oxen- and horse-drawn carts to general hospitals. Trains were also widely used, and general hospitals were frequently set up beside railway terminals. Reorganisation of the field medical units led to 3 zones for the evacuation of patients: the collecting zone, the evacuating zone and the distributing zone. The former contained the forward medical organisations and field ambulances which passed casualties to clearing hospitals and ambulance trains before moving them on to the final link within the distributing zone of stationary and general hospitals. The movement of casualties from the evacuating to distribution zones depended on the use of empty vehicles under the command of the Director of Transport and mirrored some of the challenges faced by aeromedical evacuation in future conflicts. The 1st World War stretched the evacuation systems which had been developed in previous conflicts, the First Battle of Ypres resulted in 13,000 medical evacuees, many of whom only received surgery once they arrived in the UK. Motor ambulances, as an alternative to horses and oxen, were first used in September 1914. Evacuation chains continued to evolve, and motor ambulances acquired the responsibility for moving casualties from close to the battle to medical aid and then between rear echelon medical facilities. In addition, rather than waiting for the numbers of wounded to build up, the more seriously injured were evacuated earlier having been triaged. Britain retained extensive global interests after the 1st

World War, and the long distances involved prompted the use of aircraft for casualty evacuation. In addition, experiences from the Spanish Civil War reinforced the importance of time as a key determinant of outcome in the management of war wounds [5]. Rapid triage, appropriate positioning of hospitals and a dedicated ambulance shuttle service reduced the time lag from wounding to surgery to under 5 h. Medical capabilities and evacuation procedures continued to be refined during the 2nd World War, and improvements included more effective distribution of casualties to appropriate medical facilities rather than a need to pass them backward through every link of the evacuation chain which resulted in delayed treatment. The medical support to the invasion of Northern Europe was based upon first aid treatment and life-saving surgery close to the beaches prior to evacuation to designated ships which had off-loaded their stores; this was followed by distribution of casualties within the UK. The initial treatment on land was aimed at reducing the need for medical intervention during the sea transfer to the UK. The plans included the use of aircraft to evacuate the seriously wounded from forward airstrips thereby shortening evacuation times.

Experience in the Korean War and the Suez Operation continued to highlight the importance of swift evacuation, and helicopters started to play a key role. Although the subsequent focus for medical support was aimed at Cold War scenarios, the invasion of the Falkland Islands by Argentina on 2 April 1982 required considerable planning to deal with an 8,000-mile evacuation chain. This was achieved by initial management at Regimental Aid Posts followed by helicopter evacuation to a surgical capability before further helicopter moves to hospital ship and then seaborne evacuation to Montevideo, Uruguay, for aeromedical evacuation to the UK. The 1st Gulf War also relied upon effective evacuation chains since it consisted of armoured warfare fought over open spaces with few constraints on movement [6]. Casualty evacuation in the forward area was primarily by helicopter to field hospitals followed by aeromedical evacuation in Hercules (C130) aircraft capable of tactical landings back to general hospitals and thence via aeromedically equipped aircraft to the UK.

Aeromedical Evacuation

The importance of prompt evacuation of casualties and the impact on survival has been outlined. It was therefore not surprising that the development of air transport was seen as a potential opportunity to improve evacuation chains. Man had long dreamed of flight, and the myth of Icarus and Daedalus is well known with the former being considered the 1st (imaginary) aviation fatality as he flew too close to the sun resulting in his wings melting and his plummeting to the sea below. The 1st documented flight carrying terrestrial creatures was on 19 September 1783 when Dr. Pilatre de Rozier launched a Montgolfier balloon (Aerostat Reveillon) carrying a sheep, a duck and a chicken to 1,700 ft. Unfortunately, the flight was not without casualties since the chicken suffered a broken wing having been kicked by the sheep

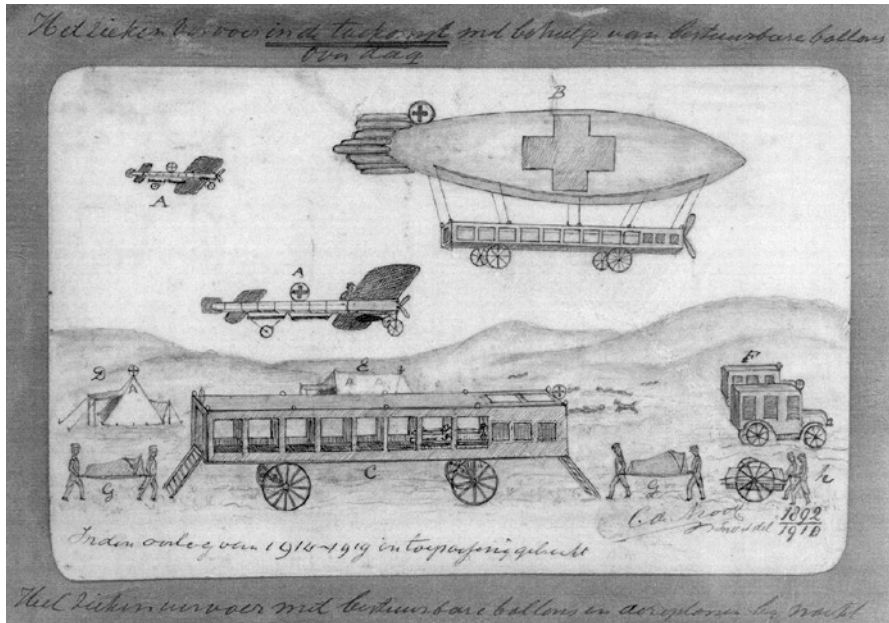


Fig. 32.1 De Mooy's concept of aeromedical evacuation (Reproduced with permission of the Royal Netherlands Army Museum)

prior to take-off [7]. Later that year, de Rozier and the Marquis d'Arlandes successfully completed the 1st manned, untethered balloon flight in Paris travelling 5 miles on 21 November 1783.

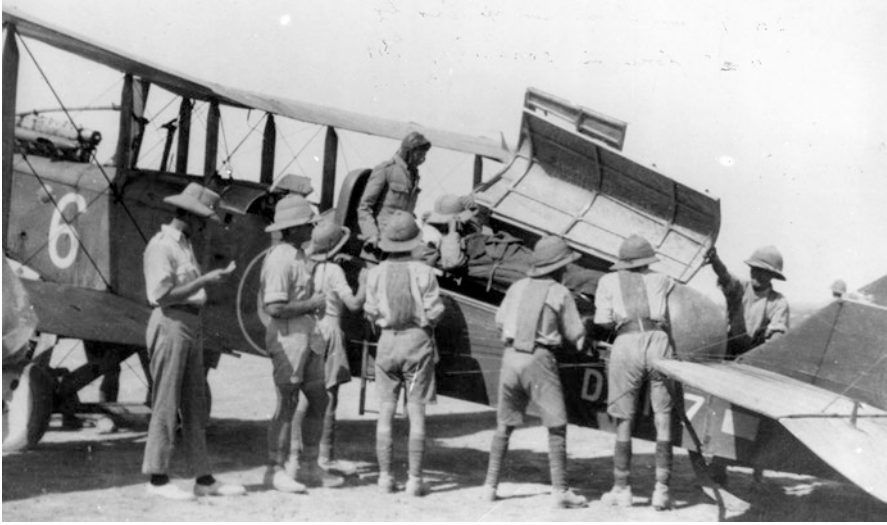
The 1st aeromedical evacuations have long been cited as balloon flights carrying 160 casualties from the Siege of Paris during the Franco-Prussian War in 1870 [8]. However, Lam [9] carried out a review of the records of balloon flights from Paris and found that there were no records of such evacuations and that they had not been mentioned in the literature until the late 1960s. Accordingly, the father of aeromedical evacuation could be considered to be Dr. Cornelius de Mooy, a Dutch military physician, who suggested evacuating combat casualties using horse-drawn tethered balloons in the late nineteenth century (Fig. 32.1). The Wright brothers' 1st heavier than air flight took place on 17 December 1903, and a proposal to transport patients using aircraft was made by Capt. Gossman of the US Army Medical Corps in 1909. The patient lay, without any protection, on the lower wing where he could be seen by the physician-pilot. However, Capt. Gossman failed to generate further funding after the aircraft crashed, and a true MEDEVAC was never completed. Nevertheless, interest continued in the face of opposition from the US War Department and the media: the editor of the Baltimore Sun wrote in 1912 "the hazard of being severely wounded was sufficient without the additional hazard of transportation by airplane". The French Army used aircraft to locate casualties and maintain communication with conventional medical transport during exercises in 1912. In the UK, Captain

RH Corder of the RAMC urged the development of air ambulances in an article published in the RAMC Journal in 1913 [10].

The earliest verifiable aeromedical evacuation of a casualty was on 16 November 1916 when Captain Dangelzer of the French Escadrille flew Lieutenant Stefanik of the Serbian Air Force 80 km on the side of a Farman F aircraft. Later that month, 5 other pilots evacuated 12 wounded soldiers on their unmodified French fighters. Subsequently, a French Medical Officer, Dr. Chassaing, persuaded his government to allow him to convert an old combat aircraft, the Dorand ARII, into a 2-stretcher air ambulance with the patients carried in the hollow fuselage. This aircraft was possibly used to move casualties from the Aisne Front (at Moulin de Laffaux), and a further 6 aircraft were later converted to the aeromedical role for use in the evacuation of Flanders. Late in 1918, Chassaing was allocated 60 Brecquet aircraft for conversion to air ambulances. At a similar time, Nemirovsky and Dr. Tilmant proposed the creation of an "Avion Radio-Chirurgical" or "Aerochir" which could carry a surgeon and all his equipment to the location where they were needed. Their hypothesis was that patient survival was best served by early surgery rather than simple transport and the aim was to deliver self-contained forward surgical support which could be set up in minutes. They also designed 2 versions of aircraft capable of carrying 1 or 10 patients, with the larger having the capability for in-flight monitoring and care. However, although successfully demonstrated to the French Government, the original Aerochir was never deployed operationally [11]. The first documented British aeromedical evacuation took place in Bir el Hassana in the Sinai Desert on 19 February 1917 when LCpl McGregor of the Imperial Camel Corps was evacuated by a BE2c aircraft after having been shot by a Bedouin [12].

The field of aeromedical evacuation continued to grow after the 1st World War with the development of the Royal Flying Doctor Service in Australia, an RAF air ambulance service based in the north of London, and a civilian air ambulance in the Scottish islands. The French Army evacuated over 3,000 casualties by air during their colonial wars in Morocco in the period 1922–1925. Later, the Luftwaffe pioneered long-distance, high altitude evacuations during the Spanish Civil War when over 500 casualties were evacuated across the Alps at up to 18,000 ft on 10-h, 1,600-mile journeys in JU52s. However, the vast numbers of casualties generated in the 2nd World War, and the extended evacuation lines, prompted a huge expansion of aeromedical services. It has been estimated that the USA airlifted over one million sick and wounded soldiers in C47 and C54 aircraft in the last 3 years of the war [13]. These evacuations all used fixed-wing aircraft to move stabilised patients to definitive care or rehabilitation; this was reflected in the low mortality rate in the air of 4/100,000 [14]. Following this success, the US Air Force declared on 7 September 1949 that all future evacuation of sick and wounded personnel both in peace and war would be accomplished by air.

The potential utility of helicopters for aeromedical evacuation was recognised early due to the potential for them to land vertically in confined spaces without the need for prepared landing strips or large flat areas. Evaluations of autogyros, the forerunners of helicopters, were carried out in 1936 but were abandoned for financial and technical reasons. The 1st recorded use of a helicopter for casualty



RAF DH9 in Somaliland in 1919 (MOD Crown Copyright. Reproduced with permission)

evacuation by the US military was in April 1944 when Carter Hamon rescued a downed pilot and 3 wounded soldiers in the highlands of N Burma. The casualties had to be rescued in 3 trips since the helicopter was underpowered, and its lift capacity was inhibited by the heat and altitude of the crash site. Later, in 1949, Dowse suggested that such “hoverflies would be able to make use of landing spaces which were out of the question for ordinary types of light aircraft”. The British had used helicopters for search and rescue missions over the dense Burmese jungle in 1944, but the 1st documented RAF helicopter casualty evacuation flight took place in June 1950 when a casualty was lifted out during the “Malayan Emergency” [15] (Fig. 32.2).

In 1950, the Commander of the US 5th Air Force authorised the use of a helicopter for the front-line medical evacuation of a patient during combat operations. Helicopters came of age during the Korean War (Fig. 32.3) when more than 17,000 patients were evacuated between 1951 and 1953. The patients were strapped to the outside of Bell 47s and delivered to field hospitals for prompt, advanced care and damage control surgery. The USA increased the use of rotary-wing aircraft during the Vietnam War and used dedicated Bell UH1 Iroquois to airlift over 50,000 troops from close to the point of wounding to operative care: codename Op DUSTOFF (Fig. 32.4). The helicopters overcame the difficulties of limited access, and lengthy evacuation chains were assessed as contributing to the reduced mortality figures seen in Table 32.1 [16].

Helicopters are now an integral part of military aeromedical evacuation. They were widely used in the 1st and 2nd Gulf Wars to reduce the time from point of wounding to operative care. Some nations have dedicated helicopters with integral medical equipment and red cross markings, while others use aircraft, manned by



Fig. 32.2 Casualty in Dragonfly basket being loaded on to an RAF helicopter in Malaya in 1952 (MOD Crown Copyright. Reproduced with permission)



Fig. 32.3 Helicopter operations in Korea (Reprinted with permission from the DUSTOFF Association)



Fig. 32.4 DUSTOFF Operations in Vietnam (Reprinted with permission from the DUSTOFF Association)

Table 32.1 Evidence that helicopters contributed to reduced mortality rate

Conflict	Dates	Evacuation time	Mortality (%)
World War I	1914–1918	12–18 h	8.5
World War II	1939–1945	6–12 h	5.8
Korea	1919	2–4 h	2.4
Vietnam	1919	65–80 min	1.7

medical personnel, which are returning from the battle after having dropped off supplies and troops. The decision on whether to display a red cross is largely driven by the availability of resources, and most nations prefer to retain flexibility by not displaying the insignia. A further consideration is that there is a perceived lack of respect for the markings in a number of current operational theatres. Moreover, Article 28(1) of 1977 Additional Protocol I to the Geneva Conventions mentions that medical aircraft cannot be used to acquire military advantage over an adverse party and the displaying of humanitarian markings on an aircraft used to take troops and ammunition forward and casualties to the rear could be interpreted as breaching the conventions [17]. Currently, in Afghanistan, the RAF use a Chinook helicopter manned by a military Consultant in Anaesthetics or Emergency Medicine supported by 2 paramedics and an Emergency Department nurse to deliver advanced



Fig. 32.5 MERT in a Chinook Helicopter (MOD Crown Copyright. Reproduced with permission)

resuscitation as close to the point of wounding as possible. The capability is known as the Medical Emergency Response Team (MERT) and, allied with numerous other developments in pre-hospital care, has resulted in significant numbers of unexpected survivors [18] (Fig. 32.5).

Experience from the military has spread across to civilian medicine and aeromedical evacuation by fixed-wing aircraft is now a worldwide norm. In addition, helicopters are widely used for both pre-hospital responses and inter-hospital transfers. There is a continuing debate on the appropriate staffing of helicopters used in pre-hospital retrieval (physician v paramedic) and the added value over ground-based evacuation when evacuation timelines are short. Nevertheless, it is clear that aeromedical evacuation in all its forms is embedded within modern healthcare systems in the developed world.

Physics and Physiology of Aeromedical Evacuation

Ascent to altitude is associated with a fall in barometric pressure, air density and temperature. A basic understanding of the physical laws governing the behaviour of gases is important to determine the effects of ascent on a patient. The key equations are:

- *Boyle's Law*: At a constant temperature, the volume of a fixed mass of gas is inversely proportional to the pressure to which it is subjected or expressed mathematically:

$$\text{Volume} \propto 1/\text{Pressure}$$

- *Charles's Law*: The volume of a fixed mass of gas is directly proportional to its absolute temperature measured at a constant pressure or expressed mathematically:

$$\text{Volume} \propto \text{Temperature}$$

- *Universal Gas Law*: This combines Boyle's and Charles's Law: expressed mathematically:

$$\frac{\text{Pressure}_1 \times \text{Volume}_1}{\text{Temperature}_1} = \frac{\text{Pressure}_2 \times \text{Volume}_2}{\text{Temperature}_2}$$

- *Dalton's Law of Partial Pressures*: The pressure exerted by a mixture of gases is equal to the sum of the pressures that each would exert if it alone occupied the space filled by the mixture; expressed mathematically:

$$P_{\text{Total}} = P_1 + P_2 + P_3 + P_4$$

- *Henry's Law*: The mass of gas that will dissolve in a liquid at a given temperature is directly proportional to the partial pressure of the gas at the surface of the liquid (and the solubility coefficient of the gas in the liquid).
- *Law of Gaseous Diffusion*: The diffusion rate of a gas across a fluid membrane is proportional to the difference in partial pressure and the area of the membrane and inversely proportional to the thickness of the membrane.

Using these laws, and a knowledge of the physics of the atmosphere, it is possible to predict the effects on the body of ascending to altitude. Barometric pressure falls on ascent as shown in Fig. 32.6.

Pressure at sea level is 760 mmHg; by 18,000 ft, it is 380 mmHg (1/2 sea level); at 33,700 ft, it is 1/4 sea level; and by 53,000 ft, it is 1/10 sea level. Thus, in accordance with Boyle's Law, gaseous volumes increase 2×, 4× and 10× at the respective altitudes. The fall in barometric pressure also has a profound affect on the partial pressure of oxygen in the atmosphere. The percentage of oxygen in the atmosphere (~21 %) remains relatively constant on ascent, but the fall in total pressure means that the partial pressure of oxygen, which "drives" oxygen into the blood, falls, and this results in hypoxic hypoxia. Although some oxygen is dissolved in the plasma, most is carried in combination with haemoglobin (Hb) in red blood cells. The maximum amount of oxygen that can be carried by 1 g of Hb is 1.39 ml which equates to approximately 20.8 ml of oxygen/100 ml of blood. Oxygen saturation is the ratio of the quantity of oxygen carried to the potential capacity and is expressed as a

Fig. 32.6 Exponential relationship between pressure exerted by the atmosphere and altitude (Reproduced by permission of Hodder Education from Rainford and Gradwell [19])

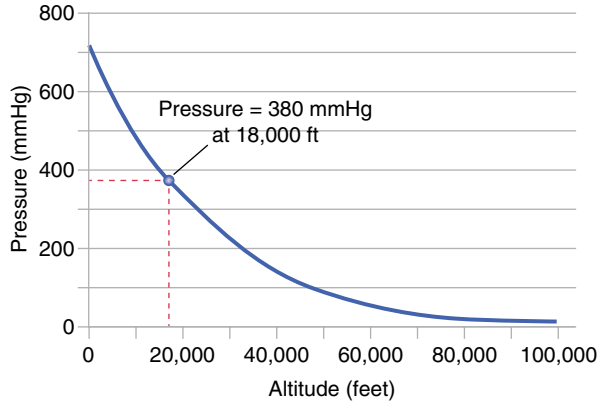
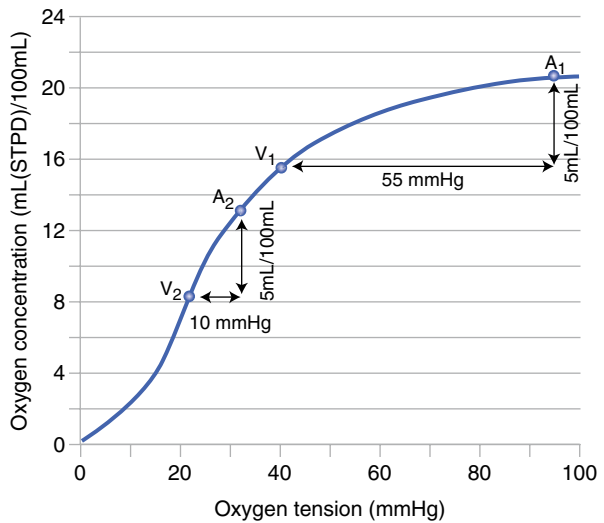


Fig. 32.7 Oxygen dissociation curve of whole blood demonstrating the effect of the sigmoid shape of the relationship on the fall of oxygen tension of the blood produced by the extraction of 5 ml of oxygen per 100 ml of blood (Reproduced by permission of Hodder Education from Rainford and Gradwell [19])



percentage. The relationship between oxygen saturation and the partial pressure of oxygen in the blood is described by the sigmoid-shaped oxygen dissociation curve shown in Fig. 32.7.

The key features of the oxygen dissociation curve are a flat upper portion which means that moderate variations in alveolar oxygen tension have little effect on the amount of oxygen combined with Hb in arterial blood. In contrast, the steep portion of the curve ensures effective delivery of oxygen to the tissues, and a large drop in saturation results in only a small fall in oxygen tension. This maintains oxygen tension at a suitable level for normal tissue function. The physiology of ascent to altitude is considerably more complex than described in this brief summary, and details are contained in standard texts of aviation medicine such as Ernsting's Aviation Medicine [19].

The most significant changes on ascent to altitude are:

- *Hypoxia*: The reduction in barometric pressure on ascent and resultant fall in oxygen partial pressure lead to hypoxia. Some protection is initially provided by the characteristics of the oxygen dissociation curve, but, if ascent continues, there are profound effects on the body's physiology, as shown in Table 32.2.
- Clearly, these affects do not occur in airline passengers even though the aircraft may be cruising at at 33,000 ft or higher. This is because the aircraft is pressurised to maintain a cabin altitude of 8,000 ft. Nevertheless, the relative hypoxia may have an effect on those who are suffering from cardiovascular or respiratory compromise. While helicopters usually fly below 10,000 ft [20] and patients are therefore not exposed to the extreme hypoxic challenges outlined above, compromised patients may still suffer from relative hypoxia.
- *Pressure Changes*: The reduction in atmospheric pressure on ascent has an effect on gas contained in cavities within the body. In accordance with Boyle's Law, gas expands on ascent and contracts on descent. Relevant cavities include the middle ear, gut, teeth, lung and sinuses; these cavities communicate with the external environment to varying degrees. The expanding gas in the middle ear vents through the eustachian tube on ascent. However, the increasing barometric pressure on descent leads to a reduction in gaseous volume and an indrawing of the tympanic membrane if pressures are not equalised. Most patients can ventilate the ear by performing a Valsalva or similar manoeuvre, but if they are suffering from an upper respiratory tract infection or altered anatomy, then the tympanic membrane can cause severe pain before rupturing. Similarly, the paranasal sinuses usually vent air spontaneously, but an upper respiratory tract infection (URTI) can lead to overpressure on ascent or a negative pressure on descent with symptoms of headache, tearing and nose bleeds. Air trapped below fillings can cause severe toothache on ascent, so-called aerodontalgia. Since the lungs communicate freely with the atmosphere, expansion and contraction of gases is of little importance apart from during a rapid depressurisation of an aircraft. There is significance for patients with a pneumothorax and this will be discussed later.

Table 32.2 The profound effects on the body's physiology of reduction in barometric pressure on ascent and resultant fall in oxygen partial pressure, leading to hypoxia

Altitude	Effects
<10,000 ft	Saturation 90–98 %. No awareness of symptoms at rest but night vision and ability to perform novel tasks deteriorate
10–15,000 ft	Saturation 80–90 %. Increased respiratory rate, increased heart rate and systolic blood pressure. Individuals may experience nausea, lethargy, fatigue, poor judgement and impaired coordination
15–20,000 ft	Saturation 70–80 %. Air hunger, amnesia, blurred vision, impaired memory and higher thinking and altered behaviour
>20,000 ft	Saturation 60–70 %. Mental and physical incapacitation, possibly convulsions, loss of consciousness and ultimately death

Finally, gas within the gut will expand on ascent and although this can be vented from the oesophagus or anus, gas within the ileum can cause abdominal pain due to gut distension. The body may also contain abnormal collections of gas as a result of injury or surgery in cases such as pneumocephalus or after injection of gas into the ocular globe following eye surgery, and these collections may expand. Helicopters are not pressurised, and the non-linear shape of the pressure-volume curve means that significant changes in pressure do occur within their operating envelope of <10,000 ft.

- *Temperature*: Temperature falls with altitude, but this is of limited relevance in an airliner used for aeromedical evacuation since cabin air is heated. However, it may be of relevance in military transport aircraft where the aircraft is pressurised, but the cabin temperature may fall. It is definitely relevant in helicopters where ascent is associated with a fall in temperature which may adversely affect trauma casualties who already have a tendency to develop hypothermia.

Principles of Aeromedical Evacuation

It has been said that there are no absolute contraindications to aeromedical evacuation, but there are fundamental considerations and principles [19]:

- Aeromedical evacuation (AE) should benefit the patient. This may be clear when a casualty is being evacuated from a location with very limited medical capability; nevertheless, the risks of AE need to be considered and whether there is the option for further treatment on site to improve stability before transfer.
- The aeromedical evacuation of complex patients may impose a significant professional challenge to the medical team, and they are working in an isolated and inhospitable environment. Careful preparation of patients is essential.
- Stabilise patients before transfer, if this is not possible then be prepared to continue resuscitation during flight; only move an unstable patient if it is to gain access to treatment that is not available at the current location.
- Anticipate problems and ensure that all intravenous lines and the airway are protected at all times; check all of these after every transfer.
- Ensure that all equipment is working before leaving the ground and that there is sufficient oxygen, battery life and medical supplies for unexpected diversions.
- Ensure that you have a full history of the patient and their recent progress, examine the patient, take all relevant notes and investigation results and repeat investigations if there are doubts or if up-to-date results on relevant tests are not available.
- Regularly assess the patient during flight to detect problems and act early.
- Ensure that the logistic chain and transport chain is intact with a receiving hospital and ambulances booked at the destination airfield.
- Always plan for the unexpected delay or diversion.

Definitions of Aeromedical Terms, Priorities and Classifications

There are a number of terms and definitions used within aeromedical evacuation. It is important that these are used in order to ensure that all relevant parties are “speaking the same language”. Use of common terminology improves teamwork, communication and interoperability. NATO has developed a series of definitions [21], as shown in Table 32.3.

NATO has also developed a series of definitions covering the categorisation of patients in terms of Priority, Classification and Dependency [22]. These once again allow nations to cooperate within aeromedical evacuation and contribute to the control of the aeromedical evacuation chain. The standardised descriptions of patients allow nations and organisations to work together using a common language.

Patients for AE should be given appropriate degrees of priority so that if aircraft space is limited, the more urgent cases may be evacuated before those whose condition is less serious. The grading of priority is shown in Table 32.4.

Classification of patients defines the patient’s requirement for space in the aircraft and for physical assessment; it also describes any requirement for physical restraint or supervision of psychiatric patients. The Classifications are shown in Table 32.5.

The assessment of dependency recognises the need to move patients who have been stabilised but whose condition remains unstable, possibly requiring intensive support in flight. The degrees of dependency are shown in Table 32.6.

Table 32.3 Aeromedical evacuation terminology and definitions developed by NATO

Term	Definition
Aeromedical evacuation	The movement of patients under medical supervision to and between medical facilities by air transportation
Forward aeromedical evacuation	That phase of evacuation which provides airlift for patients between points within the battlefield, from the battlefield to the initial point of treatment and to subsequent points of treatment within the combat zone
Tactical aeromedical evacuation	That phase of evacuation which provides airlift for patients from the combat zone to points outside the combat zone and between points within the communications zone
Strategic aeromedical evacuation	That phase of evacuation which provides airlift to patients from overseas areas or from theatres of active operations, to the home base, to other NATO countries or to a temporary safe area
CASEVAC	The non-medicalised evacuation of casualties without qualified medical support
MEDEVAC	The medically supervised process of moving any person who is wounded, injured or ill to and/or between medical treatment facilities as an integral part of the medical continuum

Table 32.4 Grading of priority in aeromedical evacuation

Priority	Definition
1 (Urgent)	Emergency patients for whom speedy evacuation is necessary to save life, to prevent complications or to avoid serious permanent disability. Usually evacuated within 24 h
2 (Priority)	Patients who require specialised treatment not available locally and who are liable to deteriorate unless evacuated with the least possible delay
3 (Routine)	Patients whose immediate treatment is available locally but whose prognosis would benefit from air evacuation on routine scheduled flights

Table 32.5 Classification of patients in AE defining their requirements for space in the aircraft and for physical assessment, as well as for physical restraint or supervision of psychiatric patients

Classification	Definition
<i>Class 1 – neuropsychiatric patients</i>	
1A (Severe)	Patients who are frankly disturbed and inaccessible and require restraint, sedation and close supervision
1B (Intermediate)	Patients who do not require restraint and are not, at the moment, mentally disturbed but may react badly to air travel or commit acts likely to endanger the safety of the aircraft and its occupants. These patients need close supervision in flight and may need sedation
1C (Mild)	Patients who are cooperative and have proved reliable under preflight observation
<i>Class 2 – stretcher patients (other than psychiatric)</i>	
2A (Immobile)	Patients who are unable to move about of their own volition under any circumstances
2B (Mobile)	Patients able to move about of their own volition in an emergency
<i>Class 3 – sitting patients (other than psychiatric)</i>	
3A	Sitting patients, including handicapped persons, who in an emergency would require assistance to escape
3B	Sitting patients who would be able to escape unassisted in an emergency
<i>Class 4</i>	
4	Walking patients, other than psychiatric, who are physically able to travel unattended

Table 32.6 Degrees of dependency defining the need to move patients who have been stabilised but whose condition remains unstable, possibly requiring intensive support in flight

Dependency	Definition
1 (High)	Patients who require intensive support during flight. For example, patients requiring ventilation or monitoring of central venous pressure. They may be unconscious or under general anaesthesia
2 (Medium)	Patients who do not require intensive support but may need frequent monitoring or whose condition may deteriorate in flight. For example, patients with multiple intravenous infusions
3 (Low)	Patients whose condition is not expected to deteriorate in flight but who may require basic nursing care. For example, a single intravenous line or a urinary catheter
4 (Minimal)	Patients who do not require nursing attention in flight but who may need assistance with mobility or bodily functions

Assessment of the numbers of patients, their dependency and classification guides the structure, numbers and competencies of the AE team based on agreed policies within NATO Standardization Agreement 3204 – Aeromedical Evacuation.

Aeromedical Evacuation Team

The AE team must be professionally qualified to undertake the task. Competencies may range from a consultant anaesthetist supported by an intensive care nurse, paramedic and equipment technician to a single registered nurse or paramedic guided by the dependency and classification of the patient(s). The team must also be trained in the special problems associated with in-flight clinical care and treatment; loading and unloading of patients into an aircraft; in-flight emergency procedures; and methods of documentation. A member of the AE team must ensure that all patients are familiar with the use of safety belts and emergency evacuation. In the event of an emergency, and dependent on aircraft type, the AE team may consider moving stretcher patients into passenger seats if circumstances permit and must ensure stretcher patients are properly secured. In order to maximise patient safety, AE teams must be totally familiar with the emergency procedures of the specific aircraft in which they are flying.

Aeromedical Equipment

The working environment within a fixed-wing aircraft or helicopter means that there is often considerable reliance upon monitoring equipment since standard clinical examination may be challenging. Moreover, a considerable amount of equipment may be required to support a Dependency 1 patient including a ventilator, syringe pumps, suction apparatus, monitors, a capnograph, intracranial pressure measurement and invasive blood pressure measurement. Stretchers used in AE need to be chosen to fit relevant aircraft, and NATO defines the dimensions in order to try and ensure interoperability and suitability; in addition, stretcher harnesses need to meet the standards required for crashworthiness. The stretcher must have the structural integrity to carry the weight of the patient and any accompanying medical equipment. The equipment needs to be compatible with the aircraft in which it is being used. There are 2 key issues: does the equipment interfere with the function of the aircraft, for example, through electromagnetic radiation interfering with the aircraft control systems, and does the aircraft interfere with the function of the equipment. Equipment should be able to function on available power be it 220/240 V AC, 110/115 V AC or 28 V DC supplies and be compatible with the aircraft. Many AE providers use battery-powered equipment that operates entirely independently of the aircraft power supply, and the battery life must be sufficient for the mission and any potential delays; this may require multiple spare batteries. Similarly, if

oxygen is required, there should be sufficient to cope with diversions or potentially increased requirement due to clinical deterioration. Aircraft operators and regulators such as the Federal Aviation Authority may also specify the type of oxygen cylinder and regulator that may be used. Equipment should be capable of operating in a wide range of temperatures and humidity and must undergo vibration and shock tests to a standard laid down by appropriate authorities. Audible alarms must be loud enough to be heard above the background noise of the aircraft, and visual alarms must be clearly discernible. Critically, the aircraft flight crew must be aware of, and approve, any equipment which is to be used on the aircraft.

Working Environment

There are a number of ergonomic and physical challenges which must be considered before aeromedical evacuation. Cabin pressurisation of fixed-wing aircraft allows for a “shirt-sleeve environment”. Nevertheless, depending on the size of the aircraft, the medical team may be working in a very cramped environment. In addition, access to the aircraft cabin for stretchers may be complex particularly if the doors are narrow or high. Military aircraft, such as the C17 (Fig. 32.8), used for



Fig. 32.8 Working environment for critical care in an RAF C17 (MOD Crown Copyright. Reproduced with permission)

aeromedical evacuation have a ramp which allows easy loading of the patient and equipment. Alternative methods of loading include the use of a high-lift vehicle to gain access to the aircraft cabin door; there must be minimal risk to the patient and the attending medical team. The ideal aircraft would allow access to all sides of the patient with the stretcher mounted in the centre of the airframe. However, this is seldom possible in non-military aircraft, and the team may have to be satisfied with access to 3 sides since stretchers may be mounted against bulkheads or the fuselage wall. As a minimum, it must be possible to access the head and chest of patients in case airway support or resuscitation is required. The problem is usually even worse in helicopters where space may be extremely limited and stretchers may be fastened directly to the floor leaving little room for equipment or a medical team. All equipment needs to be firmly attached to the airframe to minimise risk of injury from flying objects in the event of a crash. Vibration is a further physical challenge and is common in military aircraft, particularly helicopters. The vibration impacts on patient assessment and may interfere with the functioning of patient monitors. In addition, depending on the frequency and amplitude of oscillation, it can increase metabolic rate and cause hyperventilation and motion sickness. Aircraft are also noisy and this means that stethoscopes are effectively useless. Noise also potentially leads to fatigue and irritability in the medical team as well as interfering with team communication and the ability to detect auditory alarms on monitoring equipment. The noise can also be stressful for the casualties who should be provided with hearing protection in the form of disposable ear plugs. Light levels may be poor in helicopters making it more difficult to monitor patients and detect deterioration in their condition. Finally, the movement in 3 axes without an external visual reference can trigger motion sickness in both the medical team and the patient, while acceleration and deceleration may lead to fluid shifts within the body which can be harmful in unstable patients. Fear of flying is also not unusual and can lead to increased anxiety and a worsening of motion sickness; clearly, the anxiety may also be an indication of mild hypoxia due to either the cabin altitude or deterioration in cardiovascular status. In summary, the aeromedical evacuation environment presents a number of challenges that are not present on the ground both in physiological and physical terms.

Organisation of Aeromedical Evacuation

Coordination of AE must be controlled by an organisation which can assess the suitability of the patient for evacuation and ensure that appropriate escorts and medical equipment are provided. Within NATO, this is carried out by a Patient Evacuation Control Cell (PECC). The PECC also acts as the interface with the aircraft operator and advises the aircrew on any special considerations that may be required such as a ground level cabin altitude restriction. The organisation is also responsible for ensuring that the links of the evacuation chain are joined together by arranging ground transport of the patient and an ambulance pick up with an escort at the

destination airport. Moreover, admission to the receiving hospital needs to be coordinated.

Medical Conditions and Flight

It is not possible to cover all medical conditions in a short introduction to aeromedical evacuation, but the important considerations for some illnesses will be outlined; these must be considered within the guiding principles provided earlier and discussed with the medical advisers of the carrying airline.

Cardiovascular

Hypoxia, secondary to the reduced oxygen saturation accompanying a 5–8,000 ft cabin altitude, is the primary challenge for those who are cardiovascularly compromised. AE of patients who have suffered from a myocardial infarction (MI) should be delayed until there are no complications such as arrhythmias or cardiac failure. These usually occur in the 1st 14 days after the event, so a delay in AE may be appropriate if the current location is safe. Patients may be moved at 7 days with a physician escort and may be fit to travel unaccompanied 14 days after an uncomplicated MI. Unstable angina is a contraindication to flight, but patients with stable angina will probably be fit to fly. Uncontrolled cardiac failure is also a relative contraindication and should be stabilised prior to emplanement. Patients with cardiovascular compromise should have supplemental oxygen during flight and be monitored. Resuscitation equipment including a defibrillator should be available; defibrillation can be used in fixed and rotary-wing aircraft although it is standard procedure to advise the aircrew before it is carried out.

Respiratory

Patients with respiratory disease may deteriorate due to the reduced partial pressure of oxygen at altitude. Unstable COPD or asthmatic patients should not be evacuated without a fully qualified AE team. The British Thoracic Society has produced excellent guidelines for the assessment of respiratory patients' fitness to fly [23]. The reduced cabin pressure in aircraft can have a marked affect on patients with a pneumothorax: the air expands with the potential for causing cardiovascular compromise. Accordingly, pneumothoraces should be relieved prior to flight and patients not emplaned until 2 weeks later when resolution may be confirmed with a chest x-ray. Alternatively, patients must fly with a functioning chest drain in situ and an escort who is able to replace the chest drain if it is dislodged or stops working.

Neurology

Patients with a space occupying lesion are generally safe to fly although the underlying risk of seizures remains; if these occur in flight then they should be managed in standard fashion. Similarly, stable epileptic patients are fit, but unstable patients may be at increased risk of fits due to the relative hypoxia. Free air within the skull may expand on ascent and compress brain tissue; therefore, it is advisable for such patients not to fly for 7 days or to request that evacuation takes place with the aircraft cabin pressurised to ground level. Unconscious patients with a head injury need a secure airway, probably mechanical ventilation, oxygen to prevent secondary brain damage, intravenous access, a urinary catheter, anticonvulsants and intracranial pressure monitoring as recommended by a neurosurgeon. The team must ensure that they are carrying sufficient medication to continue sedation and paralysis and enough oxygen for the transfer. Ideally, patients should be loaded such that they are in a head-up position during flight in order to reduce intracranial pressure.

Haematology

The effects of hypoxia are worsened by severe anaemia, but this may be well tolerated if it is a chronic condition. Emplanement will require judgement based upon the severity and chronicity; transfusion to achieve an Hb level of >10 g/dl may be required. Sickle cell trait patients may be transferred at a normal cabin altitude, but crises may be precipitated in more severe cases and patients will require supplemental oxygen and hydration.

Orthopaedic

Air pockets within casts will expand on ascent; therefore, all casts should be split (bivalved) prior to flight. In addition, swelling of the soft tissues may cause pain if the plaster is not bivalved. Pneumatic splints are not advisable since they will expand and compress the limb on ascent, and if the pressure is relieved, then they will be less effective as splints on descent of the aircraft.

Ophthalmic

Specialist ophthalmic care may not be available in remote areas, and AE may be the only option for access to assessment and sight-saving procedures. The concern is that air trapped within the globe may expand on ascent and cause further damage;

this requires a risk assessment. Repair of a retinal detachment may require injection of gas into the eye, and specialist advice should be sought before AE: air may persist for a few days, FF_6 may persist for a few weeks and C_3F_8 can persist for a few months. Advice from the Aerospace Medical Association [24], which also provides an excellent overview on the fitness of patients to fly, suggests that flight is contraindicated until the intraocular bubble has decreased to less than 30 % of the vitreous.

Psychiatric

Careful assessment to ensure that the patient is not a danger to themselves, other passengers or the aircraft is essential. Patients should have been observed to ensure that they are stable before evacuation and may require an escort qualified in mental health care with access to chemical and physical restraints. Over-sedation is not helpful since it may interfere with the individual's ability to look after themselves, alter their behaviour and cause respiratory depression.

Surgery

Patients should ideally not be evacuated for 5–7 days after abdominal surgery since expansion of air in the gut may place tension on sutures. The expansion of gas in the gut may cause a breakdown of a gut anastomosis so the AE may require a ground level cabin altitude restriction. Laparoscopy is not a problem since the carbon dioxide introduced into the peritoneal cavity is rapidly absorbed.

In summary, most patients can be evacuated by air, but it is essential to consider the potential affects of hypoxia and pressure changes on the underlying condition and that many people find flying stressful. The appropriate time to evacuate a patient will be governed by the condition, the degree of clinical stability, the host nation support, the length of the evacuation route, the aircraft that may be used and the competencies of the aeromedical crew and equipment carried. It is a time to consider the basic medical principle of *primum non nocere* or “do no harm”.

Aeromedical Evacuation and Humanitarian Operations

It could be argued that aeromedical evacuation was of limited relevance to humanitarian operations since it is focussed on the needs of individuals or limited numbers of patients. However, it can play an important role in 2 areas: the potential need for aid workers to be evacuated and the ability of an aeromedical system to deliver medical capability to a major incident and contribute to stabilisation and recovery.

Aid workers may suffer injury or illness while working in remote areas with limited medical back up. In addition, they may have a relapse of a pre-existing condition which can occur spontaneously or be as a result of the working environment. The employer has both a legal and a moral responsibility to have procedures in place to evacuate their employees. This would usually be through an external contract with an international aeromedical evacuation company who would assess, manage and evacuate casualties in line with their standard operating procedures. Such organisations usually provide high-quality care delivered by staff with the appropriate professional and aeromedical training supported by a suite of equipment and potentially a dedicated aircraft tailored to the needs of the patient.

Recent examples of support to humanitarian crises and major incidents include the US military aeromedical support to New Orleans in the aftermath of Hurricane Katrina, the Royal Australian Air Force contribution to the 2005 Indian Ocean tsunami and the US aeromedical aid after the 2010 Haiti earthquake. New Orleans had approximately 500,000 residents, and 80 % of these required evacuation; at one point, 250,000 were in temporary shelters. Many of the city's hospitals had been destroyed in the hurricane, and medical and ancillary staff had either been killed or injured or were unable to get to the hospitals due to massive damage to the city's infrastructure. Within 24 h of the event, the US military had a forward aeromedical evacuation system in place and were generating 125–175 helicopter evacuations per hour with each airframe carrying 4–5 non-ambulatory patients [25]. During the course of the support, 12,000 patients and medical staff were evacuated. A coordinated approach allowed the distribution of casualties across hospitals in the region. Fixed-wing evacuations could then take place to more distant locations to once again spread the clinical load. Following the tsunami of 2005, the Royal Australian Air Force (RAAF) flew in 1,200 tonnes of humanitarian aid and completed 70 AE missions evacuating 2,530 patients [26]; the operation was named Op SUMATRA ASSIST. In addition, medical personnel who were flown to the disaster zone undertook 3,700 medical procedures. 12 January 2010, a 7.0 magnitude earthquake occurred in Haiti, and the US Department of Defence contributed to the international disaster response efforts. A mobile aeromedical staging facility was set up on the island, and a rapid response team helped to stabilise patients and coordinate aeromedical evacuation to the USA. Patient transfer to the USNS Comfort, a hospital ship, was also coordinated in cooperation with Florida emergency management and health officials, and over 360 patients were evacuated using military aeromedical assets.

Summary

Aeromedical evacuation has become an important part of healthcare systems within the developed world and is a key enabler to military operations conducted in austere environments. The existence of a reliable AE chain allows commanders to reduce the medical assets in the operational theatre while remaining assured that injured

personnel will get prompt advanced medical care. Moreover, the soldier on the ground is assured that he will get advanced medical care and speedy repatriation. The role within humanitarian operations may be more limited apart from the support of the deployed aid worker, but aeromedical evacuation can still contribute further management options.

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Chapter 33

Deployed Field Hospitals in the Twenty-First Century

David M. Nott

Abstract Field hospitals in conflict zones receive and treat casualties with a wide range of injuries ranging from knife and machete wounds, high- or low-energy gunshot wound, fragmentation injuries due to mortars and rocket-propelled grenades and traumatic amputation from the blast wind effect of the improvised explosive devices. It is well recognised that airway obstruction and haemorrhage are the major treatable causes of early death from these injuries and reducing the time taken from point of wounding to definitive treatment improves survival, the so-called golden hour. However, urgent transfer may be difficult because of poor terrain, inappropriate management at point of wounding and politics between warring factions. This may skew the surgical workload seen in hospitals run by NGOs (nongovernmental organisations) compared to military field hospitals where transport capability and resources allow for rapid movement of casualties. Most injuries seen by the ICRC are extremity injuries probably because those patients with abdominal, chest and head injuries have died before presenting themselves to hospital. However, some such patients may still require surgery to prevent death from sepsis and to maximise functional recovery.

Keywords Field hospital • Military field hospital • Civilian field hospital • Requirements • Deploying field hospitals • Facilities for field hospital • Stages for setting up field hospital • Field hospital infrastructure • Field hospital personnel • Damage control resuscitation • Damage control surgery

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Objectives

- To describe the role of civilian and military field hospitals presently, how they function, what their requirements are, the principles by which they operate and how/by whom they are deployed.

Introduction

Field hospitals in conflict zones receive and treat casualties with a wide range of injuries ranging from knife and machete wounds, high- or low-energy gunshot wound, fragmentation injuries due to mortars and rocket-propelled grenades and traumatic amputation from the blast wind effect of the improvised explosive devices. It is well recognised that airway obstruction and haemorrhage are the major treatable causes of early death from these injuries and reducing the time taken from point of wounding to definitive treatment improves survival, the so-called golden hour [1]. However, urgent transfer may be difficult because of poor terrain, inappropriate management at point of wounding and politics between warring factions. This may skew the surgical workload seen in hospitals run by NGOs (nongovernmental organisations) compared to military field hospitals where transport capability and resources allow for rapid movement of casualties. Most injuries seen by the ICRC are extremity injuries probably because those patients with abdominal, chest and head injuries have died before presenting themselves to hospital [2, 3]. However, some such patients may still require surgery to prevent death from sepsis and to maximise functional recovery.

Civilian Field Hospitals

In times of conflict and catastrophes, wherever they occur in the world, existing healthcare systems are rapidly disrupted and overwhelmed. Local medical and nursing staff may be injured or have left and resources such as IV fluids, blood and pain relief will be in short supply. The hospital structure itself may have collapsed or been damaged beyond repair and casualties and those requiring medical help might be congregating outside the destroyed hospital. Urgent planning is necessary to set up alternative hospital locations, either in a secure building or in a tented structure. This initial infrastructure requires water, electricity, surgical, anaesthetic and nursing equipment and the manpower necessary to help set up the hospital and provide the necessary care. The civilian field hospital in an area of conflict must be a safe place which all warring parties should respect and therefore security and protection is paramount. Much work needs to be done primarily to obtain guarantees from all parties in the conflict.

Many NGOs may descend on an area of conflict and although the UN through OCHA (Office for the Coordination of Humanitarian Affairs) will provide coordination and support, it has no legal right to stop NGOs setting up competitive facilities. Multitudes of uncoordinated “field hospitals” were erected in the same area in Haiti in 2010 despite the concerted efforts of OCHA to prevent duplication of services [4].

Water and electricity are the two most important essentials required following the decision to set up a field hospital. With regard to water, logistical information on how much is needed, the quality of the ambient water, storage facilities and risk of interruption or contamination from local latrines or disrupted sewage works are gathered. With regards to electricity, does it exist and is it adequate, are generators necessary? If so, where does one get the fuel for them?

Plans to set up the new hospital must be discussed with everyone concerned. The important players are the Ministry of health, Ministry of Defence and local security force commanders. It is important to know what is left of the existing health structure. Are there clinics, first aid posts or other hospitals functioning and if so should a separate surgical hospital be set up specifically to the war wounded. This may help other health providers concentrate on their routine work without having to divert scarce resources to treat the war wounded. Early contact with all parties of the conflict helps ensure the safety of the hospital and makes negotiation easier in the future. It is important that everybody knows that the hospital is entirely neutral and that any person wounded whether from one side or the other, including all civilians will be treated under one roof. There must be no restriction to access and if curfews are applied then there should be some means of allowing transport of patients and staff during these hours.

Setting up a field hospital requires three phases. The initial planning phase is information gathering and is reported back to the headquarters of the organisation. This overview of situation must be done by an experienced person. He/she does not have to be medically trained but have awareness of the number of potential casualties, the risks associated in setting up a hospital in a conflict zone which may include moving front lines and collateral damage from rocket-propelled grenades and mortars. This information allows the headquarters to begin the recruitment of expertise and logistical support required to transport the team into the area. Initially safe houses are set up close by, which provides safety for the team and daily briefings on security, equipment demands and potential hospital set up. In the meantime the surgical team can “get going” helping other local teams in hospitals that are functioning [5]. Information can then be returned to the head of mission on casualty numbers, mechanisms of wounding and operative and post-operative support required providing detailed information for the setting up phase, which is necessary for the preparation of the hospital infrastructure required. This includes transport and travel, preparation of logistical supply lines, purchase of locally available supplies, installation of material and equipment, training of personnel and initial running expenses. Finally in the 3rd phase, the running phase, where the hospital gets up and running requiring electricity, power and fuel, maintenance and construction, water and sanitation, food, ongoing purchasing, ordering supplies and administration.

The hospital premises must always be respected by the combatants. Without security and protection for the buildings and staff, the hospital will not function. The two main factors which provide protection of a hospital in time of war are (a) the protection given to medical structures and personnel under international humanitarian law and (b) practical measures taken to physically protect patients and staff from explosions or fighting close to the hospital.

Geneva Conventions

International humanitarian law gave birth to the Geneva Conventions of 1949 and 1977 which applies to all aid workers involved in the care of the sick, civilians caught up in the conflict and injured combatants that are no longer fighting [6]. The role of the NGOs is exactly what it means, nongovernmental, and is based on the fundamental principles of impartiality, neutrality and independence. Their work is free from any consideration or objective of a government whether political or military, the sole motivation being to meet the needs of the victims. Activities go beyond simply assisting the victims of internal violence and armed conflict; they also ensure their protection in accordance with humanitarian law and principles. However, protection ceases if acts are perceived to be harmful to the enemy such as sheltering active soldiers, storing arms and ammunition or being used as military observation posts and the hospitals may become legitimate targets.

The agreement of August 1949 consists of four conventions. They seek to protect three particular groups: combatants, civilians and captives. The first and second conventions are similar in content, covering land and sea combatants, respectively. They embody the founding principles of the Geneva Convention and Red Cross, namely, that once a combatant is no longer able to fight, they cease to be hostile and become a vulnerable person in need of care. Both conventions outline the protection of religious personnel and medical units on the battlefield. The third convention describes the treatment of combatants who are captured by the enemy. The conditions and places of captivity are precisely defined, particularly with regard to the labour of prisoners of war, their financial resources, the relief they receive and the judicial proceedings initiated against them. The conventions establish the principle that prisoners of war shall be released and repatriated without delay after the cessation of active hostilities.

The events of World War II showed the disastrous consequences of the absence of a convention for the protection of civilians in wartime, and the fourth convention emerged from that experience. It broke new ground in outlining the responsibilities of belligerent powers in their treatment of civilians within enemy and occupied territory. The conventions also formalised the neutral role of the International Committee of the Red Cross with regard to visiting prisoners, organising relief efforts and conducting other humanitarian works. The experience of weapons development and the proliferation of civil wars and internal conflicts meant that the conventions were reinforced by two protocols in 1977. Protocol I strengthened the protections applicable to the victims of international wars, whilst Protocol II extends

these protections to non-international conflicts. Such conflicts include civil wars and wars in which numerous state or non-state actors are involved. The original Geneva Conventions were very focused on international armed conflict and conflict between two states. But since then, almost all armed conflicts are internal, about 90 % are inside a country's borders. Although there is a lot of discussion on the relevance of the Geneva Conventions in the age of terrorism where the enemy is invisible, these conventions must be upheld as the most important provision is that civilians must not be targeted and have to be protected. Although terrorist and other groups may not themselves have heard of the Geneva Conventions, humanitarian law must dictate that wherever possible, basic human rights must be adhered to at least by those who have [7].

A wall or fence must surround the hospital to keep out thieves and crowds that arrive with the influx of the civilian casualties. There must be one entrance to the compound allowing passage of people and vehicles, which is guarded day and night and swept constantly as control of vermin is extremely important in hot climates. The compound must be large enough to enable triage to occur outside the hospital. It is very important that primary triage does not occur within the hospital itself because the hospital will very rapidly be overcome with patients, relatives and general onlookers. The hospital must be well marked either with flags or murals on the walls indicating the NGO. It also must be well illuminated at night. If close the front line, then sandbags must guard all entrances and windows must be secure using tape to minimise splintering (Fig. 33.1). The policy of no weapons in the compound must be adhered to.

There are 20 main facilities in the field hospital:

1. Admission room/emergency department
2. Outpatient area
3. Operating theatre
4. Intensive care/recovery room
5. Surgical ward
6. Laboratory
7. X-ray
8. Sterilisation area
9. Pharmacy
10. Physiotherapy room
11. Administration room
12. Doctors and nurses accommodation
13. Kitchen
14. Laundry
15. Vehicle parking
16. Water storage
17. Generator fuel store
18. Medical gases store
19. Incinerator/garbage/sharps disposal
20. Mortuary



Fig. 33.1 Sandbags surrounding the ICRC base in Kandahar 2001

Minimum Requirements

There must be approximately 6 m² space for each bed and therefore 50 beds will need 300 m² of ward space. Minimum supply of water is 100 l per patient per day (for drinking, washing and cooking) and on average it is around 300 l per day per patient, minimal when you consider Western hospitals usually need 1,000 l per patient per day. To provide electricity for, say, 50 beds which includes essential services such as operating theatre lights and/or air conditioning, sterilisation, X-ray, refrigeration and general lighting, around 100 kVA is required.

In all missions, there are key personnel. The head of mission has total control and command over the mission and his/her word is final. Meetings are held on a daily basis to discuss the running and organisation of the hospital with the 4 teams. These comprise the surgical team led by the surgeon who has control of the operating theatre, laboratories, X-ray and sterilisation; the nursing team, who provide treatment of patients on the ward including nutrition and rehabilitation; and the logistical team which manages all the supplies electricity, water and waste disposal and all other non-medical staff including porters and cleaners and the administration team, which look after the travel arrangements of the team, local accounting to pay the local staff and security.

Major Western hospitals generally have a large free-roaming reception area where patients pass through to various departments including outpatients and other paramedical departments. Because of security, a field hospital normally has a front

of house room which is the admission room/emergency department. This room contains around 10 examination beds and usually requires a rotation of 4 people every 8 h to man this room which is used for the management of major casualties and seriously ill patients. It contains good lighting, IV fluids, airways and chest drains and a desk next to each patient to write notes. The room is walled and roofed and there must be a large clearing area adjacent which can be used as a major triage area in case of multiple casualties. This triage area must always be outside of the hospital.

The area for triage is extremely important. Triage is covered elsewhere in this book but it is important that all casualties are taken to a receiving area in the case of a mass casualty incident. The casualties must not be brought into the hospital as it will only cause complete confusion, occupy all the available space and raise the noise level to a state where transfer of information is impossible. In a mass casualty situation, someone must take responsibility for triage and makes decisions to sort the patients into categories. Those patient requiring urgent surgery within the golden hour are designated as P1, those who require surgery within the next 2 h as P2, the walking wounded as P3 and P4 as expectant, that is, those that are dying, who are beyond salvage and those who are dead. Those designated P1 and P2 then sieved into their priorities for surgery. Triage is a dynamic process and must be constantly reviewed; patients may become more urgent and therefore change priority.

The operating room should be close by to the emergency room and in theory should have more than 2 operating tables in case of multiple casualties (Fig. 33.2). Adjacent to the operating theatre is a scrub room and room for surgical hardware



Fig. 33.2 Operating room, Mirwais Hospital, Kandahar 2001

containing surgical sets. These include sets for general surgery, orthopaedics, caesarean section, paediatric, vascular, amputation, thoracotomy, plastic surgery and sets for tracheostomy and craniotomy. Anaesthesia for trauma in the austere setting should also include management of the airway so that endotracheal intubation is necessary and all anaesthetic equipment available for ventilation should be checked and ready to use by the staff using it.

The drug most commonly used for anaesthesia given in rural hospitals is ketamine, discussed elsewhere, which is the mainstay of anaesthesia and can be used for lower abdominal work, such as caesarean section and orthopaedic procedures. For laparotomy where muscle relaxation is required, intubation and ventilation are mandatory.

Following operation, the patient is taken to a recovery room and monitored for a short while prior to discharge to the ward. Occasionally, there is an intensive care type area (Figs. 33.3 and 33.4) which does not contain ventilators as in Western hospitals, but trained nursing staff to monitor the patients on a more individual basis. Careful observations which form part of the general nursing care include careful fluid management, i.e. measurement of fluid input via oral and intravenous routes and output from urinary and gastrointestinal sources and routine measurement of pulse blood pressure and temperature and respiratory rate on an hourly basis for the most critical patients.

Sometimes as in the case of Misrata, Libya, in April 2011 when the author was a member of the MSF surgical team, the hospital may have a functioning critical care unit with ventilatory support. However, the situation can arise that there are too



Fig. 33.3 Entrance to the intensive care unit in Rutsuru, DRC



Fig. 33.4 Intensive care unit, Rutsuru, DRC

many critically ill patients and not enough ventilators. This situation can be resolved by early tracheostomy. Patients were ventilated for 24 h, then underwent tracheostomy (Figs. 33.5 and 33.6). This allows suction of the patients and removes significant amount of respiratory dead space and can allow the patient to be transferred early to the surgical ward where if ventilatory support is still required then this can be given via an ambulatory bag with 100 % oxygen squeezed by medical students on a rota around the clock.

In the case of catastrophes such as earthquakes and tsunamis, there may in fact be no infrastructure. The author was the surgeon for MSF following the earthquake in Haiti in January 2010. There were thousands of injured people relying on field hospitals for security and help. In Haiti, the hospital had to be constructed rapidly and required two surgical units, a recovery area, an intensive care unit and emergency room and rehabilitation services. Forty-five tons of equipment was transferred from centres in Europe across rough ground, and the hospital was set up after delivery of the resource within 3 working days, with the staff working 24 h per day. As well as the hospital, there were plastic flooring, generators, communication equipment and beds as well as all the surgical equipment. The structures used were not buildings but were inflatable tents. A secure area was essential not just for the safety of the patients and doctors but also for the stability of the hospital. This hundred-bed facility required about 9,700 ft² [2]. space so it was located at a football pitch in the centre of Port-au-Prince.



Fig. 33.5 Intensive care unit, Misrata, Libya



Fig. 33.6 Early tracheostomy

As the flooring in the tents was laid down, electricity, water and sanitation experts got to work. Water was acquired by a nearby water tower and, as has been previously stated, usually 26 gallons per day per bed are needed, although in better conditions, 200 gallons per day would be standard. Two generators, 30 and 60 kV, were required and these are brought in from Santa Domingo over 230 miles away.

The tents were inflated by mechanical air pumps equipped with pressure gauges to adapt to changing temperatures and the tents were connected to each other using zippers (Fig. 33.7). Medical equipment including ECG machines, autoclaves for sterilisation, defibrillators and lab equipment enough to organise a blood bank were installed. In Haiti at that time following the earthquake, there were 30 doctors and medical personnel working on 12-h shifts for the hundred-bed facility. The number of patients progressively increased over time and exceeded the initial capacity, but there was enough space on the football pitch to add extra tents to accommodate the final 300 patients. This field hospital has remained fully functioning for over 2 years (Figs. 33.8 and 33.9).

Field hospitals can remain functional for years; the ICRC run Lopiding hospital in Lokichokio (northern Kenya) was at one point the largest field hospital in the world with a peak capacity of 700 beds. It treated tens of thousands of Sudanese patients, approximately 95 % of whom arrived at the hospital by air, and performed more than 4,000 operations a year. This ICRC action may very well have been the largest and longest non-military cross-border air evacuation of casualties in history.



Fig. 33.7 Compressed air to top up the tents



Fig. 33.8 Setting up the field hospital in Port-au-Prince



Fig. 33.9 Typical ward in MSF Hospital Port-au-Prince

Founded in an isolated rural area in 1987, the hospital had two operating theatres, an intensive care and high-dependency unit and ten wards and became a training centre on war surgery for hundreds of health workers who later returned to southern Sudan or went on to use their skills in other countries. By the end of May 2006, the medical staff at Lopiding had cared for nearly 38,000 patients and performed over 60,000 surgical operations.

Military Field Hospitals

The main difference between civilian and military field hospitals is that in the former, initial emergency treatment is provided but the patients then stay within the hospital confines until discharge. In military field hospitals, initial life-saving surgical management is undertaken and then an evacuation to a higher echelon of care is mobilised in order to restrict “bed blocking” allowing the hospital to receive further casualties if necessary. The onward evacuation of indigenous security force and civilian patients can be problematic if there is disparity between the capability of the military field hospital and the local health infrastructure. If facilities become full then military operational capacity is restricted so the onus is to save life and limb and then transfer as soon as appropriate.

The military remain subject to political control, which determines their missions and objectives. Even when the ultimate aim of their mission is humanitarian, such missions are designed with the use of force, if only with self-defence in mind. There will always be a risk that military relief efforts will be perceived as partisan by local warring parties.

Historically, the first description of the basic casualty evacuation chain was described in the field service manual of 1899 relating to the Boer War [8].

Once arriving in the field hospital, which was usually situated at the limits of the bombardment, surgery was limited to amputations and wound dressing and was described as very unlike any operating theatre in London at that time. The first description during the Boer War was of three zones for removal of the sick and wounded from the battlefield. The collecting zone consisted of regimental stretcher bearer’s carrying the patient to emergency tents set up near the front line. The evacuating zone included the field hospital which was somewhat slightly more advanced. Patients were then passed onto stationary hospitals some distance away and then onto the distributing zone where repatriation to the UK was via hospital ships. One-hundred years later this chain of evacuation is still in evidence. Rather than zones they are now called roles and are based on quality of care. The use of zones and roles are not exactly comparable – see the Bricknell papers listed under further reading.

The term “role” is used by land or air forces, while “echelon” is primarily a maritime term. The treatment capability of each role/echelon is intrinsic at the higher level, e.g. a role 3 facility will have the ability to carry out role 2 functions. Each level of support has the responsibility to resupply and otherwise support the levels below them. There is no requirement that a patient must necessarily pass through

each echelon of care in progression during treatment and evacuation. Role/echelon 1 medical support is that which is integral or allocated to a small unit such as a regimental aid post often with no medical officer available. This includes the capabilities for providing first aid, immediate life-saving measures such as application of tourniquets and arrest of external haemorrhage, airway manoeuvres, splintage and administration of limited quantities of IV fluid in line with a hypotensive resuscitation strategy.

Role 2 support is normally provided at larger unit level, usually about 3,000 soldiers, though it may be provided farther forward, depending upon the operational requirements. In general, it provides evacuation from role/echelon 1 facilities, triage and continuing resuscitation, treatment and holding of patients until they can be returned to duty or evacuated and emergency dental treatment. Though normally this level will not include surgical capabilities, certain operations may require their augmentation with the capabilities to perform emergency surgery and essential post-operative management. In this case, they will be often referred to as role 2+.

Role/echelon 3 support includes additional capabilities, including specialist diagnostic resources, specialist surgical and medical capabilities, preventive medicine, food inspection, dentistry and operational stress management teams when not provided at level 2. The holding capacity of a level 3 facility will be sufficient to allow diagnosis, treatment and holding of those patients who can receive total treatment and be returned to duty.

Role 4 is usually care provided away from the conflict (e.g. the NHS and associated military facilities). This medical support provides definitive care of patients for whom the treatment required is longer than the theatre evacuation policy or for whom the capabilities usually found at role/echelon 3 are inadequate. This would normally comprise specialist surgical and medical procedures, reconstruction, rehabilitation and convalescence. This level of care is usually highly specialised, time consuming and normally provided in the country of origin. Under unusual circumstances, this level of care may be established in a theatre of operations [9].

For a thrilling and well-written account of the setting up and running of a field hospital during the Falklands war, the reader is advised to read the "Red and Green life machine" by Rick Jolly OBE. It provides insight into not only the austere environment that many military medical personnel find themselves but also the ingenuity and bravery faced by the medical teams who worked at the field hospital in Ajax Bay. It also provides insight into the diplomacy required when dealing with difficult personalities during times of stress and crises. The book also generates great pride in the knowledge that one can overcome significant hardships and maintain dignity, pride and courage for the rest of one's life. This has been so eloquently displayed by one of the editors of this book, Jim Ryan, who not only was a surgeon in that field hospital but was also the medical officer on the ship, the RFA Sir Galahad 3 that took a direct hit that killed and maimed so many Welsh Guardsmen.

A quote from the last paragraph of Admiral Sir John Field's official dispatch of Tuesday, December 14, 1982, sums up the field hospital and subsequent evacuation chain extremely well:

Major contributory factors to the survival of the wounded were the supreme physical fitness of our troops and the exemplary medical attention given to casualties of both sides. First Aid matched the professional expertise of the field and afloat medical teams. Equally vital was the skill of the helicopter pilots in speedily evacuating casualties. Casualties were then transferred to the hospital ship SS Uganda. Once fit for further travel, they were transferred to the 3 casualty fairies HM ships Hydra, Hecla and Herald, and conveyed to Montevideo for onward aeromedical evacuation to the United Kingdom by RAF VC 10. These operations were all conducted with great efficiency and great concern for the comfort of the wounded. I could not have been better served. [10]

In the last decade or so, the wars in Iraq and Afghanistan have provided outstanding research both in the UK and American literature. This has had direct effect on civilian trauma centres throughout the whole of the world. Notably, hypotensive resuscitation [11], haemostatic resuscitation with blood products [12] and damage control surgery [13] and damage control resuscitation [14] are just some of the concepts that have emerged and have been adopted in trauma care over the last decade, with considerable reductions in mortality as a result.

The role 2+ facility in the coalition operating base (COB) in Basra during Op Telic 10 was situated almost at the front line. One could say that the Geneva Conventions were not adhered to by the combatants and that although the hospital was well marked with a red cross insignia, the hospital underwent attack from rocket-propelled grenades and mortars every day for months. There were significant number of casualties from fragmentation wounds which were dealt with in the hospital. At that time, the field hospital was a tented structure. Breeze blocks situated through the corridors for the staff to hide behind during attacks for protection. The hospital staff included one general surgeon, one orthopaedic surgeon, 4 anaesthetists, one physician, junior medical staff and full complement of theatre nursing staff and ward staff. In addition there were other paramedical services available, notably physiotherapy and dental services. The setup for the field hospital is similar in all army structures. It is rather like a tree with the main corridor, the trunk and branches, the medical wards, surgical wards, operating theatre an intensive care and emergency facilities coming off at right angles. There was an air transportable facility with a helicopter landing pad close to the emergency department.

Casualties from Basra and surrounding areas outside the base would be regularly transferred in by Merlin helicopter. There were high-energy wounds with major vascular, thoracic and chest injuries which all underwent damage control surgery. Patients admitted were often hypothermic, coagulopathic and acidotic. The so-called bloody vicious cycle [15].

Hypovolaemic shock adversely affects oxygen delivery and consumption which ultimately decreases the body's ability to produce heat. Prolonged hypovolaemic shock is associated with tissue ischaemia and the shift from aerobic to anaerobic metabolism. Lactic acid is produced, resulting in profound metabolic acidosis further exacerbating the coagulopathic state. The coagulopathy is also multifactorial due to dilution and consumption of clotting factors as well as the hypothermia and acidosis.

Damage control surgery (DCS) is an operative strategy that sacrifices the completeness of the immediate surgical repair in order to address the physiological consequences of the combined trauma (double hit) of injury and surgery. In the past this has been very much focussed on abdominal trauma and the idea of performing an “abbreviated laparotomy” [16].

The principles of damage control surgery (DCS) have been well described for over 20 years but have been slow to gain universal acceptance. However, it is now recognised that severely injured trauma patients, who are still alive at the point of medical intervention, are now more likely to die from the metabolic consequences of the injury rather than the completeness of the immediate surgical repair to their damaged organs. The central observation behind the philosophy of DCS is the adverse effects of the combined triad of hypothermia, acidosis and trauma-induced coagulopathy as a consequence of the hypothermia, acidosis, consumption and dilution of clotting factors. Hypothermia leads to adrenergic stimulation with vasoconstriction, exacerbating any organ hypoperfusion that may be already present secondary to hypotension from the injury. This leads to worsening acidosis. This hypothermia and acidosis is then further exacerbated by aggressive fluid resuscitation, especially with normal saline (pH 5.5). The hypothermia and acidosis (combined with the consumption, dilution and failure to replace clotting factors) now promotes an established coagulopathy. Even if major surgical bleeding is now physically controlled, the patient continues to bleed from all cut surfaces – intensifying the “bloody vicious triad”.

In the last 5 years or so, there has been a significant increase in the understanding of the coagulopathy of trauma. Hypothermia is directly correlated to injury severity and remains an independent risk factor for mortality, reaching 100 % when core temperature is less than 32 °C in patients undergoing a laparotomy [17]. Whilst the contribution of acidosis, hypothermia and the dilution/consumption of clotting factors to the development of trauma coagulopathy are important, it has been recently recognised that in up to 30 % of patients with major traumatic injuries, there is an endogenous coagulopathy that is also present early. This response appears to be mediated through activation of the protein C pathway. This acute traumatic coagulopathy (ATC) is induced by the combination of trauma, shock and tissue hypoperfusion. Patients who have evidence of ATC on admission to the emergency department are more likely to require massive blood transfusion, develop multi-organ failure and have up to fourfold chance of dying [18].

Damage Control Resuscitation

These new insights into the pathophysiology of trauma have influenced the military approach to resuscitation. In patients with injury and massive haemorrhage, massive transfusion protocols have been developed to counter the dilution and consumption of clotting factors and address the hypothermia and acidosis. Massive transfusion protocols involve correcting shock and coagulopathy with warm red cells, fresh frozen plasma and platelets in a 1:1:1 ratio [19].

No longer is damage control surgery applied on its own followed by resuscitation using crystalloid and blood, but the new strategy which is saving lives significantly and has been adopted by the civilian community is damage control surgery and damage control resuscitation combined and streamlined together [20].

The role 3 field hospital at Camp Bastion has become the busiest trauma unit in the world and over 3 months during Op Herrick 12a in 2010 dealt with over 1,400 major trauma cases. The hospital is equipped with a potential 16 bedded ITU and over 50 hospital beds being can be made available at any time. It has 2 fully operational CT scanners. Using the most up-to-date technology both in damage control surgery and damage control resuscitation and using resuscitation techniques such as 1:1:1 packed red cells, fresh frozen plasma and platelets using warmed blood products, it has produced some of the best clinical trauma results ever produced in the world.

Over 90 % of the patients that arrive at the hospital are saved. This is due to well-trained combat soldiers and combat medical technicians and rapid transfer times from point of wounding to the field hospital using Chinook helicopters carrying the MERT (medical evacuation response team). This has evolved into a flying emergency department including consultant anaesthetists who can deliver the best airway management by endotracheal intubation if necessary and provide fluid management and blood via large vein or osseous routes, manage chest injuries with chest tubes and perform thoracostomy. Constant communication, with the base at Camp Bastion emergency department, allows for preparedness for the teams. The initial triage is by the trauma team leader who is a consultant emergency physician, and all secondary care teams are led by consultant surgeons and consultant anaesthetists. Although Camp Bastion remains a British facility, joint care is provided by American consultant teams.

Over the past decade, advances in military trauma management no doubt had significant impact on the National Health Service in the UK and lessons learnt from the field hospital in Camp Bastion can be extrapolated to provide better care in UK trauma centres. The excellent results are based on six factors. Firstly, all seriously injured patients receive treatment from a consultant. The second is the concept of damage control, where urgent correction the patient's deranged physiology is a greater priority than definitive anatomical repair. The field hospital structure is planned around the needs of the time-critical patient, ensuring all key components such as the emergency department, the trauma operating theatres, multi-slice CT scanner, blood bank and intensive care unit very close to each. The third factor is that the defence medical services have a common training model, the participants progressing from individual first aid provider *to* team medic (one in every 4 combat soldiers) and then to pre-deployment courses, battlefield advanced trauma life support, military operational surgical training and finally to a multidisciplinary field hospital situation. The training is underpinned by a single set of clinical guidelines which encompasses management of medical emergencies in specific environments for every level of provider. The use of a single set of clinical guidelines is not new but an essential component of an echeloned medical system in which there is commonality of approach to the care of casualties, i.e. the introduction of the Field Surgery Pocket Book and Casualty Treatment Regimes.

The training pathway targets team and individual skills, with an emphasis on leadership, management of personnel and human factors. The fourth is an almost real-time feedback an audit to improve system performance provided by care teams in the role 4 environment. The fifth is acceptance of rehabilitation services as equally important and favourable long-term outcome provided by the defence medical rehabilitation centre in Epsom, Surrey, UK. The 6th is robust research based on clinical findings [21].

Conclusion

The UK defence medical services field hospitals over the past 10 years have produced research that has changed trauma management. Wounded soldiers can expect the very best treatment possible from point of wounding, via the prehospital care provided by the MERT, through the role 3 field hospital and onto the role 4 NHS hospital in Birmingham. This obviously also depends on the resources available and damage control resuscitation using blood products and not crystalloid have produce sustainable results. Over 3,000 units of blood products used per month in Camp Bastion. This cannot be extrapolated to the NGO civilian field hospital which does not have this provision and is focussed on the prevention of sepsis and preparation for rehabilitation. There are also significant differences in the way that triage is performed. In civilian NGO settings the surgeon may not be of consultant grade, may be on his/her own, and the anaesthetist, maybe a nurse anaesthetist, although highly trained may not be used to trauma victims with very high injury severity scores. The staff in the hospitals may not be well trained and may be unaware of the potential problems that can occur post-operatively. The decision to operate on patients with significant injuries is based on triage and resources available. The cases operated upon in Camp Bastion would not survive in a civilian field hospital without the necessary resources. In the civilian NGO field hospital, decisions made on the trauma patient depend on facilities, resources available, situational awareness and experience and are often very difficult.

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Part V Clinical Care

Walter Henny and David M. Nott

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This section considers clinical care of the individual and special groups. It is not intended as a comprehensive medical textbook but rather a distillation of practical advice on deployed medicine.

Chapter 34

Acute Problems and Emergency Surgery: Introduction – Scene-Setting

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Abstract The authors of this chapter include specialists, many of whom have extensive deployment experience. The target group of this chapter, however, is not their fellow specialists, but the “junior” doctors, trying to help them find their way in the difficulties posed by an “adverse” environment. That junior doctor will be confronted by all imaginable ailments and injuries and should be a true generalist. As we’re all aware, even in medical school nowadays, there’s a tendency to make students choose the direction of their future work at an ever earlier stage, the opposite of what’s needed for a generalist.

Keywords Triage • Trauma and medical emergencies • Ballistic and blast injury • Infectious diseases • Climatic influences • Bites and stings • Maxillofacial problems • Head and spinal cord injuries • Abdominal complaints • Non-traumatic surgical emergencies • Soft tissues and skeleton • Surgery in the tropics • Anaesthesia and analgesia • Hostile environments • Disaster environments • Conflict environments • Catastrophe environments

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Objectives

- To indicate the range of common injuries, illnesses and conditions likely to be encountered
- To describe a rational approach to the management of these conditions
- To detail common surgical and medical emergencies
- To introduce the problems associated with ballistic and blast injury
- To describe the principles of analgesia and anaesthesia in hostile environments
- To describe the injuries/illnesses/conditions caused by climate extremes of heat and cold and their management/treatment
- To describe diseases prevalent in the tropics and their treatment
- To describe conditions prevalent in the tropics needing surgeries and those surgical procedures
- To describe envenomations and their management/treatment

The authors of this chapter include specialists, many of whom have extensive deployment experience. The target group of this chapter, however, is not their fellow specialists, but the “junior” doctors, trying to help them find their way in the difficulties posed by an “adverse” environment. That junior doctor will be confronted by all imaginable ailments and injuries and should be a true generalist. As we’re all aware, even in medical school nowadays, there’s a tendency to make students choose the direction of their future work at an ever earlier stage, the opposite of what’s needed for a generalist.

The chapter aims to impart (basic) surgical and medical knowledge, placed against the background of the constraints posed by conflict or catastrophe. Self-evidently it’s not a textbook; it covers, however, the entire body, indicating what might be treated by the junior doctors themselves and what should be referred. Referral in an adverse environment is usually difficult and occasionally impossible; careful planning is required. If a patient should but cannot be referred, the consequences are most often very serious.

All health professionals have an obligation to provide assistance to those in need, commensurate with their training and skill.

The topics covered in this chapter are:

- Triage, trauma and medical emergencies
- Ballistic and blast injury
- Infectious diseases
- Climatic influences
- Bites and stings
- Maxillofacial problems

- Head and spinal cord injuries
- Abdominal complaints
- Non-traumatic surgical emergencies
- Soft tissues and skeleton
- Surgery in the tropics
- Anaesthesia and analgesia

Chapter 35

Acute Problems and Emergency Surgery: Triage and Acute Care

Walter Henny and David M. Nott

Abstract The authors of this chapter include specialists, many of whom have extensive deployment experience. The target group of this chapter, however, is not their fellow specialists, but the “junior” doctors, trying to help them find their way in the difficulties posed by an “adverse” environment. That junior doctor will be confronted by all imaginable ailments and injuries and should be a true generalist. As we’re all aware, even in medical school nowadays, there’s a tendency to make students choose the direction of their future work at an ever earlier stage, the opposite of what’s needed for a generalist.

Keywords Triage • Trauma and medical emergencies • Ballistic and blast injury • Infectious diseases • Climatic influences • Bites and stings • Maxillofacial problems • Head and spinal cord injuries • Abdominal complaints • Non-traumatic surgical emergencies • Soft tissues and skeleton • Surgery in the tropics • Anaesthesia and analgesia • Hostile environments • Disaster environments • Conflict environments • Catastrophe environments

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Objectives

- This part emphasises the importance of managing acute patients, both trauma and non-trauma, effectively and expeditiously, by using a systematic approach. The management of a variety of injuries and diseases including soft tissue wounds, fractures, serious infections, injuries to body regions and other ailments is described in Chaps. [36](#), [37](#), [38](#), [39](#), [40](#), [41](#), [42](#), [43](#) and [44](#).

Introduction

Worldwide, trauma is the leading cause of morbidity and mortality during the first four decades of life and is the third most common cause of death overall.

During catastrophe or conflict, much attention is, rightly, paid to overwhelming public health and environmental health risks. However, trauma is an inseparable part of conflict and catastrophe, not only in the populations involved but also in health professionals who travel from abroad to give humanitarian support.

Likewise, during catastrophe or conflict, acute medical and surgical (non-trauma) problems will be encountered, either as a “new” event or as an exacerbation.

Usually it is easy to discern whether, primarily, injury is involved or not. It should be realised, however, that injury may occur because of an underlying medical problem.

A systematic approach to dealing with trauma victims has been in place for over 30 years; a comparable way of assessing non-trauma emergencies has been developing more recently.

For practical reasons, the two will be discussed separately; one more, however, it is pointed out that the junior doctor may be dealing in a patient with trauma AND a medical problem at the same time.

Those who have little experience with these subjects are most strongly advised to follow one or more life support courses (as mentioned in the Resources paragraph) or, as a minimum, study the Manuals.

Trauma***Mechanisms***

By convention injuries resulting from physical trauma are classified as follows:

- Penetrating
- Blunt
- Blast

- Thermal
- Chemical
- Miscellaneous (e.g. crush and barotrauma)

Basically, trauma is a transfer of energy, leading to damage of tissues. Depending on the characteristics of that tissue and the amount of energy transferred, the resulting damage will be repaired by a number of processes; occasionally that damage is irrecoverable. A good local oxygen supply is necessary for the repair processes to evolve effectively.

“Macroscopic” damage can be differentiated in:

- Compression
- Stretching
- Tearing
- Laceration
- Incision

In dealing with trauma victims, it’s most important to realise that the threat to life is not always immediately obvious. The problem is compounded when a health professional is called upon to care for more than one victim at the same time. This calls for a very systematic approach.

Multiple and Mass Casualties

In conflict and catastrophe, patient numbers may be large, temporarily exceeding the capacity to deliver optimal medical care. Be aware that this may also be the case when a single health professional, without back-up, has to care for two or more victims of, e.g. a road traffic accident.

Under these conditions, one must do “the most for the most”. Attempting to deliver optimal care to one victim will deprive others of much-needed and potentially life-saving care.

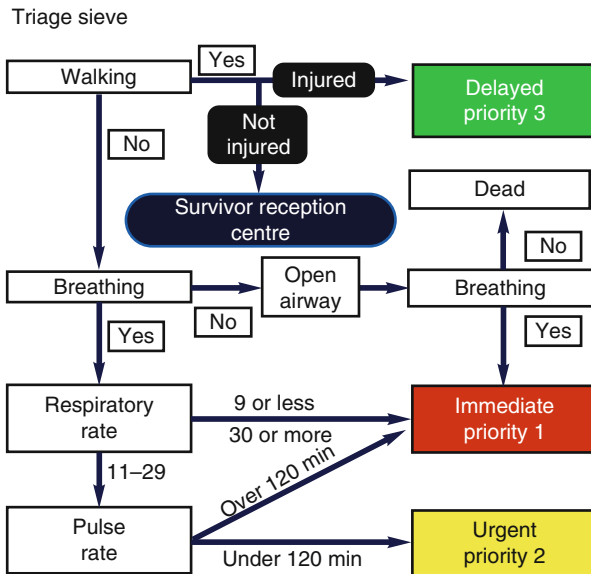
This calls for “triage”; the process by which victims are quickly assessed in order to assign a priority for further care.

Triage should take many factors into account: the patients’/victims’ condition, the severity of their injuries and the availability (or lack thereof) of “assets” (the number of health professionals, resources for treatment “on the spot” and “at a distance”, etc), distances to cover in transportation, means for transportation, time required for specific treatments, survivability of the injuries sustained, external threats, etc.

There are many triage systems. Those of the readers who have experience should use the system they are used to, as long as the actual circumstances are taken into account.

We think that the best system now available for use in the field and at the entrance of the first treatment facility is “triage sieve” which assigns an order of priority to

Fig. 35.1 Triage sieve. Capillary refill test (CRT) is an alternative to pulse rate but is unreliable in the cold or dark: if it is used, a CRT of >2 s indicates PRIORITY 1



Capillary refill test (CRT) is an alternative to pulse rate, but is unreliable in the cold or dark: if it is used, a CRT of >2 seconds indicates PRIORITY 1

each victim based on simple criteria; taking into account that victim’s characteristics only.

Figure 35.1 shows the triage sieve flowchart:

T1 are those victims who have an abnormality in their airway and/or an abnormal respiration and/or shock.

T2 have normal vital signs but are unable to walk.

T3 are the walking victims.

Please note that an unconscious victim is categorised as T1, until the airway has been secured. Be aware that a victim’s condition may change over time and that triage should therefore be repeated, using either triage sieve or triage sort (see discussion to come), depending on the circumstances.

Triage sort assigns priorities based on the revised trauma score (Fig. 35.2). At this time a victim may be up or down triaged depending on factors such as time requirements of specific treatments and survivability. Clearly, this is a judgement call; for that reason triage, sort but also sieve, should be performed by the most experienced health professional (who, ideally, has been trained in performing triage).

Triage sort has four categories:

T1: victims who require immediate care (ABC unstable: problems in airway and/or breathing and/or circulation).

Triage sort

Step 1: Calculate the Glasgow Coma Score (GCS)

A Eye opening: spontaneous 4 to voice 3 to pain 2 none 1	B Verbal response: orientated 5 confused 4 inappropriate 3 incomprehensible 2 no response 1	C Motor response: obeys commands 6 localises 5 pain withdraws 4 pain flexes 3 pain extends 2 no response 1
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GCS = A + B + C

Step 2: Calculate the Triage sort score

X GCS 13–15 4 9–12 3 6–8 2 4–5 1 3 0	+	Y Respiratory rate 10–29 4 ≥30 3 6–9 2 1–5 1 0 0	+	Z Systolic BP ≥90 4 76–89 3 50–75 2 1–49 1 0 0
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Triage sort score = X + Y + Z

Step 3: Assign a triage PRIORITY

12 = PRIORITY 3
11 = PRIORITY 2
≤10 = PRIORITY 1

Step 4: Upgrade PRIORITY at discretion of senior clinician, dependent on the anatomical injury/working diagnosis

Fig. 35.2 Triage sort

T2: victims who are ABC stable but who require treatment (usually: surgical) within 4–6 h.

T3: victims whose treatment can be postponed; if needs be, for days.

T4: victims who've been categorised T1 but whose survival is considered to be unlikely (given the circumstances). Use of this category should be “avoided” as long as possible.

Please note that both management of an individual casualty (see discussion to come) and triage of multiple casualties use the same systematic approach.

The Individual Casualty

It has become generally accepted that one should “treat first what kills first”; this principle is valid “everywhere” and for all patients/victims, trauma and non-trauma. The description to come is confined to injured people.

As threats to life are not always immediately obvious, the systematic approach now entails:

1. Assessing the general condition of the victim and a quick search for obvious life threats (abnormalities of airway, breathing, circulation and consciousness)
2. Elimination or alleviation of those threats and reassessment
3. Inventorying ALL injuries (in themselves not life-threatening)
4. Definitive care (details are described elsewhere in this chapter)

This systematic approach has first been described in the American College of Surgeon's Advanced Trauma Life Support Programme[®]. While the programme was designed to be used by doctors working in the emergency room of a modern hospital, the approach holds good even in the austere setting of a refugee camp or in a conflict setting. The background is that death following injury occurs in a predictable and time-dependent manner. An obstructed airway will kill before a lethal chest injury, while a lethal chest injury will kill before a fatal circulatory problem, and abnormalities should be looked for and treated in that order. Serious brain injury is only occasionally treatable by surgical intervention; the victim's condition will, however, deteriorate if constant delivery of oxygen and nutrients to the brain is not maintained. That flow depends on an unobstructed airway and effective gas exchange and circulation. Local injuries are usually not life-threatening. This recognition leads to the approach, listed herewith:

- Primary Survey: what is killing the victim?
- Resuscitation: treat what is killing the victim.
- Secondary Survey: identify all other injuries.
- Definitive Care: develop a definitive care plan.

Resuscitation includes frequent reassessment. Primary Survey and Resuscitation together are also called Initial Assessment.

In the pre-hospital or field setting the emphasis should be on Initial Assessment; Secondary Survey and Definitive Care are best conducted in a static health centre where the patient can be fully undressed and assessed in an appropriate environment.

The elements of the Primary Survey are described herewith, using the mnemonic ABCDE.

- *A*: Airway assessment, with protection of the cervical spine
- *B*: Breathing and ventilation assessment
- *C*: Circulation assessment and control of bleeding
- *D*: Dysfunction of the central nervous system
- *E*: Environment considerations and exposure (and, if appropriate, evacuation/transfer of the victim)

In the military medical services, this sequence is preceded by a "capital C" (< C >), indicating management of catastrophic (exsanguinating) bleeding. In this circumstance catastrophic haemorrhage is defined as compressible or noncompressible bleeding. The adage that tourniquets save lives is very important, and the

development of the combat application tourniquet (CAT) has had an enormous impact on compressible haemorrhage in the limbs. In an austere environment, this < C > may very well be important also for the civilian health professional.

Scope of the Initial Assessment

In all circumstances the aim of the health professional who's working in the pre-hospital environment is to get the victim in the best achievable condition to an appropriate hospital in the shortest possible time. In peacetime in an ordered society, this usually means that after a brief assessment the victim is transported to a well-equipped hospital, with resuscitation ongoing en route. This is known as "scoop and run".

When transportation times are longer (e.g. in rural areas of that same ordered society), it may be advisable to perform a more lengthy assessment and institute resuscitative measures on-site ("stay and play"). The latter is all the more to the point in an austere environment, where "scoop and run" is simply not possible, usually long distances, lack of transportation, destruction of physical infrastructure and so on. When physical danger is present, it's best to "try and get out" after a minimum of resuscitative measures, aimed at securing the airway and dealing with the haemorrhage. *Great emphasis is placed on the importance of personal protection !*

< C > Catastrophic Haemorrhage

This type of bleeding is usually immediately visible: a spurting artery or (very insidious!) a quickly spreading stain or pool of blood. Local compression often suffices to stop the bleeding; occasionally as mentioned earlier, a tourniquet is warranted. In the last couple of years, particularly in the military, haemostatic bandages (QuikClot, Hemcon, Celox) have come to the forefront.

A. Airway and Cervical Spine Protection

Always talk to the victim: if you get an effortless and coherent answer, the airway is unobstructed (and breathing, circulation and perfusion of the brain are adequate also, at that moment).

Further assessment is by "LLF": "look" for movement of the chest and signs of obstruction ("effort", tracheal tug), "listen" for abnormal sounds and "feel" for air passage.

The scope and extent of interventions will vary with skill, training and available equipment. Chin lift/jaw thrust and cleaning of the mouth are the most simple ones and are always possible; airway adjuncts such as naso- and oropharyngeal airways have their indications and risks; intubation and the surgical airway (cricothyroidotomy) require considerable skill. Refer to one of the trauma manual listed under the

Resources heading for a full description of the options. Only do what you're familiar with and have trained for (and for which the equipment is available).

If the victim is unconscious and the airway cannot be definitively secured by intubation, it is best to either leave that victim supine with somebody maintaining a chin lift or jaw thrust, or (if no additional personnel is available) put the victim in the recovery position (the adage still holds: "if an unconscious victim can look at Heaven, he'll soon be there").

The latter always raises questions about immobilising the spine. Cervical spine control should be addressed sagely. In peacetime almost every trauma victim will be immobilised with a cervical collar and a backboard. Be aware that further airway measures are very difficult when the collar is in place. When such measures are necessary, it is advisable to have someone immobilising the head manually and to remove the collar temporarily.

In an austere environment, collars and the like may not be available; then consider alternative ways of immobilisation (or put an unconscious victim in the recovery position). In the latter case, maintaining the airway takes precedence over protecting the spine. Moreover, recent experience has shown that in a victim with penetrating neck injuries, immobilisation is NOT necessary.

B. Breathing and Ventilation

There are five "intrathoracic killers" which should be systematically looked for and immediately dealt with when found. They are:

- Tension pneumothorax
- Open pneumothorax
- Massive haemothorax
- Flail chest and pulmonary contusion
- Cardiac tamponade

The first four kill by impairing gas exchange; cardiac tamponade by circulatory standstill (the latter is a "C" problem but will be discussed here).

Assessment is again by "LLF" (and in this case, percussion), after baring the neck and the anterior chest:

Look

- Distended neck veins (think of tension pneumothorax/cardiac tamponade)
- Breathing rate (below 10/min: think of brain injury; above 29/min, think of "hypoxemia")
- Excess respiratory effort (think of airway obstruction)
- Chest asymmetry (think of pneumothorax/tension pneumothorax)

Listen (can be done without a stethoscope)

- Listen for the quality of breath sounds, comparing left to right (if diminished/absent on one side, think of pneumothorax/haemothorax)

Feel (palpate; include the back!)

- The position of the trachea in the jugulum sterni (if deviated, think of tension pneumothorax on the opposite side)
- Crepitus (think of subcutaneous emphysema)
- Tenderness (think of rib fractures)

Percuss (apices and axillae)

- Resonance (air, think of pneumothorax)
- Dullness (fluid, think of haemothorax, hydrothorax)
- Equal (may differentiate cardiac tamponade from tension pneumothorax in a deeply shocked patient with engorged neck veins)

Please note: at first inspection bruises and wounds on the anterior trunk will also be noted. In a treatment facility the chest x-ray is of help.

For a full description of all possible interventions, you're referred again to one of the trauma manual listed under the Resources heading.

Next, they are mentioned for each of the "killers":

- Tension pneumothorax

In the field: needle thoracostomy

In a treatment facility: needle thoracostomy, tube thoracostomy

- Open pneumothorax

In the field: airtight dressing, taped on three sides; Asherman valve

In a treatment facility: closure (see previous discussion), operation

- Massive haemothorax

In the field: none

In a treatment facility: tube thoracostomy after inserting IV lines; occasionally thoracotomy

- Flail chest and pulmonary contusion

In the field: none

In a treatment facility: pain relief; occasionally mechanical ventilation

- Cardiac tamponade

In the field: none

In a treatment facility: ideally thoracotomy (pericardiocentesis often is ineffective)

C. Circulation and Haemorrhage Control

When the circulation no longer perfuses organs and oxygenates tissues, we consider the patient to be in shock. Shock is not a disease entity but a clinical state with many causes.

There are four groups of causes:

- Hypovolemic (loss of blood and/or fluids)
- Cardiogenic (cardiac contusion, loss of contractile strength as in myocardial infarction and congestive failure, dysrhythmia)
- Distributive (neurogenic as in high spinal injury, anaphylactic as in acute allergic reaction, septic)
- Obstructive (tension pneumothorax, cardiac tamponade, acute aortic dissection, massive pulmonary embolus)

Although most mechanisms may occur in trauma patients, the main cause of shock in this group is blood loss, resulting in hypovolemia.

The earlier (impending) shock (and its cause) is recognised, the better the results of treatment are. Treatment rests on two pillars: eliminating the cause and replenishing the volume lost.

Shock is diagnosed by “LLF”:

Look

- External blood loss
- Paleness of the skin (particularly in Caucasian individuals)
- Duration of capillary refill time (CTR: after 5 s of compressing a nail, the normal colour should return within 2 s)

Listen

- How the conscious patient reacts to being addressed (loss of consciousness, however, is a late occurrence!)
- By stethoscope for the blood pressure (decreased pressure is a late sign!)

Feel

- Temperature of the skin
- Heart rate by palpating an artery (tachycardia is a very early sign!)
- Presence/absence of pulsations in the radial artery bilaterally (absence usually means that the patient is in shock!)

The extent of blood loss can be roughly gauged by a combination of symptoms and signs, as depicted in Table 35.1 (adult values!).

Please note that the blood pressure remains unchanged until blood loss exceeds 1,500 ml.

As soon as the patient is considered to be in shock, a search for its cause should begin and measures be taken.

Catastrophic haemorrhage “C” should already have been excluded, or diagnosed and treated; likewise tension pneumothorax.

For the remainder of the search, the check list is:

- Blood on the floor (other external bleeding sites), the so-called compressible bleeding

Table 35.1 Classification of circulating volume lost

	I	II	III	IV
	<750 ml	750–1,500 ml	1,500–2,000 ml	>2,000 ml
Class	<15 % lost	15–30 % lost	30–40 % lost	>40 % lost
Heart rate	<100/min	>100–120/min	120–140/min	>140/min
Systolic BP	Normal	Normal	Decreased	Decreased/unrecordable
Pulse pressure	Normal	Narrowed	Narrowed	Very narrow/absent
Capillary refill	Normal	Prolonged	Prolonged	Prolonged/absent
Respiratory rate	14–20/min	20–30/min	>30/min	>35/min
Urine output	>30 ml/h	20–30 ml/h	5–20 ml/h	Negligible
Cerebral function	Normal/slightly anxious	Anxious/frightened/hostile	Anxious/confused	Confused/unresponsive

- Four places more (incompressible bleeding)
 - Chest (haemothorax) (see under Breathing and Ventilation)
 - Abdomen (pain on palpation and by excluding the other sites; in a treatment facility, sonography is a very effective diagnostic modality)
 - Retroperitoneum and pelvis (instability of the pelvis on gentle compression; a pelvic x-ray is of help in a treatment facility)
 - Fractures of long bones, in particular the femur (pain and abnormal movement on palpation; in a treatment facility, x-rays are useful)

Measures to eliminate the cause are:

- External blood loss
 - In the field: compression; occasionally tourniquet
 - In a treatment facility: occasionally surgery
- Haemothorax
 - In the field: none
 - In a treatment facility: tube thoracostomy after inserting IV lines; occasionally thoracotomy
- Hemoperitoneum
 - In the field: none
 - In a treatment facility: often surgery

- Retroperitoneal bleeding/pelvic fracture

In the field: immobilising the legs

In a treatment facility: compression with a “sheet”; occasionally surgery

- Fractures of long bones

In the field: splinting of the involved limbs

In a treatment facility: often surgery

Please note: the measures mentioned under “in a treatment facility” depend on your personal skills and the availability of equipment. “Never” attempt treatment you’re not familiar with!

Measures to restore the circulating volume are infusion and transfusion.

In the field, oral fluid replacement should be considered, provided the victim is conscious and not vomiting.

Ideally access to the circulation should be gained, at this moment either by a short, large-bore cannula in a peripheral vein or by the intraosseous route (adults and children). Both are feasible in the field. Central venous lines carry considerable risks and should be reserved for usage in a treatment facility (if ever). The intrarectal route is not advised, particularly not when abdominal injury may be present.

Infusion should begin with a crystalloid solution (Ringer’s or normal saline (ideally at body temperature)) and be followed up (when available) with blood (which should be ordered early). Hypertonic saline, dextrans and starches are still under investigation and haven’t (yet) replaced isotonic crystalloids. The same is valid for blood substitutes such as perfluorocarbons and bovine haemoglobin solutions. Recent experiences have shown that blood products should be administered as far forward as possible.

When to start an infusion obviously depends on where the victim is, on the availability of fluids (remember: in the field every unit will have to be carried on someone’s back!).

In the field, the end point of IV therapy should NOT be a normal blood pressure: 90 mmHg is entirely acceptable, and possibly, as long as a victim remains coherent, “any” blood pressure will do. Striving for normal values may “pop the clot”.

In a treatment facility, IV therapy should be used sagely: if vital signs normalise after 1 bolus of 2 l of Ringer’s solution, the victim will probably NOT need surgery for bleeding control. If, however, there’s no or only temporary improvement, the victim should be expeditiously transferred to surgery in order to stop the (often intracavitary or retroperitoneal) blood loss. It’s “no use” to go on giving large amounts of fluids; that would be a waste of resources and the result is “yo-yo resuscitation”, dilution of the circulating volume and loss of clotting factors. The resulting acidosis and clotting abnormalities, together with hypothermia, are known as the “terrible triangle of death”. As much as possible, the victim should therefore be protected from hypothermia, beginning in the field, even in a hot climate.

Recent experiences with blood transfusion in trauma victims have led to much debate on what blood products (packed red blood cells, fresh frozen plasma and

platelets) to administer and how much. The transfusion protocol at Camp Bastion in Afghanistan which is renowned now as being the best and busiest trauma unit in the world has got a 1:1 policy with one unit of packed cells to one unit of fresh frozen plasma for those that require activation of the major transfusion protocol. Platelet transfusion depends on rotational thromboelastography (ROTEM) which measures the rapid detection of plasma- and platelet-related haemostatic abnormalities. However, that is in a situation whereby resources are almost unlimited; in an austere environment, it is advised therefore to follow “local protocols”, also depending on what is and what is not available.

When the need for surgical control becomes apparent, steps should immediately be taken to transfer the victim to a facility where that surgery is possible. If no evacuation is possible, common sense and realism should prevail: some of these patients will die.

This group of patients is NOT abandoned: there are entitled to care and pain relief.

D. Dysfunction of the Central Nervous System

In the field setting, this component can be assessed quickly. There are three tasks:

- Assessment of the level of consciousness using “AVPU”.
- Assessment of the size and reactivity of the pupils.
- Assessment of “lateralisation”: looking for differences in sensibility and motor function of the limbs, comparing the left to the right side and the upper to the lower limbs. This can only be done in conscious victims.

The elements of AVPU are:

A: Alert and orientated to the surroundings and the eyes are opened spontaneously

V: Responds to Voice

P: Responds to a *Painful* stimulus (by applying pressure an eyebrow)

U: *Unresponsive* to any stimulus

The pupils are examined to assess equality and to check their response to light.

In the field, these tests can (and should) be performed only cursorily.

In a treatment facility, the same tests are performed but more elaborately. To assess the level of consciousness usually the Glasgow Coma Scale is used.

If any abnormality of the central nervous system is detected, there is very little that can be done in a pre-hospital, hostile environment. Pending evacuation/transfer, secondary brain injury due to hypoxia should be prevented, as described under *Airway*.

At the completion of the “D” assessment, the victim’s back should be inspected. As a “log roll” is required, this is formally done in a treatment facility only. In the field, health-care professionals should swipe their hands under the body (e.g. during the “B” assessment) to see whether there’s blood on the gloves.

E: Environment, Exposure and (if Appropriate) Evacuation/Transfer

The casualty should be undressed (not in the field!), and particular attention should be paid to the prevention of hypothermia. Evacuation has been discussed under the heading “Scope of the Initial Assessment.”

Reassessment

During the Initial Assessment, the victim should be regularly reassessed, to see how the situation is developing. If a victim suddenly deteriorates, the health professional should return to “A”, and assess again.

During Primary Survey and Resuscitation, a brief history should be obtained. Essentials are covered by the mnemonic AMPLE:

- A: Allergies
- M: Medications
- P: Previous illnesses and operations
- L: Last meal
- E: Event

The victim’s condition at the end of the Initial Assessment, the injuries present and the local situation (level of danger, available resources, possibility of evacuation and distance to the next treatment facility) “decide” what happens next. This critical decision making may precede the Secondary Survey.

A patient who has no life-threatening lesion, or one who successfully resuscitates, may be moved if that is possible. Others with more severe injury who fail to respond pose unique problems. If evacuation is possible, then this must be achieved safely and promptly. Where no evacuation is, possible, reassurance and optimal nursing care, including pain control, is the minimum. Never move an unstable, dying patient when no destination is known. Have the moral courage to hold such people and care for them until they die.

Secondary Survey

A secondary survey is a full, head-to-toe assessment of the victim and takes place following a successful initial assessment. Ideally the victim is fully undressed, which implies a stable, warm, safe environment.

In the field, the secondary survey can only be performed cursorily; the environment is often unstable, and undressing a victim there is for many reasons contraindicated.

In a treatment facility, the question always is whether it’s better to transfer the victim (e.g. to surgery or to a facility with more resources). In those cases the secondary survey will have to be postponed until the victim is fully stable.

Additional diagnostic modalities (imaging, laboratory tests) can only be done in an appropriately equipped treatment facility.

Definitive Care

This requires careful planning and can obviously only be done in a treatment facility with appropriate resources.

Non-Trauma

Multiple Patients

Acute non-trauma patients may present individually or in large(r) numbers. In the latter case it will be necessary to define which patient will be treated first. This is usually done by vital signs; triage is less “formal” than in trauma victims, however. Occasionally, when resources are limited, it will be unavoidable to decide that certain patients are “beyond help”. Such decisions are among the most difficult in medical practice.

The Individual Patient

As in trauma victims, threats to life are not always immediately obvious; for that reason, a systematic approach is also advocated for this category:

1. Assessing the general condition of the victim and a quick search for obvious life threats (abnormalities of airway, breathing, circulation and consciousness)
2. Elimination or alleviation of those threats and reassessment
3. Finding the underlying diagnosis (not immediately or not at all life-threatening)
4. Definitive care

This approach, which is very much like the ATLS© system for trauma victims was first described and published as MedicALS©. It consists of:

- Primary Assessment: what is killing the victim?
- Resuscitation: treat what is killing the victim.
- Secondary Assessment: make the underlying diagnosis.
- Definitive Care: develop a definitive care plan.

Resuscitation includes frequent reassessment. Primary Assessment and Resuscitation together are also called Initial Assessment. *Great emphasis is placed on the importance of personal protection!*

In the pre-hospital or field setting the emphasis should be on Initial Assessment; Secondary Assessment and Definitive Care are best conducted in a static health centre where the patient can be fully undressed and assessed in an appropriate environment.

The elements of the *Primary Assessment* are described herewith, using the mnemonic ABCDE.

- *A*: Airway, with protection of the cervical spine
- *B*: Breathing
- *C*: Circulation
- *D*: Dysfunction of the central nervous system
- *E*: Environment, exposure and (if appropriate) evacuation/transfer

Obviously, physical examination of this category of patients is almost identical to that of trauma victims (using Look, Listen, Feel) and will not be enumerated in the discussion to come, unless there are differences. However, conditions to be considered are quite different and will be listed with (additional) symptoms and signs under the separate headings, as will be the measures to be taken. The conditions mentioned in this text cannot be all-inclusive; they cover most “common diagnoses”. Which of the listed measures CAN be taken depends much on available resources, local protocols and the need to evacuate.

A. Airway and Cervical Spine Protection

Examination: as in trauma victims

Abnormalities to be considered:

- Swelling of tongue and/or soft tissues
- Laryngospasm
- Aspiration

Treatment: as in trauma victims

Monitoring:

- Frequent re-examination
- If available: pulse oximetry, capnography

B. Breathing

Examination: as in trauma victims

Abnormalities to be considered:

Bronchospasm	Expiratory stridor
Exacerbation of COPD	Ronchi, fever
Infected emphysema	Prolonged expiration, fever
Tension pneumothorax	Asymmetrical auscultation, percussion movement, CVP↑, deviated trachea
Pulmonary oedema	Basal crepitus

Treatment:

Bronchospasm	Bronchodilators
Exacerbation of COPD	Bronchodilators, antibiotics
Infected emphysema	Bronchodilators, antibiotics
Tension pneumothorax	Decompression
Pulmonary oedema	See under Circulation

Monitoring:

- Frequent re-examination
- If available: pulse oximetry

C. Circulation

Examination: as in trauma victims, plus

- Heart
 - Murmurs
 - 3rd sound
 - Size
 - Pulsations, left<>right
 - Capillary refill time (CRT) on chest
 - 12-lead EKG

Abnormalities to be considered:

Pulmonary oedema	(Crepitus)
Myocardial infarction	(ST elevation, lab tests)
Heart failure	CVD↑
Hypertension	BP↑
Valvular disease	Murmur
Cardiomyopathy	
Endocarditis	Fever
Chronic tamponade	Muffled heart sounds
Shock	HR↑, BP↓, diuresis↓
Hypovolemia	
Blood	Visible, sonography
Fluid	Vomiting, diarrhoea, medication
Note: Addisonian crisis	
Pump failure	
Myocardial infarction	Previously discussed
Heart failure	Previously discussed
Valvular disease	Previously discussed
Endocarditis	Previously discussed
Dysrhythmia	Palpitations

Vasodilatation	
Anaphylaxis	(rash)
Sepsis/SIRS (systemic inflammatory response syndrome)/toxic	Fever
Neurogenic	Trauma
Obstruction	
Pulmonary embolism	Pain, dyspnea
Dissection	Pain, asymmetrical pulsations
Tension pneumothorax	Previously discussed
Acute tamponade	CVP↑
Note: severe asthma	
Note: pregnancy	

Treatment:

Myocardial infarction	MONA (morphine, oxygen, nitrate, aspirin) Thrombolysis, revascularisation
Heart failure	Inotropics, diuretics
Hypertension	Vasodilatation
Valvular disease	Interventional, operative
Cardiomyopathy	
Endocarditis	Antibiotics
Cardiac tamponade	Decompression
Shock	
Hypovolemia	
Blood	Stop the bleeding Transfusion
Fluid	Replacement
Pump failure	
Myocardial infarction	Previously discussed
Heart failure	Previously discussed
Valvular disease	Previously discussed
Endocarditis	Previously discussed
Dysrhythmia	Cardioversion Antiarrhythmics
Vasodilatation	
Anaphylaxis	Fluids Antihistaminics Vasopressors Corticosteroids
Sepsis	Cultures Fluids Antibiotics Vasopressors Low-dose steroids
Neurogenic	Fluids Vasopressors Atropine

Obstruction	
Embolus	Fluids
	Inotropics
	Anticoagulants
	Thrombolysis
Dissection	Antihypertensives
	Surgery
Tension pneumothorax	Decompression
Acute tamponade	Decompression
	Surgery
Severe asthma	Bronchodilators
Pregnancy	Left lateral tilt

Monitoring:

- Heart rate
- Blood pressure
- CVP
- EKG

D. Dysfunction of the Central Nervous System

Examination: as in trauma victims, plus:

- Check for meningism
- Glucose test

Abnormalities to be considered:

- Intoxication
- Metabolic
- Intracranial bleeding
- Stroke
- Convulsions

Treatment:

Intoxication	Supportive care
	Antidote
Hypoglycaemia	Glucose
Hyperglycaemia	Fluids
	Insulin
Intracranial bleeding	CT
	Surgery
Stroke	CT
	Thrombolysis
Convulsions	Benzodiazepine
	Epanutin

Monitoring:

- Glasgow Coma Scale
- Pupils
- Glucose

E: Environment, Exposure and (if Appropriate) Evacuation/Transfer

Examination:

- Inspection for rashes
- Core temperature

Abnormalities to be considered:

- Meningococcal septicaemia
- Infections
- Hyperthermia
- Hypothermia

Treatment:

Meningococcal septicaemia	Culture Antibiotics
Infections	Identification of focus Culture Antibiotics
Hyperthermia	Cooling Medication
Hypothermia	Warming

During the Primary Assessment, a number of parameters is measured. Generally speaking, a patient who shows one or more of the findings mentioned next is or may be in trouble:

Airway

- Stridor

Breathing

- RR > 30
- RR < 10
- Increased effort (retraction, accessory muscles, tracheal tug)
- Asymmetry
- SpO₂ < 98
- Abnormal breathing pattern

Circulation

- HR > 100
- HR < 50
- Central <> peripheral pulses
- CRT > 2 s
- BP < 90 mmHg
- BP > 160 mmHg
- Pulse pressure < 40 mmHg
- Urinary output < 1 ml/kg/h

Dysfunction of the central nervous system

- Decreased conscious level
- Inequality/abnormal reaction of the pupils
- Lateralisation

Reassessment

During the Initial Assessment, the patient should be regularly reassessed, to see how the situation is developing. If a patient suddenly deteriorates, the health professional should return to “A”, and assess again.

The patient’s condition at the end of the Initial Assessment, the abnormalities found and the local situation (level of danger, available resources, possibility of evacuation and distance to the next treatment facility) “decide” what happens next. This critical decision making may precede the Secondary Survey.

A patient who is not immediately life-threatening lesion, or one who successfully resuscitates, may be moved if that is possible. Others, who fail to respond, pose unique problems. If evacuation is possible, then this must be achieved safely and promptly. Where no evacuation is possible, reassurance and optimal nursing care, including pain control, is the minimum. Never move an unstable, dying patient when no destination is known. Have the moral courage to hold such people and care for them until they die.

Secondary Assessment

A secondary assessment is a full, head-to-toe examination of the patient and takes place following a successful initial assessment. Ideally the patient is fully undressed, which implies a stable, warm, safe environment.

Generally speaking, in non-trauma patients the Secondary Assessment is performed before transfer is considered.

Essential part of the Secondary Assessment is a detailed history, for which the mnemonic PHRASED can be used:

- P: Presenting problem
- H: History of problem
- R: Relevant medical and surgical history
- A: Allergies
- S: Systems review
- E: Essential family/social history
- D: Drugs (medical and illegal)

During the Secondary Assessment, a definitive diagnosis should be reached, if possible. Here it is useful to start from the most important complaint and/or the most important findings. Diagnostic tests play a supporting role, for which transfer may be occasionally required.

In the following text, differential diagnoses are given for a number of complaints. Obviously such differential diagnoses are not all-inclusive; they may have to be adapted, depending on what part of the world they are used in.

Most of these diagnoses are not directly life-threatening. Some, however, are, without as yet causing abnormal vital signs. In those instances they will be clearly indicated.

Dyspnea

Directly life-threatening:

- Obstruction
- Severe asthma
- “Acute or chronic”
- Pulmonary oedema
- Tension pneumothorax
- Heart failure
- Hypovolaemia
- Pulmonary embolism
- Tamponade

Not directly life-threatening:

- Asthma
- Pulmonary oedema
- Pneumothorax
- Pneumonia
- Pleural exudate
- Pulmonary embolism
- Acidosis (diabetes/salicylate)

Chest Pain

Directly life-threatening:

- Myocardial infarction
- Pulmonary embolism
- Aortic dissection
- Unstable angina
- New-onset angina

Not directly life-threatening:

- Pneumothorax
- Pericarditis
- Pleuritis
- Oesophageal abnormalities
- Cervical spondylosis
- Herpes

Diminished Conscious Level

Not directly life-threatening

Without meningism:

- Drugs
- Hypoxia
- Hypoglycaemia
- Ketoacidosis
- Cardiac failure
- Respiratory failure
- Renal failure
- Liver failure
- Hyponatraemia
- Hypernatraemia
- Sepsis
- CO intoxication
- Alcohol
- Wernicke's encephalopathy

With meningism:

- Bacterial meningitis
- Encephalitis
- Subarachnoid bleeding (SAB)
- Intracerebral bleeding
- Cerebral malaria

Collapse

Not directly life-threatening

Permanent:

- Bleeding
 - Intracerebral
 - Subarachnoid
- Vascular occlusion

Transient:

- TIA
- Syncope
 - Cardiac
 - Ischaemia
 - Aortic stenosis
 - Cardiomyopathy
 - Pulmonary hypertension
 - Pulmonary embolism
 - (Myxoma)
 - Dysrhythmia
 - Reflex
 - Vagal
 - Posture
 - Vascular
 - Vertebrobasilar
- Epilepsy (status)
- Metabolic
 - Hypoglycaemia
 - Addisonian crisis
 - Pheochromocytoma
 - Hypoxemia
 - Insulinoma
 - “Dumping”
 - Hyperventilation
- Medication
 - Beta-blockers
 - Ca-entry blockers
 - Amiodarone

- Diuretics
- Antihypertensives
- Antidepressants

Headache

Not directly life-threatening

With abnormal GCS and or focal signs:

- Stroke
- SAB
- Chronic subdural hematoma
- Meningitis
- Encephalitis
- Abscess
- Neoplasm

With papillary oedema, without focal signs:

- Hypertension
- Mass lesions
- Hydrocephalus
- Cerebral oedema
- Venous sinus thrombosis

With fever, without focal signs:

- Meningitis, encephalitis
- SAB
- Sinusitis
- Malaria
- Typhus

With extracranial signs:

- Sinusitis
- Cervical spondylosis
- Giant cell arteritis
- Acute glaucoma

Others:

- Cluster
- Tension
- Migraine
- Intoxication (drugs, CO)

Red and Hot/Pale and Cold Limbs

Not directly life-threatening:

- Venous thrombosis
- Erysipelas/cellulitis
- Necrotizing fasciitis/gas gangrene
- Ruptured muscle
- Ruptured Baker's cyst
- Phlebitis
- Arterial occlusion
- Arterial embolism
- Arterial thrombosis
- Compartment syndrome

Abdominal Pain

Directly life-threatening:

- Peritonitis
- Intestinal obstruction
- Obstruction urinary/biliary tract, *with fever*
- Bleeding, *with shock*

Intraperitoneal

Retroperitoneal

Intraluminal

- Acute pancreatitis
- Mesenteric thrombosis
- Extrauterine pregnancy

Not directly life-threatening:

- Infiltrate
- Obstruction urinary/biliary tract, *without fever*
- Testicular torsion
- Epididymo-orchitis
- Haematoma abdominal wall
- Incarcerated hernia
- Ketoacidosis
- Uraemia
- Intoxication
- Porphyria
- Sickle cell crisis
- Angina/myocardial infarction/pulmonary embolism
- Pneumonia

Painful Joints

Not directly life-threatening:

Mono (“single”)

- Trauma
- Infection
- Neoplasm
- Gout
- Foreign body
- Haemarthrosis (haemophilia)

Poly (“several”)

- Gonorrhoea
- Endocrine
- Viral
- Endocarditis
- Acute rheumatic fever
- Allergy
- Lyme disease

Others

- Arthrosis
- Rheumatoid arthritis, spondylarthrosis
- Psoriasis
- Bechterew
- Reiter
- Connective tissue disease

Rash

Directly life-threatening:

- Erythrodermia/exfoliation (often with vesicles)
 - Meningococcal septicaemia
 - Gonococcal septicaemia
 - Toxic epidermal necrolysis (TEN)
 - Toxic shock syndrome
 - Staphylococcal scalded skin
- Urticaria/angioedema
 - Anaphylaxis
- Purpura (with thrombocytopenia)
 - DIC

- Erythema
 - Necrotizing fasciitis
 - Gas gangrene

Not directly life-threatening:

- Erythrodermia/exfoliation
 - Psoriasis
 - Seborrhoeic dermatitis
 - Contact dermatitis
 - Drugs
 - Lymphoma
- Purpura (without thrombocytopenia)
 - Corticosteroids
 - Infection
 - Henoch-Schönlein
 - Drugs
 - Paraneoplastic (often with vesicles)
- Purpura (with thrombocytopenia)
 - SLE
 - Hypersplenism
 - Lymphoma
- Erythema
 - Erysipelas

Vesicles

Not directly life-threatening:

- Painless
 - Infection
 - Staphylococci
 - Scabies
 - Insects
 - Herpes
 - Eczema
 - Autoimmune
 - Pemphigus
 - Dermatitis herpetiformis
 - Parapemphigus/parapemphigus gestationis

- Erythema multiforme
- Epidermolysis bullosa
- Painful
 - Herpes (dermatomes)
 - Stevens Johnson (generalised)

Fever

Fever is a non-specific phenomenon. Its cause can have a very acute presentation; on the other hand, its cause may only be found after careful examinations and test, in particular when there are few other symptoms and signs:

- Infection (also as a complication of interventions)
- Non-infectious inflammation
- Medication
- Intoxication
- Trauma (in particular brain injury and intracranial bleeding)
- Environment (e.g. hyperthermia)
- Dehydration
- Endocrine abnormalities (e.g. thyreotoxicosis)
- Granulomatous disease (e.g. sarcoïdosis, Wegener's disease)
- Malignancies
- Allergies and autoimmune diseases (e.g. TENS)
- Genetic abnormalities (e.g. sickle cell anaemia)

Definitive Care

This should be done in a facility with the required resources. Transfer may be necessary.

For details the reader is referred to the appropriate textbooks.

Further Resources

American College of Surgeons. ATLS manual. 9th ed. Chicago 2012.

Advanced Life Support Group. MedicALS manual. 2nd ed. Manchester 2011.

Chapter 36

Acute Problems and Emergency Surgery: Ballistics and Blast

Ralph J. de Wit and David M. Nott

Abstract The authors of this chapter include specialists, many of whom have extensive deployment experience. The target group of this chapter, however, is not their fellow specialists, but the “junior” doctors, trying to help them find their way in the difficulties posed by an “adverse” environment. That junior doctor will be confronted by all imaginable ailments and injuries and should be a true generalist. As we’re all aware, even in medical school nowadays, there’s a tendency to make students choose the direction of their future work at an ever earlier stage, the opposite of what’s needed for a generalist.

Keywords Triage • Trauma and medical emergencies • Ballistic and blast injury • Infectious diseases • Climatic influences • Bites and stings • Maxillofacial problems • Head and spinal cord injuries • Abdominal complaints • Non-traumatic surgical emergencies • Soft tissues and skeleton • Surgery in the tropics • Anaesthesia and analgesia • Hostile environments • Disaster environments • Conflict environments • Catastrophe environments

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Objective

- This part is concerned with unique injury mechanisms – ballistics and blast. Although not unique to the hostile environment, most aid workers will not have encountered injuries of this nature. This part serves to introduce and elucidate the topic.

Ballistic Injuries

Ballistic wounds are produced by penetrating missiles. These cause injury by giving up their energy to the body, which results in laceration, contusion, crushing and disruption of tissue, either by direct energy transfer or by cavitation and shock wave. Additional injury often also arises from heavily contamination that accompanies these kinds of wounds.

Mechanism of Injury**Energy Transfer**

When the body is struck by a missile, the damage inflicted depends upon the characteristics of the missile and the tissue through which it passes. The amount of damage caused is related to the amount of energy that the missile transfers to the tissues. Injuries can broadly be classified into low-energy-transfer and high-energy-transfer injuries since kinetic energy equals $\frac{1}{2}$ times mass multiplied by the square of the velocity of the object. The greatest amount of tissue damage is caused by high-energy transfer, which is related to the retardation of the missile and where the velocity of the missile is a more important factor than the size (mass).

The retardation of the missile is an important factor in the creation of the wound, for the more rapidly a missile is retarded, the greater will be the energy release and consequent tissue damage. Retardation depends upon missile factors such as shape, stability and composition since this determines the way the missile will pass through the tissues but also depends on tissue factors itself such as density and elasticity.

Fragments and Bullets

Penetrating missiles can be classified into two major groups, fragments and bullets. Fragments are the most common wounding agents in war, accounting for between 44 and 92 % of all surgical cases, depending on the location and type of conflict situation. Antipersonnel fragments from military munitions tend to be small and numerous and are fairly regular in shape to ensure adequate range and consistent

performance. Most military antipersonnel fragments have poor penetrating power and limited effective range. The energy available for wounding by the fragments is low, and so a low-energy-transfer wound is created. Still by direct force and blast, military munitions can cause detrimental injury. Current trend worldwide is to prohibit the use of antipersonnel mines, but around the world in numerous (former) conflict areas these munitions will remain a burden for decades to go.

In civilian practice, bullets are the predominant penetrating missiles although fragmentation injuries can occur following terrorist bombings. The bomb can be designed to contain all kind of fragments, or the blast produces fragments of irregular shape and size by disrupting the surrounding environment. Bullets in general have a greater range and penetrating power than fragments. Handgun bullets tend to have a lower velocity than rifle bullets, but both can produce a spectrum of high-energy-transfer and low-energy-transfer wounds, depending on the amount of energy transferred to the tissues (size of the bullet, distance of shooting). Keep in mind to “treat the wound, not the weapon”.

Wound Track

When a projectile hits the body, it produces a wound track. As already stated, the nature of the wound track will depend upon the amount of energy transfer. Low-energy-transfer wounds are characterised by the injury being confined to the wound track. Injury results from a simple cutting mechanism, and the severity will be determined by the nature of the tissue penetrated, i.e. bone, muscle, nerve or vascular structure.

Cavitation

High-energy-transfer wounds are characterised by the formation of a temporary wound cavity, as well as by cutting and laceration in the path of the missile. This phenomenon is called (temporary) *cavitation* and occurs because the tissues surrounding the missile track are accelerated away. The velocity and momentum imparted causes tissues to continue to move after the passage of the missile and create a cavity that is 10–40 times the diameter of the missile. Due to the elasticity of the tissue, this cavity expands and contracts several times. These contractions are also very forceful and also contribute significant to the amount of damage to the adjacent tissues. It is this cavitation effect which leads to the devastating injuries seen in high-energy-transfer wounds. At the end a permanent cavitation remains.

Indirect Injuries

As the effects of a missile are not confined to the missile track, indirect injuries can occur. For example, the spinal cord may be involved when the wound track passes

close to the vertebral column by the accompanying shock wave, or a long bone may fracture in a limb even if it is not hit by the missile itself. Also pieces of a direct hit bone may spread through the body and act as an additional fragment passing through. Depending on the type of bullet used, a single missile can turn into a multi-fragmental assault by fragmentation on impact.

Entry and Exit Wound Size

The sizes of the missile entry and exit holes are governed by the size and shape of the penetrating missile and the degree of energy transfer at the site. Although a large tissue defect is the result of large energy transfers, the corollary that small entry and exit wounds imply low-energy transfer is not true, as high-energy transfer may have occurred internally. This is particularly true of long wound tracks, such as those occurring in abdominal wounds. Significant injury may have occurred within abdominal cavity due to a large amount of energy dissipation, although the projectile only retains a small amount of energy at the end of its track and so produces a small exit hole or may even remain lodged within the tissues.

Wound Contamination

Pattern of Spread

Contaminants can enter the wound track from both entry and exit wounds. Low-energy-transfer wounds have contamination which is limited to the wound track itself, whereas high-energy-transfer wounds have contamination spread throughout the boundaries of the temporary cavity. Contaminants include skin bacteria from the normal skin flora, pieces of clothing, fragments of the projectile and material from the external environment (e.g. mud and dirt). Especially at the entry side of the missile tract (permanent cavitation) this is true because in its path a short-term high vacuum follows the missile.

Bacteria

Clostridium welchii causes gas gangrene and has a rapid onset which is quickly fatal. *Staphylococcus aureus* and *Streptococcus pyogenes* infections develop in the first 3 days, followed by gram-negative bacilli infections (e.g. *Pseudomonas aeruginosa*, *Escherichia coli*).

See also the paragraph on “[Surgical Infections](#)” in Chapter 43.

Principles of Treatment of Ballistic Injuries

Basic Principles

Staged Surgery

The surgical treatment of a ballistic wound is a two-stage operation. The first part is concerned with saving the life and when possible the limb. Further concern is the prevention of serious sepsis by primary wound excision but only when the condition of the patient allows for such surgical management. In unstable patients, surgery should only address immediately life-threatening injuries. Only after stabilisation (intensive care unit when available), wound excision should be performed a few hours or 1 day later. The second stage is the closure of the wound, which is carried out 3 or 4 days later. Intravenous antibiotic treatment should start upon arrival in the medical facility.

Timing of Surgery

All wounds are contaminated by a mixture of organisms. Infection remains latent and superficial for about 6 h, after which time it becomes established and invasive. Therefore, keeping in mind the necessity of stable patient condition, surgery should be carried out as soon as possible after wounding.

Resuscitation

Patients should receive adequate fluid resuscitation before surgery, although surgery maybe part of the resuscitation process.

Debridement

The wound should be thoroughly debrided. There should be generous surgical access, extensive wound debridement with decompressive fasciotomy for limb wounds, control of haemorrhage, excision of devitalised tissue and debris and dressing of the wound opening in preparation for delayed primary closure at 3–4 days or more definitive surgery. When in doubt about the vitality of the injured tissues or when vital structures are tried to be spared, another approach might be to repeat the surgical procedure after 24 h.

It may be necessary to excise some viable soft tissue when there is extensive soft tissue contamination.

Antibiotics

Antibiotics are only an adjunct to, and not a replacement for, surgery. They should be used early in the treatment for maximum effect and should be discontinued as quickly as possible (5–7 days) to prevent the emergence of resistant strains of bacteria. Broad-spectrum antibiotics should be used according to local or regional protocol. When available, bacterial cultures may guide treatment in arising infections.

Dressings

Once dressed, wounds should be daily inspected, as appropriate in the operating theatre or a special dressing area. Adequate analgesia must be provided to the patient.

Blast Injuries

An explosive is a substance that undergoes chemical decomposition into gaseous products at high pressure and temperature.

Physics

Blast Shock Wave

The explosive substance, when detonated, is rapidly converted into large volume gas, which results in the formation a blast shock wave. The blast shock wave rapidly expands as a sphere of hot gases with an instantaneous rise to peak pressure (the overpressure) that travels at supersonic speed. The overpressure falls as the speed of the shock wave declines, ending as a phase of negative pressure. This change in pressure results in blast winds, which blow alternately away from, and then back to the epicentre of the explosion. Blast waves may be reflected by buildings or other fixed structures, causing complex interactions of pressure changes. Additional injuries are caused by high-speed fragments from the explosive device itself or from destructed surrounding structures. Blast wind and heat following an explosion (and/or fire) may add to the insult. Injuries following blast are traditionally divided into primary, secondary and tertiary types, although a victim may exhibit components of all three.

Injuries Due to Blast

Primary

The overpressure associated with the shock or blast wave is responsible for the primary blast injuries. The most vulnerable sites are the air-containing organs such as the ear, lungs and bowel; also some solid viscera like liver and spleen are susceptible to injury.

Ear

The ear is the most sensitive organ, with rupture occurring at modest pressures. Blast damage may result in tympanic membrane rupture, disruption of the ossicles and inner ear damage. The usual symptoms are tinnitus and deafness. The orientation of the ear relative to the shock wave is important in determining whether ear damage will occur. When approaching a victim of a blast assault, one should keep this injury in mind; the person may not respond as expected and the diagnostic process may be misdirected.

Blast Lung

Lung contusion (blast lung) is rare and occurs in less than 10 % of survivors. Damage occurs at the alveolar membrane, resulting in haemorrhagic contamination of the alveoli and pulmonary oedema. Although usually mild, it may take the form of rapidly progressive respiratory distress syndrome. High-pressure artificial ventilation may be necessary.

Bowel Injury

Bowel injury is rarely a cause of clinically apparent injury when the blast occurs in air but is an important mechanism of injury in underwater blast. The most usual injury is haemorrhage into the bowel wall, but there may also be visceral disruption. Initial signs of intra-abdominal damage may be absent so with this type of injury a period of observation is warranted.

Sudden Death

Sudden death may occur with no apparent evidence of external injury. This is believed to be due to occult cerebral or cardiac injury (coronary embolism) although fatal dysrhythmias have also been suggested.

Secondary

Fragment Injuries

Secondary blast injury is caused by the impact of missiles from the explosive device or from other debris generated and propelled by the explosion. There are primary fragments from the explosive device itself and secondary fragments from surrounding objects. Casualties will have multiple penetrating wounds, most of which will be relatively superficial; widespread bruises; abrasions and lacerations; and severe bacterial contamination of wounds. In fatalities the principle cause of death is from head injury arising from penetrating missiles and blunt impacts. Thoracic and abdominal wounds account for the majority of the remainder, and the pattern can extend from multiple very high-energy-transfer wounds, to injury in a vital organ from a small, low-energy-transfer projectile with good penetrating power. In modern combat situations, military personnel are often equipped with protective garment leading to a reduction of lethal injury to head and torso. Main cause of death in this situation is severe haemorrhage from injured extremities. First aid and life-saving procedure, especially under hostile fire, is the application of a tourniquet.

Tertiary

Blast Wind

Tertiary blast injuries are caused by the blast wind. Victims may be thrown through the air, sustaining impact injuries particularly to solid organs. Such injuries have been estimated to occur in 25 % of the victims in a confined space. Traumatic amputation can occur as parts of the body are torn off, and long-bone fractures and head injuries can occur. The bodies of victims very close to the explosion may be completely disrupted. Traumatic amputation of limbs by blast occurs only very close to explosions.

Antipersonnel Mines

The most common explosive wounds of limbs in modern conflicts are those inflicted by antipersonnel mines, which cause a typical pattern of injury. There is traumatic amputation or disruption of the foot with mud, grass and fragments of the mine, shoe and foot being driven upwards into the patient's genitals, buttocks and arms. The other leg is normally severely injured. Massive contamination occurs

throughout the limb even though only the foot has been amputated. Similarly, if a hand is traumatically amputated, tissue damage extends beyond the forearm, especially along tendon sheaths.

Crush Injuries

Tertiary injuries may also result from building collapse. Crush injuries can result from falling masonry. In prolonged entrapment, amputation at the scene may very occasionally be required. In case of prolonged entrapment of an extremity with vascular compromise, a tourniquet should be applied when trying to free the victim after more than 2 h. of entrapment. With reperfusion of the extremity dangerous amounts of potassium, lactate and other toxic substances may enter the systemic circulation (Crush syndrome).

Burns

Thermal injury may result from exposure to the fireball. These are usually flash burns affecting the exposed parts of the body. They are mostly superficial, but airway damage and oedema may occur. If the interior of a building ignites, flame burns may also occur. An additional hazard in confined spaces is inhalation of hot air and/or smoke and toxic gases.

Psychological Problems

Approximately 40 % of those involved in a bomb incident will develop psychological sequelae. As well as the victims of the bombing, health care workers will also be psychologically traumatised, but this appears to be less troublesome amongst trained rescue personnel, especially if their actions had a beneficial result.

Treatment of Blast Injuries

Note: when treating victims at the scene of an explosive (or other) incident, make sure that medical personnel, mostly untrained to this type of situation, can safely approach. First aid should be withheld when there is serious risk of injury to the people helping since this will aggravate the situation multi fold.

Non-Limb Injuries

All those suspected of having been exposed to a significant blast effect should be observed for 48 h. Patients with no injury other than a ruptured eardrum should

considered to have been exposed to a significant blast effect and should be observed accordingly.

Blast Lung

Blast lung will usually occur within 6–12 h but may take up to 48 h to develop, and so the patient needs careful observation. Chest X-rays, if available, will reveal bilateral diffuse shadowing; early presentation (at admission) of these infiltrates suggests serious injury and rapid referral to a health care facility with artificial ventilation equipment is warranted. There will be hypoxia and hypercapnia on blood gas analysis.

There is a risk of bilateral pneumothorax, and so consideration should be given to the insertion of prophylactic bilateral chest drains, certainly when there is an indication (pulmonary support, neurological deficit) to intubate the patient. Vigorous chest physiotherapy is required during the severe phase of blast lung. The role of corticosteroids remains controversial. Nebulisation of mucolytic and bronchodilational medication may be supportive.

Resuscitation should be with colloids or blood. Crystalloids may exacerbate pulmonary oedema as will over-infusion of fluids.

Tympanic Perforations

The majority of uncomplicated tympanic perforations will recover with conservative management.

Abdominal Injuries

Abdominal injuries may present as mild abdominal pain due to multiple small haemorrhages. Conservative treatment is appropriate, although should the patient develop signs of peritonitis, significant gastrointestinal haemorrhage or radiographic evidence of free gas under the diaphragm (where X-ray facilities are available), a laparotomy should be performed. When available, abdominal tap procedure, sonography or CT scan can aid in the diagnostic work-up for abdominal injuries. This additional information can provide safer guidance for operative or conservative treatment. Timely referral to a more appropriate health care facility should be considered in these situations.

Limb Injuries

Survivors with limb wounds from blast alone are amongst the most severely injured patients. The amputated limbs have been torn away from the torso and nerves, blood

vessels and tendons are often avulsed at a proximal level. After resuscitation, in hemodynamically stable patients, surgery is confined to wound toilet with extensive debridement of dead and possibly infected tissue. There will be multiple fragment wounds which will also need debriding. *Wounds are initially to be left open. (Too) Early closure is a guaranty for disaster.*

Acknowledgements The editors and authors would like to acknowledge that this subchapter also reflects the work of our departed colleague, David G. Burris.

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Chapter 37

Acute Problems and Emergency Surgery: Tropical Diseases

Pieter-Paul A.M. van Thiel and Adriaan P.C.C. Hopperus Buma

Abstract The authors of this chapter include specialists, many of whom have extensive deployment experience. The target group of this chapter, however, is not their fellow specialists, but the “junior” doctors, trying to help them find their way in the difficulties posed by an “adverse” environment. That junior doctor will be confronted by all imaginable ailments and injuries and should be a true generalist. As we’re all aware, even in medical school nowadays, there’s a tendency to make students choose the direction of their future work at an ever earlier stage, the opposite of what’s needed for a generalist.

Keywords Triage • Trauma and medical emergencies • Ballistic and blast injury • Infectious diseases • Climatic influences • Bites and stings • Maxillofacial problems • Head and spinal cord injuries • Abdominal complaints • Non-traumatic surgical emergencies • Soft tissues and skeleton • Surgery in the tropics • Anaesthesia and analgesia • Hostile environments • Disaster environments • Conflict environments • Catastrophe environments

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Objectives

- To introduce a symptomatic approach to infectious diseases
- To be able to classify and treat patients with fever
- To be able to classify and treat patients with diarrhoea
- To be able to classify and treat patients with skin problems
- To be able to link an individual presentation to an outbreak

Scene Setting

It is well known that infectious diseases have played a major role in man-made and natural disasters. Despite regional differences, victims of infectious diseases have often outnumbered the trauma casualties. Both civilian and military populations have suffered great losses in the past from infectious diseases especially in the tropics. Over the years major improvements have been achieved in prevention such as provision of clean water and vaccinations. However, the recent outbreaks in Haiti and the Horn of Africa stress the need for medical personnel who are still trained to deal with patients suffering from infectious diseases. [Part 2](#) of this book describes the epidemiology and organizational aspects of outbreaks. This chapter concentrates on the approach to the main clinical presentations in the individual patient, often in a resource limited setting. The important link with the second section is, however, that the individual patient may well be the first case of an outbreak. This chapter provides a practical approach and does not attempt to replace the available textbooks on infectious and tropical diseases. It therefore concentrates on the most common tropical pathology. The further readings refer to detailed information about specific diagnoses and treatments.

Introduction

Most presentations with an infectious disease background can be divided in:

- A patient with fever
- A patient with diarrhoea
- A patient with skin problems

Essentials for Diagnosis and Management

- Proper history taking:
- Where did the patient stay?
- When was the patient in that area?
- Which activities had the patient in the area?
- Which precautions were taken: immunizations and chemoprophylaxis (for malaria and/or other diseases)?

- What is the previous medical history of the patient? Is there an underlying disease or a compromised immune system?
- Which complaints?
- What was done since the start of the problem? Which treatment has already been given?
- Similar complaints in other group members or in the indigenous population?
- Physical examination, full examination with specific attention for:
 - Temperature, circulation, heart, lungs, liver, and spleen; assess mental state; look for signs of meningitis, also for abnormalities of eyes, ENT, lymph node stations, skin, and genitalia
- Basic laboratory facilities:
 - Hb, white blood count (WBC) and differential count, total eosinophil count, platelets, and routine urinalysis
 - If available, liver enzymes, total bilirubin, creatinine, or blood urea
 - Blood film for malaria parasites, trypanosomes, and spirochetes of relapsing fever; antigen tests for malaria parasites
 - Gram stain, AFB stain (acid fast bacilli) of sputum, urine, CSF, and skin and soft tissue; CSF also Indian ink stain for cryptococci
 - Stool examination: macroscopic aspect and microscopy (WBC, “shooting star bacteria” of cholera, parasites)
 - Culture/sensitivity (usually not available)

With this set of data, usually a presumptive diagnosis can be reached. Always keep a nontropical (“common”) condition in mind. It has to be determined whether the condition is treatable and contagious. A patient can be the first presentation of an outbreak or part of it. Potentially fatal presentations need immediate medical attention.

Fever

NB: In case of fever in a patient in (or shortly before in) malarious area, always exclude malaria.

Consider in a patient with fever and:

- Splenomegaly:
 - Malaria, typhoid fever, brucellosis, relapsing fever, visceral leishmaniasis, EBV-infection, and CMV-infection
- Hepatomegaly:
 - Malaria, amoebic liver abscess, visceral leishmaniasis, acute schistosomiasis (Katayama syndrome), typhoid fever, brucellosis, relapsing fever, early (pre-icteric) phase of acute hepatitis A/B/C/E, and Crimean-Congo haemorrhagic fever (CCHF)

NB: think of insufficient immunization status hepatitis A/B and of hep A/B vaccine failure

- Lymphadenopathy:
 - Arbo-viral infections¹ (dengue), rickettsiosis, tuberculosis, toxoplasmosis, EBV-infection, filariasis (bancrofti), visceral leishmaniasis, African and American trypanosomiasis, secondary syphilis, acute HIV infection, rubella, plague, anthrax, lymphogranuloma venereum, brucellosis, rubella, bartonellosis, cat-scratch disease, and rat-bite fever
- Jaundice:
- Viral hepatitis (A, B, C, E), EBV-infection, CMV-infection, leptospirosis, relapsing fever, falciparum malaria, typhoid fever, and yellow fever
- Rash:
 - Rickettsiosis, dengue (and other arbo-viral infections² as West Nile fever, Sindbis fever, sand fly fever), echo-virus infection, measles, rubella, drug fever, and secondary syphilis
- Haemorrhagic tendency:
 - Rickettsiosis, viral haemorrhagic fevers (DFH, CCHF, Ebola- and Lassa fever, Rift Valley fever), meningococcal septicaemia, leptospirosis, and relapsing fever
- Conjunctival injection:
 - Arbo-viral infections³, leptospirosis, relapsing fever, rickettsiosis, and acute haemorrhagic conjunctivitis
- Neurologic signs:
 - Falciparum malaria, bacterial and viral meningitis, arbo-viral infections⁴, typhoid fever, CCHF, West Nile virus infection, Q fever, scrub typhus, and leptospirosis
- Leucocytosis:
 - Amoebic liver abscess, leptospirosis, relapsing fever, and Katayama syndrome
- Leucopenia (or \pm normal):
 - Malaria, typhoid fever, arbo-viral infections⁵, tuberculosis, and visceral leishmaniasis

¹ Arbo-viral infections: arthropod-borne or by arthropod-transmitted viral infections.

² See footnote 1.

³ See footnote 1.

⁴ See footnote 1.

⁵ See footnote 1.

- Eosinophilia:
 - Katayama syndrome, trichinosis, fascioliasis, and toxocariasis

Patient with Acute Fever (Onset <2 Weeks) and Positive Laboratory Test for Malaria

NB: Positive blood film or antigen test, malaria! However, people from malaria-endemic area may have malaria parasites, not being the cause of the fever!

Laboratory Findings

- Blood film (or antigen test): positive
- WBC: N or ↓
- Left shift in differential count +/-
- Platelets: ↓

Treatment of Malaria

- Depending on species: *P. falciparum*, *P. vivax*, *P. ovale*, *P. malariae*, and *P. knowlesi* (only in parts of S.E. Asia)
- Infections with *P. vivax*, *P. ovale*, chloroquine, followed by primaquine base (except *P. vivax* in PNG: mefloquine or atovaquone/proguanil followed by primaquine base); *P. malariae*, chloroquine
- Infection with *P. falciparum*, depending on grade of parasitaemia and presence of clinical complications:
 - (a) Low parasitaemia (<2 %), no signs of clinical complications:
 - Oral combination artemether/lumefantrine
 - Combination atovaquone/proguanil
 - NB: chloroquine-sensitive *P. falciparum* strains only in Central America, Caribbean, North Africa, and Middle East
 - (b) High parasitaemia or any grade of parasitaemia but with signs of clinical complications:
 - Start with artesunate i.v. (if not available quinine dihydrochloride IV), to be followed by comb. artemether/lumefantrine (or comb. atovaquone/proguanil).
 - Consider exchange transfusion (or, if possible, erythrocytapheresis).

- Supportive treatment (antipyretics, rehydration, blood transfusion, anti-convulsive treatment, peritoneal-, or haemodialysis).
- Severe malaria needs intensive care management.

Clinical Complications of Infection with *P. vivax*, *P. ovale*, and *P. malariae*: Rare

- *P. vivax*: splenic rupture, altered consciousness, convulsions, and severe thrombocytopenia (and multiorgan failure).
- *P. knowlesi* can be misdiagnosed as *P. malariae* and might run a severe course if diagnosed late.

Complications of Infection with *P. falciparum* (Often in Combination)

- Neurological: altered consciousness, coma, delirium, disorientation, stupor, convulsion, and focal neurological signs (e.g. dysarthria)
NB: convulsions and aspiration pneumonia
- Renal: renal failure, with or without oliguria or hemoglobinuria
- Hematologic: severe anaemia, severe thrombocytopenia, and disseminated intravascular coagulation (DIC)
- Hepatic: jaundice and fever
- Metabolic: hypoglycaemia and acidosis
- Pulmonary: pulmonary oedema
- Gastrointestinal: vomiting and diarrhoea
- Cardiovascular: shock
- “Blackwater fever”: obsolete term; used for sometimes occurring syndrome with severe intravascular hemolysis, hemoglobinuria, and renal failure (esp. in non-immune adults with severe *P. falciparum* infection)

Patient with Fever (Onset <2 Weeks) and “No Malaria” in Repeated Laboratory Test

The white blood count divides this group in two, as follows:

White blood cells: ↑

White blood cells: N or etc.

Pyogenic infection	Viral infections (often thrombocytopenia)
Leptospirosis	Rickettsiosis (Rickettsial infection)
Relapsing fever	Typhoid fever
Amoebic liver abscess	Visceral leishmaniasis
Other, less common infections, e.g. endocarditis	Brucellosis
Non-infectious conditions (e.g. rheumatologic illness, SLE)	Q fever
	Seldom: endocarditis

Acute Fever Onset <2 Weeks, ↑ WBC with Localizing Symptoms and/or Signs

- Tonsillitis (streptococcal)
- Pneumonia (pneumococcal; normal WBC in case of atypical bacterial cause: *Mycoplasma* sp., *Legionella* sp., *Chlamydia* sp.)
- (Bloody) diarrhoea (mainly caused by *Shigella* sp., *Campylobacter* sp., *Salmonella* sp.)
- Pyelonephritis
- Bacterial meningitis
- Amoebic liver abscess (↑ ESR)
- Lymphadenitis (genuine bacterial infection, anthrax)
- Skin infections: erysipelas and cellulitis
- Bone and joint problems: osteomyelitis and pyogenic arthritis

Acute Fever Onset <2 Weeks, ↑ WBC Without Localizing Symptoms/Signs

- Septicaemia
- Leptospirosis
- Relapsing fever (spirochaetes present in blood film only during attack of fever. PM: malaria parasites also present in blood film beyond attack of fever)
- Endocarditis

Acute Fever Onset <2 Weeks, WBC: Normal or ↓

- Viral infection: arbo-viral infection, e.g. dengue (↓ platelets), EBV-infection, CMV-infection, Japanese encephalitis, and influenza
- Rickettsial infections (tick, flea, louse, mite borne):
 - The spotted fever group: large number of species (*R. rickettsii*, *R. conorii*, *R. africae*, etc.; transmitted from rodents or other animals by ticks; except *R. akari* by mouse mites)
 - The typhus group: *R. typhi* (mooseri) (by rat and cat fleas) and *R. prowazekii* (by human body louse)
 - Scrub typhus: *Orientia tsutsugamushi* transmitted by mite larvae
- Q fever
- Typhoid and paratyphoid fever (enteric fever); caused by *Salmonella enterica* serovar *Typhi* and serovars Paratyphi A, B, and C; systemic, septicaemic illness (seldom picture of gastroenteritis); the many – so called non-typhi – zoonotic Salmonellae (e.g. *S. enteritidis*, *S. typhimurium*) cause gastroenterocolitis, and in patients with HIV co-infection, an enteric fever-like illness
- Brucellosis

Patient with Chronic or Intermittent (Relapsing) Fever (Duration >2 Weeks)

This is seen mostly seen with vivax malaria, relapsing fever, brucellosis, cholangitis, and amoebic liver abscess. See Table 37.1.

Therapy (Non-Malaria) of Most Common Acute and Chronic Febrile Illnesses

See Table 37.2. Administration is oral, unless otherwise indicated, adult dosages.

NB: visceral leishmaniasis, treatment in referral centre (small risk in nonindigenous population)

Table 37.1 Patient with chronic or intermittent relapsing fever (duration >2 weeks)

<i>WBC</i> ↑	Amoebic abscess liver Septicaemia Cholangitis Relapsing fever
Eosinophilia	Acute stage of worm infection, e.g. trichinosis, strongyloidiasis, hookworm infection, fascioliasis Toxocariasis (visceral larva migrans) Acute lymphangitic exacerbations of <i>Wuchereria bancrofti</i> and <i>Brugia malayi</i> infections
Neutropenia	Malaria (<i>P. vivax</i>) Brucellosis Disseminated tbc (Histoplasmosis)
<i>Normal WBC</i>	Toxoplasmosis Brucellosis Secondary syphilis Visceral leishmaniasis (more often leucopenia, in combination with thrombocytopenia and anaemia) CMV-infection Lassa fever (mostly leucopenia) Subacute bacterial endocarditis Non-infectious inflammatory disorders as systemic lupus erythematosus, rheumatoid arthritis, etc.
<i>Variable WBC</i>	Typhoid/paratyphoid fever Drug fever Malignancy

Table 37.2 Therapy (non-malaria) of most common acute and chronic febrile illnesses

Amoebic abscess liver	1st choice: metronidazole 750 mg tds, 5 (10) days If i.v. necessary: metronidazole 500 mg, tds or tinidazole 2 g od 5 (10) days Aspiration p.r.n. Treatment followed by clioquinol 250 mg tds, 10 days (contact amoebicide agent to kill cysts of <i>E. histolytica</i> in bowel)
Brucellosis	Doxycycline 100 mg bd, in combination with rifampicin 600–900 mg (10 mg/kg) od, 6 weeks (on empty stomach)
Typhoid/paratyphoid fever	Ciprofloxacin 500 mg bid, 10 days (i.v. 400 mg bid) If ciprofloxacin resistance ceftriaxone 2 g od, 14 days Alternative: azithromycin 1 g loading dose, followed by 500 mg bd, 6 days <i>NB</i> : frequently strains (i.e. resistance against all three traditionally used antibiotics: ampicillin (amoxicillin), chloramfenicol, co-trimoxazole)
Dengue Relapsing fever	Symptomatic treatment (analgesics, e.g. paracetamol) Doxycycline 100 mg bid, 7 days, or erythromycin 500 mg qid, 7 days; or clarithromycin 500 mg bid, 7 days Cave Jarisch-Herxheimer reaction (often leuco- and thrombopenia): if shock i.v. infusion with NaCl 0.9 %; if present: meptazinol 300–500 mg i.v., an opioid antagonist with agonistic properties
Leptospirosis	Doxycycline 100 mg bid, 5–7 days, or amoxicillin 750 mg tid, 5–7 dgn vomiting patient: penicillin G 1 mill. U i.v. qid, 5–7 days
Meningitis e.c.i.	Pat < 60 jr. without risk factor 1st choice penicillin G 2 mill.U every 4 h, 2 weeks 2nd choice ceftriaxone bid i.v. bid, 2 weeks Pat > 60 jr without risk factor amoxicillin 2 g every 4 hrs i.v., plus ceftriaxone 2 g bid i.v., 2 weeks Pat. with risk factor (diabetes, alcoholism, imm. defic., recent brain trauma, CSF leakage, kidney transplant): amoxicillin 2 g every 4 h i.v., plus ceftriaxone 2 g bid i.v., 2 weeks <i>NB</i> : also dexamethasone 10 mg qid i.v., 4 days; start before or at same time as antibiotics if no contraindication
Q fever	Doxycycline 100 mg bid, 14 days, or ciprofloxacin 500 mg bid, 4 days
Rickettsial infection	Doxycycline 100 mg bid, 5–7 days
Septicaemia	“In the field”: ceftriaxone 2 g od i.v. Field hospital: ceftriaxone 2 g od i.v. together with gentamicin 4 mg/kg od i.v. If type I reaction penicillin allergy (in 15 % cross allergy with cephalosporins) Clindamycin 100 mg tds in combination with gentamicin 4 mg/kg od i.v.
CCHF:	Supportive therapy, ribavirin (treatment in referral centre)

Diarrhoea

Introduction

Diarrhoea is one of the commonest causes of morbidity and mortality in tropical regions, for the endemic population and for visitors. Diarrhoea is defined as:

- Passage of at least 3 unformed stools per day
- Frequent passage of watery stools in a 24-h period
- Passage of 1 or 2 unformed stools in a 24-h period accompanied by at least one of the following symptoms: nausea with or without vomiting, abdominal pain, or tenesmus

Accompanying features may be systemic (fever, dehydration, loss of weight) or local (nausea and vomiting, abdominal cramps, tenesmus) in nature.

Acute diarrhoea is defined as diarrhoea lasting less than 2 weeks. Diarrhoea longer than this period is defined as chronic. Causes of diarrhoea acquired in the (sub) tropics can be divided into four categories. These are bacterial, viral, parasitic, and non-infectious causes. There are a number of organisms that are responsible for a typical episode of traveller's diarrhoea, although infection with enterotoxigenic *E. coli* (ETEC) is by far the most important.

Approach to Diarrhoea Management

With the aid of a number of simple clinical data, a useful and systematic approach to managing diarrhoea can be achieved.

In each case it is important to establish the duration (acute versus chronic) and presence of fever and of blood in stools. This is the basis on which practical divisions are made to decide on further diagnostic and therapeutic strategies. First, it is important to establish the seriousness of the diarrhoea since it has a direct influence on the therapeutic strategies. Among children and the elderly, diarrhoea quickly leads to dehydration. This manifests clinically as follows: loss of weight (>5 %), reduction in skin turgidity, dry mucous membranes, low blood pressure, tachycardia, and decreased urine production. In such cases adequate restoration of water and fluid balance is the key factor in the management and this is life saving.

Acute Diarrhoea

Figure 37.1 shows the three crucial questions (duration, blood, fever) that divide acute diarrhoea into the following categories:

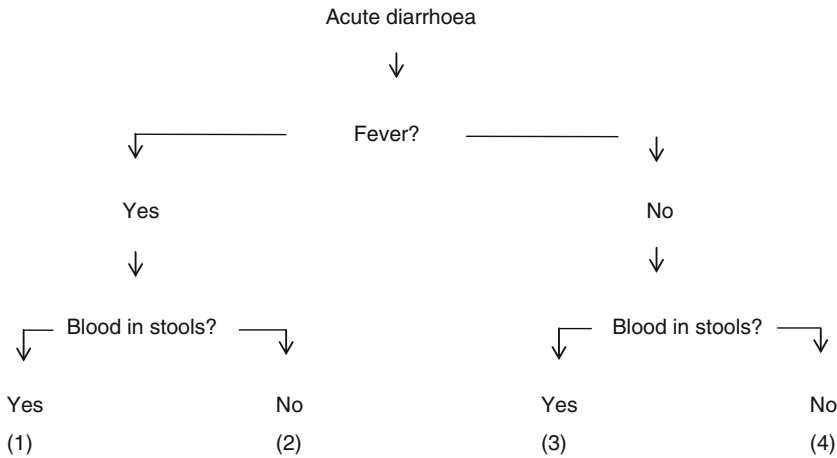


Fig. 37.1 Charts showing the three crucial questions (duration?, blood?, fever?) that divide acute diarrhoea into the following categories: diarrhoea with fever and blood; diarrhoea with fever without blood; diarrhoea without fever, with blood; diarrhoea without fever, without blood

1. Diarrhoea with fever and blood
2. Diarrhoea with fever without blood
3. Diarrhoea without fever, with blood
4. Diarrhoea without fever, without blood

This is helpful when considering acute diarrhoea but less so for chronic diarrhoea.

Diarrhoea with Fever and Blood

Diarrhoea as a consequence of infection with an invasive microorganism; localization especially in the colon; and frequent, non-voluminous bloody diarrhoea, often preceded by watery diarrhoea

Causes

- *Shigella* spp. (bacillary dysentery, shigellosis)
- *Campylobacter jejuni*
- *Salmonella* spp. (“other” or non-typhi Salmonellae)
- Enteroinvasive *E. Coli* (EIEC), *Aeromonas hydrophila*, and *Vibrio parahaemolyticus*
- Not frequently in the tropics: *Yersinia enterocolitica*

P. falciparum infections are sometimes associated with fever and bloody diarrhoea.

“Other Salmonellae” refer to salmonella organisms that cause diarrhoea other than *S. typhi* and *S. paratyphi* A, B, or C (causing enteric fever), e.g. *S. enteritidis* and *S. typhimurium*.

Diagnosis

- Specific differentiation along clinical grounds not possible
- Numerous leucocytes in stools (invasive microorganism)
- Stool culture for *Salmonella*, *Shigella*, *Campylobacter*, and *Yersinia* (commonly available)
- Other lab. investigations (ESR, white cell counts): of little use

NB: blood slide for malaria parasites

Treatment

- In most cases the condition runs a mild course with spontaneous recovery. If the condition is serious or persistent, use of antibiotics is needed: Table 37.3.

Diarrhoea with Fever without Blood

Causes

- *Salmonella* spp. (non-typhi)
- *Shigella* spp.
- *Campylobacter jejuni*
- Viruses: rotavirus [seldom fever, mainly seen in children] and norovirus [often with vomiting]

NB: Think about *P. falciparum* infections!

Diagnosis

- In case of bacteria and leucocytes in stools
- Stool culture for *Salmonella*, *Shigella*, *Campylobacter*, and *Yersinia* (commonly available)
- Thick blood film for malaria parasites

Treatment

- Normally spontaneous recovery, antibiotics are indicated depending on clinical course: See Table 37.3.

Table 37.3 Antimicrobial treatment (orally, unless otherwise mentioned; dosage for adults)

Infection	Therapy
Shigellosis (infection with <i>Shigella</i> spp.)	Ciprofloxacin 500 bid, 3 days In ciprofloxacin resistance: azithromycin 500 mg od, 3 days
Enteric fever (infection with <i>S. typhi</i> or <i>S. paratyphi</i> , or typhoid, paratyphoid fever)	First choice: ciprofloxacin 500 mg bid, 10 days (i.v. 400 mg bid) In ciprofloxacin resistance: ceftriaxone i.v. 2 g od, 5–10 days
Other (non-typhi) salmonellosis: With bacteraemia/sepsis In risk groups (e.g. immunocompromised persons)	Idem <i>S. (para)typhi</i> infection
Infection with <i>Campylobacter</i>	Azithromycin 500 mg, od, 3 days Erythromycin 500 mg qid, i.v. 5 days
Infection with <i>Yersinia</i> (seldom in tropical regions)	No treatment unless systemic clinical manifestations and immunocompromised patients Co-trimoxazole 960 mg bid Or ciprofloxacin i.v. 400 mg bid; after improvement: 500 mg bid orally
Amoebic dysentery (infection with <i>Entamoeba histolytica</i>)	First choice: tinidazole (Fasigyn) 2 g od, 3–5 days Or metronidazole (Flagyl) 750 mg tid, 5 days This treatment is followed by diloxanide furoate 500 mg tid, 10 days, or clioquinol 250 mg tid, 10 days
Infection with <i>Giardia lamblia</i>	Tinidazole 2 g, once, or metronidazole 2 g od, 3 days
Infection with <i>Schistosoma</i> spp.	Praziquantel (Biltricide) 40 mg bd, once
Infection with <i>Strongyloides stercoralis</i>	Ivermectin 200 µg/kg, once Alternative: albendazole 400 mg bid, 3 days
Infection with <i>Trichuris trichiura</i>	Mebendazole (Vermox) 100 mg bid, 3 days, or albendazole 400 mg once
Cryptosporidiosis	Self-limiting in the immune competent patient In case of protracted diarrhoea no effective therapy in the immunocompromised, although paromomycin (500–1,000 mg tid, 14 days) may reduce parasitic load and lessen magnitude of diarrhoea
Infection with <i>Isospora belli</i>	Co-trimoxazole 960 mg bid, 7–10 days Immunocompromised patients: co-trimoxazole 1,920 mg bid, 2 weeks
Infection with <i>Clostridium difficile</i> (mostly “hospital infection”)	Usually self-limiting after cessation antibiotics (in young, healthy persons) Mild to moderate infection: Metronidazole 500 mg tid, 7–10 days Serious infection: vancomycin 125 mg qid, 7–10 days
Infection with <i>Vibrio parahaemolyticus</i>	Usually self-limiting Doxycycline 200 mg bid Or ciprofloxacin 500 mg bid
Infection with <i>Cyclospora</i>	Co-trimoxazole 960 mg bid, 7–10 days
Cholera (infection with <i>Vibrio cholerae</i>)	Oral rehydration (ORS); i.v.: Ringers lactate solution (electrolytes!) Doxycycline 300 mg once Or co-trimoxazole 960 mg bid, 3 days, or ciprofloxacin 1,000 mg once

Diarrhoea Without Fever (Temp. < 38 °C or 100.5 °F) with Blood

Causes

- Intestinal amoebiasis=amoebic dysentery (infection of the colon with invasive *Entamoeba histolytica*)
- *Schistosoma* spp. infection; infection with EHEC (enterohaemorrhagic *E. coli*), *Clostridium difficile*, usually following antibiotic use, often with fever; seldom in young healthy persons; *Campylobacter* spp., *Salmonella* spp., and *Shigella* spp. Rare: massive infection with *Trichuris trichiura* and massive *Strongyloides stercoralis* infection

Diagnosis

- Parasitological examination of the stool; in case of bacteria, leucocytes in stools; stool culture.
- White blood cell count (total and differential). Eosinophilia is often present in infections with *Schistosoma*, *Trichuris*, or *Strongyloides* spp.

Treatment

- Causes of a bacterial origin: no need for specific antibiotic treatment.
- Other causes: See Table 37.3.

Diarrhoea without Fever and Without Blood

Non-invasive diarrhoea (voluminous, watery stools; no leucocytes in stools); often accompanied by nausea and sometimes vomiting

Causes

- Enterotoxigenic *E. coli* (ETEC); the most frequent cause of “traveller’s diarrhoea” (80–85 %).
- *Giardia lamblia*.
- Rotavirus and norovirus.
- Preformed *Staphylococcus aureus* exotoxins, “food poisoning”. Also infections by *Bacillus cereus*, *Clostridium perfringens* (type A); a characteristic feature is the short incubation period, usually as early as 6 h, and vomiting.
- *Vibrio cholerae*: cholera. Rice-water stools, vomiting often present. With adequate observance of hygienic measures, in visitors/travellers, the chance of acquiring cholera is low.

- Toxic substances in food (heavy metals, e.g. in tinned foods, nitrites, histamine in fish, mushrooms).
- *Cryptosporidium parvum* and *Isospora belli*, mostly seen in immunocompromised patients (e.g. HIV positive) but can occur in healthy persons.

Diagnosis

- Leucocytes are absent in stools.
- Stool culture (the yield from watery diarrhoea is very low: ETEC not in routine lab!).
- Parasitological examination of stools (“fresh stools”), for Giardia and other parasites.

Treatment

- Prevent or correct dehydration (ORS).
- Spontaneous recovery (ETEC, viruses, “food poisoning” bacteria); for the rest, see Antimicrobial treatment.

Some General Aspects of Treatment

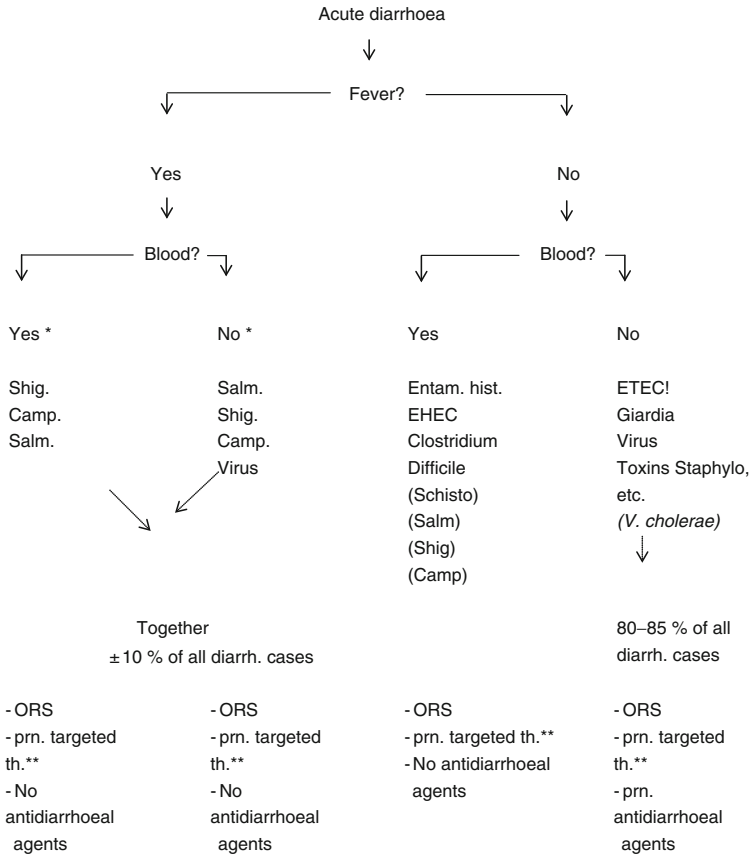
Figure 37.2 shows a summary flow diagram of diagnosis and treatment of acute diarrhoea.

Rehydration

- Severe dehydration: mostly seen in children and the elderly.
- Generally oral rehydration is possible with ORS (even in the presence of vomiting).
- I.V. infusions should be administered to patients with severe dehydration (>8 % loss of body weight). Use an isotonic salt-containing solution (normal saline NaCl 0.9 % or Ringers lactate); supplement with potassium and bicarbonate if necessary.

Dietary Measures

- Fasting is not necessary. Eat small frequent meals.
- No caffeine or lactose (milk!)-containing products (they worsen the course of diarrhoea).



* p.m: rule out malaria

** Bacterial causes need antibiotic treatment in case of serious or persistent infection; also antibiotics "to speed return to the workforce". Always treat parasitic causes of diarrhoea.

Fig. 37.2 Summary flow diagram of acute diarrhoea

Non-specific Antidiarrheal Agents

- Tannalbumin, lactobacillus preparations, and Norit: There is no evidence to support use of these agents.
- Loperamide (Imodium, Diacure):
 - Symptomatic treatment for mild to moderate cases of infectious diarrhoea.
 - Not to be used in case of fever (>38.5 °C) and/or blood/pus in stool (and/or leucocytes in stool).
 - Should not be used for longer than 48 h, because it ceases to be effective.
 - Dosage: start with 2 capsules, then 1 capsule after each unformed stools to a maximum of 8 per day. There should be an interval of at least 2 h between the

doses. Advised maximum of 4–6 days. Beyond this, patients are likely to become constipated.

Antimicrobial Treatment

See Table 37.3.

Persistent Diarrhoea (>2 Weeks)

Persistent diarrhoea is generally defined as the passage of loose stools for >2 weeks, progressing to chronic diarrhoea at the 4-week mark; usually because of persistent infection, repeated infection (in poor hygienic conditions), or post-infectious irritable bowel syndrome.

Causes

- Parasites:
 - *Giardia lamblia*, *Entamoeba histolytica*, *Cyclospora* spp., and *Cryptosporidium* spp.
- NB: In HIV infection with low CD4 count, failure of therapy of *Giardia*, *Cryptosporidium*, and *Isospora* infection is seen; further persistent diarrhoea due to Microsporidia
- Bacteria:
 - Enteropathogenic *E. Coli* (EPEC) and enteroaggregative *E. coli* (EAEC) are most commonly implicated bacterial pathogens in developing countries, esp. among children.
 - *Campylobacter* and *Salmonella* (e.g. if resistant to the administered antibiotic treatment).
 - *Clostridium difficile*: colitis after (several) antibiotic treatment.
- Secondary disaccharidase deficiency (or lactose intolerance); because of temporary damage of brush border
- Post-infectious irritable bowel syndrome
- Inflammatory bowel disease: ulcerative colitis and Crohn's disease (episode of infectious diarrhoea may precede these diseases)
- Rare causes: intestinal tuberculosis; coeliac disease; tropical sprue (predominantly in India and South East Asia, as well as in the Caribbean and Central America); and *Tropheryma whippelii* infection

Skin Diseases

Introduction

Skin diseases are commonly seen in short and long stayers of the tropics and mostly infectious of origin. It should be noted that refugees and displaced persons may present with dermatological diseases caused by nutritional disorders, e.g. pellagra (dermatitis, diarrhoea, dementia), scurvy, kwashiorkor, and noma.

The most common ones are:

- Pruritic skin diseases: general conditions
- Pruritic skin diseases: specific conditions
- Mycoses
- Pyodermas
- Ulcers

Pruritic Skin Diseases: General Conditions

Miliaria Rubra (“Prickly Heat”)

This is caused by obstruction of eccrine sweat ducts to the surface of the skin.

Clinical picture is characterized by pruritic papules and papulo-vesicles, occasionally pustules.

Localization: covered parts of the skin, especially where friction from clothing, particularly around the middle and upper trunk, elbow, and knee folds

Management

- Avoidance of heat and high humidity, if possible
- Light clothing
- Cold baths/showers
- Treatment: symptomatic with lotion (calamine lotion); in more severe cases with a mildly potent corticosteroid cream

Drug Eruption

Drug eruptions are in general characterized by a symmetrical distribution over the skin.

The clinical picture is very variable; the most common clinical expressions are:

- Macular or papular erythematous lesions
- Eczema
- Urticaria

- Erythema multiforme
- Photosensitivity reaction

Photosensitivity reactions can be divided in phototoxic and photoallergic reactions.

In the far majority of cases phototoxic reactions are seen, elicited by drugs as tetracyclines, quinolones, and NSAID's. Phototoxic reactions are caused by formation of free radicals in the skin by breakdown of metabolites of the offending drug under the influence of UV light. This can also occur after local contact with furocoumarins from plants and perfumes.

Photoallergic reactions are uncommon. They are caused by a type I anaphylactic response to substances (e.g. sulphonamides, antiseptics promethazine, chlorothiazide, chlorpromazine, chlorpropamide, tolbutamide) in combination with light exposure.

Treatment

Avoidance of the offending drug; symptomatic with mildly potent corticosteroid cream and if required oral therapy with antihistamines (esp. the sedative ones are most effective against itch, e.g. promethazine and alimemazine; less sedative: fexofenadine and oxatomide).

Eczema

The clinical picture is in principle not different from countries with a moderate climate, although atopic eczema may aggravate under tropical conditions. Macrovesicular eczema has a relation with higher temperatures.

Treatment

Corticosteroid creams or ointments, if severe exacerbation (short) course of systemic corticosteroids. Secondary infection may occur, especially due to scratching.

Urticaria

Urticaria (nettle rash, hives, wheals) are short-lasting (hours) erythematous oedematous papules or plaques, usually associated with itching. Angioedema consists of transient swellings in the deeper dermal, subcutaneous, and submucosal tissues. Chronic urticaria is urticaria lasting longer than 6 weeks and accounting for approximately 10 % of the patients.

A special form, physical urticaria, can be subdivided in cholinergic urticaria induced by physical exercise and urticaria by stimuli like pressure, heat, or cold.

They consist of 1–5 mm pruritic oedematous papules on an erythematous base, in most patients localized on the upper part of the body.

Treatment: urticaria, oral antihistamines

Note: Intestinal parasites may be a cause of urticaria under tropical conditions.

Note: Urticaria may occur as part of Katayama syndrome (= immune complex-mediated reaction of acute schistosomiasis).

Pruritic Skin Conditions: Specific Conditions

Reaction to Bites or Excretion Products of Arthropods

Insect bites (mosquitoes, lice, fleas, bedbugs, etc.) are in general short-lasting reactions. Secondary infection may occur due to scratching. Treatment of insect bites is in general symptomatic with a lotion: when not effective, a moderate potent corticosteroid cream can be prescribed as long as there is no secondary infection. If necessary, add oral antihistamine.

Note: “*Persistent insect bite*”

Variable clinical picture with in the majority pruritic papules and nodules, often with excoriations; after bites of mites, harvest mites, and itch mites from cattle, birds, and other animals, which may persist for months and may have a clinical course with remissions and exacerbations. Secondary eczematization is common due to scratching, as well as secondary infection.

Treatment: potent corticosteroids, if necessary under hydrocolloid occlusion

Scabies

Papules that are extremely pruritic, especially at night, often accompanied by scratch marks and secondary infection. Classically localized in the finger webs, the flexor side of the wrists, the genitalia, and in women around the nipples. Diagnosis is by demonstrating the mite/larvae/eggs in a scraping from the skin at the place of a burrow.

Treatment

Ivermectin 200 µg/kg body weight (=5 tablets of 3 mg for an adult of 66–79 kg), if necessary to be repeated after 1 week, or a 5 % permethrin cream, in most instances one application of 12 h duration. Undergarments and bed linen are laundered.

Pediculosis Capitis and Pubis

Pruritic erythematous papules follow the bites of the lice. Diagnosis by demonstrating the lice and/or the eggs (nits), attached to the hairs.

Treatment

0.5 % malathion lotion for 12 h and has to be repeated after 1 week; alternatively, 1 % permethrin rinse for 10 min; in general one application suffices as it is ovocidic

Bed Bugs

Bed bugs feed on humans, taking a blood meal at night, leading to a non-pruritic, purpuric macule in an unsensitized person. In a sensitized person, a papule with a central haemorrhagic punctum, surrounded by an intensely irritating urticarial area, is found. The frequently grouped skin lesions are localized on the face, the neck, arms, and hands.

Treatment

Symptomatic; spraying with an insecticide of the area where the bed bugs reside

Trombiculiasis

Synonym

Scrub itch and chigger bites (don't confuse with jiggers).

Clinically urticaria and pruritic papules localized where the chigger attaches itself, which is dependent on the clothing. It starts a few hours after walking through high grass.

The diagnosis is made on the history; generally several other people of the party are also affected.

Treatment

Symptomatically with lotion or corticosteroid cream. Bathing after leaving the infested area. Generally the larvae are not found. If so, they are seen as red dots and in that case apply oil.

Use repellents and protective clothing and boots.

Tungiasis

Synonym

Jiggers

The female sand flea penetrates the skin under the nails, between the toes or the sole and the rim of the feet. The flea swells due to the production of hundreds of eggs. Clinically it is a nodular swelling with a central small dark macule.

Treatment

Removal in toto

Prevention

Wearing of closed shoes (the sand flea is a low jumper)

Myiasis

Infestation with larvae of Diptera flies

Three clinical forms of cutaneous myiasis exist:

- Subcutaneous myiasis: a furunculoid lesion (“moving furuncle”)
- Treatment: suffocating the larvae by sealing the opening with paraffin or petroleum jelly after which it can be expressed
- Wound myiasis: invasion of existing wounds and ulcers
- Treatment: removal of the larvae

Pruritic Skin Lesions due to “Helminthic Infection”**Larva Migrans (“Creeping Eruption”)**

Pruritic burrows with a bizarre pattern and migration with several millimetres to centimetres daily, caused by hookworms of dogs and cats. The larvae penetrate the skin and do not enter the blood stream. If untreated, the spontaneous cure is in the course of weeks to sometimes 6 months or 1 year.

Treatment

Ivermectin 150–200 µg/kg once (i.e. for adults in general 4 tabs of 3 mg), may have to be repeated after 1 week, or albendazole 400 mg tablets twice daily for 3 days

Larva Currens

Serpiginous erythematous lesions due to the passage of the larvae of *Strongyloides stercoralis*. They are localized mainly in the area between the waist and knees.

Treatment: ivermectin 150–200 µg/kg once or albendazole 400 mg twice daily for 3 days

Ground Itch

Pruritic papules and vesicles between the toes and on the soles of the feet where the larvae of human hookworms penetrate the skin.

Treatment: symptomatic with a lotion or a mild potent corticosteroid cream and albendazole 400 mg twice daily for 3 days or ivermectin 150–120 µg/kg once

Cercarial Dermatitis (“Swimmers Itch”)

It is caused by penetration of the skin by zoophilic or anthropilic cercariae of, most commonly avian, schistosomes. Pruritic papules and vesicles develop several hours after swimming in water infested with cercariae.

Treatment: symptomatic with lotion or a mild potent corticosteroid cream

Onchocerciasis

Skin lesions caused by the microfilaria of *Onchocerca volvulus* have several clinical forms:

- Acute papular onchodermatitis (6 months after infection and presenting with a non-specific itching papular rash, usually on the back or buttocks). This form may be seen in visitors. Later, lichenification may occur.
- Chronic forms: atrophy and depigmentation (“leopard skin”), onchocercoma, lymphadenopathy, and lymphoedema.

Mycoses

Superficial Mycoses

Tinea Pedis (“Athletes Foot”)

Clinical picture

Lateral interdigital scaling and fissuring of the feet; in more severe cases: Maceration and secondary infection

Treatment

Antifungal cream and/or powder

Tinea Corporis (“Ringworm of the Body”)

Clinical picture

Slowly centrifugally enlarging lesions with a scaling erythematous border

Treatment

Antifungal cream or ointment

Pityriasis Versicolor

Macular lesions with fine (pityriasiform) scales, hypo-pigmented or brownish. Localized predominantly on the shoulders, chest, back, and upper arms. Frequently occurring in the tropics. Reinfection regularly occurs, especially in the tropics.

Treatment

2.5 % selenium sulphide shampoo applied undiluted and left overnight, for three nights, or creams of imidazole derivatives, or oral ketoconazole/itraconazole

Erythrasma (Not a Real Mycosis, as It Is Caused by a Corynebacterium)

Erythematous, slightly scaling, sharply demarcated macules in the folds, especially the groins

Treatment

Topical antifungals or 1 % erythromycin solution or oral tetracycline 250 mg four times daily for maximal 3 weeks (also erythromycin is used)

Deep Mycoses

The clinical most relevant are chromoblastomycosis, sporotrichosis, lobomycosis, (para)coccidioidomycosis, histoplasmosis, rhinosporidiosis, mycetoma, and blastomycosis (see boxes of geographic distribution of diseases).

They develop in general after a preceding trauma (inoculation), with localisation at cutaneous and subcutaneous level. Clinical pictures depend on the geographical distribution.

Treatment

Depending on the causative organism, in general long lasting (months to years) and in several instances unsuccessful

Pyodermas**Cellulitis**

This is an acute, subacute, or chronic inflammation of deep dermis and subcutaneous tissue.

Clinical picture

Erythematous area, in the level of or raised above the skin, without distinct demarcation. Acute cellulitis is caused by streptococci, staphylococcus aureus, or both.

Treatment

Acute cellulitis: flucloxacillin 1 g four times daily (route of administration depending on the severity: oral or intravenously). Macrolide in case of type I penicillin allergy

Note: Bacterial cultures are in general negative.

Erysipelas

This is a special type of cellulitis, mostly caused by Streptococcus A. The clinical picture is that of an acute illness with high fever and circular erythematous and oedematous, sometimes haemorrhagic and swelling. The most common localizations are the leg and the face.

Treatment

Intravenous penicillin G one million U four times daily till subsidence of the fever, followed by oral penicillin 500 mg four times daily (total 10–14 days)

Ulcers**Streptococcal Ulcer***Clinical picture*

Acute necrotizing inflammation with ulceration

Treatment

Oral penicillin 500 mg four times daily for 10 days, when causative organism is unknown

Flucloxacillin 1 g four times daily (macrolide, in case of type I penicillin allergy)

Ecthyma*Clinical picture*

Ulcerating inflammation with a raised border, in general caused by streptococci

Treatment

Penicillin 500 mg four times daily for 10 days

Tropical Ulcer*Clinical picture*

Painful, deep, crateriform ulcer with raised border and purulent necrotic base

Treatment

Penicillin or metronidazole in high dosages

Leishmania Ulcer

An ulcer in the course of cutaneous leishmaniasis, which started with a papule/nodule. Leishmania parasites are transmitted by the bites of *Phlebotomus* sandflies. Lesions develop at the localization(s) where one is bitten by the sandfly.

Treatment

Depends on the species, the extent and number of the lesions, and the course of the disease

Buruli Ulcer

Painless, undermined, extensive ulceration with necrosis of the subcutis, caused by *Mycobacterium ulcerans*

It is nowadays epidemic in parts of West Africa.

Treatment

Surgical, with a wide excision with respect to the subcutaneous extension

Cutaneous Diphtheria

Greyish pseudomembrane-like ulcer caused by *Corynebacterium diphtheriae*, secondarily infecting skin lesions as (surgical) wounds, burns, insect bites, and eczema. It also occurs in persons who have been adequately vaccinated.

Treatment

Penicillin in high dosage, antitoxin

Geographic Distribution of Infectious Diseases

Infectious diseases of the tropics have a regional prevalence pattern. The following may offer helpful guidance.

North Africa**Fever**

- Arbo-viral infections (RVF, WNF, Sindbis, sandfly fever, CCHF a.o.)
- Malaria (very limited)

- Typhoid fever
- Acute schistosomiasis
- Amoebiasis (abscess)
- Visceral leishmaniasis
- Brucellosis
- Rickettsioses
- Rabies

Hygiene, Food, and Water Related

- Hepatitis A and E
- Norovirus infections
- Bacterial infections (with *Salmonella* sp., *Shigella* sp., *Campylobacter* sp., *E coli* sp., *Vibrio cholera*)
- Protozoal infection (with *G. lamblia*, *E. histolytica*, *Cryptosporidium* sp., *Toxoplasma* sp.)
- Helminth infections (*Ascaris*, *Trichuris*, *Fasciola*, *Taenia saginata*, *Enterobius*, *T. solium*, and *Trichinella*)
- Echinococcosis
- Schistosomiasis (asymptomatic/chronic stage)
- *Strongyloides* and *Toxocara* infection

Other

- Cutaneous leishmaniasis
- Endemic syphilis
- Scorpion stings and snakebites
- Chromoblastomycosis, blastomycosis, histoplasmosis, and mycetoma

Sub-Saharan Africa

Fever

- Malaria
- Arbo-viral infections (chikungunya, dengue, RVE, Sindbis O'nyong nyong, CCHF a.o.)
- Rickettsioses
- Leptospirosis
- Brucellosis
- Relapsing fever
- Meningococcal meningitis
- Schistosomiasis

- Trypanosomiasis
- Visceral leishmaniasis
- Rabies
- Yellow fever (good vaccine available!)
- Ebola, Lassa, and Marburg fever (rare)

Hygiene, Food, and Water Related

- Hepatitis A and E, norovirus, and rotavirus infection
- Bacterial diarrhoea, all well-known pathogens
- Protozoal diarrhoea (*E. histolytica*, *G. lamblia*, *Cryptosporidium*)
- Helminth infections (*Ascaris*, *Enterobius*, hookworm, *Strongyloides*, *Trichuris*, *Schistosoma*, *T. saginata* and *T. solium*)

Other

- Filarial infections, onchocerciasis, *Loa loa* infection, and *W. bancrofti* infection
- Fungal infections: histoplasmosis, blastomycosis, Mycetoma, and Madura foot
- Snakebites

Ectoparasites

- Scabies
- Myiasis
- Larva migrans cutanea
- Lice and fleas (*Tunga penetrans*, jiggers)

Southern Africa

Fever

- Malaria
- Arbo-viral infections (chikungunya, dengue, CCHF)
- Rickettsioses
- Leptospirosis
- Schistosomiasis
- Trypanosomiasis (sporadisch)

Hygiene, Food, and Water Related

- Hepatitis A and E, norovirus, and rotavirus infection
- Bacterial diarrhoea
- Protozoal diarrhoea

Others

- Larva migrans cutanea
- Snakebites and scorpion stings

Middle East and West Asia

- Brucellosis
- Cutaneous leishmaniasis

Hygiene, Food, and Water related

- Diarrhoea (bacterial, protozoal, viral)
- Cestodes: *Echinococcus granulosus*

Other

- Snakebites and scorpion stings

Indian Subcontinent (India, Pakistan, Bangladesh, Nepal, Sri Lanka)**Diarrhoea**

- Protozoa: *G. lamblia*, *E. histolytica*, and *Cyclospora*
- Bacteria: *Shigella*, *Campylobacter*, *Salmonella*, *E. coli*, and *Vibrio cholerae*
- Viruses: rota- and norovirus

Fever

- Dengue
- Japanese encephalitis
- *S. typhi* infection (typhoid fever)

- Malaria (frequently *P. vivax*)
- Visceral leishmaniasis (North India, Bangladesh, Nepal)

Others

- Cysticercosis (India)
- Hepatitis A and E
- *W. bancrofti* and *B. malayi* infection
- Strongyloidiasis
- Snakebites

South East Asia

Diarrhoea

- Bacterial: *Campylobacter*, *Shigella*, and *Salmonella*
- Protozoal: giardiasis, amoebiasis, and cyclosporiasis
- Strongyloidiasis

Fever

- Malaria, esp. in east Indonesia New Guinea and surrounding
- Islands and elsewhere: less
- Dengue
- Leptospirosis
- Rickettsioses
- Histoplasmosis and *Penicillium marneffe* infection
- Rabies (Thailand)

Other

- Snakebites

Caribbean

- Dengue
- Larva migrans cutanea
- Ciguatera
- Other fish poisoning
- Cholera

Central and South America

Fever

- Malaria
- Dengue
- Visceral leishmaniasis (esp. east Brazil, rare in travellers)
- Histoplasmosis
- Leptospirosis
- Brucellosis (Peru)
- Hantavirus infections
- Typhoid fever (esp. Mexico, Peru)

Diarrhoea

- Bacterial
- Protozoal, o.a. Cyclospora in Guatemala, Peru, and also elsewhere

Others

- Strongyloidiasis
- Cysticercosis (esp. Mexico, Peru)
- Myiasis
- Cutaneous and mucocutaneous leishmaniasis
- Deep mycosis (blastomycosis, chromoblastomycosis, coccidioidomycosis (Mexico), histoplasmosis, lobomycosis, mycetoma, paracoccidioidomycosis, rhinosporidiosis, sporotrichosis)
- Snakebites and scorpion stings

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Chapter 38

Acute Problems and Emergency Surgery: Climate – Hot and Cold (An Aide)

James M. Ryan and Adriaan P.C.C. Hopperus Buma

Abstract The authors of this chapter include specialists, many of whom have extensive deployment experience. The target group of this chapter, however, is not their fellow specialists, but the “junior” doctors, trying to help them find their way in the difficulties posed by an “adverse” environment. That junior doctor will be confronted by all imaginable ailments and injuries and should be a true generalist. As we’re all aware, even in medical school nowadays, there’s a tendency to make students choose the direction of their future work at an ever earlier stage, the opposite of what’s needed for a generalist.

Keywords Triage • Trauma and medical emergencies • Ballistic and blast injury • Infectious diseases • Climatic influences • Bites and stings • Maxillofacial problems • Head and spinal cord injuries • Abdominal complaints • Non-traumatic surgical emergencies • Soft tissues and skeleton • Surgery in the tropics • Anaesthesia and analgesia • Hostile environments • Disaster environments • Conflict environments • Catastrophe environments

Objectives

- To review the heat- and cold-related illness/injuries affecting victims and how to treat these conditions in a hostile environment

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Introduction

Heat- and cold-related illness is a potential hazard faced by both local victims and by expatriate volunteers. However, the expatriate is likely to be more at hazard because of lack of acclimatisation. Illness rates even among acclimatised victims may be severe if there has been loss of shelter. Vulnerable groups such as lactating mothers, children, the elderly, the ill and the disabled are particularly at risk.

Heat Injury

A number of syndromes or conditions are recognised and often a combination of clinical symptoms occurs. These range from the benign to the potentially lethal. Note that core temperature varies in a healthy individual. Normal ranges are:

- At rest: 36.5–37.5 °C or 97.7–99.5 °F
- During exercise: 36.5–38.5°C or 97.7–101.3 °F

The most common heat-injury conditions are described next.

Dehydration

This may affect displaced and exposed individuals or communities who have limited or no access to drinking water. It may also affect expatriate volunteers engaged in vigorous (and unfamiliar) physical effort. Severity is related to extent of body weight lost. The following is a good guide:

- 2 % loss – severe thirst.
- 2–5 % loss – severe thirst, anorexia, headaches and altered conscious level.
- 5–10 % – all of the above, plus dyspnoea, cyanosis and neurological signs.
- >10 % – the above plus visual disturbances and uncontrolled rise in core temperature; see heat exhaustion and heat stroke discussion to come.

Weight loss of 10 % or greater signifies an immediate threat to life. As a general rule, losses above 5 % are best treated by intravenous fluids (interosseous access may be best in babies and children <6 years). The initial bolus in an otherwise healthy adult is 2 l of isotonic crystalloid. In a child, the initial volume is calculated by the formula – 20 ml/kg/body weight. These are initial challenges and may be repeated. Urinary output is an excellent guide to clinical response. An output of greater than 30 ml/h in the adult indicates effective volume replacement.

Sunburn

This is caused by excessive exposure to sunlight. Expatriate volunteers should ensure liberal use of UV-blocking creams and should avoid prolonged exposure. Displaced people without shelter are vulnerable, with infants and small children being particularly at risk. Prolonged exposure may lead to heat stroke. (See discussion to come.) Management is by protection under cover, non-adherent dressings to blistered areas, oral rehydration and simple analgesics.

Heat Cramp

The mildest in a range of hyperthermic conditions. It typically occurs in a non-acclimatised individual engaging in vigorous physical activity. The characteristic muscle cramps are caused by a combination of salt and water depletion. Treatment is with oral fluids if tolerated. If vomiting is a symptom, replacement by the IV route may be required.

Heat Faint

Also known as heat syncope. It is associated with prolonged vigorous exercise in a non-acclimatised expatriate volunteer. It is a more severe variant of heat cramp. Dehydration and widespread peripheral vasodilatation are major features. Management is by resting in a shaded place and fluid replacement by oral or IV routes.

Heat Oedema

Similar to these conditions but with dependant oedema in addition. It is associated with heavy manual labour and prolonged standing. Treatment is by rest and elevation of affected limbs, in addition to the measures outlined previously.

Heat Exhaustion

A potentially lethal condition and a more severe variant of the foregoing. In addition to hypotension and fainting, there is an alteration in conscious level and severe

headache. This condition requires immediate management consisting of the following:

- Cessation of all physical activity
- Removal to a cool place
- Tepid sponging and fanning
- Intravenous fluid resuscitation using an isotonic solution until clinical improvement

Heat Stroke

This is the most severe and immediately life-threatening hyperthermic syndrome. It usually follows a failure to recognise the onset of less severe hyperthermic conditions. It includes all of the events outlined previously plus a rapid rise in core temperature and a failure to lose heat. At 41 °C/105.8 °F, organ failure commences. Untreated, changes become irreversible and convulsions leading to coma follow. If suspected, central temperature must be recorded using the rectal or oesophageal route.

Prevention is better than cure. Follow the advice given herewith:

- Avoidance of hard physical labour until acclimatised
- Appropriate clothing
- Head cover
- Drinking plenty before and during heavy manual labour
- Liberal use of sun screen creams

Central to effective management is rapid cooling. The following approach should be adopted:

- Tepid bathing, but avoiding ice cold fluid which results in vasoconstriction limiting heat loss.
- Evaporative cooling of moistened skin by fanning; the skin must be moistened to achieve heat loss.
- Administration of oral rehydration salts if tolerated.
- Administration of 1–2 l of electrolyte solution IV over 1 h in an adult. In a child, 20–40 ml/kg/body weight is used as a guide to volumes required.

Cooling should be stopped when rectal temperature falls to 38.5 °C to avoid overshoot and resultant hypothermia. A benzodiazepine administered intravenously or rectally may be required to control convulsions.

In a catastrophe or conflict setting, it is unlikely that advanced laboratory or critical facilities will be available and treatment must be based on clinical observation. Rapid lowering of core temperature, rehydration with resulting improved urinary output and good control of convulsions are keys to survival.

A final note. It is often the young, enthusiastic and very fit expatriate who succumbs to heat illness.

Cold Injury

Cold injury poses a particular problem for displaced communities in war and disasters. Even in warm climates, it is often very cold after dusk. The risk factors may include any or all of the following:

- Lack of shelter
- Inadequate clothing
- Presence of vulnerable groups (e.g. lactating mother, children and elderly)
- Pre-existing disease
- The presence of traumatic, open wounds

Classification

Local Injury

Three variants of local injury may be seen:

- Frostnip
- Frostbite
- Immersion (non-freezing) injury

Frostnip

Is the mildest form of injury and is characterised by pain, pallor and numbness of the affected part (fingers, toes, nose and ears). If recognised before progression to frostbite, it is easy to treat by rewarming. It should be emphasised that the extent/depth cannot be estimated before thawing. Frostnip injury does appear to predispose to subsequent injury.

Frostbite

Results from freezing of tissues with intracellular ice crystal formation. The extent varies from superficial through partial skin thickness injury to deep injury involving muscle and bone (as with burns). The condition is characterised by hyperaemia, oedema and vesicle formation in superficial injury to frank necrosis in deep injury. Urgent management is needed either to prevent necrosis and gangrene or to limit its extent. Rewarming is the key element in treatment but should not be undertaken if refreezing is likely. If possible the injured part should be placed in warm circulating water at 40 °C until the part turns pink and reperfuses. Treatment may be painful requiring analgesia. Following rewarming the injured parts remain vulnerable and need to be protected. Antibiotics should only be used if clinical signs of infection

are evident. It may take several weeks to determine the extent of tissue loss so early surgical intervention should be avoided. If refreezing is possible, the frozen part should be left frozen until definitive rewarming can take place.

Immersion Injury

Is the non-freezing variant of cold injury usually seen in victims who have had prolonged exposure to wet conditions in temperatures just above freezing. It was endemic among soldiers during the Falkland Islands War in 1982. It typically effects the feet but may affect hands. Injury tends to be more superficial than frostbite. The appearance varies from widespread superficial necrosis to an intensely painful hyperaemia. Management is by gentle rewarming in circulating warm water at 40 °C and by protecting the injured part from further injury and infection.

Systemic Injury

The most clinically important condition is systemic hypothermia which may be life-threatening. Accurate diagnosis requires measurement of core body temperature using special thermometers capable of measuring low temperatures. Health-care workers in war and disaster settings may not have access to such equipment and will have to use clinical judgement.

By convention the condition is classified as mild, moderate or severe.

- Mild: 35–32 °C or 95.0–89.6 °F
- Moderate: 32–30 °C or 89.6–86.0 °F
- Severe: Below 30 °C or 86.0 °F

Recognition

Awareness and a high index of suspicion are essential. Displaced communities, with many elderly, young, ill and injured among their number, are particularly vulnerable. Provision of shelter and some form of energy source for heat is vital. Key physical signs include:

- A drop in core temperature (low reading thermometer)
- Altered level of consciousness
- Cold peripheries (cold to touch)
- A grey appearance with central cyanosis (a blueness around the lips and in the nail beds)

Alterations in vital signs such as pulse rate, respiratory rate and blood pressure are not helpful except in patients close to death.

Management

The best management is prevention by provision of shelter and heat. Where the condition is suspected or proven by core temperature recording, the following steps are recommended:

- Removal from the cold environment
- Removal of wet, cold clothing and covering in warm blankets or dry clothing
- Administration of high-flow oxygen if available
- Cardiac monitoring if possible

Regular reassessment is essential. If the patient is improving, they should be protected from exposure and given hot fluids and drinks. If there is no improvement, consider administration of warm (body temperature) intravenous fluids – ideally an isotonic electrolyte solution. Volumes administered will be determined by age and pre-existing disease. However, in a healthy adult, 2 l of warmed electrolyte is recommended. In a child, a dose of 20 ml/kg body weight as an initial bolus and then repeated is a safe approach.

Under austere conditions, it is unlikely that anything further will be possible. Techniques such as active core rewarming and the use of antiarrhythmic agents require a critical care environment.

Chapter 39

Acute Problems and Emergency Surgery: Envenomations: Bites and Stings

Steven A. Bland

Abstract The management of animal bites remains a worldwide problem, however the additional problem of envenomation requires urgent and life saving treatment including first aid measures and the potential use of antivenin.

Keywords Bites • Stings • Venom • Envenomation • Antivenom • Antivenin • Snake • Scorpion • Spider • Centipede • Marine envenomation • Paralytic tick bites • Remote medicine • Environmental medicine

Objectives

- To describe snakebites and their management/treatment
- To describe scorpion stings and their management/treatment
- To describe marine envenomations and their management/treatment
- To describe spider bites and their management/treatment
- To describe paralytic tick bites and their management/treatment

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Introduction

The burden of health for cases following bites and stings, including envenomations and rabies, involves greater than 200,000 deaths per year worldwide. It is estimated that there are over five million snakebites with 2.5 million envenomations leading to 125,000 deaths each year. However, with poor medical infrastructures in the developing world and delays in presentation, many of these avoidable deaths are not prevented. The incidence of lethal bites and stings may also be under reported due to the lack of access to medical facilities and health registries. Animal bites also have a significant nonlethal morbidity including deformity, organ dysfunction and chronic pain (Source: World Health Organisation).

The effect of a bite or sting from any animal may have an adverse effect on human health for a number of reasons:

- *Mechanical trauma*: Any bite usually requires some form of physical energy to penetrate the skin. This energy may cause a range of injuries from minor irritation to major trauma and loss of function and even death (sting ray/dog bite).
- *Envenomation*: Some animal bites or stings contain potent biological toxins (venom) that act in a number of ways to cause pain and/or death. The venom may be for predation or for use as a defensive mechanism. Toxins within some arachnid species' saliva or injected venom assist in early digestion of food but cause local necrosis in humans.
- *Zoonotic infections*: Examples of zoonotic infections spread to humans from animal bites with significant health implications include malaria, rabies and leishmaniasis.
- *Opportunistic infections*: Any penetration of the skin may allow for the inoculation or introduction of bacteria into the wound. The probability of secondary infection varies with each species. Secondary infection from snake fang penetration is relatively rare compared to bites from some mammal species. Bites that cause local necrosis are a lot more likely to become infected.
- *Hypersensitivity reactions*: Most venom components are peptides and proteins. They will therefore have the potential to cause immunological sensitisation and hypersensitivity reactions. The severity of these reactions may vary between individual humans and is independent to the toxicity of the venom, not following a dose/response relationship. A common example within the United Kingdom is the hypersensitivity of individuals to arthropod stings such as the honeybee.

This chapter will focus on the toxic effects of envenomation – the introduction of a biological toxin of animal origin into the body with local and systemic effects.

Snakebites

About 15 % of snake species are venomous. There are two major families of snakes, Elapidae (cobra, mamba, kraits, coral snakes) and Viperidae (vipers). There is a sub-family of the viper, the Crotalinae (pit vipers, such as the rattlesnakes, puff adder). The pit vipers have sensory organs that allow them to detect warm-blooded prey by heat. Two minor families of venomous snakes are Hydrophiidae (sea snakes) and Colubridae (rear fanged snakes such as the boomslang). *The distribution of species and toxic effects is very region specific; therefore, interpretation of published advice including journal articles should reflect this.* For example, the North American continent has a greater proportion of pit vipers (rattlesnakes), while Australia has a greater proportion of Elapidae species resulting in varying opinion on the best first aid methods for each region including the use of pressure-immobilisation.

Snake Venom

Snake venom is a complex mixture of peptides and proteins of various sizes. While effects can be grouped into syndromes, it is important to understand that the observed effects of envenomation may be complex with regional variation even within a species, as well as between snake and the individual casualty. The main effects observed due to the action (enzymatic, agonistic or antagonistic) of the venom components include:

- Neurotoxic: These effects may be presynaptic, postsynaptic or both. Symptoms include neuropathic pain, nerve palsies (especially cranial nerve), fasciculation, convulsions, coma and respiratory paralysis. Paralysis is often observed as a descending paralysis affecting the cranial nerves first with double vision, drooping eyes (ptosis) and difficulty with speech and swallowing.
- Haemotoxic: These effects can be complex due to pro-coagulation and anti-coagulation effects. The end result is a bleeding disorder often similar to disseminated intravascular coagulopathy (DIC) due to a mixture of consumptive coagulopathy and direct antagonism and disruption of the normal clotting cascade with increased fibrinolysis. Additional causes for haemorrhagic presentations include endothelial disruption.
- Myotoxic: Local breakdown of muscle and connective tissue often occurs even in the more neurotoxic elapids. Local tissue swelling will lead to increase pain and may result in compartment syndrome. Secondary toxic injury is due to the breakdown of muscle tissue (rhabdomyolysis) and the release of myoglobin; this causes acute tubular necrosis and renal failure.
- Cytotoxic/haemolytic: Some components of venom cause disruption of cells, including red blood cells, usually through disruption of the cell membrane.

- **Cardiotoxic:** Similar to the effects of neurotoxic agents, some toxins are more specific for mechanisms involved in cardiac function, such as sodium channels. These toxins often have a rapid onset and are more common in certain species of snake (sea snakes).

The Most Toxic Snake?

The title of the most toxic snake depends on definition, and toxicity can be defined in a number of ways. Some snakes have the ability to inject a significant quantity of venom per bite, while other snakes achieve this with multiple bites. The quantity of venom may also depend on the maturity of the snake and its ability to control the quantity of venom it injects. For this reason, any bite from an immature or smaller species of snake should be considered as significant. The potency of the venom is important, and this is defined by the LD₅₀ or lethal dose, expressed as weight of venom per kilogramme of victim needed to kill 50 % of the sample. Some species account for more human deaths than others, but the reason for this is multifactorial. These factors include species population, cohabitation with humans and aggression.

A snakebite from a venomous species may not always cause envenomation, and a bite from a venomous species with no toxic effect is commonly called a *dry bite*. This may be due to the snake's ability to control the bite reflex when performing a defensive bite rather than a bite intended to kill prey. Fang size is also important with some species such as the Gibbon Viper having significantly large fangs compared with some of the Australasian elapid species with fangs that may be more easily defended against with clothing and footwear. Better medical services and rapid access to effective antivenom will also reduce the incident of snakebite deaths despite significant envenomation, while many deaths go unreported.

Prevention

Many snakebites are preventable. A review of cases within more developed parts of the world suggests that snakebites tend to be associated with younger adult males with a high incidence of alcohol consumption. The location of the bite is often the distal limb, including the arm. In certain parts of the world, snakebites are an occupational hazard with a greater incidence in farming and fishing communities that may encounter snakes when tending the fields or fishing nets, respectively. Understanding the importance of pest control is also important with an increase in the local rodent population likely to attract natural predators such as snakes. Increasing human migration into snake habitats is likely to result in increased snakebites (Southeast Asia/Australia). Depending on the resilience of the snake species, the end result may be the eventual reduction in the native snake population as seen in areas of Northeast America.

First Aid Management

Safety is paramount and a number of rescuers/responders have become victims while trying to catch the snake for identification. Decapitated snakes may still be hazardous due to the presence of the bite reflex moments after death. In many areas first aid management may be the most important intervention due to the distance both geographically and in time from medical resources, if any. Any inoculated substance such as venom is likely to be subcutaneous, intradermal or intramuscular, unless the fang breached a blood vessel which is unlikely. Immediate effects are therefore likely to be local to the site of the bite and within the tissue planes penetrated. Systemic effects depend on absorption via the lymphatic system that drains the compromised tissues. For this reason, there is an opportunity to reduce absorption by limiting the mechanisms that promote lymph drainage. The patient should be removed from the immediate area, if the threat of further bites remains. The patient should be calmed and reassured. Most first aid measures suggested in the last few decades and in Hollywood (cutting the wound, sucking out venom) have no proven efficacy, may cause more harm and should not be used. Where venom is still present, it should be left in situ or wiped with a gauze or swab. The venom sample should be taken to the medical facility with the patient. In some facilities, especially in Australia where there are a number of species-specific antivenoms, venom can be used to identify the type of snake and therefore likely antivenom to be effective. In other countries, polyvalent antivenom may only be available.

The initial first aid measure is to reduce limb movements and rest the patient. Splintage will improve compliance and, where self-extrication of the patient is required, minimise absorption despite patient movement. The next intervention is the application of pressure dressings to the effected limb. When combined with splintage, this is called pressure immobilisation. The empirical use of this method is not universal as local pressure and reduction in tissue fluid and blood flow may worsen local effects especially of the myotoxic components in the venom. The advice therefore varies significantly between regions depending on the prevalence to species with venom that have a greater local effect than those with immediate life-threatening systemic effects (neurotoxins). This advice can also be applied to arachnid bite/stings discussed later. Advice for bites in SE Asia is to use pressure immobilisation only for elapid bites, while in Australia this method is recommended for all snakebites due to the higher prevalence of elapid species. A joint position statement in the US recommended against the use of pressure-immobilisation for *Crotalinae* bites. Once a pressure dressing has been applied, it should not be removed until the casualty has access to advanced resuscitation capability including ventilation and ideally antivenom. Within a medical facility, access to the snakebite wound may be made by windowing the dressing without reducing the pressure dressing to the whole limb. This allows for the assessment of local toxic effects such as ecchymosis as well as the sampling of any residual venom for identification. The removed dressing window may also be used for venom sampling. The diagnosis of a species can sometime be difficult in regions with several venomous and nonvenomous species. There may be significant colour variation even within a species (Fig. 39.1).



Fig. 39.1 Two taipan from the Northern Territory, Australia. (Note the different colouration in the same species) (Copyright S. A. Bland)

Investigation and Initial Patient Management

On arrival in a medical facility, the patient should be assessed for any obvious signs of envenomation. A history should be taken from the patient or witness with a description of the snake or safe handover of any snake remains. Symptoms the patient should be asked for include wound pain and neurological symptoms (paraesthesia, weakness, difficulty in speech or swallowing and double vision). Any bruising or bleeding should be noted as well as the colour of urine, especially if dark brown (rhabdomyolysis) or haematuria present (haemotoxic).

Where available venom identification kits should be used (Australia) or a herpetologist sought to assist in snake identification. The key question is whether the snake was venomous or not. The next question is whether the bite was dry or envenomation is likely. If envenomation occurred, the history, examination and investigations are vital to assess the risk benefit of antivenom use where available. In the absence of antivenom, management is supportive. The observed syndromes that the patient presents with may provide additional species identification or verification. It should be noted, however, that the complex nature of the venom might result in varying syndromes. The most important medical intervention, with or without antivenom is respiratory support in patients with neurological impairment. Repeated assessment is important and warning signs include increased anxiety, cranial nerve lesions, diarrhoea

and vomiting as well as deteriorating vital signs. Increasing local pain may suggest a compartment syndrome and this will be discussed later. ECG monitoring and serial 12 lead electrocardiograms should be carried out in view of the risk of primary cardiotoxicity and secondary causes such as autonomic dysfunction and hyperkalemia.

Laboratory investigations are useful especially for the early identification of coagulopathy and deteriorating respiratory function. Tests should therefore include renal function, clotting (INR, APTT, fibrinogen and fibrin-degradation products such as d-dimers) and, if not contraindicated, arterial blood gases. In resource-limited facilities, a 20-min whole blood clotting test has been described as a rapid assay for coagulopathy. This involves the use of a glass test tube and leaving a blood sample for 20 min. If the blood remains uncoagulated after this time, a haemotoxic syndrome should be suspected.

Antivenom

Antivenom is derived usually from animal subjects such as horse or sheep. It is a result of repeated sublethal exposures of the subject animal to specific venom. The result is a host immunological response against the proteins and the increase in IgG titres against the relevant antigens. The importance of understanding the mechanism of the action of IgG and derived Fab fragments is that the dose required for an effective treatment is dependent on the amount of circulating venom. There is a 1:1 interaction rather than a receptor antagonism mechanism of action for the antidote. The antivenom should therefore be titrated to effect rather than given as a dose per kilogramme of patient. For this reason, paediatric patients may require “adult” doses. Dose regimes may require a significant number of doses, in some cases over ten vials depending upon total venom injected and efficacy of the antivenom formulation (IgG vs. Fab fragments). Fab-based antivenom may have less acute hypersensitivity side effects and better tissue penetration.

The presentation of the antivenom varies regionally. Some antivenoms are polyvalent with broad species coverage. The disadvantage of empirical treatment with polyvalent antivenom is that there is a significant antigen load both in number and dose, if multiple doses are required. The reaction seen following antivenom administration ranges from the acute anaphylaxis to a delayed type III hypersensitivity reaction and serum sickness. It is recommended that any administration of polyvalent antivenom should be supported with full resuscitation facilities including the immediate access to adrenalin (for intramuscular use), histamine antagonists and corticosteroids. Delayed hypersensitivity reactions respond well to steroids. Some units advocate pretreatment with antihistamines and steroids before antivenom use. In some regions such as Australia, there are a number of species-specific antivenoms. In these areas it is advantageous to identify the species of snake, and as a result, there are often venom identification kits. In summary, the decision on the use of antivenom is dependent on the severity of symptoms, availability and experience of a clinician with the use of antivenom and its complications.

Other Treatments

Surgical Management

First aid, supportive management and antivenom are the mainstay of snakebite treatment. Other treatments may be necessary although their use in lieu of antivenom is not supported. The development of compartment syndrome requires immediate intervention. However, unlike traumatic compartment syndromes, the initial management should be antivenom due to the underlying aetiology. Surgery, in the form of fasciotomies, may have a role, but any coagulopathy should be treated prior to surgery and confirmed by compartment pressure measurement. The use of antivenom to reverse any coagulopathy may also reverse the compartment syndrome.

Fresh Frozen Plasma (FFP)

The treatment of any coagulopathy depends on the mechanism of action of the venom on the coagulation cascade. In some cases, FFP may “fan the flames of the coagulation fire”. However, where there is a consumptive disorder, there may be scope for judicious use of FFP especially if surgery is a consideration. In this circumstance, haematological investigations including fibrinogen levels should be considered, where available.

Renal Replacement Therapy

In some cases, the secondary effects of the venom including rhabdomyolysis will require renal dialysis until recovery has occurred.

Scorpion Stings

Scorpions (Scorpiones) are an order of arachnid. Other orders include spiders (Araneae), mites and ticks (Acari) and sun/camel spiders (Solpugida). Scorpions are found worldwide on most continents and the majority of species pose little threat to human life. Size is a poor predictor of the toxicity of the scorpion's sting and some of the most venomous species are relatively small with small pincers. Stings are often a result of human interaction with a scorpion using shoes or clothing for shelter.

Venom

Scorpion venom is primarily made up of neurotoxic peptides. These act either on ion channels or interfere with synaptic conduction either by depolarising or

non-depolarising effects. The effects are a combination of pain, sympathetic stimulation (via noradrenalin release) and cholinergic and anticholinergic syndromes. Most envenomations initially present with severe pain including hyperesthesia, usually without local tissue necrosis. Systemic toxicity is a combination of these syndromes and depends upon the timing and the dominant syndrome. While local pain may affect all casualties, systemic toxicity is more likely in the young and the elderly.

Treatment

Treatment is mainly symptomatic with strong analgesia for the pain that can persist for several days. Analgesia includes systemic analgesics (opiates, paracetamol) and local interventions such as immobilisation and avoiding contact with bed linen. Regional anaesthesia or local infiltration may also be highly effective for pain relief. Patients should be observed for up to 12 h for any signs of systemic neurological signs or symptoms. ECG monitoring should be considered. Any hypertensive crisis should be treated by vasodilators (nitroprusside or GTN) and anxiolytics.

Antivenom

Species-specific antivenom is available but again subject to regional variation. The evidence for the use of scorpion antivenom is not as strong as for snake antivenom. Early use is also suggested (<1 h), and this is unlikely to be met in most regions of the world and may reflect North American practice and pre-hospital care. Prevention remains the most important factor in reducing morbidity and mortality.

Spider Bites

The order of spiders (Araneae) has over 34,000 named species. In general, the toxic effects of a spider bite can be divided into two:

- Local effects due to the requirement for spiders to liquefy their prey to assist digestion (necrotic arachnidism). Secondary infection may also occur either due to inoculated bacteria from the spider fang or opportunistic infections. The initial presentation of a spider bite may have a broad differential diagnosis if the causation is unknown; this includes cellulitis, necrotising fasciitis, anthrax in endemic areas, Lyme disease and neoplastic lesions. The brown recluse spider causes significant local effects. The lesion may initially look ischaemic with a blanching circle around a bluish necrotic area.
- Systemic toxicity. Systemic effects vary between species, and some may on occasion be a result of the local effects. Unlike snakebites that may involve supralethal doses of venom, spider bites are within an order of magnitude of the

LD₅₀ for humans. As a result it is usually the larger members of the species or larger gender that are more venomous. Again, children are at greater risk of death following envenomation due to the reduced relative body weight.

Venom

The mechanism of action for the systemic toxicity of spider venom appears to be mainly neurotoxic. For example, the Australian funnel web spider increases the levels of acetylcholine in the synaptic cleft causing cholinergic-type symptoms although tachycardia is also described. The major concern is respiratory depression and pulmonary oedema, the later possibly due to increased sympathetic tone. The black widow spider also has neurotoxic venom causing presynaptic neurotransmitter release, resulting in severe muscle contractions and pain, especially in the abdominal wall resulting in severe abdominal pain.

Treatment

First aid includes pressure immobilisation as tolerated and cold compresses. Further management is mainly supportive. Some antivenoms exist but the risk-to-benefit balance of efficacy against the significant possibility of hypersensitivity means the threshold for its use is high.

Paralytic Tick Bites

A number of tick species in North America and Australia produce a salivary neurotoxin. The onset of the effects is insidious and the tick itself may go unnoticed. Symptoms include poor coordination, lethargy, blurred vision and a progressive paralysis. Alternative diagnoses include botulism and Guillain-Barre syndrome. The main intervention is the atraumatic removal of the tick including mouth parts, the most recommended method being the use of rounded forceps. Severe cases may require respiratory support until recovery. Other diseases associated with tick bites include allergic reactions, Lyme disease with its characteristic erythema migrans rash and rickettsial spotted fever.

Marine Envenomations

In coastal areas there are a number of animal species that have significant health effects. Human interaction with these species is primarily through local fishing industries and recreation. Sea snakes may be caught in fishing nets, and their

management is consistent with other life-threatening snakebites with pressure immobilisation and rapid access to medical facilities.

Venomous Fish

Most venomous fish use venomous spines for defence in addition to either camouflage (weaver fish/stone fish (Fig. 39.2)) or bright warning colours (lion fish). The venom is very painful, but in most fish species, it is heat sensitive. Treatment should include the immersion of the effected body part, usually a limb, into a water bath as hot as tolerated (approx 45 °C); pain usually subsides rapidly.

Jellyfish Stings

Some areas of coastline in the world are annually inaccessible to humans without protective suits due to the toxicity of some of its marine inhabitants. The box jellyfish (chironex) across the Northern Australian coast is an example (Fig. 39.3). Stings are extremely painful and lead to a very localised dermatonecrosis. A large surface area of stings may lead to systemic toxicity including a rapid onset cardiac arrest due to a number of dysrhythmias. Initial management consists of rinsing the sting with vinegar; this causes the sting mechanisms (nematocysts) to retract. Supportive management is required and analgesia. Box jellyfish antivenom is also available for systemic intoxication.

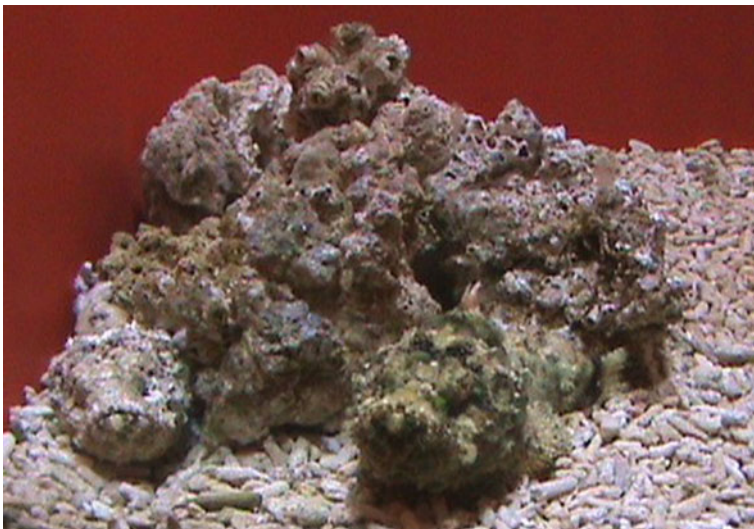


Fig. 39.2 Two stone fish, the most venomous fish (camouflaged) (Copyright S. A. Bland)

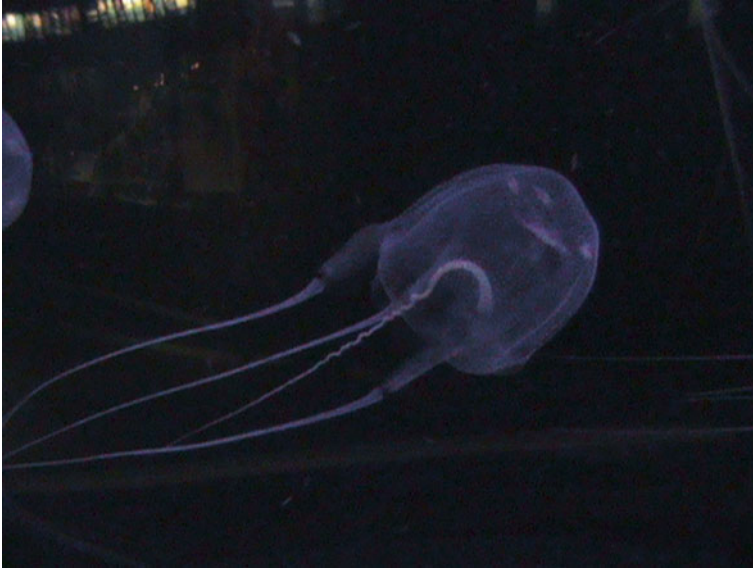


Fig. 39.3 Box jelly fish (chironex) (Copyright S.A. Bland)

Other species of jellyfish can cause a late (~2 h) presentation of severe muscle spasms, anxiety, some respiratory distress and headache. The syndrome, known as *Irukandji syndrome*, is significant as the initial sting may go unnoticed. Symptoms are usually self-limiting and resolve within 24 h with symptomatic treatment normally only required.

Octopus Bites

Some octopus species (blue-ringed octopus) are highly venomous. The venom is a very potent neurotoxic leading to respiratory paralysis. There is no antidote, and supportive treatment including ventilation is required until the patient recovers, usually within 24 h.

Cone Shell

Cone shells may result in acute paralysis with similar duration to the blue-ringed octopus. The initial injury may go unnoticed or seem negligible, but a rapid paralysis with or without myalgia can occur. Cranial nerve palsies may be the first signs of deterioration with visual disturbance, speech and swallowing disorders. Treatment is supportive.

Summary

Preparation for a medical mission must include an assessment of the local fauna and flora. Medical literature may be very region specific and as a result species specific. The most important factor in reducing deaths from any animal bite or sting is prevention with an understanding of the local environment. For many species, the use of venom in defence is wasteful especially in areas where food is often very scarce. It is not surprising that the most potent venoms are found in regions of the world that are barren, inhospitable and remote from medical resources. Understanding the mechanism of action of a specific venom allows a medical practitioner to predict and quantify the severity of an envenomation. Supportive management, including ventilation, may in many cases be the only treatment available. Most of the antidotes in the form of antivenom have varying efficacy, and all have the potential for life-threatening side effects. Pre-deployment preparation to areas with any venomous species should include awareness training and resource allocation based on appropriate risk assessments and access to medical facilities and antidotes (antivenom).

Further Resources

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Chapter 40

Acute Problems and Emergency Surgery: Head Injury

Andrew I.R. Maas and Walter Henny

Abstract The authors of this chapter include specialists, many of whom have extensive deployment experience. The target group of this chapter, however, is not their fellow specialists, but the “junior” doctors, trying to help them find their way in the difficulties posed by an “adverse” environment. That junior doctor will be confronted by all imaginable ailments and injuries and should be a true generalist. As we’re all aware, even in medical school nowadays, there’s a tendency to make students choose the direction of their future work at an ever earlier stage, the opposite of what’s needed for a generalist.

Keywords Triage • Trauma and medical emergencies • Ballistic and blast injury • Infectious diseases • Climatic influences • Bites and stings • Maxillofacial problems • Head and spinal cord injuries • Abdominal complaints • Non-traumatic surgical emergencies • Soft tissues and skeleton • Surgery in the tropics • Anaesthesia and analgesia • Hostile environments • Disaster environments • Conflict environments • Catastrophe environments

Objectives

- To describe management and treatment for TBIs and PBIs in a hostile environment

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Introduction

Traumatic brain injury (TBI) constitutes a major health and socioeconomic problem throughout the world and forms an important aspect of combat-related injuries. The type of brain injury sustained in the military situation is different from that more commonly observed in the civilian population. In the military situation blast injuries and penetrating injuries are more frequent, whilst closed TBI is the predominant type in the civilian population. Closed TBI may result from acceleration/deceleration forces (causing diffuse injuries with damage to axons) or from blunt impact to the head (mainly causing focal contusional damage).

Blast injuries have been identified as a novel entity within TBI, and the term “a new beast” has been used to characterise this entity (Gean 2007). Blast injuries mainly result from improvised explosive devices, both in the military and unfortunately also in the civilian situation due to terrorist activities. Explosive blast accounts for over 60 % of combat casualties occurring during deployment in Afghanistan and Iraq. Our understanding of the pathophysiology of blast-related TBI is still incomplete. Primary, secondary, tertiary and quaternary blast effects contribute to the complexity of blast TBI. The primary injury results from physical forces with rapid pressure waves caused by the detonation. Secondary injury occurs from matter and debris thrown by the explosion. Tertiary injury occurs when the patient is thrown by the explosive blast, and quaternary injury is caused by other factors such as burns or toxic fume inhalation. Clinical severity of blast TBI can vary from very mild with perhaps only a brief period of confusion to severe, resulting in coma or death. Approximately 20 % of military personnel returning from deployment screen positive for having suffered mild blast TBI. Symptoms of mild blast TBI may, however, overlap with those of post-traumatic stress disorder. Severe blast TBI is characterised by early brain swelling, prominent vasospasm and subarachnoid haemorrhage. Outcome in these patients may be surprisingly good following intensive care including a decompressive craniectomy (Ecker et al. 2011; Ling et al. 2009).

Penetrating brain injury (PBI) commonly results from debris from IEDs and from shell and shrapnel injuries. These are generally low-velocity injuries, frequently causing a depressed skull fracture and cortical contusions with a very similar pathophysiology compared to closed civilian head injury. Gunshot injuries may be perforating (through and through), penetrating (missile lodged within the head) or tangential (glancing off the skull). Penetrating injuries due to higher-velocity projectiles result in a complex wounding pattern with extensive damage both produced by a shock wave preceding the projectile and more specifically by a temporary cavitation effect in the wake of the projectile following its passing. The resulting tract of injury is often several times the size of the passing projectile. In blast TBI characteristics of closed head injury and of penetrating brain injury often occur in combination. General therapeutic goals, both for PBI and for blast TBI, are very similar to those for closed head injury:

1. Prompt diagnosis and timely evacuation of an intracranial hematoma. Most feared are cases where a seemingly minor injury leads to intracranial haemorrhage, with rapid neurological deterioration. Immediate operative treatment can

be life saving with patients obtaining a full recovery, whilst any delay may result in the death of the patient.

2. Prevent and limit secondary brain damage. An important concept in traumatic brain injury is that the primary damage initiates a complex sequence of events leading to secondary damage, potentially amenable to treatment. Secondary damage can result from intrinsic pathophysiologic mechanisms occurring within the brain and/or due to systemic events such as hypoxia and hypotension. The latter can be prevented. A major focus in the management of head injury is therefore to ensure adequate perfusion and oxygenation of the brain.

General approaches to management have become standardised and are summarised in widely accepted international guidelines, covering different aspects of TBI management (Table 35.1).

Medical personnel operating in an austere environment, however, have to constantly ask themselves which of these guidelines is applicable in their actual situation.

The following recommendations are aimed at non-specialist medical personnel.

Prehospital Care

Experience in recent deployment activities has shown that styles of combat have changed the nature of warfare and that developments in weapon and armour technology have also influenced the number and severity of injuries sustained by military personnel. Injuries are mainly caused by improvised explosive devices that occur often in more isolated situations and outside the setting of possible battlefield chaos. Thus, evacuation to a mobile hospital can occur more rapidly. Recommendations for care in the prehospital setting include:

- A high level of suspicion for the risk of TBI is appropriate in all patients injured in the proximity of a blast explosion. Any individual who has been within a 50m. radius of a blast explosion should be screened for possible TBI.
- All casualties with head injury and/or traumatic loss of consciousness should be ABC stabilised, as far as possible given the circumstances.
- Hypotension and hypoxia should be prevented, with a target blood pressure of at least 90 mmHg and a target SaO₂ of at least 90 % (if pulse oximetry is used).
- In the event of (relative) hypovolemia fluid resuscitation is essential, administration of hypertonic saline has the benefit of reducing raised intracranial pressure. If used, the volume of hypertonic saline administered should not exceed 500 ml.
- If clear neurological deterioration develops, hyperosmolar fluids should be administered.
- In penetrating TBI intravenous antibiotics are indicated, if available.
- Cervical spine immobilisation is recommended in casualties with:
 - GCS < 15
 - Neck pain or tenderness
 - Focal neurological deficit
 - Paraesthesia in the limbs

Care at a Medical Treatment Facility

The extent and level of treatment depends to a high degree on the availability of diagnostic facilities (CT scan) and therapeutic facilities (neurosurgery and intensive care including the availability of mechanical ventilation). In the absence of appropriate facilities for treating severely injured patients, all such casualties should be immediately transferred to a tertiary care facility following initial stabilisation. All casualties should be approached according to ATLS standards.

ABCDE (Primary Survey): Important Items for Head-Injured Casualties

- Intubation and ventilation should be considered in casualties with:
 - GCS < 9
 - Bradypnea (<10), spontaneous hyperventilation (exclude hypoxia first)
 - Bilateral maxillofacial fractures
 - Copious bleeding into mouth (e.g. from skull base fracture)
 - Seizures, not responding immediately to medication
- ICP-directed management (moderate hyperventilation, hyperosmolar fluids) is indicated when signs of herniation are present.
- In the absence of signs of herniation, hyperventilation should be avoided during the first 24 h after injury.
- Maintain adequate ventilation and circulation.
- Immediate CT scanning is indicated; if neurological deterioration occurs, signs of herniation develop or the patient is unconscious.
- Cervical spine immobilisation should be maintained until the spine can be cleared, following the ATLS guidelines.

Secondary Survey: Important Items for Head-Injured Casualties

History

The following should be addressed:

- Initial level of consciousness and any changes thereof as measured by GCS
- Mechanism of injury (blast, shell/shrapnel, gunshot, accident)
- Neurological deficits (weakness, paresis of arm/leg)
- Persistent headache, vomiting and seizure

- Altered behaviour
- Medication (anticoagulants in particular), drugs and alcohol

Neurological Evaluation

Neurologic examination should focus on the most relevant aspects for trauma and can be performed within a few minutes. Detailed neurologic examination including a full assessment of all reflexes is not required. The most relevant aspects for evaluation are:

- The level of consciousness (GCS)
 - The values for E(yes), M(otor) and V(erbally) should be determined separately, ideally in an ABC-stabilised patient, before neuromuscular blocking agents or opiates are administered.
- Pupils: size and reactivity
 - The development of pupillary asymmetry or unresponsive pupil is a warning sign of impending herniation, possibly caused by an enlarging intracranial hematoma requiring prompt diagnosis and intervention.
- Focal deficits
- Signs of a penetrating head injury (the entry wound may be small)
- Signs of a skull base fracture:
 - Clear fluid running from the ears or nose
 - Black eye with no associated damage around the eyes
 - Bleeding from the ears
 - Bruising behind the ears

A skull base fracture does not require any immediate therapy, but can increase the risk of meningitis occurring.

Laboratory

- Blood gas analysis (to ensure adequate oxygenation and to exclude inadvertent hyperventilation)
- Glucose
 - In all patients with a decreased level of consciousness, hypoglycaemia should be excluded: hyperglycaemia is related to poorer prognosis and should be avoided.
- Electrolytes (hyponatraemia may aggravate the development of cerebral oedema)
- Coagulation parameters (TBI can cause coagulopathy; the presence of coagulopathy carries a substantially increased risk for the development of a progressive intracranial hematoma and is related to poorer outcome.)

Imaging

- Immediate CT scanning following initial stabilisation is indicated in all patients with a GCS ≤ 8 and in all patients with neurological deterioration.
- Ideally, CT scanning should be performed in all patients with GCS ≤ 14 at any point since the injury and in patients with a GCS of 15 in the presence of risk factors:
 - Suspected open or depressed skull fracture
 - Any sign of basal skull fracture
 - Post-traumatic seizure(s)
 - Focal neurological deficit
 - More than one episode of vomiting
 - Retrograde amnesia > than 30 min
 - Age over 65 years
 - Warfarin use
- In the absence of CT facilities, all patients with a GCS ≤ 12 should be transferred to a tertiary care facility as soon as possible. In patients with a GCS of 13–15, careful neurologic observation may be acceptable.
- CT scanning – or in the absence of CT facilities, conventional X-rays – of the cervical spine should be performed in patients with:
 - GCS ≤ 15 at the time of assessment
 - Paraesthesia in the extremities
 - Focal neurological deficit
 - Contraindication for functional examination of the spine (pain in the neck, midline tenderness on palpation)
 - Inability to actively rotate neck to 45° to the left and right
 - Age over 65 years
- Specialist workup including CT angiography is recommended in PBI when a vascular injury is suspected. An increased risk of vascular injury is present if:
 - The wound trajectory passes through or near a major vessel trajectory, either arterial or venous, and in the presence of an intracranial hematoma. Awareness should exist of the increased risk for developing a traumatic intracranial aneurysm.

Treatment

As mentioned in the introduction, this text has been written primarily for non-specialist personnel. Here we limit a summary to the most important aspects, without describing the specialist care in detail.

Surgical Management

Surgical indications include intracranial hematoma (epidural, acute subdural or intracerebral), elevation of a depressed skull fracture, management of penetrating injury and performing a decompressive craniectomy for treatment of raised intracranial pressure. Generally, these operative procedures should be performed by a neurosurgeon. However, a general surgeon may be the only one with operative skills who is available or who can be reached. In those circumstances we recommend the following approaches:

- Patients with an epidural hematoma and loss of consciousness should be operated immediately without any delay. The preferred procedure is to perform a small craniectomy to release the pressure of the hematoma. As long as this pressure is successfully released, the patient can be transferred for secondary final operation at a tertiary centre.
- Patients with an acute subdural or intracerebral hematoma should be referred for neurosurgical care without delay.
- Patients with a blast injury and raised intracranial pressure should be referred for neurosurgical care immediately. Early decompressive craniectomy is recommended in these patients (Ecker et al. 2011).
- The entry opening of a penetrating head injury may be managed by simple wound closure and the patient secondarily transferred.
- A closed, depressed skull fracture can be managed conservatively.

Conservative Treatment

- Careful, clinical monitoring (GCS and pupillary reactivity) is the most important element of conservative management.
- Patients in need of specialist treatment for raised intracranial pressure should be transferred for tertiary care.
- Prophylactic antibiotic treatment is indicated in patients with penetrating brain injury. Antibiotics are not indicated in other cases.
- Prophylactic antiseizure medication is only indicated in patients with penetrating head injury.
- There is no place for the administration of steroids or calcium channel blockers (nimodipine).

Observation

Any patient who has suffered an objectively confirmed diagnosis of TBI will not be fit to return to combat duty at short notice. All such patients should therefore be transferred outside the combat area. Indications for consultation and rapid transfer include:

- Definite or suspected blast or penetrating TBI
- Cerebrospinal fluid leak
- Unexplained confusion which does not clear quickly
- GCS of 13 or less
- Persisting coma (GCS less than or equal to 8) after initial resuscitation
- Progressive focal neurological signs
- Seizure without full recovery
- Relevant abnormalities on imaging
- Need for imaging (previously discussed), in the absence of a CT scanner
- Deterioration during observation (previously discussed)

If transfer is impossible (because of weather, tactical/political situation, etc.), consultation via telemedicine should be sought and the patient observed.

Patients are admitted for observation:

- If they have no indication for referral but their GCS is below 15
- If an indication for referral exists, but transfer is not possible

The latter category is at a distinct risk.

Items to be documented during observation:

- GCS
- Pupil size and reactivity
- Limb movements
- Respiratory rate
- Heart rate and blood pressure
- Temperature
- Blood oxygen saturation

Frequency of observations:

- Half-hourly until GCS 15 has been achieved
- Thereafter:

Half-hourly for 2 h

Then one hourly for 4 h

Then two hourly

- When deteriorating: half-hourly

Consultation should be sought and transfer considered if during observation:

- Agitation or abnormal behaviour develops.
- There is a sustained (>30 min) drop of one point in motor level or any drop of greater than two points in GCS level regardless of duration.
- Severe or increasing headache or persisting vomiting occurs and new or evolving symptoms or signs (pupils/lateralization) are seen.

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Chapter 41

Acute Problems and Emergency Surgery: Dental, Maxillofacial, Eye, and ENT

Jan L.N. Roodenburg

Abstract The authors of this chapter include specialists, many of whom have extensive deployment experience. The target group of this chapter, however, is not their fellow specialists, but the “junior” doctors, trying to help them find their way in the difficulties posed by an “adverse” environment. That junior doctor will be confronted by all imaginable ailments and injuries and should be a true generalist. As we’re all aware, even in medical school nowadays, there’s a tendency to make students choose the direction of their future work at an ever earlier stage, the opposite of what’s needed for a generalist.

Keywords Triage • Trauma and medical emergencies • Ballistic and blast injury • Infectious diseases • Climatic influences • Bites and stings • Maxillofacial problems • Head and spinal cord injuries • Abdominal complaints • Non-traumatic surgical emergencies • Soft tissues and skeleton • Surgery in the tropics • Anaesthesia and analgesia • Hostile environments • Disaster environments • Conflict environments • Catastrophe environments

We would like to acknowledge that Peter Dyer was a co-author of this subchapter on Dental, Maxillofacial, Eye and ENT in the previous edition, and that subchapter served as the starting point for this updated and revised subchapter.

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Objectives

- To describe dental, maxillofacial, eye and ENT conditions and injuries as well as a support for the general practitioner so that he/she can decide whether to start a therapy or refer the patient to a higher echelon
- To describe treatments/therapies for this

Introduction

Most of the pathology in this area needs treatment by specialist. This chapter is a support for the general practitioner to decide on starting a therapy or referral of a patient to a higher echelon.

Especially in head and neck trauma cases, the principles of Battlefield Advanced Trauma Life Support (BATLS) should be followed. The airway and cervical spine (A), circulation (C) and disability (D) can be involved. In case of referral, the patient should be stabilised for (potential) A, B and C problems.

Advanced inflammations in this area can cause life-threatening situations like airway obstruction and spread to the neck and finally the mediastinum.

Dental***Introduction***

Those conditions involving the mouth and oral structures may be divided into two groups:

- Hard tissues (including the teeth and bony anatomy of the face)
- Soft tissues

Nomenclature

The mouth is divided into four quadrants to identify the teeth and the site of intra-oral lesions. Both the upper and lower arches are divided into the patient's left and right as viewed from looking directly into the mouth. The teeth are named as follows, starting at the midline:

- Incisors
- Canines
- Premolars (only found in adults)
- Molars

There are 20 primary teeth (deciduous teeth) in children. When looking into the mouth, the teeth are sequentially numbered 1–5 starting from the midline. The quadrants are numbered 5=upper right, 6=upper left, 7=lower left and 8=lower right. The 64, called “six four”, is the upper left first deciduous molar.

In adults there are 32 permanent teeth which are sequentially numbered from 1 to 8 starting from the midline. The quadrants are numbered 1=upper right, 2=upper left, 3=lower left and 4=lower right. The 43, called “four three”, is the lower right canine.

Examination of the Mouth

The mouth should be examined with a good light (headlight), with a suction and with the aid of a dental mirror or spatula. The patient will normally be able to point to the affected side of the mouth and may be able to identify the exact location of the problem.

Tapping a tooth with the handle of the mirror may elicit a painful response if there is a significant problem like an inflammation of the dental pulp or a traumatic injury of the tooth or the jaw. If in doubt, apply a cold stimulus such as ethyl chloride on a pledget of cotton wool to the tooth. A short reaction that disappears after removal of the stimulus indicates a vital dental pulp. Increase of pain intensity or duration is a sign of pulpitis.

Hard Tissues

Toothache

1. Pulpitis (inflammation of the pulp) is the commonest cause of dental pain. The main causes are:

- Dental caries
- Fracture of the tooth
- Dental treatment (exposure of the nerve)

The symptoms of pulpitis are:

- Pain (sharp and stabbing in nature)
- Hypersensitivity to hot and cold stimuli
- Patient kept awake at night because of pain

Examination of the mouth may reveal a carious (decayed) tooth. The main treatment is either to remove the pulp (nerve) from the tooth or to extract the tooth. Dental cement containing oil of cloves can be applied to the tooth as a temporary analgesic measure.

2. Periapical periodontitis is inflammation of the periodontal membrane around the apex of a tooth. It is due to spread of infection following the death of the pulp. The symptoms are as follows:

- Pain on biting on the tooth (which can be extruded out of the socket)
- Worsening pain (throbbing in nature)
- Hot and cold stimuli have no effect

Treatment is again aimed at either saving the tooth or extracting it.

3. A dental abscess occurs when infection persists around the apex of the tooth following periapical periodontitis. Pus may spread directly into the surrounding soft tissues and emerge into the mouth or onto the face. The patient may complain of pain swelling in the mouth or on the face. Examination may reveal an unwell patient with pyrexia. They may not have eaten or drunk recently due to trismus (difficulty in opening the mouth). The position of the swelling will indicate the tooth that is the source of infection. This is illustrated next.

Name of tooth and position of swelling

<i>Upper teeth</i>	
Central incisor	Upper labial sulcus
Lateral incisor	Anterior palate
Canine	Inner canthus of eye
Premolars	Upper buccal sulcus
Molars	Upper buccal sulcus
<i>Lower teeth</i>	
Central incisor	Lower labial sulcus
Lateral incisor	Lower labial sulcus
Canine	Lower buccal sulcus
Premolars	Lower buccal sulcus
Molars	Lower buccal sulcus
2nd and 3rd molars	Submandibular space

The intraoral abscesses need drainage.

Abscesses in the submandibular space, the floor of the mouth and the parapharyngeal area can extend to the neck and finally the mediastinum and be life-threatening. Drainage of all abscesses under general anaesthesia is mandatory within a few hours! These patients need intravenous fluid replacement and antibiotics. The antibiotic currently suggested is a broad-spectrum penicillin, although metronidazole is also effective. The source of the infection should be extracted after reduction of the acute signs of the inflammation.

Post-Extraction Haemorrhage

The causes of bleeding following the extraction of a tooth are listed herewith:

- Trauma to the bone socket
- Soft-tissue trauma

- Bleeding disorder
- Anticoagulant therapy
- Infection
- Failure to follow post-operative instructions

The patient should be examined in a good light and preferably with an assistant to suck away any blood. The tooth socket should be examined for signs of excessive trauma. The treatment is described herewith:

- Reassure the patient and instruct them to sit down quietly.
- Ask them to bite on a rolled-up piece of gauze placed over the socket for half an hour.
- If the bleeding persists, the socket should be sutured using a local anaesthetic (2–4 ml 1 in 80,000 adrenaline and 2 % lignocaine) infiltrated around the area. If that is not effective, the socket can be plugged with a gauze soaked with Vaseline or with a clot-stimulating product.
- The patient should avoid rinsing or hot drinks for 12 h.
- Lay in bed with an elevated head.

Injury to the Teeth

Teeth may be *avulsed* (completely lost from the socket), *extruded* (partially lost from the socket), *intruded* into the socket or *subluxed* (displaced in a forward, backward or sideways direction).

Injuries to the tooth may be confined to the enamel, the dentine and the enamel or extend below the level of the gum. A fracture of the tooth may involve the pulp and be painful.

A tooth which has been completely avulsed (usually a front tooth) should be managed in the following way:

- Instruct the patient to reinsert the tooth into the socket immediately and hold it in place until seen.
- Alternatively, advise the patient to place the tooth into a container of milk and to bring it to the carer as soon as possible.
- Under local anaesthetic, wash the socket using saline and reimplant the tooth within 2 h after transport in an adequate medium.
- Temporarily hold the tooth in place using wire from a paper clip and a dental adhesive
- Antibiotics should be prescribed and tetanus prophylaxis should be given.

If a tooth or a fragment of a tooth is missing, a chest radiograph is necessary to exclude the possibility of inhalation.

Fractured teeth involving the pulp may be dressed using a calcium hydroxide paste in the exposed surface.

Injuries to the Bones of the Face

Injuries to the face are usually assessed during the secondary survey. However, some injuries may be life-threatening and should be managed during the primary survey and resuscitation phases.

1. Mandibular Fractures

- Mobile fragments of jaw
- Teeth not meeting properly (malocclusion)
- Sublingual haematoma
- Step deformity along the line of the jaw
- Anaesthesia of the mental nerves (lower lip and chin)
- Reduced mouth opening

2. Zygomatic Fractures

- Depression of the cheek
- Infraorbital swelling
- Periorbital haematoma
- Unilateral bleeding from the nose
- Anaesthesia of the infraorbital nerve
- Redness of the eyeball
- Diplopia
- Steps lateral and/or inferior rim of the orbit
- Step at the zygomatic-maxillary rim (intraoral, lateral of the first molar)

3. Maxillary Fractures

- Mobile maxilla (Le Fort I), including nose (Le Fort II) and including orbits (Le Fort III). Can be absent due to impaction of the fragments
- Teeth not meeting properly (malocclusion)
- Bilateral facial swelling
- Bilateral periorbital haematoma
- Bilateral bleeding from the nose
- Bilateral steps at the zygomatic-maxillary rim (intraoral, lateral of the first molar; Le Fort I and II)

4. Nose Fractures

- Bleeding from the nose
- Asymmetry
- Movable at the frontal bone
- Haematoma of the septum

Beware, nose bleeding can be a symptom of a skull base fracture!

Life-threatening injuries in the face which may compromise the airway, particularly in a patient with an associated head injury, are listed here:

- Displacement of the fractured maxilla
- Loss of tongue control (occurs with a bilateral fracture of the mandible or chin area)

- Foreign bodies, e.g. teeth, dentures, bone fragments, vomitus or haematoma
- Haemorrhage
- Soft-tissue swelling and oedema
- Direct trauma to the larynx and trachea

Cervical spine injury occurs in 2 % of facial trauma cases and must always be considered. The spine should be protected with a cervical collar and appropriate radiographs obtained.

5. *Dislocation of the Jaw*

This may follow trauma to the jaw or be caused by simply yawning widely. The symptoms are:

- The mouth is fixed open.
- The patient is unable to speak.
- Drooling saliva.
- Considerable pain.

The jaw can be relocated by laying the patient with the clinician standing in at the side of the patient. The fingers of both hands, wrapped with gauzes, are placed over the posterior lower teeth, and both thumbs are placed under the chin. With the fingers, traction is applied in a downward direction, and by pressure of the thumbs, the joint is repositioned. The clinician can feel the jaw move back into the correct position and the patient has immediate relief. Occasionally sedation (10 mg diazepam iv) may be required, particularly if the patient is anxious or if the dislocation happened some time before.

Soft Tissues

There are a number of conditions which commonly affect the soft tissues of the mouth. The gingivae (gums) may be affected by:

- Chronic periodontal disease
 - Acute necrotising ulcerative gingivitis (ANUG)
 - Acute pericoronitis
 - Ludwig's angina
 - Trauma
1. *Chronic periodontal disease* is very common and is caused by plaque or calculus (tartar) building up around the teeth. This can be a local or a generalised problem. The main reason for this is inadequate brushing of the teeth. The patient usually complains of halitosis and bleeding from the gums on brushing. The dental sulcus depth is increased over 3 mm. Treatment is professional cleaning of the teeth and oral hygiene instruction.
 2. *Acute necrotising ulcerative gingivitis* (ANUG) (trench mouth) may occur in epidemic form especially in institutions. It is often preceded by immune suppression by:

- Viral respiratory infection
- Fatigue
- Immune defects

The symptoms are:

- Widespread soreness of the gums
- Spontaneous bleeding of the gums
- Characteristic halitosis
- Pyrexia and malaise
- Cervical lymphadenopathy

The appearance of the gums is diagnostic. The papillae (between the teeth) are ulcerated, tender and bleed to the touch. ANUG is managed by gentle cleansing with a toothbrush and diluted hydrogen peroxide. Metronidazole is the appropriate antibiotic. The patient must be considered infectious. Use of cutlery and toothbrush by others should be avoided. The patient must not be involved in preparation of food for others.

3. *Acute pericoronitis* is an infection of the gum around a partially erupted lower wisdom tooth (3rd molar). The symptoms are:

- Pain ranging from mild to severe
- Bad taste in the mouth
- Halitosis
- Difficulty in opening the mouth
- Cervical lymphadenopathy
- Occasionally pyrexia and malaise

The immediate treatment is antibiotic therapy with penicillin or metronidazole. Hot salt mouthwashes are helpful. If the patient is unwell, intravenous fluids should be commenced. There is a potential risk for abscesses (see earlier) and the airway. Extraction of the tooth, after treatment of the acute symptoms, will prevent further episodes of infection.

4. *Ludwig's angina* is a rare but life-threatening spreading infection usually from a lower molar tooth. Both sides of the floor of the mouth become swollen, and the tongue is raised up against the roof of the mouth. Swelling spreads below the lower jaw on both sides to compromise the airway. This must be treated immediately with high-dose antibiotics and drainage of all the infected tissue spaces. Occasionally tracheostomy is needed.
5. *Trauma*. Bleeding from the soft tissues of the mouth, face and scalp may be profuse due to the good blood supply in that the area. Fractures of the facial bones can also produce considerable haemorrhage. Life-threatening bleeding due to airway obstruction or hypovolaemic shock must be managed in the primary survey:
 - Open wounds should be assessed for blood loss.
 - Open wounds should be cleaned using chlorhexidine solution (0.05 % chlorhexidine gluconate) and covered with a sterile dressing.

- Simple nosebleed (epistaxis) may be controlled by direct digital pressure the lower nose.
- Closed wounds may produce bleeding from the nose and mouth. The nose may be packed using ribbon gauze anteriorly and a 12/14 G Foley catheter and balloon posteriorly.

Eye Injuries

- Periorbital haematoma (black eye) may be due to soft-tissue injury or an underlying fracture of the cheek bone (zygoma) or maxilla.
- The eye must be examined and the visual acuity (ability to see) tested.
- Foreign bodies should be left in situ and the eye covered with a non-compressive pad.
- Penetrating foreign bodies must not be removed.
- If the globe is disrupted, the eye should be covered with a non-compressive pad.
- If chemicals enter the eye, copious amounts (500–1,000 ml) of normal saline, sterile water or Hartmann's solution should be used to wash the eye.

N.B. patients with foreign body injuries should be referred to an appropriate surgical team if one is available.

Ear, Nose and Throat

Examination of the patient should be in a good light, preferably using a mirror. Common problems include:

- Infections
- Foreign bodies
- Trauma (previously discussed)

Infections

1. *Acute otitis externa* is inflammation of the ear canal and may be due to trauma or eczematous ear canal skin. The symptoms are:
 - Mild irritation to severe pain, discharge from the ear canal
 - Hearing loss

Treatment consists of gentle removal of ear canal debris and application of antibiotic/steroid drops, ointment or spray.

2. *Acute otitis media* is inflammation of the middle ear and is common in children. Symptoms include:

- Recent upper respiratory tract infection.
- Severe earache, which may be bilateral.
- Pyrexia and malaise.
- Rupture of eardrum produces relief of pain.

Treatment consists of bed rest, antibiotics, painkillers and nose drops to reduce mucosal swelling.

3. *Acute mastoiditis* may occur if acute otitis media is inadequately treated. It is often seen in young children and the symptoms are:

- Severe pain
- Pyrexia and tachycardia
- Swelling and redness behind the ear

Intravenous antibiotics and surgical intervention ASAP are necessary.

4. *Acute pharyngitis* commonly occurs following a viral infection. The patient will complain of:

- Difficulty in swallowing
- Feeling unwell

Treatment is aimed at relieving the symptoms and includes fluids and painkillers.

5. *Acute tonsillitis* is seen in children and the symptoms include:

- Sore throat
- Difficulty in swallowing
- Pyrexia and malaise
- Cervical lymphadenopathy

Treatment includes bed rest, painkillers, antibiotics and fluid replacement.

6. Quinsy (peritonsillar abscess) occurs as a complication of acute tonsillitis and is more common in adults. An abscess forms around the tonsil causing the patient to complain of:

- Sore throat on the affected side
- Difficulty in swallowing and dribbling saliva
- Change in the voice (hot potato quality)
- Malaise
- Difficulty in opening the mouth (trismus)
- Earache
- Cervical lymphadenopathy

Intravenous antibiotics and drainage of the abscess are essential for treatment. Beware of airway problems and spreading to the neck or even the mediastinum.

7. *Supraglottitis* affects children between 3 and 7 years of age and requires urgent management. It is characterised as follows:

- Stridor (noisy breathing resulting from an upper airway obstruction)
- Sore throat
- Mouth breathing and dribbling

Immediate treatment with intravenous antibiotics (chloramphenicol) is essential. Beware of the airway. In case of oedema corticosteroids can be considered. If in doubt a cricothyroidectomy must be performed.

Foreign Bodies

1. Ears

- Commonly occurs in children.
- Earache may be the presenting complaint.
- Can be removed either by grasping the foreign body with forceps or gentle syringing (providing that the item is not vegetable matter which may swell).
- General anaesthetic may be required for children.

2. Nose

- Commonly found in children.
- Foul discharge from a nostril may be the presenting symptom.
- Can be removed by visualising the object and grasping it with forceps.
- General anaesthetic may be required for children.

3. Throat

- An object may lodge anywhere in the pharynx or laryngotracheobronchial tree.
- May cause scratching, tearing or perforation of the mucosa.
- Differentiation must be made between inhaling and swallowing the foreign body.
- Inhalation may be suggested by a sudden onset of coughing. Chest infection may be the presenting symptom.
- If the airway is compromised, a sharp blow to the back may dislodge the item.
- A general anaesthetic may be needed to remove a foreign body.
- In case of a high airway obstruction, a cricothyroidectomy must be performed.

Suggested Further Resources

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Chapter 42

Acute Problems and Emergency Surgery: Abdominal Complaints and Acute Surgical Emergencies

Walter Henny and David M. Nott

Abstract The authors of this chapter include specialists, many of whom have extensive deployment experience. The target group of this chapter, however, is not their fellow-specialists; but the “junior” doctors, trying to help them find their way in the difficulties posed by an “adverse” environment. That junior doctor will be confronted by all imaginable ailments and injuries, and should be a true generalist. As we’re all aware, even in medical school nowadays there’s a tendency to make students choose the direction of their future work at an ever earlier stage; the opposite of what’s needed for a generalist.

Keywords Triage • Trauma and medical emergencies • Ballistic and blast injury • Infectious diseases • Climatic influences • Bites and stings • Maxillofacial problems • Head and spinal cord injuries • Abdominal complaints • Non-traumatic surgical emergencies • Soft tissues and skeleton • Surgery in the tropics • Anaesthesia and analgesia • Hostile environments • Disaster environments • Conflict environments • Catastrophe environments

We would like to acknowledge that Adam Brooks was a co-author of this subchapter on Abdominal Complaints and Acute Surgical Emergencies in the previous edition, and that sub-chapter served as the starting point for this updated and revised subchapter.

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Objectives

This part deals with surgical, (mainly) non-traumatic emergencies. It describes the range of abdominal complaints and conditions which may present and suggest a management approach suitable both for the hostile and for the more secure environment. Specifically, the following are discussed:

- Inflammation of the peritoneum
- Obstruction of a hollow viscus (small bowel, large bowel, biliary tract, urinary tract)
- Bleeding (intraperitoneal, retroperitoneal, intraluminal)
- Acute pancreatitis and mesenteric ischaemia, urinary tract infection and acute pyelonephritis, testicular torsion and acute epididymo-orchitis and haematoma of the abdominal wall

Introduction

Acute conditions should immediately make the responsible health professional ask:

1. Does this patient need operative treatment?
2. Can I provide that treatment or should the patient be transferred?

If the former question has been answered negatively, the patient should be reassessed frequently: the patient may deteriorate in which case the treatment plan may have to be altered.

The answer to the latter question depends in the first place on your own skills and the availability of resources; in an austere environment other factors such as possibility of transportation, distance to and capabilities of the next treatment facility and the tactical situation have to be taken into account as well.

In this part the following acute conditions will be discussed:

- Abdominal complaints
- Other surgical emergencies
 - Superficial abscesses
 - Acute ischaemia of a limb

Abdominal Complaints

Referring to Chap. 35 Non trauma, it should be understood that what is described next is part of the section “[Secondary assessment](#)”.

In assessing patients with abdominal complaints, it should be realized that there are several confounders:

- Abdominal complaints may be caused by disease processes located outside the abdomen: myocardial infarction and pneumonia. Also the chest should be examined in all patients with abdominal complaints.
- Systemic abnormalities may present as abdominal complaints: uraemia, diabetes mellitus, acute porphyria, sickle cell crisis and lead intoxication. These possibilities should be addressed in the history.
- Medications such as morphine and corticosteroids will assuage the severity of complaints and the findings at physical examination.
- Complaints and findings may be less clear-cut in young children and the elderly.

Whilst assessing the patient, the essential question is: does this patient need surgery? You should be thinking in “processes”; the exact organ which gives rise to the presenting complaints is, with a few exceptions, less important.

Assessment rests on three pillars:

- History
- Physical examination
- Laboratory tests and imaging (*in an austere environment often not or hardly available, which may necessitate transfer*)

History

This should cover:

- Age and sex
- Complaints and their characteristics
 - Most important complaint
 - Sudden or gradual onset
 - Site and possible movement of pain
 - Radiation of pain
 - Constant or fluctuating pain
 - Relieving and aggravating factors
 - Appetite
 - Vomiting: frequency and aspect of vomitus
 - Flatus, constipation and diarrhoea
 - Micturition: frequency, pain
 - Bleeding from orifices
 - Menstrual cycle, vaginal discharge
 - Fever
 - Medications
 - Allergies

Physical Examination

This should cover:

- General impression
 - Well/unwell
 - Pale and jaundiced
 - Lying still/agitated
- Vital signs
 - Pulse
 - Blood pressure
 - Respiratory rate
 - Temperature
- Chest (lung base consolidation, cardiac dysrhythmia)
- Abdomen
 - Inspection (including groins): scars, distension, movement on respiration and lumps
 - Palpation (including groins): tenderness, guarding, rebound tenderness, rigidity, masses and hernias
 - Percussion: dull/tympanic and tenderness
 - Auscultation: tinkling/normal/diminished/silent. Note: some physicians prefer to perform auscultation before percussion/palpation, as touching the abdomen before auscultation might lead, in their opinion, to “spurious bowel sounds” (in particular in the abdomen with diminished/absent peristalsis).
 - Note: the quadrant of the abdomen where the complaints and findings are mainly localized may give some indication of the most likely involved organ.
 - Right upper: gallbladder and liver
 - Right lower: appendix, fallopian tube, ovary and ureter
 - Left lower: large bowel (diverticulitis), fallopian tube, ovary and ureter
 - Flanks: kidney
 - Middle upper: pancreas and stomach
 - Middle lower: bladder
- Internal examination (rectal, vaginal)

Laboratory Tests and Imaging

- Blood: haemoglobin, white cell count, CRP, sedimentation rate, electrolytes, urea, creatinine, glucose, amylase and liver function tests.
- Urine: dipstick (blood, protein, ketones, white cells, glucose, bilirubin) and sediment.
- Chest/abdominal X-ray (basal pulmonary consolidation, free gas, distended bowel, fluid levels).

- Ultrasound (calculi, aneurysm, gynaecological pathology).
- Contrast X-ray, CT, and endoscopy will not be often available.

Differentiation and Management

There are four main groups of causes of abdominal complaints:

1. Inflammation of the peritoneum
2. Obstruction of a hollow viscus
 - Small bowel
 - Large bowel
 - Biliary tract
 - Urinary tract
3. Bleeding
 - Intraperitoneal
 - Retroperitoneal
 - Intraluminal
 - Digestive tract
 - Urinary tract
 - Genital tract
4. Miscellaneous
 - Acute pancreatitis
 - Acute mesenteric ischaemia
 - Urinary tract infection and acute pyelonephritis
 - Testicular torsion and acute epididymo-orchitis
 - Haematoma of the abdominal wall

Not all these conditions warrant operative treatment, but many do. Newer treatment modalities, such as interventional endoscopy/laparoscopy/sonography-guided aspiration and angiographic embolization, will not be discussed, as they are rarely available in an austere environment.

In all instances it is extremely important that the patient be stabilized haemodynamically, as much as possible (part of the “Primary Assessment”). Recording the fluid balance, especially urine output, is vital, and nasogastric aspiration should be commenced where vomiting continues.

Inflammation

Inflammation usually begins on the inside of a hollow viscus, tending to spread through the entire wall and leading to involvement of the adjacent peritoneum and/or frank perforation. In both cases generalized peritonitis will result.

History

- Continuous pain, not severe and ill-defined at first (visceral pain), at a later stage severe and well localized
- Some vomiting, not very productive
- Some constipation
- Little fever at first, at a later stage (much) higher

Examination

- *Inspection*: lying still
- *Palpation*: tenderness, at a later stage rebound tenderness, then rigidity
- *Percussion*: at first normal, at a later stage ipsilateral, then also contralateral pain
- *Auscultation*: diminishing bowel sounds, silence at a later stage
- *Internal examination*: possible tenderness
- Note: some physicians prefer to perform auscultation before percussion/palpation, as touching the abdomen before auscultation might lead, in their opinion, to “spurious bowel sounds” (in particular in the abdomen with diminished/absent peristalsis).
- Note: in the case of frank perforation, generalized peritonitis will develop (as described earlier under “at a later stage”), often in a short period of time (occasionally without the preceding complaints and findings).

Laboratory and Imaging

- WCC ↑, CRP↑
- Erect chest X-ray: free abdominal gas under the diaphragm in cases of perforation

Treatment

When the findings mentioned under “at a later stage” are present, this implies involvement of the peritoneum: operative treatment is warranted. Ideally inflamed structures are removed before peritoneal involvement has occurred.

There are exceptions to this guideline. In some instances conservative treatment is warranted because surgery does not lead to a better outcome:

- Several abdominal diseases which have become rare in the developed world (e.g. tuberculosis, helminth infection of the biliary tract, splenic infarct). You are referred to the relevant paragraphs in this book and to textbooks on tropical medicine.
- Diverticulitis coli

This may occur in middle-aged and elderly people, who will have all the signs of inflammation in the left lower quadrant, including peritoneal involvement.

However, if conservative treatment (consisting of bed rest, nothing by mouth and intravenous fluids), with or without antibiotics (the latter is a matter of personal preference), does not lead to resolution or if perforation occurs, surgery is indicated.

- Salpingitis

This may occur in younger women, with painful adnexa on bimanual vaginal examination. Treatment is with antibiotics. Again surgery is indicated if this approach does not lead to resolution or if perforation occurs.

- Crohn's disease

This ailment should be considered if the history is positive. Treatment consists of anti-inflammatory drugs and possibly steroids. Frank perforation (the signs of which may be obscured if steroids have been given!) should be treated operatively.

- Development of an "abdominal infiltrate"

The body tries to "isolate" an inflamed structure by enveloping it with greater omentum. Usually this process takes a couple of days. This diagnosis becomes likely if you see a patient who has had abdominal pain for 2–3 days and now seems to be getting better. If there are no signs of peritoneal involvement (the infiltrate can sometimes be palpated as a mass) and the patient has a considerably elevated sedimentation rate, conservative treatment (consisting of bed rest, nothing by mouth and intravenous fluids) is justified. Administration of antibiotics is a matter of personal preference. However, an abscess that develops within the infiltrate (diagnosed by a see-saw fever pattern) should be drained surgically.

Note: in cases of generalized peritonitis, antibiotics should be begun preoperatively.

Obstruction of a Hollow Viscus

Mechanical obstruction of the bowel arises from a number of causes.

- Outside the wall: hernias, adhesions from previous operations and volvulus
- In the wall: tumours
- In the lumen: gallstones, foreign bodies and bezoars

If the blood supply to the bowel is compromised, it is a strangulating obstruction.

Small Bowel

History

- Severe, intermittent, cramping pain, often with agitation during cramps
- Frequent vomiting (in parallel with cramps), which remains productive and becomes eventually faeculent (may lead to hypovolemia and shock)

- No constipation at first
- No fever (if fever occurs it may be indicative of strangulation)

Examination

- *Inspection*: agitation during cramps; abdomen may be distended; occasionally visible peristalsis; sometimes visible scars from previous operations. Note: also look for swelling in the groin and umbilical areas (incarcerated = irreducible hernia).
- *Palpation*: some tenderness, no signs of peritoneal involvement. Note: in cases of strangulation (ischaemia of the bowel wall) perforation will occur; the clinical picture then changes to one of generalized peritonitis.
- *Percussion*: often tympanitic.
- *Auscultation*: high-frequency “tinkling” (during cramps). Note: if on auscultation the abdominal sounds seem to normalize or is infrequent, but the patient does NOT improve generally, the bowel may be in ileus (aperistalsis).
- *Internal examination*: normal.

Note: some physicians prefer to perform auscultation before percussion/palpation, as touching the abdomen before auscultation might lead, in their opinion, to “spurious bowel sounds” (in particular in the abdomen with diminished/absent peristalsis).

Laboratory and Imaging

- No specific tests, in severe cases acid–base and electrolyte abnormalities. WCC ↑ may be indicative of strangulation.
- Erect abdominal X-ray: distended loops of bowel and fluid levels.

Treatment

Treatment depends to a certain degree of the severity of the underlying abnormality. An initial conservative regime of intravenous fluids, a nasogastric tube and urinary catheter, and close observation is justified, unless:

- The patient is very ill with signs of peritonitis.
- There are signs of impending strangulation.
- The patient fails to settle within 12 h.

In those cases prompt operative intervention is indicated.

Large Bowel

Obstruction of the large bowel is most often seen in elderly patients. The cause is usually a neoplasm, occasionally inspissated faeces (stercoral ileus).

History

- Alteration in bowel habit
- No defecation (sometimes with “false” diarrhoea)
- Little pain
- Sometimes vomiting (at a late stage)
- No fever

Examination

- *Inspection*: abdomen may be distended, later very distended.
- *Palpation*: sometimes a “full” descending colon, no signs of peritoneal involvement.
- *Percussion*: usually no abnormalities, occasionally a tympanitic area in the right lower quadrant, later generalized tympany.
- *Auscultation*: no abnormalities, at a late stage some high frequency.
- *Internal examination*: a low rectal tumour may be palpable

Note: some physicians prefer to perform auscultation before percussion/palpation, as touching the abdomen before auscultation might lead, in their opinion, to “spurious bowel sounds” (in particular in the abdomen with diminished/absent peristalsis).

Laboratory and Imaging

- No specific tests
- Abdominal X-ray: occasionally a distended caecum, no gas in the rectum

Treatment

- “Gentle enema” if inspissated faeces (stercoral ileus) is suspected
- Operation if caecum has a diameter >10–12 cm and depending on general condition

Biliary Tract

History

- Severe, intermittent, cramping pain in the right upper quadrant or flank, often with agitation during cramps
- Infrequent vomiting
- Sometimes jaundice
- Normally no fever

Examination

- *Inspection*: normal, sometimes jaundice
- *Palpation*: some tenderness in the right upper quadrant
- *Percussion*: normal
- *Auscultation*: normal
- *Internal examination*: normal

Note: some physicians prefer to perform auscultation before percussion/palpation, as touching the abdomen before auscultation might lead, in their opinion, to “spurious bowel sounds” (in particular in the abdomen with diminished/absent peristalsis).

Laboratory and Imaging

- Sometimes bilirubin ↑ and alkaline phosphatase ↑.
- Sonography may show stones in gallbladder.

Treatment

- Conservative with fluids and analgesia.
- Administration of antibiotics is a matter of personal preference.

Note: Charcot’s triad – pain, jaundice and fever. The diagnosis is obstructive cholangitis; because of the risk of septicaemia, the biliary tract should be drained operatively.

Upper Urinary Tract

History

- Severe, intermittent, cramping pain in one flank, often with agitation during cramps
- Infrequent vomiting
- Sometimes haematuria
- Normally no fever

Examination

- *Inspection*: normal
- *Palpation*: normal, sometimes some tenderness in the flank
- *Percussion*: normal

- *Auscultation*: normal
- *Internal examination*: normal

Note: some physicians prefer to perform auscultation before percussion/palpation, as touching the abdomen before auscultation might lead, in their opinion, to “spurious bowel sounds” (in particular in the abdomen with diminished/absent peristalsis).

Laboratory and Imaging

- Sometimes haematuria
- Sonography may show a dilated renal pelvum.

Treatment

- Conservative with fluids and analgesia.
- Administration of antibiotics is a matter of personal preference.

Note: If fever is present the diagnosis is obstructive pyelonephritis; because of the risk of septicaemia, the urinary tract should be drained operatively.

Lower Urinary Tract (Acute Urinary Retention)

History

- Gradually increasing difficulties with passing urine (hypertrophy of the prostate) or sudden onset (stones, clot).
- Patient may be quite ill, with hypotension.
- Normally no fever.

Examination

- *Inspection*: distended lower abdomen
- *Palpation*: tender mass in the lower abdomen
- *Percussion*: dullness in the lower abdomen
- *Auscultation*: normal
- *Internal examination*: occasionally enlarged prostate, otherwise normal

Note: some physicians prefer to perform auscultation before percussion/palpation, as touching the abdomen before auscultation might lead, in their opinion, to “spurious bowel sounds” (in particular in the abdomen with diminished/absent peristalsis).

Laboratory and Imaging

- Sonography will show an enlarged bladder.

Treatment

- Introduction of a urinary catheter; if that cannot be passed, then suprapubic catheterisation
- In case of prostatic hypertrophy, definitive treatment of that condition at a later stage

Note: if fever is present antibiotic treatment is also warranted.

Bleeding

In bleeding *the most important guide* for deciding what treatment to give is the *haemodynamic status* of the patient.

Intraperitoneal

This is most often caused by trauma (liver, spleen), occasionally by a ruptured aneurysm. In the latter case the patient has usually died before being seen by a health professional.

History

- In trauma cases this is usually obvious (also see Chap. 35).
- There may be some pain.
- A ruptured aneurysm leads to tearing pain in the back.

Examination

- *Inspection*: In trauma cases there may be bruising or wounds of the abdominal wall. Distension of the abdomen is a late sign.
- *Palpation*: Some tenderness because blood acts as an irritant in the abdomen. Rebound tenderness and rigidity are late signs. An aneurysm may be felt as a pulsating mass.
- *Percussion*: May be dull.
- *Auscultation*: Bowel sounds may be diminished.
- *Internal examination*: Possible tenderness.

Note: some physicians prefer to perform auscultation before percussion/palpation, as touching the abdomen before auscultation might lead, in their opinion, to “spurious bowel sounds” (in particular in the abdomen with diminished/absent peristalsis).

Laboratory and Imaging

Tests are initially normal. A drop in haemoglobin is a late sign. Sonography will show free abdominal fluid, and if an aneurysm is the cause of intraperitoneal bleeding, sonography will confirm its presence.

Treatment

- A ruptured aneurysm should always be treated operatively, likewise the other causes of intraperitoneal bleeding if the patient is in shock.
- Non-shocked patients may be managed nonoperatively.

Retroperitoneal

This is caused either by trauma (kidney, pelvis) or by a ruptured aneurysm.

History

- In trauma cases this is usually obvious (also see page 547, 550).
- There may be some pain.
- A ruptured aneurysm leads to tearing pain in the back.

Examination

- *Inspection*: In trauma cases there may be bruising or wounds of the back and/or flanks.
- *Palpation*: No obvious findings. An aneurysm may be felt as a pulsating mass.
- *Percussion*: Unremarkable.
- *Auscultation*: Bowel sounds may be diminished.
- *Internal examination*: Unremarkable.

Note: some physicians prefer to perform auscultation before percussion/palpation, as touching the abdomen before auscultation might lead, in their opinion, to “spurious bowel sounds” (in particular in the abdomen with diminished/absent peristalsis).

Laboratory and Imaging

- Tests are initially normal. A drop in haemoglobin is a late sign.
- Sonography will confirm injury to the kidney and the presence of an aneurysm.

Treatment

- A ruptured aneurysm should always be treated operatively.
- Other causes are treated conservatively; unless the patient becomes hypotensive, then surgical hemostasis is necessary.

Intraluminal

There is a variety of non-traumatic causes for bleeding from the digestive, urinary and genital tracts.

Haematemesis is associated with bleeding from the upper digestive tract (proximal of the pylorus); bleeding from the more distal digestive tract usually presents as haematochezia. The colour of blood lost rectally may give an indication about the localization of its source: the darker, the more proximal which can present as frank melaena; bleeding from the urinary tract presents as haematuria.

A ruptured ectopic pregnancy should be considered in every women of childbearing age who is experiencing lower abdominal pain, with or without vaginal bleeding.

You are referred to obstetrical textbooks for information on bleeding in a well-established pregnancy and around the time of childbirth.

Management of non-traumatic bleeding is highly influenced by the haemodynamic status of the patient.

History

- Bleeding is the main complaint, as described earlier.
- Sometimes pain (upper abdomen for upper digestive tract, flank for urinary tract, lower abdominal for genital tract).

Examination

- *Inspection*: normal.
- *Palpation*: sometimes tenderness in the upper abdomen (upper digestive tract), flanks
- (urinary tract) and lower abdomen (genital tract).

- *Percussion*: unremarkable.
- *Auscultation*: unremarkable. Peristalsis may be active in bleeding from the digestive tract.
- *Internal examination*: an ectopic pregnancy may be felt in one of the adnexa on bimanual vaginal examination.

Note: some physicians prefer to perform auscultation before percussion/palpation, as touching the abdomen before auscultation might lead, in their opinion, to “spurious bowel sounds” (in particular in the abdomen with diminished/absent peristalsis).

Laboratory and Imaging

- An ectopic pregnancy may be present with or without a positive pregnancy test.
- Bleeding from the digestive or urinary tracts requires finding the source (e.g. by endoscopy).

Treatment

- An ectopic pregnancy should be treated operatively.
- Bleeding from the digestive and urinary tracts can be treated conservatively with appropriate drugs such as omeprazole, as long as the patient remains haemodynamically stable, and the bleeding stops with a reasonable time span.

Miscellaneous

Acute Pancreatitis

History

- Extreme pain in the upper abdomen and back.
- Patient may be known with gallstones or alcohol abuse and is feeling very sick and looking very unwell.
- Fever may be present.
- Occasionally some vomiting.

Examination

- *Inspection*: normal. Cullen’s sign and a discoloration in the left flank are extremely rare (representing retroperitoneal oozing).
- *Palpation*: tenderness in the epigastrium.

- *Percussion*: unremarkable.
- *Auscultation*: unremarkable.
- *Internal examination*: unremarkable.

Note: some physicians prefer to perform auscultation before percussion/palpation, as touching the abdomen before auscultation might lead, in their opinion, to “spurious bowel sounds” (in particular in the abdomen with diminished/absent peristalsis).

Laboratory and Imaging

- Amylase ↑↑↑.
- Sonography may show an enlarged pancreas.

Treatment

- Most cases of acute pancreatitis can be treated conservatively, with careful monitoring.
- If hypotension occurs, operative exploration is warranted.

Acute Mesenteric Ischaemia

History

- Extreme pain in the abdomen.
- The patient is feeling very sick and looking very unwell.
- Occasionally some vomiting and/or bloody diarrhoea.
- No fever.

Examination

- *Inspection*: unremarkable but pain out of proportion with signs
- *Palpation*: unremarkable
- *Percussion*: unremarkable
- *Auscultation*: unremarkable
- *Internal examination*: unremarkable

Note: some physicians prefer to perform auscultation before percussion/palpation, as touching the abdomen before auscultation might lead, in their opinion, to “spurious bowel sounds” (in particular in the abdomen with diminished/absent peristalsis).

Laboratory and Imaging

- WCC ↑↑↑ and base excess ↓↓↓ (“pathognomonic”)

Treatment

- This condition is almost always untreatable.
- Usually a laparotomy is performed to exclude other pathologies.

Urinary Tract Infection and Acute Pyelonephritis

History

- UTI presents with burning pain on passing urine, with frequency and urgency.
- Acute pyelonephritis is associated with abdominal or loin pain, haematuria and fever.

Examination

- Tenderness in flank and/or loin

Laboratory

- WCC ↑, positive dipstick and microscopy

Treatment

- Antibiotics

Testicular Torsion and Acute Epididymo-orchitis

History

- This occurs mainly in adolescents.
- Sudden onset of severe pain in the scrotum (one sided), with occasional radiation to the lower abdomen.
- No fever.

Examination

- Swollen testis; extremely painful on examination

Note: this condition should be differentiated from epididymo-orchitis (which presents with fever and pain on passing urine). When in doubt, it “is” testicular torsion!

Treatment

Operative derotation and fixation of both testes

Haematoma of the Abdominal Wall

History

- Often, but not necessarily, there is a history of blunt trauma.
- Pain.

Examination

- Occasionally discoloration
- Sometimes swelling
- Pain on palpation
- No signs of peritoneal involvement

Note: it is important to exclude a (incarcerated) hernia (see under Obstruction of Small Bowel)

Treatment

- Conservative

Other Surgical Emergencies

Abscesses

Soft Tissue Abscess

History

- Any infection of the soft tissues may give rise to formation of an abscess.
- Pain.
- Fever.

Examination

- Red, swollen area with fluctuation

Treatment

- Incision (parallel to Langer's lines) and drainage.
- Occasionally a foreign object like a splinter is found.

Breast Abscess

History

- Recent breast-feeding, usually following acute mastitis

Examination

- Red, tender swelling which may become fluctuant

Treatment

- Incision, following the edge of the areola
- Drainage

Anorectal Abscess

History

- Throbbing pain in the perianal area. Sitting down is extremely painful.
- Fever.

Examination

- Tender mass in the perianal area clinches
- Occasionally no visible abnormalities
- Very painful rectal examination

Treatment

- Incision and drainage

Acute Ischaemia of a Limb

Acute arterial occlusion may be the result of embolus from a distant source or thrombosis on underlying atherosclerotic disease.

History

- Acute onset of extreme pain
- Possibly recent myocardial infarction or atrial fibrillation (embolus) and intermittent claudication (arterial thrombosis)

Examination

- Pain
- Pallor
- Paraesthesia
- Paralysis
- Cold
- Absence of arterial pulsations in femoral, popliteal and distal arteries

Treatment

- In order to save the limb, perfusion must be restored as soon as possible:
- Surgical removal of emboli; anticoagulation.

Chapter 43

Acute Problems and Emergency Surgery: Soft Tissues and Skeleton

Ralph J. de Wit and David M. Nott

Abstract The authors of this chapter include specialists, many of whom have extensive deployment experience. The target group of this chapter, however, is not their fellow-specialists; but the “junior” doctors, trying to help them find their way in the difficulties posed by an “adverse” environment. That junior doctor will be confronted by all imaginable ailments and injuries, and should be a true generalist. As we’re all aware, even in medical school nowadays there’s a tendency to make students choose the direction of their future work at an ever earlier stage; the opposite of what’s needed for a generalist.

Keywords Triage • Trauma and medical emergencies • Ballistic and blast injury • Infectious diseases • Climatic influences • Bites and stings • Maxillofacial problems • Head and spinal cord injuries • Abdominal complaints • Non-traumatic surgical emergencies • Soft tissues and skeleton • Surgery in the tropics • Anaesthesia and analgesia • Hostile environments • Disaster environments • Conflict environments • Catastrophe environments

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Objective

- To delineate open-wound management of the soft tissues and skeleton in a hostile environment, in particular:
 - Fractures and dislocations
 - Sprains and strains
 - Burns
 - Bites and stings

Wound Management

This part is concerned with the time-honoured principles of open-wound management in a hostile environment. These are distilled from the many lessons learnt over the last 200 years, in situations of war and disaster, often by hard example. The circumstances often dictate another approach to wound care, an approach that differs from what may be safely practised in a twenty-first-century hospital in the developed world.

This part and the one that follows are in the main directed at health professionals who specialise in the management of traumatic wounds in hostile environments, but it should also help to inform all who may have to care for the injured. Effective and simple ways for primary treatment of these wounds are listed as well as indications for referral.

The range of injury in hostile climates is considerable. The main features are:

- Multiple open wounds, across multiple body cavities or systems
- Variable extent of soft tissue injury
- Extent of the injury primarily obscure to physical examination
- Wounds associated with delay and heavy contamination
- Initial management rendered by relatively inexperienced personnel
- Poor working conditions because of less than optimal equipment, limited supplies and unsuitable environment

General Statement on Wounds

Prompt and appropriate initial management of all injury types reduces suffering and prevents unnecessary loss of life and limb. Local circumstances largely determine what type of injuries are to be expected. In remote areas, especially when means of transport are limited, serious multiple injured patients will not reach health care facilities in time. The majority of patients will present with conditions usually not immediate life threatening or major. Nonetheless, improperly treated soft tissue

injuries, wounds and other septic conditions can lead to prolonged or even permanent disability. Where possible, one should document the history of the insult including the circumstances, time and mechanism of injury (how, where and when) in addition to any treatment given. This documentation must also be made available to other health care professionals who care for the patient at that time or in the future.

A wound is any break in the continuity of the skin. The extent of tissue damage and therefore treatment required is related to the mechanism of injury. Most soft tissues react similarly to mechanical forces; five types of wound can usually be identified:

- Abrasion. A breach in the skin caused by friction; usually there is only superficial damage.
- Contusion. Damage to the skin and deep structures caused by blunt force. This is associated with bruising but not with defect in the skin; but loss of skin may occur later.
- Laceration. A breach in the integrity of the skin caused by the tearing effect of a blunt injury. This includes degloving injury where the skin with the local layer of subcutaneous fat is stripped of the underlying muscular fascia.
- Incision. Damage caused by a sharp object.
- Puncture. A penetrating injury involving deep structures.

Contusions and lacerations are often associated with similar internal injuries. In puncture or penetrating wounds, external evidence of serious internal damage may be minimal. The mechanism and history of the injury contains essential information for estimating the extent of any damage, the likelihood of any contamination (chemical or infective) or the presence of foreign bodies. Minor wounds should be gently cleaned with antiseptic or sterile solutions and then covered with sterile dressings. Foreign bodies should only be removed if not adherent or penetrating, this to prevent further tissue damage or haemorrhage. Large wounds and damage to special areas such as the eyes, hands or head need to be covered and reviewed by medically trained personnel. This also applies to wounds involving bones or internal organs.

Principles

Open, penetrating wounds are usually obvious. What often may be less obvious is the extent of concealed injury. Little can be determined from the wound's external presentation, and no assumptions concerning damage to deeper tissues can be made on the basis of its superficial appearance. Initial management when faced with patients with open wounds is as described in the earlier in this part. It is important that apart from controlling compressible haemorrhage, nothing further is appropriate in wound care until the primary survey has been completed and the patient is stable.

Management Strategy

A suggested working management strategy is described next.

Early Priorities

Take a history and examine the patient using the time-honoured ABCDE approach according to the Advanced Trauma Live Support (ATLS) directives. Life-saving measures take priority to attending to a wound unless this is necessary to control the bleeding. Note any delays or contamination that points to the likelihood of impending sepsis. Cover the wound with a field dressing, wound pad or bandage. Record your findings and draw a diagram if possible.

Pain Relief

If pain is a feature, small incremental doses of intravenous opiates are best. This will also allay anxiety. Beware of overdose. See also Chap. 45.

Control of Infection

While never a substitute for early and adequate surgery, systemic, preferably intravenous, broad-spectrum antibiotics will control bacterial growth and colonisation for a time, if started as soon as possible (ideally within an hour of wounding). There is little to no evidence that the use of local antibiotic powders is helpful. It may even be detrimental to the process of wound healing and it interferes with repeated wound inspections.

What follows is for surgeons who may be unfamiliar with wound management in hostile and austere environments.

Preoperative Assessment

Surgery should not be delayed for laboratory and radiological investigations if there is an immediate risk to life or limb. If time permits, some tests are appropriate; X-rays of the chest, pelvis in search for significant haemorrhage and X-ray of the cervical spine are helpful in the multiply injured. When available (portable) sonography can rapidly confirm or rule out most of the immediate life-threatening injuries in the chest or abdominal cavity. In the case of ballistic injury, bi-planar X-rays are helpful in determining wound tracks and in locating metallic fragments. Some baseline laboratory tests are appropriate. These include a full blood count, blood for bacterial cultures and serum for group and a cross-match of whole blood or erythrocyte concentrate for transfusion.

Surgical Technique

Most surgeons will be familiar with techniques used in wound excision in the stable environment of a late twentieth-century hospital in the developed world. In a hostile and austere environment, some modifications are appropriate.

Wounds in these environments are often old, neglected and contaminated. Further many surgeons may not be familiar with injury caused by bullets, shell fragments or mines (blast injury). An aggressive and, if necessary, repeated approach with generous skin incision, wide fasciotomy and meticulous excision of all devitalised tissue holds the key to success. In the field, neurovascular structures must be directly inspected for injury that maybe subtle. At the end of the procedure, it is often appropriate to leave the soft tissues open for a delayed primary closure at 4/5 days, a time-honoured lesson in these situations. Wounds should be carefully dressed as follows:

- Lay on (do not pack) fine, fluffed gauze layers with overlying synthetic or cotton wool. Wound edges may be adapted but should allow for drainage of wound secretions from the bottom of the wound into the gauze.
- Hold in place with a broad (6-in.), conforming or elastic crepe bandage.
- Formal drainage is not required unless infective secretions already exist or the amount of secretion exceeds the absorbent capacity of the gauzes.
- For major limb wounds, splinting with plaster of Paris slabs or split casts is recommended, especially when the patient needs to be transported.
- For associated fractures, external fixators are in more austere situations mostly safer than internal fixation devices.
- When available vacuum-assisted closure techniques can provide excellent protective and draining wound dressing.

Post-operative Care

The wounded area should be rested and mildly elevated if possible. Repeated observation for impending vascular compromise and wound sepsis is mandatory. Soft tissue swelling may require the readjustment of outer dressings. The inner wound dressings should be left undisturbed unless they are felt to be causing vascular compromise or are masking serious underlying bleeding or infection.

Antibiotics should be continued depending on the severity of the contamination or infection already present. When the wound is intended to remain open and heal by secondary intention (by forming of granulating tissue with or without skin grafting), antibiotic treatment can be stopped when signs of infection withdraw. In case of ongoing infection, the treatment must be continued and changed if cultures indicate a resistant organism; sometimes (repeated) surgical débridement is necessary. Open wounds do not require antibiotic treatment when there are no signs of infection. Wounds under these circumstances often leak considerable quantities of blood and serum, even to the extent of requiring blood transfusion. When striving for delayed closure in noninfected wounds, a 5-day course of antibiotics may be started at the time of the closure.

Delayed Closure

If wounds have been left open, the optimal time for inspection and closure is between the third and fourth post-operative days. This usually requires a return to theatre and a general anaesthetic. If the wound is clean and shows no signs of infection, it may be closed, but this must be done by suture without tension and with minimal disturbance to the wound edges. In case of doubt concerning the condition of the wound, it is prudent to insert a subcutaneous drain for 2–3 days when the skin is closed. When there is tension on the wound edges during closure, a combination of direct suture and split-skin grafting may be appropriate.

Fractures and Dislocations

This discussion is aimed at health professionals with little or no exposure to treating fractures or dislocations, but who may encounter such patients during a deployment. It is not intended to be an exhaustive discourse on management, but rather an outline of the principles of early management. Experts in the field should manage such patients where possible.

General Statement

A fracture is any crack or break in a bone. It can be associated with an open wound and complicated by injury to adjoining muscle groups, blood vessels, nerves and organs. A dislocation is a displacement of a bone at a joint; there will always be associated sprains and tearing of ligaments around the affected joint. Deformed limbs should be gently returned to a normal position as the patient will allow, certainly in case of neurological or vascular deficit. Any further movement should then be restricted by splinting, since it may cause additional injury or pain. Splint devices need not be tailor-made; blankets or belts, for example, can be used to restrict unnecessary movement and may facilitate patient transport. The definitive treatment of any fracture or dislocation requires specialist medical input.

Biomechanics and Pathophysiology

Fractures and dislocations occur when the bony skeleton fails under a too large force. The skeleton rarely fails in isolation – surrounding structures such as soft tissue and neurovascular structures may also suffer injury. The principle that should apply is not to manage bones and joints in isolation. The affected limb or limbs should be assessed as a whole. In managing these injuries, the approach outlined

earlier should be applied. Start with the primary survey and work through it in the usual way. Injuries to bones and joints will normally be encountered either as part of the “C” of the ABCDE paradigm in case of life-threatening haemorrhage or during a detailed secondary survey (limb-threatening).

Management Strategy

The recommended approach is outlined next.

Primary Survey and Resuscitation

Check for and manage any life-threatening injury. In the context of limb injury, this will be recognition and control of external haemorrhage and placing the injured limb in rough alignment and length. Doing this is a very effective measure in controlling bleeding and reducing the risk of further injury. It also reduces pain. Do not do this against resistance!

History

The history (road traffic accident or gunshot wound, for example) gives important information on the extent of injury. Road traffic accidents are typically associated with multiple and multisystem injuries. Ambulance paramedics refer to this as “reading the wreckage”. Falls from a height suggest foot, ankle, leg, pelvic and spinal injury. Gunshot wounds inevitably mean injury to multiple structures and wound contamination. The history may also give an indication of the delay between injury and management.

Limb Examination

A systematic approach is necessary. The time-honoured way is known as look, feel, move and stability:

- Look at the skin, soft tissues and bone and note swelling, bruising or deformity.
- Feel the skin, surrounding tissues and over the bone (gently!) and also assess neurovascular integrity.
- Movement: first ask the patient to move the limb, and then move it yourself (gently) as far as the patient allows.
- Stability: gently check the stability of the affected joint.

In a field setting there is much that can be learnt by this simple approach. The general vascular state of the limb can be ascertained, and the extent of swelling or

deformity will be noted. The range of movement will also be noted actively and passively. Location and severity of the pain as well as loss of function may indicate the presence of a fracture. The complete examination will give not only an indication of the extent of injury but also a guide to the necessity of urgent intervention (vascular or neurologic injury, open fractures) and the need to get the patient to a hospital or higher level of care.

Treatment

Treatment should be divided into immediate and early.

Immediate

This means save life, then limb. For example, if the patient is unconscious, clear the airway and then attend to the limb. If there is vascular compromise, pulling the limb out to length and roughly realigning it may restore circulation. If not, urgent hospitalisation is required. External haemorrhage should be dealt with by external compression over a wound pad or with a pressure bandage. Depending on the situation, for example, under fire, a tourniquet might be the best option to control the bleeding. The person performing this technique should be trained and educated on the proper indications and use. The time of application should be noted and the patient moved to hospital as fast as possible.

Early

In the field, there should be no attempt to perform definitive reduction. Returning the limb to length and alignment should now be attempted if this was not done earlier. It is usually possible to do this with fractures but only seldom with dislocations. Do only use minor force! An expert may perform reductions of dislocations to shoulder and ankle in the field. One may try distraction of a dislocated joint once, but when not successful the attempt should be stopped. As a rule, some form of intravenous analgesic and anxiolytic agent is required. *Do not attempt reduction if you are not trained in these procedures unless there is neurovascular compromise.*

Having achieved length and alignment as well as having applied appropriate wound dressing, some form of splint is required. In the field setting ingenuity may be required. Use any materials in the immediate surroundings such as pieces of wood or tree branches. *No matter what your discipline or area of expertise, you should acquire some basic knowledge in the management of wounds, fractures and joint injuries.* Many humanitarian agencies will insist on such training. If not, approach organisations such as St. John Ambulance or the Red Cross societies.

Many of these injuries are very painful and frightening. If available, opiate analgesia is best, given in small intravenous boluses rather than a single dose by

intramuscular injection. Repeated small intravenous increments maintain a plateau of pain relief, and overall less analgesia may be required. See also Chap. 45.

Other Injuries

Sprains and Strains

Sprains are stretching injuries of joint-related structures, whereas strains involve damage to muscular tissue. The acronym PRICE summarises the initial treatment priorities for both problems:

- Protection and pain relief. The injury and the individual should be protected from further harm; simple analgesia should be given if available.
- Rest. The initial injury may be exacerbated by any undue exertion. Pain and swelling will also restrict the amount of activity possible.
- Ice. A cold compress made from crushed ice, bags of frozen peas, etc. should be wrapped in a towel to protect the skin from cold injury and placed next to the injured area for 20 min/h for the first 3 h.
- Compression. Where possible, the injured area should be compressed by a layer of bandaging. Care needs to be taken not to constrict the circulation; an increase in pain may indicate a dressing that has been applied too tightly.
- Elevation. Raising the injured area to the level of the heart can reduce swelling and pain.

After 2 days, or when tolerated, gentle mobilisation of the injured area can begin. A supportive elastic bandage may reduce pain and recurrence of swelling. In case of sprains a tape bandage of the affected joint can promote mobilisation when the swelling has come down. Continued pain or swelling may be an indication of a more serious underlying condition requiring more specialised medical help.

Burns

Burns are injuries caused by heat, but by convention, and since the treatment similar, damage caused by irradiation and chemicals are also included. The source of the injury is usually outside the individual, and as a result the surface layers of the body are commonly affected first. Exceptions to this are electrical burns where extensive damage can affect deep structures with little to no damage to the skin. Another exception is inhalation injury from inhaled heat or smoke. It is important to realise that burns often occur as part of an incident where it is very likely that the patient has sustained other injuries. The patient should then be assessed according to the ATLS principles. The initial management of any burn is to remove the source of the injury; this may involve stripping the patient. The damaged area should then be

flushed with lukewarm water, whatever available at that moment, for 20 min; this cools the burn, removes any residual chemical contaminant and provides pain relief. Minor burns, as assessed by depth and area, can be treated by sterile dressing and observation. Larger, deeper burns or burns to a special area (face, hands, genitalia) need more intensive resuscitation or treatment and are best looked after in specialised medical facilities, eventually one with an intensive care department. Since burns are initially sterile, antiseptic preparations should only be used if the wounds have become infected, if sterile dressings are not available or if evacuation is likely to be lengthy. Reassessment of depth and area should be done after 24 h; undue use of ointments might make this more difficult.

Bites and Stings

Trauma is caused by the mouth or hind parts of animals. Problems with these wounds arise either from infection associated with the germs harboured in the mouths of all animals (e.g. human, dog) or by envenomation (e.g. spiders, snakes). Bites from sharp, pointed teeth cause penetrating or puncture wounds, while others, human teeth, for example, can lacerate or contuse tissues. The vast majority of stings or poisonous bites, although painful and alarming, are not life or limb threatening. In allergic individuals or in cases of multiple stings, anaphylactic reactions can occur rapidly and require immediate medical help. Stings to the mouth and throat can result in swelling that can impede the airway and should be taken very seriously. Urgent referral to a medical facility where advanced airway management is available is warranted. The initial management of simple bites or stings is similar to that for sprains and strains, although the injured area should be kept dependent rather than elevated. Puncture wounds or lacerations caused by bites should be left open and allowed to drain; suture closing will inevitably lead to wound infection. If possible patients stung in the mouth should be given ice to suck. Where there is thought to be a risk of envenomation, an attempt should be made to identify the species responsible. This should be abandoned if it puts any further people at risk of similar injury.

Injuries to Special Sites

Certain injuries are beyond the scope of this manual. They require highly specialised training and expertise. Included here are serious head injuries and spinal injuries. Readers who are likely to encounter such injuries during their deployment should ensure a level of training appropriate to their seniority and field of work.

Surgical Infections

Introduction

Next, we will discuss different types of soft tissue infections that may be encountered in catastrophe and conflict situations. Soft tissue infections can lead to loss of limb and develop into life-threatening conditions because of accompanying severe systemic toxicity (septic shock and multiple organ failure). The early recognition of these kinds of infections is crucial for successful treatment, but initial clinical signs are often minor and delay correct diagnosis. Common characteristic in the treatment of the soft tissue infections listed next is that early surgical intervention is indicated. Beside supportive treatment with fluid resuscitation, haemodynamic stabilisation and broad-spectrum antimicrobial regimen, always expedient, and radical surgical débridement must be performed. When clinical signs are present, deep infections may mimic superficial pyodermas like erysipelas, impetigo, ecthyma, furunculosis or carbunculosis; a “suspicious” attitude is warranted.

Panaritium

Soft tissue infections of fingers or the hand can easily spread in the direction of deeper anatomical structures. Tendons and tendon sheets as well as fascia structures provide a route for fast progression of the infection to other parts of the hand and lower arm. Staphylococci and Streptococci are the main causative bacteria but sometimes saprophytes are involved. Initial treatment includes broad-spectrum antimicrobial regimen until results of bacterial cultures are available. Clinical signs are primarily severe pain and not necessarily markers of infection like erythema, swelling and elevated skin temperature. Especially when the tendon sheets of the flexor muscles of the hand are involved (panaritium tendineum), pain and loss of function are the dominant signs. A superficial small wound with pus discharge on a finger can well be a sign of deeper infection of the underlying bone or pulpa. Even very small skin wounds (sometimes already healed) can allow access of bacteria to the deeper anatomical structures, so the presence of a large or fresh wound is not a prerequisite for making the diagnosis.

To determine the presence of deep infection, surgical inspection under local anaesthesia may be performed, i.e. local incision of the skin and exploration. But when deep infection is encountered, an extended exploration is necessary, often into other parts of the hand and lower arm. Complete drainage and débridement must be performed which is only possible with adequate anaesthetic care and surgical expertise. So preferably a surgical inspection should be performed in an adequately equipped surgical facility; otherwise a two-step procedure is needed: the explorative

wound is left open for drainage; supportive treatment is started as needed, including antibiotic treatment, and the patient must be referred to an appropriate facility.

Necrotizing Fasciitis

This type of acute soft tissue infection involves the deep and superficial fascia as well as the local subcutaneous tissue. The underlying muscle is unaffected. In the early course of infection, the skin is not involved, only later showing blisters, haematoma-like appearance, markers of infection or necrosis. Also in necrotizing fasciitis local pain (without evident cause) is an alarming first sign. Severe sepsis or septic shock may be present even before a deep infection is clinically suspected. Common initiating injury leading to this infection is mostly minor trauma, less frequently operative wounds and decubitus ulcers. The onset can be slow (up to 14 days) or very sudden with septic shock and extensive necrosis within 24 h. Progression of the infection and necrosis in the affected fascia with one or more centimetres per hour is possible. In case of slow onset, the course of the disease may be more benign with less tissue necrosis and less systemic effects.

Group A Streptococcus, (anaerobic) Clostridium perfringens and/or a mixture of gram-positive and gram-negative bacilli lead to this type of infection. The clinical presentation is not typical to the causative bacilli, so broad-spectrum antibiotic regimen, after taking cultures (when suitable laboratory facilities are present), must start immediately when this infective condition is suspected.

When the causative bacilli are not known, a combination of penicillin, gentamicin and clindamycin makes a rational empirical regimen; an alternative would be amoxicillin with clavulanic acid and gentamicin. In case of clostridial myonecrosis, a combination of penicillin and metronidazole or piperacillin-tazobactam would be appropriate. New supportive treatment modalities like intravenous immunoglobulins (IVIG) and hyperbaric oxygen therapy should be considered when these resources are available locally or at distance (and transfer of the patient is a possibility...). To diagnose necrotizing fasciitis a local puncture and aspiration can confirm the diagnosis, but a negative test does not rule out the diagnosis. Should the puncture be inconclusive local surgical exploration is indicated. When the diagnosis is confirmed, immediate and complete surgical débridement must follow. The patients often require extensive surgical exploration, frequently including limb amputation. Post-operative often large open wounds remain that need further surgical attention and supportive treatment in an intensive care unit in most patients is necessary. Patients with (suspicion of) this condition should be referred to an appropriate medical facility.

Fournier's gangrene is a type of necrotizing fasciitis that affects the scrotum and genitalia. Cutaneous gangrene appears early in the course of the disease because of the lack of subcutaneous fat between the dartos fascia and the skin. The infection often spreads rapidly in the direction of the buttock and upper leg as well in the perineal muscles and around the rectum.

Myonecrosis

Bacterial myonecrosis syndromes include clostridial infections, also known as gas gangrene. But also nonclostridial myonecrotic infections can occur, presenting with the same clinical signs. Rapidly progressive necrosis of the affected muscles is the main characteristic. After some time also the overlying subcutaneous tissue and skin become necrotic. Penetrating trauma and arterial insufficiencies are the most important causes. Surgical management and supportive treatment are in accordance with the information discussed previously.

Cellulitis

This group of more superficial infections initially only involve the skin and the local subcutaneous fat. Classic presentation is erythema, oedema, pain and local tenderness, sometimes lymphangitis. The course of the infection is mostly more benign than in the previous mentioned soft tissue infections, but rapid progression to surrounding skin regions and entire extremity can occur, also with systemic toxicity (sepsis). Broad-spectrum antibiotic regimen is indicated aimed at Streptococci and Staphylococci. Local care includes immobilisation and elevation of the affected extremity. Further analgesic drugs and cool compress may be of help. Sometimes abscesses or necrosis develop that need surgical management. When the cellulitis type of infection does not respond to appropriate treatment within 48 h or the systemic toxicity progresses one should keep in mind the possibility of a more virulent deeper soft tissue infection and act accordingly.

Septic Arthritis

Joint infection with pyogenic bacteria can result from penetrating trauma, adjacent osteomyelitis or haematogeneous seeding. The onset is mostly acute and characterised by fever and pain. Physical examination shows swelling, erythema and tenderness to palpation or movement of the affected joint. The diagnosis can be confirmed by needle aspiration which should be performed under careful sterile conditions. Cloudy and turbid aspect of the synovial fluid and elevated cell count are indicative. Gram stain can help to guide the antibacterial treatment. Radiography does not contribute to the diagnosis in the early phase of the infection.

Septic arthritis must be treated as an emergency condition. Intravenous antibiotic treatment and rest of the affected joint are primary measurements. Irrigation with sterile saline or surgical incision and drainage are needed when the joint aspiration reveals infection, certainly when the aspiration produces pus.

Further Resources

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Chapter 44

Acute Problems and Emergency Surgery: Surgery in the Tropics

David M. Nott

Abstract The authors of this chapter include specialists, many of whom have extensive deployment experience. The target group of this chapter, however, is not their fellow-specialists; but the “junior” doctors, trying to help them find their way in the difficulties posed by an “adverse” environment. That junior doctor will be confronted by all imaginable ailments and injuries, and should be a true generalist. As we’re all aware, even in medical school nowadays there’s a tendency to make students choose the direction of their future work at an ever earlier stage; the opposite of what’s needed for a generalist.

Keywords Triage • Trauma and medical emergencies • Ballistic and blast injury • Infectious diseases • Climatic influences • Bites and stings • Maxillofacial problems • Head and spinal cord injuries • Abdominal complaints • Non-traumatic surgical emergencies • Soft tissues and skeleton • Surgery in the tropics • Anaesthesia and analgesia • Hostile environments • Disaster environments • Conflict environments • Catastrophe environments

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Objectives

To describe prevalent surgical conditions and procedures in the tropics due to the following conditions/diseases/injuries:

- AIDS
- Tuberculosis
- Malaria
- Tropical ulcer
- Buruli ulcer
- Ludwig's angina
- Typhoid fever
- Volvulus of the sigmoid colon
- Amoebiasis
- Schistosomiasis
- Hydatid disease
- Intestinal roundworms
- Hookworms and whipworms
- Filariasis
- Onchocerciasis
- Osteomyelitis
- Trauma
- Anaemia, malaria and HIV/AIDS during obstetric surgery
- Obstructed labour
- Vesicovaginal fistula

Introduction

It has been stated that the glory of ancient civilisations departed on account of disease and microbes than have changed the map of the Earth more often by wars. In China in the fourteenth century, 13 million died from the "Black Death". In Europe from 1347 to 1350, 25 million people died from the same disease, and in the eighteenth century, 60 million people died from smallpox in Europe alone. For centuries men have sought the causes of yellow fever, plague, malaria and other diseases, and some of the guesses were near the mark. Egyptians made the cat a sacred animal because where it flourished there was no plague [1]. Infectious diseases are still by far the most important agents of disease in the tropics today, and millions of children suffer and die from malaria, respiratory infections and diarrhoeal disease; those concomitantly infected with HIV have little chance of recovery.

This chapter is written based on my personal experience of tropical conditions encountered whilst working with Medecins Sans Frontieres in East, Central and West Africa. All my missions have been outside teaching or capital city hospitals, and the majority of the diagnoses have been made based on clinical features alone.

HIV/AIDS

The AIDS pandemic has radically changed the practice of surgery, and in many tropical countries many conditions are as a direct result of HIV infection. As a surgeon it is very important to take particular care and to double and triple glove and wear eye protection especially in dealing with bone fragments in fractures and ensure that you wear plastic aprons if theatre gowns are not waterproof.

HIV and AIDS more heavily affect sub-Saharan Africa than any other region of the world. By the end of 2009, there were an estimated 22.5 million people living with HIV in the region, around two-thirds of the global total. In that year around 1.3 million people died from AIDS, and 1.8 million people became infected with HIV [2]. HIV gradually destroys the human immune system, increasing vulnerability to other infections and cancers, such as pneumonia, Kaposi sarcoma and tuberculosis (TB).

The virus consists of two copies of the RNA genome and two copies of the enzyme reverse transcriptase contained in a viral core surrounded by an envelope composed of lipids. The viral envelope contains 20 glycoproteins, and most diagnostic tests detect the antibodies to these glycoproteins. HIV uses the CD4 receptor to attach to lymphocytes, and once inside the cell viral RNA is transcribed to host DNA using the enzyme reverse transcriptase, and it is this enzyme which is targeted by compounds, which inhibit HIV replication, the antiretroviral drugs. HIV causes disease in humans primarily by causing destruction of cells of the immune system, thus making the HIV-infected individual increasingly susceptible to other pathogens as the course of HIV disease progresses. CD4+ lymphocytes are the main target cells infected by HIV, and loss of CD4+ lymphocytes is a key feature of HIV-related immunosuppression. The function of the cellular immune system is best measured using the CD4+ lymphocyte count, which can also be used to both stage the disease and predict treatment response. Immunoassay tests for antibodies to HIV are highly sensitive and commercially available at US\$1 per test. But still millions of people at risk in Africa are not tested or avoid testing, and of those tested positive only 37 % receive antiretroviral therapy [3].

The clinical diagnosis of HIV infection is difficult because most of the characteristic symptoms and signs of HIV infection are neither sensitive nor specific. A particular problem is that the clinical presentation of advanced HIV disease can be indistinguishable from tuberculosis in an HIV-negative individual. However, with clinical assessment, the significant stages of HIV disease can be recognised, and the patient's probable immune status assessed [4]:

Clinical stage 0	Serologically HIV positive and no signs or symptoms
Clinical stage 1	Generalised lymphadenopathy
Clinical stage 2	Weight loss, cutaneous lesions and recurrent upper respiratory tract infection
Clinical stage 3	Severe weight loss, diarrhoea, fever, oral candidiasis, pulmonary TB and severe bacterial infection
Clinical stage 4	Full-blown AIDS wasting, severe opportunistic infections, extrapulmonary TB, lymphoma, Kaposi sarcoma and encephalopathy

From a surgical point of view, patients with HIV tend to develop post-operative wound infections, and in fact one study showed that the rate of post-operative wound infections doubled in stage 0 and were treble in those in stages 1–4 [5].

Some time ago, I treated a patient in the Congo who I felt was clinical stage 3 with fever, weight loss and diarrhoea for several months who was admitted with signs very suggestive of a perforated duodenal ulcer. At laparotomy, there was large perforation in the terminal ileum, which was walled off with little abdominal contamination. I elected to perform a right hemicolectomy. Sadly the patient died of an overwhelming sepsis 7 days later. From a clinical point of view, I suspect the patient had a cytomegalovirus (CMV) perforation, as it is the most common cause of emergency abdominal surgery in AIDS patients. CMV causes a vasculitis in the arterioles of the GI tract, which results in focal or diffuse ulcerations, most commonly of the terminal ileum and colon where they can cause bleeding and spontaneous perforation [6].

The commonest cancer in HIV-infected people in Africa is Kaposi sarcoma, a tumour of the endothelial cells of the lymphatics. Surgery is occasionally indicated to remove single lesions; multiple lesions need systemic treatment such as vincristine and other cytotoxics. In the limbs multiple lesions cause oedema and may break through the skin and extend from the foot to the mid thigh. The patient shown in Fig. 44.1 had experienced such severe pain that they requested an amputation.

Occasionally plaques of Kaposi occur in the small bowel and give rise to intussusception and bowel obstruction [7]. However, bowel obstruction in patients with



Fig. 44.1 Kaposi sarcoma



Fig. 44.2 Thyroid gland abscess

AIDS is commonly due to non-Hodgkin's lymphoma. Although peripheral lymphadenopathy is often absent, bulky retroperitoneal and mesenteric lymphadenopathy is common in AIDS patients and can cause abdominal pain, nausea and vomiting. In addition to obstruction, gastric haemorrhage and intestinal perforation with peritonitis have also been reported [8].

Surgical sepsis in HIV affects mainly the female genital tract; the pleural cavity, causing empyema; the large joints; and the anorectal area. A few patients have multiple abscesses or infection in unusual sites such as the thyroid gland (Fig. 44.2).

Patients with HIV are also at risk of developing necrotising fasciitis (Fig. 44.3), which is a rapidly progressive inflammation and necrosis of subcutaneous tissues and the deep layer of superficial fascia with sparing of the deep fascia and muscle. Aerobic pathogens are usually the primary tissue invaders, for instance, beta-haemolytic streptococci and staphylococci. They destroy tissues and create an anaerobic environment conducive for anaerobic or microaerophilic organisms, which are secondary invaders such as gram-negative organisms such as *Bacteroides fragilis*, peptostreptococci, *Proteus* sp., *Pseudomonas* sp. or *Enterobacter* spp. [9]. The surgical treatment in all cases involves fasciotomy and wide debridement of all dead tissue supplemented by combinations of penicillins, aminoglycosides and metronidazole [10, 11].

In patients with HIV, necrotising fasciitis can complicate such surgical procedures as colostomy, appendectomy, herniotomy, laparotomy or dental extraction; or it can follow infections such as chickenpox, gingivitis, boil or perineal abscess [12].

Today, the orofacial form of necrotising fasciitis is called cancrum oris (noma), and the perineal form is called Fournier's gangrene [13]. Noma (Fig. 44.4) is typically found in the tropical sub-Saharan and affects children under the age of 6 and is the result of a combination of factors. It begins as a polymicrobial infection caused by anaerobic organisms that produce enzymes, as well as pro-inflammatory mediators, that degrade the intracellular matrix. Acute necrotising gingivitis is a risk factor for developing the disease. It may start as a simple ulcer and, without nutritional support and antibiotics, can rapidly progress. Children often have systemic comorbidities, such as leukaemia, HIV/AIDS, diarrhoea, malaria or a recent case of

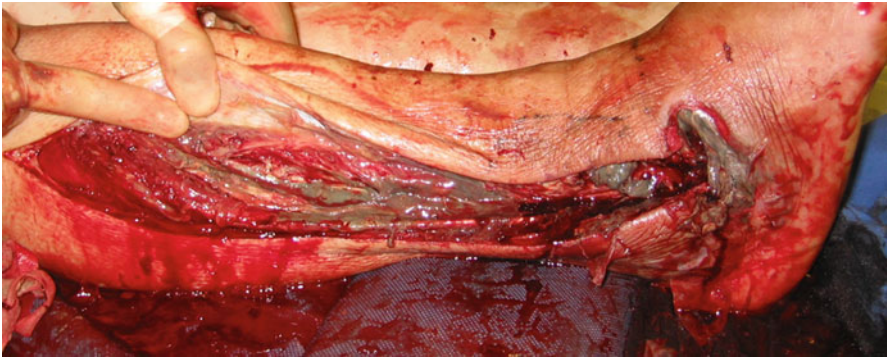


Fig. 44.3 Necrotising fasciitis

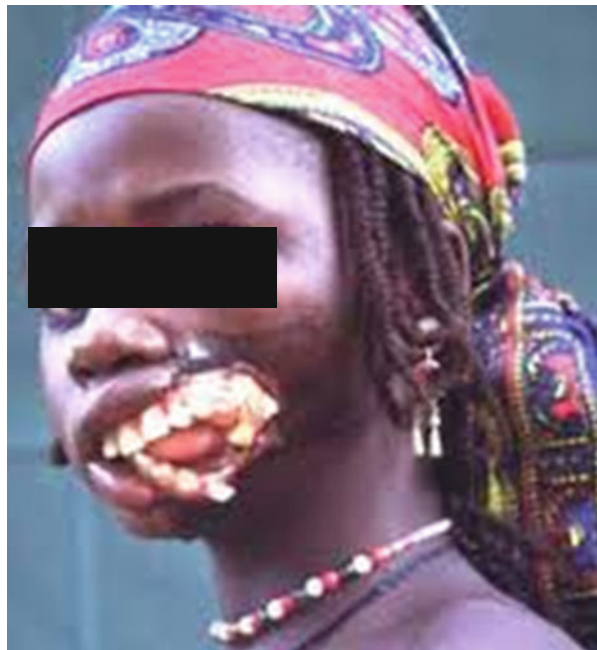


Fig. 44.4 Child with noma

measles. Every year, WHO estimates more than 100,000 cases of noma occur worldwide, and only 10 % survive. The lack of an adequate diet lowers the immune system's defences in children, and these illnesses only aggravate the situation. Without appropriate treatment the child will perish from complication such as pneumonia, septicaemia or diarrhoea. Those who survive usually suffer from severe facial disfigurement and/or trismus and will need difficult staged surgical reconstructions. Initial treatment is with penicillin or broad-spectrum antibiotics together with rehydration correction of electrolyte imbalances and supplemental nutrition as soon as erythema or oedema develops [14].

Pyomyositis (myositis tropicans) is a disease strongly associated with HIV infection in young adults (Fig. 44.5). Usually skeletal muscles are immune from infections; however, this condition causes a severe infection of the skeletal muscle usually the powerful muscles of the trunk and extremity. Intramuscular abscesses occur without any penetrating trauma or adjacent septic focus. *Staphylococcus aureus* is still the usual organism although a variety of other organisms have been found in HIV-positive patients [15]. The treatment invariably requires drainage of the abscess and combination treatment using penicillins, metronidazole and gentamicin.



Fig. 44.5 Polymyositis involving the quadriceps muscle

Tuberculosis

One-third of the world's population is thought to be infected with *M. tuberculosis* [16]. A person infected with both TB and HIV is 30–50 times more likely to develop the active form of TB than someone infected with TB alone [17]. In some countries such as Malawi, Zambia and Botswana, 70 % of tuberculosis patients are HIV positive [18]. When tuberculosis becomes active, 75 % of cases involve infection in the lungs (pulmonary TB), and the other 25 % affect extrapulmonary sites. Pulmonary symptoms include chest pain, haemoptysis and a productive, prolonged cough for more than 3 weeks. Systemic symptoms include fever, chills, night sweats, appetite loss, weight loss, pallor and fatigue. Extrapulmonary infection causes tuberculous pleurisy, tuberculous meningitis, scrofula of the neck (cervical tuberculous lymphadenitis), urogenital tuberculosis and infection of the bones, joints and spine (Potts disease), and tuberculosis of the breast can mimic breast cancer [19].

Abdominal Tuberculosis

Tuberculosis can involve any part of the gastrointestinal tract and is the sixth most frequent site of extrapulmonary involvement. Tuberculous bacteria reach the gastrointestinal tract via haematogenous spread, ingestion of infected sputum or direct spread from infected contiguous lymph nodes and fallopian tubes. The gross pathology is characterised by transverse ulcers, fibrosis, thickening and stricturing of the bowel wall, enlarged and matted mesenteric lymph nodes, omental thickening and peritoneal tubercles.

Peritoneal tuberculosis occurs in three forms, the wet type with ascites, the dry type with adhesions and the fibrotic type with omental thickening and loculated ascites. The most common site of involvement of the gastrointestinal tuberculosis is the ileocaecal region (Fig. 44.6). Like Crohn's disease any part of the gastrointestinal tract can be affected, and pathologically it may be either an ulcerative form with caseation, perforation and internal fistulae or the hypertrophic form with fibroblastic reaction leading to intestinal stricture and obstruction. Ileocaecal and small bowel tuberculosis presents with a palpable mass in the right lower quadrant and/or complications of obstruction, but also examination of the abdomen may reveal a vague lump, which may be rolled-up omentum, enlarged lymph nodes or matted loops of bowel with omentum. In Africa therefore be aware that a lump in the right iliac fossa may well be due to abdominal tuberculosis than acute appendicitis. Always be aware that TB can mimic lots of western diseases and can include dysphagia, odynophagia and a mid-oesophageal ulcer due to oesophageal tuberculosis and dyspepsia and gastric outlet obstruction due to gastroduodenal tuberculosis. In the majority, abdominal TB presents as abdominal pain, and ascites is the most frequent physical finding followed by hepatomegaly, splenomegaly, abdominal



Fig. 44.6 Tuberculous abscess in the right iliac fossa

mass, fistula and acute abdomen if perforation of the bowel has occurred. Most of these patients are significantly anaemic [20].

Management is with conventional anti-tuberculous therapy for at least 6 months. In the tropics keep tuberculosis at the forefront of the differential diagnoses because to operate is fraught with complications and is only reserved for life-saving instances such as perforation [21, 22].

Malaria

Unexplained persistent pyrexia and general deterioration are presenting features following a surgical procedure in patients infected by malaria. Indeed malaria is a common cause of hyperpyrexia, unexplained post-operative confusion progressing to coma, shock and acute renal failure (blackwater fever). Contaminated fresh blood transfusion may cause profound coma and severe shock with hyperpyrexia if infected with malaria. For planned surgery, especially in children, a haemoglobin check and a paracheck should always be performed before surgery [23]. I have seen a young boy die post-operatively having been taken to surgery for appendicectomy when a simple 5-min paracheck would have made the diagnosis of malaria.

The spleen is a major site of antigen presentation and acts as a reservoir. Splenic macrophages remove damaged or old red cells. The spleen enlarges as a result of this haematological overactivity or the antigenic process. The classic causes of

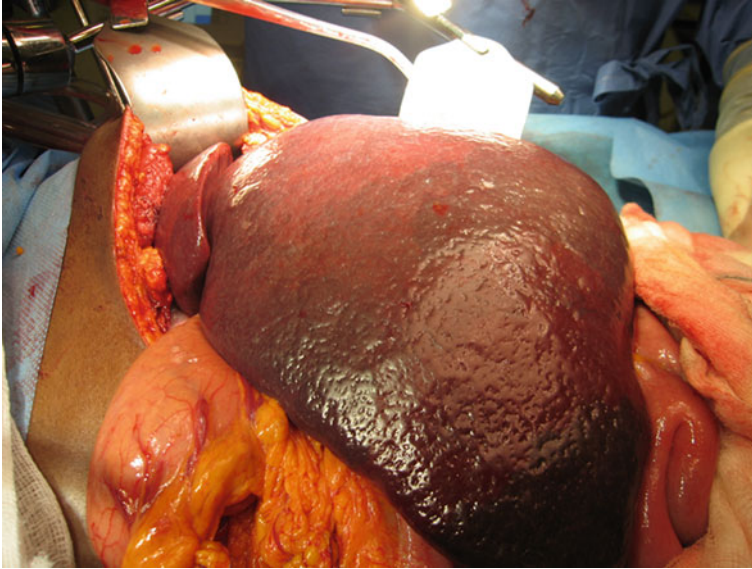


Fig. 44.7 Massive spleen due to malaria

massive tropical splenomegaly are hyperreactive malarial splenomegaly (HMS), schistosomiasis (see discussion to come) and visceral leishmaniasis. Almost all patients with massive spleens have blood pooling and are therefore anaemic which may contribute to the high mortality associated with HMS [24].

Those in whom malaria parasites are found should have a course of antimalarial treatment using chloroquine, and surgery if required should be delayed several days. However, this may not be possible in trauma. The spleen in HMS is enormous (Fig. 44.7) and if ruptured is commonly fatal. Apart from the initial anaemia procedure, the surrounding perisplenitis makes it adhere to the diaphragm and stomach, and it is a relatively anchored organ. Following removal of the spleen, a large bed is left and the surgeon has to be extremely vigilant with haemostasis in this situation. In an emergency situation such as removal of a malarial spleen in cases of trauma, antimalarial drugs should be taken soon after the procedure.

It is unlikely that a splenectomy would be performed for anything other than trauma outside a major teaching establishment in Africa. It is very important to recognise the causes of massive spleens if encountered during a laparotomy and the potential morbidity and mortality when having to perform a splenectomy for trauma.

Tropical Ulcer

Skin infection and breakdown is common in tropical ulcer (Fig. 44.8). This is because bactericidal and fungicidal compounds containing fatty acids produced by sebaceous glands in the skin are defective due to malnourishment, and the skin may



Fig. 44.8 Tropical ulcer

be thin. Skin infections are much more common in the wet, humid times of the year. Bacteria and fungi are able to multiply easily at these times, possibly because bactericidal secretions are diluted by sweat. Many patients will be seen with superficial skin ulceration secondary to insect bites and scratches become infected with *Streptococcus pyogenes* or *Staphylococcus aureus* together with *Treponema vincentii*. These are usually simple to treat with antibiotics but become more difficult as these tropical ulcers normally have a necrotic base and are colonised by anaerobic *Fusobacteria*.

Buruli Ulcer

Buruli ulcer (Fig. 44.9) is caused by *Mycobacterium ulcerans* and is endemic in Ghana and estimated to affect 150–180 per 100,000 population and often leaves children with large disfiguring scars and occasional joint deformities with massive loss of skin if not treated. Bacteria enter the skin from scratches from vegetation in swamps. The mycobacteria causes disease by producing a potent tissue-destructive toxin called mycolactone [25]. Treatment involves removing infected tissue and skin grafting, but recently more effective medical treatment using rifampicin and streptomycin for 12 weeks proves to be a better alternative to radicle debridement [26].



Fig. 44.9 Buruli ulcer

Ludwig's Angina

The cause is usually an infection from the lower molars or the gums surrounding the third molar tooth. It can occur in healthy individuals but more often in immune-compromised patients. Symptoms include swelling, pain, fever, dysphagia and in severe cases stridor and difficulty in breathing due to the pressure pushing up the tongue against the soft palate. The word angina comes from the Greek meaning strangling. The patient shown in Figs. 44.10, 44.11 and 44.12 had developed sudden airway obstruction and was becoming hypoxic. A decision was made to thrust a knife and scissors into the floor of the mouth to evacuate the abscess. Following that intervention the patient was able to breathe almost immediately. The alternative was to perform an urgent tracheostomy, but this can be difficult if the tissues of the neck are firm and oedematous.

Tropical Conditions Affecting the Abdomen

Typhoid Fever

Typhoid fever is caused by *Salmonella typhi* that includes bacteraemic phase with fever and chills during the first week, sustained high temperature, a rose spot rash and abdominal pain during the second week and ulceration of the Peyer's patches of the

Fig. 44.10 Acute dyspnea due to Ludwig's angina (note the drop of pus below the mouth)



Fig. 44.11 Urgent decompression of the floor of the mouth in patient in Fig. 44.10

small bowel with intestinal bleeding and perforation of the patch during the third week usually on the antimesenteric border situated within 45 cm of the ileocaecal valve [27].

Intestinal perforation (Fig. 44.13) is the most common complication of typhoid fever and without surgery is uniformly fatal [28]. The current surgical options include copious washout of the abdomen, freshening of the ulcer followed by primary doubled layered closure, segmental resection and end-to-end anastomosis and primary ileostomy (Fig. 44.14). Medical treatment includes chloramphenicol, amoxicillin and cotrimaxazole.



Fig. 44.12 Patient from Figs. 44.10 and 44.11 the following day



Fig. 44.13 Typhoid perforation

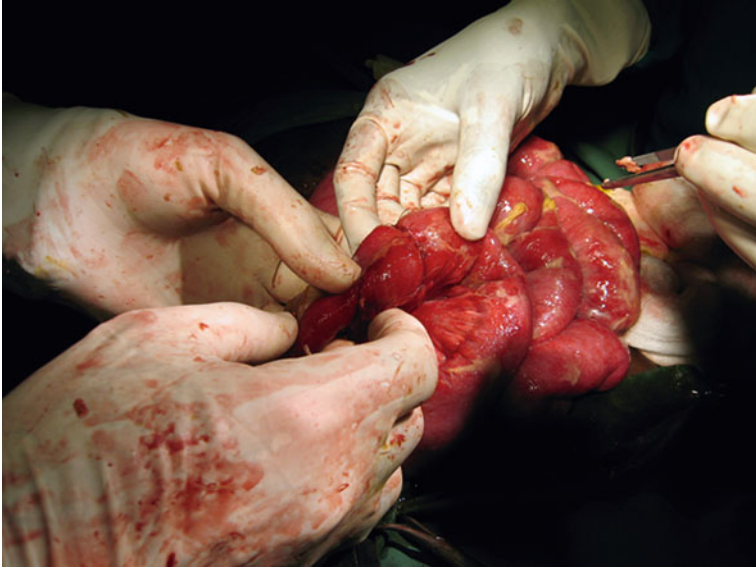


Fig. 44.14 Typhoid perforation closed by 2-layered anastomosis

Volvulus of the Sigmoid Colon

A high-fibre diet has many advantages, which are said to include the low incidence of appendicitis, and a much lower incidence of carcinoma and diverticula of the colon. But it may have at least one disadvantage. A large sigmoid colon distended with gas due to a high-fibre diet is more liable to twist on its mesentery and is the commonest cause of large bowel obstruction, particularly in Africa. The main danger of deflating a patient with a sigmoidoscope is that gangrene may be missed which could be lethal (Fig. 44.15). In Africa if there is any doubt, perform a laparotomy. It is the best investigation.

Amoebiasis

Caused by the protozoan parasite *Entamoeba histolytica* and has a worldwide distribution. It is estimated that 40–50 million cases of amoebic liver abscesses occur annually with 40,000 deaths per year [29]. Transmission is via the faecal-oral route following ingestion of infective cysts in food or drinks contaminated by faeces or possibly transported by insects such as flies and cockroaches. The cysts survive gastric acidity, but once in the large bowel they release trophozoites in the colonic mucosa causing amoebic colitis, and further spread within the portal vein may lead



Fig. 44.15 Gangrene of the sigmoid colon due to volvulus

to liver abscesses or abscesses at other sites. A colitis develops gradually with loose stools with blood and mucus and colicky abdominal pain usually in the lower abdomen. The infection can continue for weeks or months and tends to involve the caecum and ascending colon, which may give right abdominal tenderness. The appendix is rarely affected, but it's important to take a good history because weight loss predominates with incessant diarrhoea and although, presenting with right iliac fossa pain, appendicectomy may be perilous as perforation of the colon may ensue. Other differential diagnoses are ileocaecal tuberculosis, schistosomiasis and *Trichuris* infection. In severe cases the whole colon may be distended giving an acute toxic megacolon (Figs. 44.16 and 44.17).

Abscesses usually occur in the right lobe of liver and may eventually perforate into the pleural cavity, peritoneal cavity or, if in the left lobe of the liver, into the pericardial cavity with the risk of cardiac tamponade. The patient may present with fever and sweating and pain in the right hypochondrium aggravated by inspiration, which may radiate to the right shoulder. Symptoms of dry cough and difficulty breathing occur if there is a pleural effusion or emphysema or brown haemoptysis if the abscess ruptures into a bronchus. It is now recommended not to aspirate the amoebic liver abscess (classical anchovy sauce) as medical treatment such as metronidazole and tinidazole will give rapid improvement of the clinical condition.



Fig. 44.16 Toxic megacolon in amoebic dysentery in a 7-year-old

Schistosomiasis

Schistosomiasis is the generic name given to diseases caused by parasitic flukes of the genus *Schistosoma*. An older name, still widely used in Africa, is Bilharzia after Theodor Bilharz who discovered the condition in 1851. Although exact figures are hard to obtain, it is estimated that out of 600 million people at risk of schistosome infection, 200 million infected live in Africa and 20 million suffer from severe sequelae [30]. Of the three main species that commonly infect humans, two occur predominantly in Africa. *Schistosoma mansoni* is the cause of intestinal schistosomiasis, and *Schistosoma haematobium* produces urinary schistosomiasis. The adult flukes causing human schistosomiasis are wormlike creatures 1–2 cm long, which have a groove (schist), which gives them their name. The life cycle is digenetic with an asexual phase in freshwater snails and a sexual phase in the human. The eggs hatch in freshwater to release free-swimming miracidium larvae, which penetrate freshwater snails. The larval form, the cercaria, breaks out of the snail and penetrates human skin. Following migration to the liver via the portal venous system (*S. haematobium*) or to the venous plexus of the bladder (*S. haematobium*), they enter the sexual phase over the next 20 or 30 years producing eggs which lead to granuloma formation causing fibrotic changes and cirrhosis. Patients with *S. haematobium*



Fig. 44.17 Laparotomy specimen of toxic megacolon

present with symptoms of urinary tract infection with suprapubic pain frequency, dysuria and haematuria, the haematuria classically coming at the end of micturition. *S. mansoni* often presents with massive haematemesis with an enlarged liver and spleen with ascites due portal hypertension. Giant urticaria can occur with acute toxæmic reaction with fever, chills and hepatosplenomegaly (Katayama fever, Fig. 44.18).

Currently, the drug used in treatment is praziquantel; however, it only is effective against adult worms and does not affect eggs or immature worms. Treatment with this drug is simple, and its dose is based on the patient's weight with two doses given on 1 day. The drug causes rapid disintegration of the worm, which in turn allows the human immune system to attack the parasite.

Hydatid Disease

I have seen this condition many times; in Africa it is rife in northwest Kenya in the Turkana region. In this tribe of 200,000, there are approximately 200–300 new cases of hydatid disease each year. A local custom was to use nurse dogs to clean infants.

Humans are infected by hand-to-mouth transfer of all ova picked up by stroking a dog or drinking water or eating food contaminated with dog faeces. The adult stage



Fig. 44.18 Katayama fever in a child from Yemen

is the tapeworm *Echinococcus granulosus* about 5 mm long, which is found in enormous numbers in the small bowel of the dog. Once ingested by the human, larvae penetrate the gut wall, which travel to various sites to form cysts. A cyst contains capsules full of tapeworm heads. Seventy percent occur in the liver and about 20 % in the lungs and there may be single or multiple. Symptoms are caused by the mass effect of the growing cyst, by secondary bacterial infection or leakage of the cyst. Spillage or leakage of the cyst fluid can produce intense hypersensitivity reaction ranging from urticaria, a pruritic fever, to fatal anaphylaxis. The patient in Fig. 44.19 was a man who fell from a height onto his right side of the abdomen and burst one of these cysts. He was admitted hypotensive and in severe shock; the preliminary diagnosis of ruptured spleen was made, but in fact it was bright red due to the significant hypersensitivity reaction, and the shock was due to anaphylaxis. At laparotomy a huge cyst in the right lobe of the liver had burst. The cyst was completely removed from the liver bed. He was treated post-operatively with albendazole.

Intestinal Roundworms

These are soil-transmitted helminths, and their life cycle depends on the period of development outside the human host, typically in moist warm soil. Most important

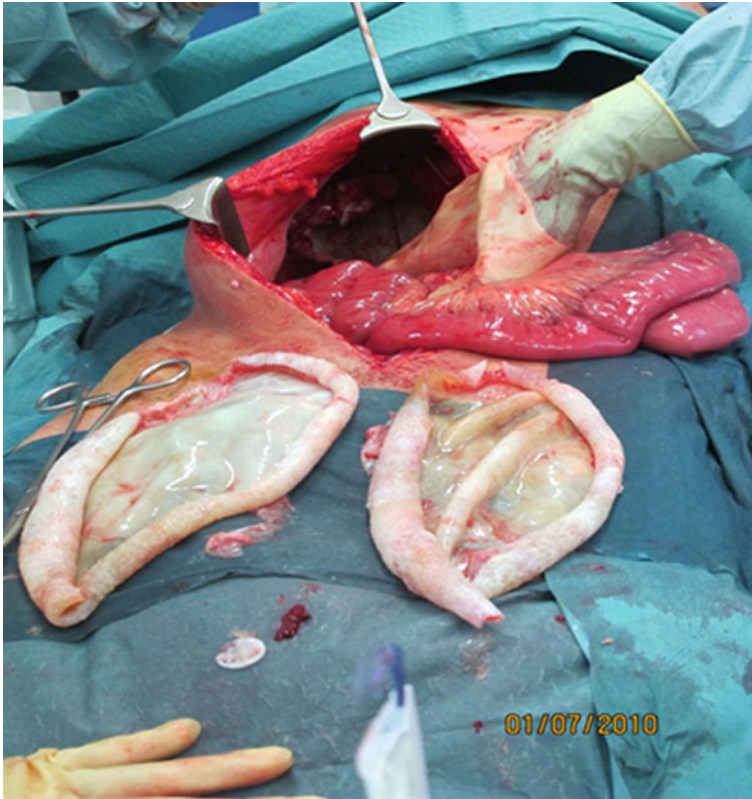


Fig. 44.19 Hydatid disease of the right lobe of the liver

of these globally are roundworms (*Ascaris lumbricoides*), whipworms (*Trichuris trichiura*) and hookworms (*Ancylostoma duodenale*).

Ascaris lumbricoides (Figs. 44.20 and 44.21) affects over 600 million people worldwide. They gain access to the human via the faecal-oral route. The *Ascaris* eggs liberate larvae as they pass through the stomach and small intestine, which penetrate the intestinal mucosa to enter the bloodstream and lymphatics and reach the lung about 2 weeks later. They then penetrate the alveoli and migrate via the respiratory tract to be coughed up and swallowed finally living in the small bowel where they obtain nourishment. Adults are large, cream-coloured worms between 15 and 40 cm in length and can produce up to 200,000 eggs per day. They are excreted in faeces and there remain viable for years. From a surgical point of view, worms may form a bolus in heavy infections causing intestinal obstruction, perforation and peritonitis or can migrate to the common bile duct causing cholangitis, pancreatitis and liver abscess; they can block nasogastric tubes and have been seen inside endotracheal tubes. On several occasions, I have seen them free swimming in the abdomen following abdominal gunshot wounds. A particularly unpleasant sight! They have also been known to escape through the suture line in single-layer bowel anastomoses, and therefore in Africa if performing bowel anastomoses, I routinely

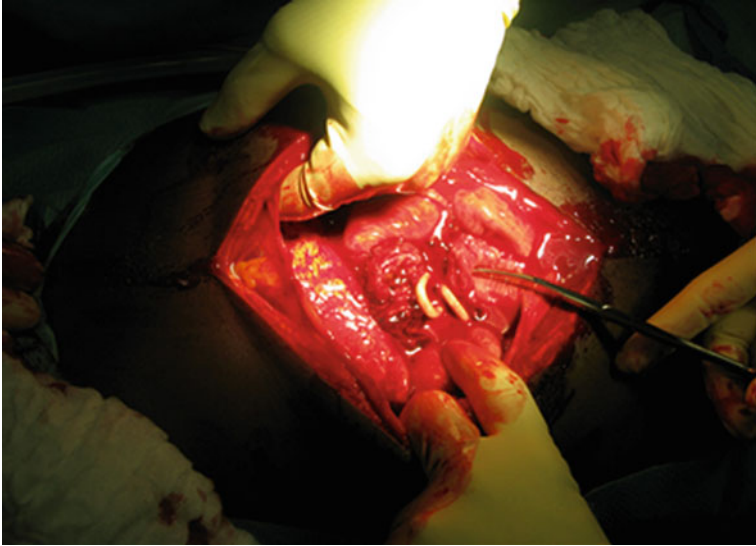


Fig. 44.20 *Ascaris lumbricoides* from the small bowel due to gunshot wound to the abdomen

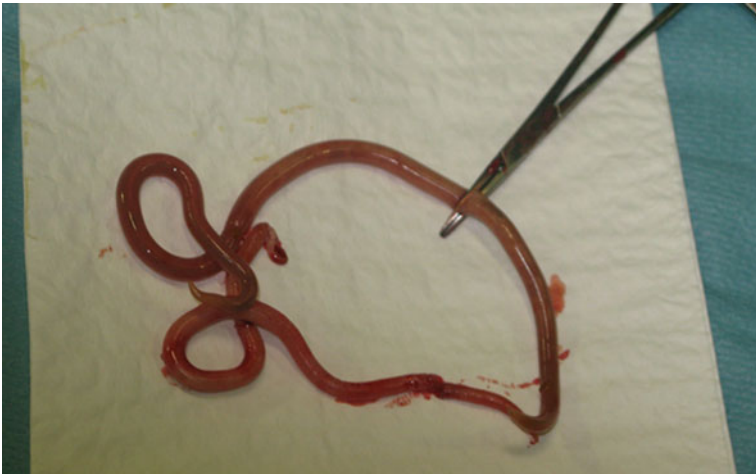


Fig. 44.21 *Ascaris lumbricoides*

and regularly perform double- or triple-layer anastomoses, followed by a course of albendazole if worms are detected.

Hookworms (Ancylostoma duodenale)

Hookworms normally penetrate the feet where they migrate in the veins to the right side of the heart and lungs and penetrate the alveoli and then into the trachea coughed up and swallowed. These worms are about 1 cm in length and live in the

small bowel sucking blood from intestinal mucosa causing severe iron deficiency anaemia. Again the treatment is albendazole; it is mentioned purely because it is a cause of severe anaemia and should be part of the differential diagnosis.

Whipworms (Trichuriasis)

Whipworm eggs when ingested hatch in the small intestine, and the larvae live in the caecum and sometimes rectum. The adult worms are 3–5 cm in length and cause infants to have severe chronic bloody diarrhoea, which is so intense that it causes a rectal prolapse (Fig. 44.22) . Treatment is with albendazole.

Filariasis

The WHO considers lymphatic filariasis to be the fourth leading cause of permanent disability worldwide. Larvae of *Wuchereria bancrofti* are ingested by female mosquitoes and undergo further development within the mosquito. Larvae are then injected into humans by the mosquito and develop further eventually migrating into lymphatic system. The primary pathological process is local damage to the lymphatics almost certainly as a result of local inflammatory response. The initial presentation is fever



Fig. 44.22 Whipworm infection causing rectal prolapse in a baby

with painful lymphadenopathy and lymphangitis followed by gross swelling of the leg and/or the upper arm and breast in women and external genitalia in men. There are some oddities associated with this condition. I remember being shown the urine of a man who was allegedly passing milk; the diagnosis was made after removal of his gown revealed gross elephantiasis of one leg. Most likely the dilated lymph vessels in his pelvis had ruptured and discharged lymphatic fluid into the bladder thus producing the milky appearance known as chyluria. The surgical management of this condition is beyond the scope of this chapter, and the medical management is also changing from the classical diethylcarbamazine (DEC) to combination treatments [31].

Onchocerciasis

Onchocerciasis or river blindness is caused by the filarial worm *Onchocerca volvulus* transmitted by the bloodsucking *Simulium* black fly, breeding near fast rivers. Approximately 270,000 people in 500,000 have significant visual loss making it the world's fourth most common cause of blindness [32]. Apart from causing blindness the adult filariae become encapsulated in fibrous tissue, which forms nodules in subcutaneous tissues to the extent that the inguinal lymph nodes can become so large that they can be misdiagnosed as incarcerated inguinal hernia (Fig. 44.23), which I have seen on occasions. But there are other telltale signs before one operates



Fig. 44.23 Lymph node enlargement mimicking incarcerated hernia in a patient with onchocerciasis

that is to look at other nodules and the pre-tibial deep pigmentation sometimes known as leopard skin where atrophy of the skin can also occur resulting in a tissue paper appearance. The mainstay of this treatment is medical notably ivermectin.

Osteomyelitis

This is a particularly tragic disease, which has almost disappeared from the industrialised world, but is very common in Africa. There are three kinds of osteomyelitis. Acute haematogenous osteomyelitis mainly affects the metaphysis of the tibia and femur. Pyogenic staphylococci remain the commonest causative organisms although some yield *Salmonella typhi*, *Escherichia coli* and other exotic bacteria. The second cause is traumatic osteomyelitis following road accidents and is usually as a result of inadequate wound toilet. Thirdly and perhaps most importantly from a clinical point of view is osteomyelitis following orthopaedic procedures particularly internal fixation of femur fractures with intramedullary nails and metal plates and screws for tibial fractures. This is the main reason why patients in the tropics should be treated by immobilisation using combinations of plaster of Paris, traction and external fixation.

In tropical areas, acute haematogenous osteomyelitis (Fig. 44.24) is a common severe affliction with high morbidity and occasional deaths that affects infants and children. Unless treatment is early, most patients progress to chronic osteomyelitis. At onset, there is pain in the affected bone (commonly the tibia, femur or humerus), and often there is a history of recent trauma. Soon the pain becomes severe and high fever develops. The child refuses to use the limb, and the bone is tender to gentle percussion. Infants respond to infection with lethargy, failure to feed and subnormal temperature. Pseudoparalysis of the affected limb is an important sign but is more likely to be noticed by the mother than by medical staff. Concomitant septic arthritis (Fig. 44.25) is the norm, because the blood vessels crossing the epiphyseal plates of the infant provide a pathway for the spread of sepsis. If diagnosis is delayed, joint destruction occurs and loss of the femoral head is particularly common. Appropriate antibiotic should be given intravenously, then the joint drain thoroughly washed; the hip should be held in abduction to prevent septic dislocation and other affected joints splinted in a functional position. A combination of ampicillin and cloxacillin of the broad-spectrum antibiotics is also indicated.

If the infection progresses areas of periosteal reaction are separated by a smooth area of unreactive cortex, which becomes nonviable, and subsequently becomes known as the sequestrum. In sub-Saharan Africa, sickle cell disease is common. Children who are homozygotes for the sickle cell gene develop a chronic haemolytic anaemia with splenomegaly and intermittent jaundice. They have periodic sickling crises, which may include painful bone infarction, and they also frequently develop acute haematogenous osteomyelitis due to staphylococcus and salmonella.

The treatment of post acute osteomyelitis is with analgesics and antibiotics and by draining the extra osseous abscess.



Fig. 44.24 Acute haematogenous osteomyelitis

Chronic Haematogenous Osteomyelitis

If the disease becomes chronic, then this is characterised by a swollen limb with sinuses discharging pus and palpably thickened bone (Fig. 44.26). Adjacent joints are often already stiffened by the time of first presentation. The stripped periosteum begins to form new bone overlying the dead cortex and is called the involucrum. This forms to maintain the integrity and length of the bone; however, the dead cortical bone, the sequestrum, continues to cause sinuses and accumulation of pus. Radiographs as in Fig. 44.27 show a characteristic pattern of bone destruction, sequestrum, and new bone (involucrum) surrounding the sequestrum (Fig. 44.28). There is a spectrum of severity ranging from severe infections with huge diaphyseal sequestrum and inadequate involucrum that fails to bridge the remnants of missing bone to small sequestrum surrounded by sealed cavity of pus or surrounded hypertrophic cortical bone. The latter situation is often described as a Brodie's abscess, which gives rise to intermittent pain, fever and swelling. The bacteriology of chronic osteomyelitis is mixed. The variety of organisms isolated increases with the number of swabs taken and usually include staphylococcal, bowel flora and



Fig. 44.25 Aspiration of pus from septic arthritis



Fig. 44.26 Chronic osteomyelitis with sinuses

Fig. 44.27 Osteomyelitis showing new bone (involucrum and dead bone the sequestrum)

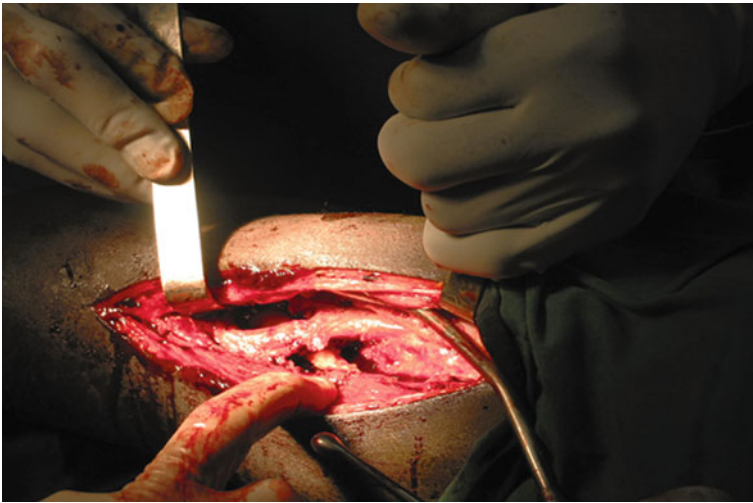
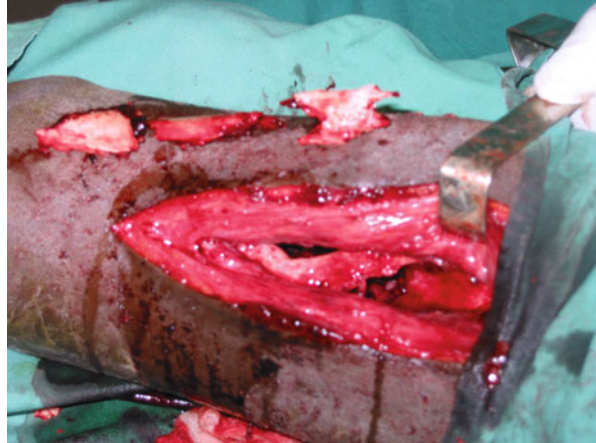


Fig. 44.28 Sequestrum and involucrum

anaerobic organisms. Antibiotic should be given immediately before surgery is undertaken in a few days post-operatively to prevent septicaemia, but the treatment of chronic osteomyelitis is essentially surgical. The limb should not be used, but protected in a brace to allow the involucrum to bridge the dead bone. Sequestrectomy can then be done (Fig. 44.29). If the involucrum has failed to progress within 3 months, then sequestrectomy should be performed to bring infection under control, whilst providing stability and maintaining limb length with external fixation. When small sequestra lie in a cavity surrounded by thick new cortical bone, the cavity must be widely opened (saucerised), cleared and opened into the adjacent medullary cavity proximally and distally and the wound left open for daily saline dressings.

Fig. 44.29 Sequestrectomy

Trauma in the Tropics

Often patients arrive having had long and difficult transportation with no prehospital care. There is limited emergency room competence with the staff not being trained enough to understand the concept of emergency care and certainly not within the bounds of ATLS. There is often no x-ray machine and little diagnostic capability. Once treated, the patient may discharge himself or through cultural reasons refuse treatment or if treated may never return for follow-up. From the trauma point of view, most injuries will have self-selected themselves, and very unusually you may have to treat patients within the golden hour which mainly involves control of haemorrhage. More likely patients will be seen several hours or days following the accident. The patients who suffer trauma and blood loss may have also been anaemic prior to the accident and are severely anaemic on presentation. Usually if blood for crossmatch is available, then a target of 8 g/l is usually satisfactory. Consideration for fluid management is a high priority, and the patient may be significantly dehydrated because of the length of time taken getting to the hospital and the ambient temperature. A target of urine output of 30mls per hour is mandatory prior to surgery as a guide for resuscitation. The mainstay of orthopaedic management for fractures will be reduction and stabilisation usually with traction and plaster of Paris. External fixation is mainly used for soft tissue management during open fractures, septic non-union and malunion of fractures. Usually the external fixator remains in place for between 2 and 6 months. The techniques are not difficult to perform but should not be used without consideration of simpler methods of fracture fixation. Internal fixation should never be used in this sort of environment for the reasons described previously. To assess whether or not the fracture has healed in this environment, after a period 3 months or so, loosening the connection struts and allowing the patient to walk and if without pain, then you can assume the fracture has healed and the pins can then be taken out. Obviously a further few weeks of gentle weight bearing before full weight bearing is necessary. Figure 44.30 shows a fractured femur treated with traction and physiotherapy.



Fig. 44.30 Fractured femur treated by traction and physiotherapy

Obstetrics in the Tropics

Between 5 and 10 % of babies die in the perinatal period from 28 weeks of pregnancy to 7 days postpartum. Intrauterine deaths are often unexplained, but preventable causes include malaria, syphilis and obstructed labour. Most perinatal deaths in Africa are usually of normally formed, normal-weight babies who die avoidably from trauma, asphyxia or infection. Many neonatal deaths occur in babies whose low birth weight is due to prematurity or intrauterine growth retardation, the deaths of both mothers and babies mostly due to the maternal and social conditions under which they live.

Anaemia, Malaria and HIV/AIDS During Obstetric Surgery

Major causes of anaemia in pregnancy are malaria, iron deficiency due to worms, folate deficiency and haemoglobinopathies and AIDS. Anaemia is often multifactorial, with the different causes interacting in a vicious cycle of depressed immunity, infection and malnutrition.

Anaemia progresses through three stages:

- (a) Compensation, with breathlessness on exertion only
- (b) Decompensation, with breathlessness at rest and haemoglobin (Hb) below 7 g/dl
- (c) Cardiac failure, with Hb below about 4 g/dl

Surviving infants have low birth weights, immune deficiency and poor reserves of iron and folate. They have entered already the vicious cycle of infection, malnutrition and impaired immunity. Treatment with blood transfusions is even more hazardous because of HIV and should be limited to saving the life of the mother. Treatment of malaria is complex as chloroquine-resistant strains are now common. Prevention remains relatively easy with proguanil and supplements of iron and folic acid and is highly cost-effective in the improvement of maternal and infant health; it is more important than ever as it avoids the unnecessary exposure of women and infants to HIV transmitted through blood transfusion.

Patients arriving after long journeys from distant villages in obstructed labour are often dehydrated, ketotic, shocked, anaemic or infected. Performing an emergency Caesarean section through infected tissues may be complicated by peritonitis, which antibiotics may fail to control. When recovered, memories of a frightening operation followed by a difficult puerperium may make the mother deliberately not seek hospital care when she becomes pregnant again. If the baby dies, the family may blame the hospital and decide to have the next one at home. Unfortunately, Caesarean section seldomly removes the factor, which caused the obstructed labour that is of a narrow pelvis. In addition to that, the scar in the uterus following caesarian section is now its weakest part, and therefore the chances of the uterus rupturing on the during the next birth are very high.

Obstructed Labour

Obstruction is “the failure of the presenting part to descend in spite of uterine contractions”. What really distinguishes delay from obstruction are the secondary signs and complications such as severe moulding and caput, fetal distress, stretched lower segment, bloody urine, fistulae and rupture of the uterus. Whereas delayed labour is usually inevitable and readily treatable and is comparatively harmless, obstructed labour is none of these things. It should never happen where care is adequate. Obstruction may be due to (a) a small contracted and underdeveloped pelvis; (b) an abnormality in the baby, e.g. hydrocephaly; and (c) an abnormality in the birth process. This can be either an abnormal lie or presentation such as a breach, a brow, a face, a shoulder presentation or a prolapsed arm in a transverse lie or an unfortunate coincidence of the relative sizes of the head and the pelvis such as cephalopelvic disproportion (CPD). Rarer causes such as stenosis of the vagina, locked twins or pelvic tumour, particular fibroids or an ovarian cyst. CPD is the most important

cause (two-thirds of these cases), and an impacted transverse lie is second most common cause.

In a labour that is going to obstruct, the first stage is often prolonged, but it can be normal or even short. The membranes rupture and liquor escapes, and the uterus contracts and retracts and forces the baby into its lower segment, which gradually becomes overstretched. Obstruction prevents the baby's escape, so the lower segment moulds closely around and thins. The contractions of the uterus become hypotonic and relaxation between them poor. The placenta becomes poorly perfused and fetal distress occurs and unfortunately the baby dies. Obstructed labour has two main dangers: (a) the vagina, bladder and rectum are trapped between the head and pelvic symphysis so that they become necrotic, slough and develop fistulae, and (b) the uterus ruptures. Primips usually develop fistulae, and multips usually rupture, but both can do either and rupture and fistulae can occur in the same patient. If the mother and baby do not die from the process and the dead baby is delivered either by caesarian or by symphysiotomy, then the likelihood of developing a chronic vesicovaginal fistula is very high.

Vesicovaginal Fistula

One of the most satisfying operations a surgeon can perform is that of vesicovaginal fistula repair. These patients are normally rejected by their husbands and families and often develop flexion contractures of their knees and hips because they have taken to lying and squatting in a darkened room because of the smell of urine. Following vaginal examination, a fistulous connection from the anterior vagina wall to the bladder is easily confirmed; however, the procedure to repair it is usually straightforward but can be difficult. I usually perform the operation with the patient lying in the prone position (Fig. 44.31) and carefully separate the anterior vagina wall from the bladder and separately suture the bladder and vagina with a 2/0 Vicryl stitch. A catheter is then placed in the bladder for several days to allow healing (Fig. 44.32). Figure 44.33 shows a repaired fistula.

Conclusion

Surgery in the tropics is an exciting area of medicine to explore. The lack of investigations and equipment brings medicine back to basics. Clinical acumen needs to be fine-tuned, and a knowledge of tropical medicine is a must before one can understand the diseases that may influence decision-making. For a western-trained surgeon, embarking on a first mission to Africa takes a good supply of information in the form of books on a USB stick because your educational needs will be high.



Fig. 44.31 Position of the patient for repair of vesicovaginal fistula

Fig. 44.32 Vesicovaginal fistula with catheter in the bladder



Fig. 44.33 Repaired fistula

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Chapter 45

Acute Problems and Emergency Surgery: Anaesthesia and Analgesia

Christiaan P. Bleeker

Abstract The authors of this chapter include specialists, many of whom have extensive deployment experience. The target group of this chapter, however, is not their fellow-specialists; but the “junior” doctors, trying to help them find their way in the difficulties posed by an “adverse” environment. That junior doctor will be confronted by all imaginable ailments and injuries, and should be a true generalist. As we’re all aware, even in medical school nowadays there’s a tendency to make students choose the direction of their future work at an ever earlier stage; the opposite of what’s needed for a generalist.

Keywords Triage • Trauma and medical emergencies • Ballistic and blast injury • Infectious diseases • Climatic influences • Bites and stings • Maxillofacial problems • Head and spinal cord injuries • Abdominal complaints • Non-traumatic surgical emergencies • Soft tissues and skeleton • Surgery in the tropics • Anaesthesia and analgesia • Hostile environments • Disaster environments • Conflict environments • Catastrophe environments

Objectives

- To discuss pain relief in an austere environment
- To discuss the principles of pain treatment
- To describe the range of agents and techniques available
- To discuss local and general anaesthesia in an austere environment
- To discuss the options and to describe techniques

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Introduction

If not the first word, then certainly the second word a doctor will learn in Afghanistan is “dard ki”, meaning it hurts. A doctor is expected to be able to deal with this complaint. It describes the main issue and is meant as an appeal to the doctor for help. A doctor will encounter pain under different circumstances such as operational circumstances in the field, a rural clinic call or humanitarian situations. This chapter means to describe how you can provide aid in a confident and responsible fashion.

Definitions

Throughout this chapter, the term analgesia is used to mean relieving pain, whereas anaesthesia is used to mean the absence of sensation. Anaesthesia may involve general anaesthesia (the patient is put to sleep, usually to allow a surgical procedure to be performed) or local anaesthesia (where a body part is deprived of sensation). Some anaesthetic drugs provide analgesia (e.g. ketamine), and some analgesic drugs (e.g. certain opioids), if given in large doses, will cause unconsciousness and general anaesthesia. All of these drugs have side effects. Depending on the drug and the dose given, this can include decrease in blood pressure, stopping a casualty breathing and other toxic effects.

Analgesia

General

It is a well-known fact that the doctor will underestimate the pain and the family will overestimate the pain. This often leads to under treatment of the patient. Remember the pain sensation belongs to the patient.

There are different types of pain which respond differently to different medications. Acute pain is treated easiest and provides grateful patients. For chronic pain you should be wary of starting a treatment. Do you have the right medications, the supplies to sustain the treatment and is follow-up guaranteed? Certain pains, such as ischemic pain or cancer infiltration into nerve tracts, cannot be treated with everyday medication and may lead to overdosing with opioids. So know your limitations and choose the enemy well. We cannot treat everybody.

The choice of analgesia method may also depend on the operational circumstances. Should the casualty be able to continue the fight, and should he stop shouting right now?

Principles of Pain Treatment

- Resuscitation comes before attempts at pain relief. Treating pain before resuscitation may remove pain and the sympathetic stimulation this causes as compensatory mechanism to shock.
- Pain is a symptom implying (impending) damage to tissue. When you treat pain you should also be looking for the cause of the pain. Treating the cause may be treatment of the pain. Treating the pain without treating the cause may well mask progressive damage.
- Verbal anaesthesia/analgesia is a valuable adjunct to other analgesia methods. Calm the patient, explain what is happening and promise only what can be guaranteed. Never lie to the patient especially children as they will never trust you again.
- Simple physical measures to relieve pain should be tried first. This includes splinting limb fractures and cooling burns.
- Start with the WHO analgesia ladder.
- Then switch to specific analgesic techniques.
- Know what is available in the doctor's kit and in the personal kits and know how to use it.
- Consider the number of casualties involved, their clinical condition and the circumstances of injury (including threats to the safety of both casualties and helpers).

Clinical Assessment

Your clinical assessment will be modified in the light of the situation and the number of casualties. Where practical, it is valuable to find out about the past and present history. Before giving a drug, contraindications (such as pregnancy or allergy) should be ruled out.

Clinical assessment relies on clinical observation and regular measurement of consciousness level, blood pressure, pulse rate and respiratory rate (these findings should be charted in a manner which will be understandable to personnel in both the field and the receiving hospital).

Routes of Administration of Medication

Orally

Oral analgesics are effective after minor surgery and in the less seriously injured. After serious injury or major surgery, gastric emptying and gut motility are likely to be delayed, and patients may vomit so alternative routes for giving drugs are needed.

Intramuscular Injection

Intramuscular injection of drugs may be necessary when carers lack cannulation skills, resources are limited and the casualties are inaccessible or presenting in large numbers with minor injuries. Intramuscular (IM) injection has a number of limitations. Onset of drug action is unpredictable and will be delayed in the shocked and cold patient. Subsequent fluid resuscitation and rewarming following an IM injection can result in the drug being rapidly “washed” out of the muscle into the circulation. This may in turn produce cardiovascular and respiratory depression.

Subcutaneous Injection and Infiltration

See Intramuscular injection. An i.v. cannula can be inserted subcutaneously and left for subsequent injections making it easier and less painful than an injection every 4–6 h. Precautions must be taken to assure nobody attaches an i.v. line to the cannula.

Rectal Application

Another easy route of applying medication is rectally. In warm climates without refrigerator, suppositories may be a little too fluid to use, and they are not easily transported in a warm backpack. However, many medications can be applied rectally in their native fluid form. Ketamine, morphine, midazolam or diazepam can be inserted using a bit of tubing, grease and a syringe. Make sure you have enough volume to fill the tubing and still reach the rectum by adding saline or flushing the tube. For children sat on their mothers lap, it may prove to be a friendly method. Dosage will need to be adjusted, but can be titrated to effect just by keeping the cannula in place and adding shot after shot of medicine.

Intravenous Injection

Intravenous injection (i.v.) provides a faster onset of analgesia and is best done by giving small amounts of the drug slowly into an intravenous cannula and monitoring the patient’s response. Remember to give the drug a chance to work before adding the next dose. Morphine only starts to work after 10 min to peak at 20 min. Do not make the patients urgency your own.

Infiltration and Nerve Blockade

This will be discussed under the section “[Local anaesthesia](#)” later in this chapter.

Inhalation

The drug is absorbed across the large surface area of the lung. An advantage is the rapid onset of drug action. Auto inhalation is a controlled manner of providing pain relief and sedation.

Mucosal

Some drugs can easily be applied via the oral or nasal mucosa. The effect will usually be fast. Drugs such as fentanyl and midazolam are available in nasal spray. In paediatric procedures sedation or analgesia is possible without an i.v. needle.

Choice of Drugs for Medical Kits

If you are in a position to compile your own selection of drugs for pain relief, take the following into account when choosing. The medication should be:

- Familiar to the people who will be giving them
- Non-addictive
- Legal in the country or area of work and importing the drugs must be arranged with all the paperwork necessary
- If possible available locally
- Able to withstand the temperature and conditions likely to be encountered
- Have a predictable action and minimal side effects
- Have effects which can be reversed in the event of an accidental overdose

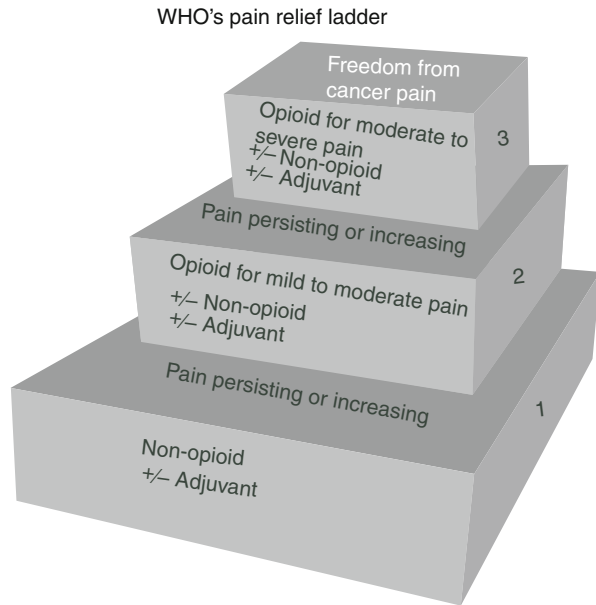
Pharmacology and Use

WHO's Pain Ladder

The WHO has developed a three-step “ladder” for cancer pain relief (Fig. 45.1). The escalation in therapy can be used in other pain settings as well. The WHO Internet site states:

If pain occurs, there should be prompt oral administration of drugs in the following order: non opioids (aspirin and paracetamol); then, as necessary, mild opioids (codeine); then strong opioids such as morphine, until the patient is free of pain. To calm fears and anxiety, additional drugs – “adjuvants” – should be used. To maintain freedom from pain, drugs should be given “by the clock,” that is every 3–6 h, rather than “on demand” This three-step approach of administering the right drug in the right dose at the right time is inexpensive and 80–90 % effective. Surgical

Fig. 45.1 WHO's three-step ladder for cancer pain relief (Reproduced with kind permission of WHO Press)



intervention on appropriate nerves may provide further pain relief if drugs are not wholly effective.

Oral Analgesics

A normal pain schedule will almost always start with paracetamol, and then an NSAID should be added. If this is not adequate, a mild or strong opioid can be added. This multipronged approach constitutes a broad attack on pain.

Paracetamol

This drug has a good analgesic action and unlike aspirin causes minimal gastric irritation. For adults, 500 mg to 1 g is taken up to four times a day. In the correct dosage side effects are rare. Paediatric dose ranges from 10 to 15 mg/kg four times per day. Paracetamol is available in an i.v. formulation as proparacetamol. Paracetamol is dangerous in overdose and can cause fatal liver damage.

Nonsteroidal Anti-inflammatory Drugs (NSAIDs)

This group of drugs is used in hospital to treat musculoskeletal and post-operative pain. They have been shown to have opioid-sparing effects. A range of drugs is

available, but they differ in terms of recommended dosage, dosage interval and licensed route of administration and severity of side effects. They have been used effectively in a variety of circumstances. Intramuscular ketaprofen has been used successfully in battle casualties with minor fragment wounds. In emergency department practice, oral ibuprofen and intramuscular ketolorac have supplied comparable analgesia for musculoskeletal injuries. In the authors' experience, diclofenac and naproxen are the most effective analgesics of this group when used in trauma patients. Diclofenac is also very effective in treating colic pain due to appendicitis, gallstones or stones in the kidney and inflammation of the liver or the ovaries. It is registered only for i.m. use; however, 75 mg i.v. (off licence) in a single dose has proved very effective in stopping a renal colic.

At present, out-of-hospital injectable use of NSAIDs may be restricted by the conditions of a particular drug's licence.

A number of disadvantages and limitations exist to the use of NSAIDs:

- They can inhibit platelet aggregation and prolong bleeding time, resulting in an increase in blood loss during surgery.
- Post-operative haemorrhage has been reported.
- They have been implicated in acute renal failure, particularly in patients with pre-existing diminished renal function.
- They may exacerbate asthma.
- They may cause gastric irritation and should not be used in aspirin-sensitive people.

This means that their use may be limited in cases of major injury associated with haemorrhage and shock.

Opioid Analgesics

These drugs remain the gold standard by which other analgesic agents are judged, particularly for treating severe visceral pain. Many synthetic and semi-synthetic drugs are available, but certain comments are relevant to all opioids:

- In severe pain, small incremental doses should be administered by the intravenous route where possible, and patient response should be observed closely both to assess pain relief and to check for adverse effects (particularly for signs of respiratory depression).
- The opiate antagonist naloxone must always be available, as should facilities for advanced airway management.
- Anti-emetics will frequently be necessary when opioids have been used.
- Certain of these drugs are controlled and subject to the Misuse of Drugs Regulations.

The respiratory depression may be deleterious in brain injury casualties where an insidious increase in CO₂ may increase intracranial pressure of the patient.

Morphine

This is the narcotic analgesic standard. Its classic actions of analgesia with euphoria (and ultimately physical dependence) and respiratory depression depend upon an agonist (positive) action on central nervous system opioid receptors. These effects can be reversed with the opioid antagonist naloxone.

In the field, a 1 mg/ml solution can be used to provide an adult bolus injection between 2 and 5 mg followed by 1-mg increments according to patient response. Analgesia may be expected to start after some 5–10 min. Cardiovascular effects include a lowering of blood pressure from systemic vasodilatation following histamine release. Morphine is generally avoided in head injuries as hypercapnia may occur and pupillary assessment during neurological examination may become more difficult.

Nalbuphine

This is an injectable (subcutaneous, intramuscular or intravenous) synthetic opioid characterised by its minimal abuse potential. A dose of 10–20 mg is given every 3–6 h as necessary. Its analgesic effect and degree of respiratory depression are stated to be similar to those of morphine, whilst nausea and vomiting may be less. Reports of its clinical effect in hospital are varied, but prehospital use is reported to be safe and effective.

Codeine Phosphate

This is an opioid with good analgesic activity; 30–60 mg is given orally or intramuscularly every 4–6 h up to a maximum of 240 mg per day. Constipation and drowsiness may occasionally be problems.

Pentazocine

This is a morphinomimetic with mixed agonist – antagonist characteristics. It comes in ampoules of 30 mg/ml or capsules of 50 mg.

Side effects are less than morphine but include nausea and vomiting. The dose is 15–30 mg i.v. or 30–45 mg i.m or s.c. It is antagonised with naloxone.

Tramadol

Tramadol is a centrally acting synthetic opioid analgesic. Although its mode of action is not completely understood, at least two complementary mechanisms appear applicable: binding of parent and M1 metabolite to μ -opioid receptors and

weak inhibition of reuptake of norepinephrine and serotonin. Tramadol has the same side effects as morphine such as pruritus, constipation, nausea and vomiting. It does, however, not have the histamine release effects of morphine. Tramadol is partly antagonised by naloxone. Doses range from 50 to 100 mg four times daily.

Fentanyl Lollipops

Fentanyl lozenges are a solid formulation of fentanyl citrate on a stick in the form of a lollipop that dissolves slowly in the mouth for transmucosal absorption. These lozenges are intended for opioid-tolerant individuals and are effective in treating breakthrough cancer pain. It is also useful for breakthrough pain for those suffering bone injuries, severe back pain, neuropathy, arthritis and some other examples of chronic non-malignant pain. The unit is a lozenge on a stick which is swabbed on the mucosal surfaces inside the mouth – inside of the cheeks and under and on the tongue and gums – to release the fentanyl quickly into the system. It is most effective when the lozenge is consumed in 15 min. The drug is less effective if swallowed, despite good absorbance from the small intestine. Fentanyl lozenges are available in six dosages, from 200 to 1,600 µg in 200 µg increments (excluding 1,000 and 1,400 µg).

Most patients find that it takes 10–15 min to use all of one lozenge, and those with a dry mouth cannot use this route. In addition, nurses are unable to document how much of a lozenge has been used by a patient, making drug records inaccurate. Also as with any opioid, this formulation is particularly susceptible to misuse and abuse.

Fentanyl

See the part in this chapter on section “[Anaesthesia](#)”.

Inhalational Analgesia

Both Entonox and methoxyflurane present an easy method of providing analgesia. Both are prone to misuse as a party drug.

Entonox

Premixed 50:50 nitrous oxide and oxygen (Entonox) has been a traditional analgesic in UK prehospital care for some 30 years. Its popularity is owing to its ease of administration and safety. The mixture is provided from on-demand valve cylinders and administered via a mask or mouthpiece. Overdose is unlikely as once a patient becomes drowsy, they release the mouthpiece and their level of consciousness recovers.

Analgesia will peak some 2–5 min after inhalation, and this fact needs to be respected when Entonox is used to assist procedures such as patient extrication. Size D cylinders allow 20–30 min continuous use, the efficiency of which is improved by locating the demand valve at the patient's mouthpiece.

During storage, care must be taken to ensure that the temperature of the gas is not allowed to fall below -7°C because at this point separation of the gases can permit delivery of a hypoxic mixture.

When necessary, a cylinder can be rewarmed at 10°C for 2 h and then completely inverted three times (to mix the gases) or rapidly rewarmed by immersion in water at 37°C for 5 min and then inverted three times.

Entonox is contraindicated in decompression illness. It should also not be used in the presence of a pneumothorax unless there is a functioning chest drain in situ. Nitrous oxide diffuses out of the blood stream into gas-filled cavities (and bubbles) faster than nitrogen can be removed, causing an increase in pressure and volume within these spaces. Theoretically similar considerations apply to air collections within the cranial cavity of head-injured patients. In practice, Entonox should be safe, for a casualty with mild concussion and pain from other injuries, particularly since it is likely to be given for a short time period.

Methoxyflurane

Methoxyflurane is an old-fashioned anaesthetic vapour which is a weak anaesthetic and strong analgesic. It is currently used by ambulance services delivered via an inhaler with or without oxygen. Onset of action is 1–3 min and the duration is 5–10 min. The dose should be self-administered. If the patient is unable to self-administer, then the attendant should observe consciousness of the patient and remove the inhaler when the patient starts to lose consciousness. Care should be taken in patients with an already altered level of consciousness, e.g. after a head trauma, that airway patency is maintained.

The dose is 3 ml inserted on the wick of the inhaler. This may be repeated to 6 ml per day and 15 ml per week.

Anaesthesia

Anaesthesia uses medication to induce a controlled state of depressed consciousness or unconsciousness in which the patient may experience partial or complete loss of protective reflexes including the ability to independently and continuously maintain a patent airway. This is the reason why the provision of full anaesthesia is undertaken by specially trained individuals with the ability to maintain oxygenation in spite of the airway being at risk. So do not try this at home.

Even so events may call upon the available doctor to provide for a more cooperative patient. He can choose to provide help without full loss of consciousness. This

is called conscious sedation. Conscious sedation is defined as the use of medication to minimally depress the level of consciousness in a patient whilst allowing the patient to continuously and independently maintain a patent airway and respond appropriately to verbal commands and/or gentle stimulation. It is still a form of anaesthesia and on the continuum to full unconsciousness. Therefore the monitoring, observation, preparation and execution remain essentially the same as for full-blown anaesthesia. In this respect The WHO Guidelines for Safe Surgery 2009 state:

- Before induction of anaesthesia:
 - Has the patient confirmed his/her identity, site, procedure and consent?
 - Is the site marked?
 - Is the anaesthesia machine and medication check complete?
 - Is the pulse oximeter on the patient and functioning?
 - Does the patient have a known allergy?
 - Does the patient have a difficult airway/aspiration risk?
 - Does the patient have a risk of >500 ml blood loss (7 ml/kg in children)?

Preparation

During the preparation the patient is assessed as to his suitability for the sedation. The elderly will cross over to full anaesthesia easily and have little physiological reserve to compensate for the side effects of the medications. So essentially patients should be healthy and reasonably strong (ASA classifications 1, 2 and some 3). Beware especially of patients with symptomatic heart disease and symptomatic diabetes mellitus. Pre-existing airway problems will exacerbate when you sedate. You should ask about allergies, medications use, last meal and other diseases. The patient should be fasted just as for full anaesthesia.

After the sedation the patient should not be allowed to drive, operate power equipment, cook or make important decisions such as getting a divorce until next day.

The *ASA physical status classification system* is a system for assessing the fitness of patients before surgery. In 1963 the American Society of Anesthesiologists (ASA) adopted the five-category physical status classification system; a sixth category was later added. These are:

1. A normal healthy patient
2. A patient with mild systemic disease
3. A patient with severe systemic disease
4. A patient with severe systemic disease that is a constant threat to life
5. A moribund patient who is not expected to survive without the operation
6. A declared brain-dead patient whose organs are being removed for donor purposes

If the surgery is an emergency, the physical status classification is followed by “E” (for emergency), for example, “3E”. Class 5 is usually an emergency and is therefore usually “5E”.

Personnel

There should be one competent person available to watch the patient during the sedation. This person should have no other duties to perform during the sedation. The condition of the patient during the sedation should be charted. The sedation is not finished once the procedure is finished, but only once the patient is fully conversant and clear headed.

Equipment and Supplies

Oxygen

System capable of delivering 100 % at 10 l/min (If oxygen supply is a problem, consider investing in an oxygen concentrator. They usually produce less than 10 l/min but can be very useful. Some run on batteries, 12 V, and normal electricity. They are very low in maintenance.)

Suction

Apparatus capable of producing continuous negative pressure of 150 Torr

Airway Management

- Face masks (all sizes)
- Oro- and nasopharyngeal tubes
- Endotracheal tubes
- Laryngoscopes

Monitors

Pulse oximeter (Please refer to the WHO Patient Safety Pulse Oximetry Project; see the further resources heading.)

- Cardiac monitor in a cardiac patient
- Blood pressure device

Resuscitative Equipment/Medications

- Ambu bag
- Defibrillator

Emergency drugs including naloxone (Narcan), flumazenil, ephedrine and epinephrine
Emergency drug card and ACLS protocols

Principles of Providing Conscious Sedation

Conscious sedation is achieved using some of the same medications and delivery methods used for anaesthesia. The object is to titrate the medication to slowly reduce consciousness to a level of slurred speech. The medication is slowly injected and the result checked after waiting the effect time, then another small bolus is added.

Medication Used

Midazolam

Midazolam is a short-acting water-soluble benzodiazepine. It has antianxiety, anti-convulsant, sedation, muscle relaxation and antegrade amnesic properties.

Side effects include decrease in blood pressure and some depression of ventilation and the muscle relaxation may lead to airway obstruction.

Sedation dose: titrate 0.05–0.15 mg/kg. Dilute the solution to a concentration of 1 mg/ml and slowly start with 1 mg and then add 1 ml per bolus.

Diprivan/Propofol

Propofol is a real anaesthetic so has to be used very carefully. When given as a bolus, the patient will initially stop breathing and then resume. The patient will get drowsy and may get very talkative during the slow infusion. As such propofol is not ideal for conscious sedation. Also it has little or no painkilling properties. You will need continuous added boluses which increases the risks. Side effects include a blood pressure drop and a burning sensation on injection. It gives a fast clear-headed awakening with the patient having experienced sometimes vivid dreams.

If possible start propofol on an infusion pump start at 2 mg/kg/h. When giving boluses inject very slowly to a maximum of 0.5–1 mg/kg.

Ketamine

Ketamine is an anaesthetic drug with a profound analgesic effect. It has little or no ventilatory depression, and it does not depress the pharyngeal reflexes as much as other agents, but the airway should not be presumed safe. It causes little

cardiovascular depression. It produces a dissociative anaesthesia which looks like a catatonic state. It is often accompanied by unpleasant dreams and hallucinations. It produces hypertension and tachycardia. Also there may be a disturbing hypersalivation. Because of the side effects, ketamine is usually combined with low-dose midazolam and with atropine.

Ketamine is very useful for short painful procedures such as bandage changes (burn cases).

CAUTION: there are two formulations for ketamine: *the normal ketamine and the left gyrating ketamine-S*. Ketamine-S is twice as potent as normal ketamine, so all dosages mentioned here should be halved for ketamine-S. Dosage for ketamine:

- I.v. is 1–2 mg/kg for 5–10 min effect
- I.m. dosage is 5–10 mg/kg, the effect lasting 10–20 min
- Rectal application 10 mg/kg slow-action gradual increase in sedation lasting 10–30 min

Fentanyl

Fentanyl is a potent synthetic short-acting opioid. It will work for 20–30 min. As it is so potent, it should be used with extreme care. A central ventilation depression will provide decreased sensitivity for CO₂. Fentanyl may increase intracranial pressure due to the CO₂ rise. It may produce bradycardia and thoracic rigidity.

Fentanyl should be titrated very slowly to a good effect. Titrate with 25 µg per bolus. A normal dose is 50–100 µg in a grown-up with a maximum effect after 5 min. When combined with other medications, be even more careful.

Local Anaesthesia

Local anaesthetic techniques can provide safe and effective analgesia in acute trauma. Regional anaesthesia is a local anaesthetic technique that removes sensation from a particular body region, e.g. using a nerve block for a limb or using spinal or epidural injections to numb the abdomen and legs.

There are a number of limitations to local anaesthesia in prehospital and field conditions:

- Personnel with the appropriate anatomical knowledge and training may not be available.
- Preparation of the patient (resuscitation, positioning and access) is difficult.
- There may be insufficient time to perform the technique and wait for it to work.
- Inadvertent toxic problems may be difficult to manage.

In practice, local anaesthesia will be used for certain specific purposes:

- **Infiltration.** Direct injection of local anaesthetic into the skin and subcutaneous tissues for wound exploration and suturing or to assist practical procedures such as chest drain insertion.
- **Nerve blocks.** Certain blocks such as femoral nerve block (which can be performed quickly and safely in some instances even during transport to hospital) or intercostal block to assist with chest drain placement or moving a casualty with fractured ribs.
- **Haematoma blocks.** Direct injection of a fracture haematoma is useful for certain limb fractures, particularly of the wrist.
- **Specialised blocks.** Less common and more specialised techniques such as caudal, epidural and spinal anaesthesia.

Local Anaesthetic Safety

Local anaesthetic safety is a complex subject. The potential danger will vary according to the technique proposed, the patient's condition and the local anaesthetic selected. Safety is maximised by careful preparation and execution of the local anaesthesia. You have to ensure that:

- The patient has an intravenous cannula (to allow fluid resuscitation and treatment of allergic and toxic reactions to the local anaesthetic).
- The local anaesthetic is never injected as one bolus. Once the needle for the local anaesthetic is in place, first you should aspirate and make sure the needle is not in a vessel. If you aspirate blood do not inject but reposition the needle. Once a good position of the needle is achieved and no blood aspirated, you inject the local anaesthetic ml after ml aspirating in between each increment until the full dose is inserted thus guarantying it is not intravascular.
- The Maximum Recommended Therapeutic Dose (MRTD) relevant to nerve block and infiltration techniques should be calculated beforehand and not exceeded.

Adrenaline is often added to local anaesthetics. It prolongs the action of the local anaesthetic. The adrenaline-containing mixtures should not be used in body parts that are fed by end arterioles. Traditionally these are the digits, nose, ears and penis. On accidental intravascular injection, there will be an immediate rise in pulse rate on the pulse oximeter, warning you of impending danger.

Pharmacology of Local Anaesthetics

Toxic reactions from local anaesthetics are usually the result of technique failure or incorrect doses. They may well be fatal. The smaller the individual the more at risk

the patient is of being intoxicated. Never just infiltrate a skin area of a baby or paste with local anaesthetic cream or spray so many squirts from a nebuliser without calculating the total dose allowed.

Toxic Reactions

Cardiac

Sinus bradycardia, cardiovascular collapse, conduction blocks, prolonged PQ time, suppression of ectopic pacemakers, negative inotropic effects and fibrillation. Resuscitation of a patient intoxicated with bupivacaine is hardly ever successful. Treat cardiac arrest with normal CPR. Prolonged resuscitation may be necessary. If available give a lipid emulsion such as 20 % Intralipid®. Start with a 100 ml bolus and start an infusion of 0.25 ml/kg/min. Every 5 min repeat the bolus. Continue the infusion until circulation has been restored. Continue CPR with the lipid emulsion treatment. It may take an hour.

CNS

Sudden loss of consciousness, dizziness, fasciculations, paraesthesias around the mouth and fingers, hypersalivation and tonic clonic convulsions. Treat the convulsions with anticonvulsants such as a benzodiazepine, a barbiturate or propofol in small incremental doses.

Dosages

See Table 45.1 for maximum safe dosages and duration of effects for local anaesthetics.

The figures given for maximum safe doses are approximations, and in practice they may need to be reduced depending on the condition of the patient and the techniques being used.

Table 45.1 Local anaesthetics: maximum safe doses and duration of effects

Drug	Maximum safe dose (mg/kg)	Duration of effect (h)
Procaine	7	0.5–1
Tetracaine	1–2	1–2.5
Prilocaine	6–9	1–2
Lidocaine	4–7	1–2
Mepivacaine	4–7	1–2
Etidocaine	4–5	2–6
Bupivacaine	2–3	2–5
Ropivacaine	2–3	2–4

Selected Local Anaesthetic Procedures

Exact details of anatomy and technique should be studied from any of the standard texts on nerve blocks and regional anaesthesia.

Femoral Nerve Block

This technique may be used to assist splinting or movement of an injured leg. A 3-cm 23-gauge needle will be sufficient for nonobese patients. The nerve is frequently more superficial (1–1.5 cm deep) than is taught in some trauma skill courses. As quick-onset analgesia is required, lignocaine is a suitable anaesthetic and bilateral blocks are permissible within the MRTD.

Firstly, identify the point of injection, using the surface landmarks. For the femoral nerve, this is just below (distal to) the inguinal ligament. Palpate both the anterior superior iliac spine and the pubic tubercle. The line between these two overlies the inguinal ligament. It is often helpful to draw the lines that are described on the skin. The femoral artery should lie at the midpoint of the inguinal ligament, and it is necessary to locate this by feeling for the pulse at this point. The site for injection is 1 cm lateral to (outside of) the pulsations of the femoral artery and 1–2 cm below (distal to) the line of the inguinal ligament. After skin and subcutaneous tissue infiltration of local anaesthetic agent, the needle is inserted aiming approximately 45° cranial. The point of needle entry is just inferior to the inguinal crease. Two definite “pops” should be felt when the needle penetrates first the fascia lata and then the iliac fascia. It is very important to penetrate both these layers of fascia, because the local anaesthetic agent will not cross the fascia layer if deposited superficial to it. This is a common mistake when performing femoral nerve blocks.

The local anaesthetic should be deposited in a fan-shaped distribution in order to accommodate the variable distances of the nerve lateral to the femoral artery.

Peripheral Hand Blocks for the Hand

Ring blocks of digits or single nerve blocks at the wrist or ankle may occasionally be of value for individuals whose limbs are trapped in machinery. A digital block using the Oberst technique will allow a finger operation or amputation of a mangled digit. Do not use local anaesthetic with adrenaline.

Haematoma Block for Reduction of Closed Fractures

This may be useful when dealing with large numbers of casualties. You should, however, be aware of the risks of converting a closed fracture to a potentially

infected fracture. How clean are your circumstances, how clean can you get the patient, is it your only option and can you improve circumstances by postponing?

Intercostal Nerve Block

This technique can be used to treat pain from fractured ribs. The practical danger is the risk of pneumothorax, and short small-gauge needles must be employed. Remember to insert the needle onto the rib and then walk the needle down till it slides under the rib and insert $\frac{1}{2}$ cm and inject 3–4 ml of local anaesthetic per rib. In this location a lot of local anaesthetic is absorbed so extra attention should be given to the MRTD.

Axillary Block

The axillary nerve bundle is situated around the axillary artery. The easiest approach is the transarterial approach. This also means that there is a high risk of intra-arterial injection of local anaesthetic.

Position the patient with his hand beside or behind his head. You have to locate the axillary artery high in the axilla. Then disinfect the location and inject local anaesthetic into the skin. A hypodermic needle is chosen and an extension tube attached to the needle, and the tubing and needle are flushed with the local anaesthetic you are using. Use a local anaesthetic with adrenaline. Then the syringe is detached from the tube, so there is an open connection to the air. Now insert the needle high in the axilla and try to puncture the axillary artery. Once you are in the artery, blood will be seen in the tubing. Advance the needle through the artery until blood flow stops. Aspirate for blood. When there is no blood, inject a small dose of local anaesthetic and wait to hear if there is an increase in heart rate on the pulse oximeter indicating intravascular injection. If you are not in the artery, aspirate and inject a small dose and aspirate again until half the dose is injected. Now detach the syringe from the tubing. Withdraw the needle slowly until blood again flows into the tubing. Withdraw a little further until the flow stops. Now aspirate again to confirm you are outside the artery and inject, aspirate and inject the remaining dose. After the procedure remember to compress the artery for haemostasis and to massage the local anaesthetic higher into the axilla for an even better coverage of the block.

The dose for an axillary nerve block is 30–40 ml of the local anaesthetic. Keep talking to the patient and ask for signs of local anaesthetic intoxication such as tingling or numbness in the tongue, passing blindness or other signs.

Bier's Block (Intravenous Regional Anaesthesia)

The intravenous regional anaesthesia as described by Dr Bier, 1808, is indicated for a procedure below the elbow or knee lasting shorter than an hour. The procedure

should not be used in patients with Raynaud's disease, homozygous sickle cell disease or a crush injury to the relevant limb.

The drug of choice would be prilocaine because of its low toxicity. The alternative option is lignocaine 0.5 %. Never use bupivacaine. For an arm 40 ml. may be used and for a leg 50–60 ml. in smaller individuals the dose may have to be reduced. No adrenaline is to be added.

Preparation

An i.v. cannula is inserted distally in a vein in the scheduled limb and another in another arm. A tourniquet is placed on the upper arm or thigh. The limb is then exsanguinated by elevating the limb and, if feasible with the wound, tightly wrapped with a rubber bandage to squeeze the limb empty. The tourniquet is then inflated 50 mmHg above the patient's blood pressure. Now the local anaesthetic solution is injected into the i.v. cannula. The lower arm or leg will start to feel hot and the skin may appear mottled. You can then start the operation.

The tourniquet must be left in place, even after the operation is finished, for at least half an hour after injection of the local anaesthetic. If the tourniquet is deflated before this period, toxic side effects may occur. Beware of accidental release of the tourniquet during the procedure. When it's time to release the tourniquet, the tourniquet should be let down for 20 s and then reinflated. The patient should be checked for side effects, and if none have occurred, then the tourniquet can be let down for good.

If the procedure takes too long, the tourniquet may become very uncomfortable. In that case another tourniquet may be placed distally from the original tourniquet and inflated. The new tourniquet will be located in the anaesthetised area, and the original tourniquet can be released.

Complications

When local anaesthetic enters the central bloodstream into high a dose, neurological symptoms may follow even convulsions. The treatment for the convulsions is standard: protection of the airway and termination of the convulsions with medication such as diazepam.

Caudal, Epidural and Spinal Anaesthesia

Caudal and epidural techniques have been used in field settings to provide post-operative analgesia. Spinal anaesthesia has been used to provide anaesthesia for lower-limb surgery. This should only be carried out when the patient has received adequate fluid resuscitation and can be given regular monitoring of pulse, blood pressure and consciousness level by a trained individual during the procedure. You can only do these procedures if you have shown proficiency in the techniques under supervised circumstances.

Training

In order to be proficient in providing analgesia and sedation, the provider should take personal responsibility for his/her training and skills maintenance over time. Very often the health-care provider will work in situations where qualifications are not really scrutinised. It will be very useful to maintain a personal log of all training received and interventions practised.

Many large training hospitals throughout Europe provide anaesthesia simulator training for anaesthetists in training. Regular human patient simulator sessions are invaluable as a starting point to learning the appropriate skills.

Regular sessions in local hospital anaesthetic room will teach the health-care provider the core skills such as Bag-Valve-Mask ventilation, i.v. placement and the standard monitoring required.

Qualified medical and nursing staff who are unfamiliar with pain management are recommended to arrange to spend time in a hospital post-operative recovery unit.

Whilst preparing in a teaching hospital, it can be very helpful to obtain a copy of the local protocol for different subjects such as an anaesthesia report, pain protocol, local anaesthetic protocol and other such useful collections of knowledge. They may not be available where you are going and a copy is easily made.

Examples of useful courses are:

Anaesthesia in the UK for doctors. The Royal College of Anaesthetists, 48–49 Russell Square, London WC1B 4JY.

Training for anaesthetists in anaesthesia for difficult locations.

Anaesthesia in developing countries: 1 day primer and a 5 day International course (<http://www.nda.ox.ac.uk/announcements/anaesthesia-in-developing-countries/anaesthesia-for-developing-countries>).

Courses such as run by the Departments of Anaesthesia at Frenchay Hospital, Bristol and the Radcliffe Infirmary in Oxford.

Further Resources

British Medical Association and Royal Pharmaceutical Society of Great Britain. <http://british-medical-association-and-royal-ph.software.informer.com/>.

Davies NJH, Cashman JN (eds.), Lee's Synopsis of Anaesthesia, 13th ed., Butterworth-Heinemann, Stoneham, MA, ISBN 0-7506-8835-1.

Dobson MB. Anaesthesia in the district hospital. Geneva: World Health Organisation; 2000. Available on internet as PDF: <http://whqlibdoc.who.int/publications/9241545275.pdf>.

Regional Anaesthesia, Pocket Compendium of Peripheral Nerve Blocks Gisela Meier MD, ISBN-10:3890751547.

<http://www.arapmi.org/maraa-book-project.html>: for peripheral nerve block discussion and download of relevant chapters.

<http://www.nerveblocks.net/>: with download of manuals.

International Standards for a Safe Practice of Anaesthesia. World Federation of Societies of Anaesthesiologists 2008. Available from http://www.operationgivingback.facs.org/stuff/content-mgr/files/a384bb3c7b77e154ad25c6136d7be344/miscdocs/wfsa____2008_international_standards_for_a_safe_practice_of_anesthesia.pdf.

Safe Surgery Saves Lives. The Second Global Patient Safety Challenge. WHO <http://www.who.int/patientsafety/safesurgery/en/>.

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WHO guidelines for safe surgery. 2009. http://whqlibdoc.who.int/publications/2009/9789241598552_eng.pdf.

Chapter 46

Chemical, Biological, Radiological and Nuclear (CBRN) Casualty Management Principles

Steven A. Bland

Abstract Chemical, biological, radiological or nuclear (CBRN) weapons have been used since antiquity. Examples of their recent use include war fighting, ethnic conflict, terrorism and assassination. In addition, CBRN incidents have also included accidental releases during peace time operations, and many of the principles for CBRN incident response can be applied to other hazardous material (HAZMAT) incidents. The impact of such weapons may have a range of implications for medical personnel both military and civilian.

Keywords Chemical weapons • Biological weapons • Radiological dispersal devices • Dirty bombs • Nuclear weapons • Terrorism • Weapons of mass destruction • WMD • CBRN • Hazardous materials • HAZMAT • Contamination • Contagious

Objectives

- To describe the characteristics and effects of CBRN agents
- To outline the principles of CBRN casualty management
- To outline the requirements for casualty hazard management including decontamination

This chapter is adapted from *AMedP-6: NATO Management of CBRN Casualties Manual* for a civilian readership

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Introduction

Chemical, biological, radiological or nuclear (CBRN) weapons have been used since antiquity. Examples of their recent use include war fighting (World War One and the Iran-Iraq War), ethnic conflict (chemical weapon use against the Iraqi Kurds and in Syria), terrorism (release of sarin in the Tokyo underground, US anthrax letters) and assassination (ricin, polonium-210). In addition, CBRN incidents have also included accidental releases during peace time operations, and many of the principles for CBRN incident response can be applied to other hazardous material (HAZMAT) incidents. The impact of such weapons may have a range of implications for medical personnel both military and civilian. The health consequences related to a real or perceived CBRN hazard are:

- The initial (immediate, acute and delayed onset) health effects of CBRN agents
- The long-term (late onset or chronic) health effects of CBRN agents
- The secondary exposure risk to medical personnel due to either contamination or a contagious illness
- The requirement to carry out casualty hazard management that may include decontamination, isolation and quarantine
- The implementation of wider public health reporting and travel restrictions for transmissible biological agents
- The potential impact on the health of individuals due to use of CBRN personal protective equipment, including heat illness and psychological stress
- The potential impact on the healthcare system to implement pre-exposure or postexposure prophylaxis
- The management of any casualty, including trauma, in a CBRN environment
- The presence of combined (CBRN and conventional) injury
- The traumatic effects due to a nuclear detonation

Each type of medical mission will have its own risk assessment with a spectrum of hazards including CBRN weapons, environmental hazards¹ and endemic disease as well as conventional injuries due to trauma; this all-hazards approach is reflected by chemical, biological, radiological, nuclear, environmental, endemic and traumatic hazards (CBRNEET). Some agents have no alternative uses other than as a weapon such as a nuclear weapon or sulphur mustard gas.

Characteristics of CBRN Agents

The medical effects of a CBRN agent depend on a number of characteristics that affect not only the medical presentation of casualties but also the delivery method,

¹This includes toxic industrial hazards (TIH), also referred to as hazard materials (HAZMAT).

type of response, physical protection and additional resources required such as decontamination or isolation. Important characteristics include agent class, physical properties and onset of effects (latency):

- *Chemical agents*: The main classes of chemical agents are:
 - Nerve agents (organophosphorus compounds).
 - Blistering agents (vesicants) agents.
 - Cyanides (also known as blood agents).
 - Pulmonary agents (choking or lung damaging agents).
 - Incapacitants (mental and physical).
 - Toxic industrial chemicals (TICs). While this class of agent is used, there is significant overlap with other classes of chemical agents especially cyanides and pulmonary agents.
 - Riot-controlled agents (RCAs). These agents used by law enforcement agencies are not prohibited by international conventions but may still have harmful effects.
 - Pharmaceuticals. This class includes illicit and commercial drugs usually at supra-therapeutic or toxic doses.
- *Biological agents*: The two classes of biological agent are:
 - Live agents such as bacteria including rickettsia and chlamydia, viruses and fungi
 - Toxins – chemical agents that are of biological origin and include those derived from bacteria, fungi, plants and animals (venom)
- *Radiological material*: This hazard can be classed by the type of ionising radiation present:
 - Alpha – a relatively large subatomic particle (similar to a helium nucleus) with limited range in air (millimetres) but significant damaging effects
 - Beta – a small subatomic particle similar to an electron with a range in air of centimetres
 - Gamma/X-ray – high-energy photons with no mass but highly penetrating
 - Neutrons – normally associated with nuclear material and the fission (nuclear) process which are highly penetrating and variable damaging effects
- *Nuclear material*: The term nuclear material is generally used to describe material involved in the nuclear power or weapon industry, or as having fissile properties, i.e. the potential for the nucleus to be split and therefore generate energy, fission products and further neutron emissions.

The physical properties of an agent may vary across a class of agent (e.g. nerve agents). These properties determine the optimal delivery system, route of exposure and continuing presence in the environment (persistence). The physical properties of an agent determine whether the agent is a:

- *Gas*: A substance that exists in the air at ambient (room) temperature (non-persistent hazard).
- *Vapour*: A substance that diffuses into the air (evaporates) but is normally a liquid at ambient (room) temperature (non-persistent hazard, but may condense into clothing and wound dressings).
- *Liquid*: Persistent hazard although the degree of persistency is dependent on volatility of the substance with water often considered a reference point (i.e. petrol < water while water < VX).
- *Aerosols*: Some solids and liquids can be aerosolised and therefore present a *droplet* or *airborne* hazard requiring respiratory protection. (These may remain a persistent hazard as particles settle on to surfaces with a risk of re-aerosolisation or evaporation if liquid.)
- *Ionising radiation*: Radioactive material may be in any of the physical forms just described, but irradiation itself does not present a contamination hazard.

Methods of Delivery

The characteristics of a CBRN agent such as physical properties and stability as well as vulnerable routes of absorption will determine the delivery method used. The device or munitions used may also cause additional medical effects such as trauma (injuries) or psychological stress. The two types of delivery are *overt* or *covert*. Overt releases are likely to follow a conventional major incident response, while a covert release may go unrecognised for a period of time. Subsequent response to a covert release may follow that for an outbreak using epidemiological methodology to establish cause and mitigation.

Risk of Secondary Exposures (The Two Cs)

For responders, CBRN incidents have significant risks due to the hazard. CBRN agents and other TIHs and endemic disease may be a continuing hazard to medical personnel. The main secondary hazards are:

- *Contaminated casualties*: Casualties coming into direct contact with a persistent agent will be contaminated (*primary contamination*). This may then be spread as *secondary contamination* to other personnel, equipment and infrastructure. Contamination may be classified as:
 - *External contamination*: External contamination is the coating of an external surface such as the skin, hair or clothing of a casualty by a persistent agent. The agent may be liquid or dry particulate.
 - *Internal contamination*: Internal contamination occurs by inhalation, ingestion or through the skin. Relatively small quantities of agent are internalised by the inoculation route and are unlikely to represent a secondary hazard.

- *Wound contamination*: Wound decontamination is the introduction of a persistent agent into an area of traumatised tissue. A secondary hazard to responders including surgical teams may be present; however, the greater the potency of the agent, the less likely the casualty is to survive before surgery, and therefore the risk tends to be self-limiting. Devitalised (dead) tissue may also act as a buffer to limit systemic absorption of an agent.
- *Contagious casualties*: Casualties presenting with an infectious disease may pass the illness to others if the disease is *transmissible*. Mitigation is by *isolation* as decontamination will be ineffectual.

Effects of Exposure (The Four Is)

The type of CBRN agent will define the type of effects seen following an exposure, these are:

- *Intoxication*: This is due to a chemical (and toxin) exposure.
- *Infection*: This is due to a live biological agent exposure.
- *Irradiation*: This is due to ionising radiation exposure.
- *Injuries*: This is due to exposure to trauma or climatic stress (heat) either in isolation or as a *combined injury* (CBRN and trauma). The delivery method of the CBRN agent may cause trauma as well as physical degradation from individual protective equipment (IPE) use (heat injury).

Onset of Effects (Latency)

The onset of symptoms is important in the recognition and establishment of causation of a CBRN or TIH exposure. However, delay in these symptoms due to a *latency period* will confound any epidemiological investigation. For live biological agents, the latency period is called the *incubation period*. In some cases, such as certain live biological agents and acute radiation syndrome, there is a significant period of non-specific symptoms and signs (e.g. fever and muscle aches) that precede a more recognisable syndrome (or toxidrome); this is called a *prodromal stage*. A toxidrome is a pattern of symptoms and signs (syndrome) due to exposure to a toxic substance. Notable toxidromes are those for nerve agent intoxication and opioid overdose. Figure 46.1 provides a summary of the latency and incubation periods for certain CBRN agents.

Medical Effects of CBRN Agents

The medical effects of CBRN agents depend on a number of factors including route of exposure, type of agent and severity of effects.

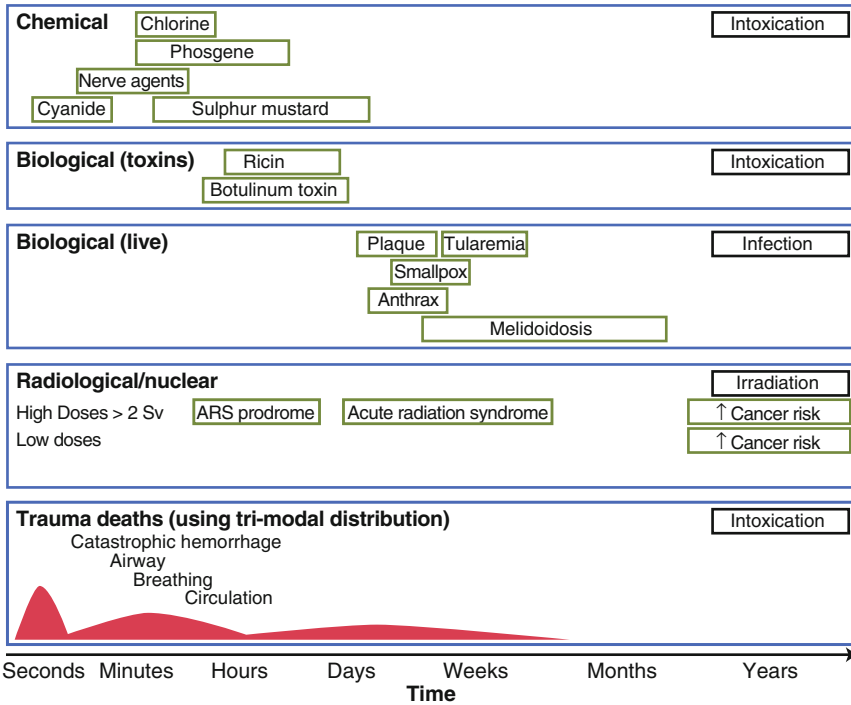


Fig. 46.1 Onset of effects of some CBRN agents (Courtesy of S.A. Bland)

Routes of Exposure

The routes of exposure (sometimes referred to as routes of absorption) are important both for predicting and modelling the medical effects of agents and the provision of protective equipment specific to that route. The routes of exposure are:

- *Inhalation:* This route may present the greatest risk of multiple casualties due to an airborne hazard such as a gas, vapour, aerosol, droplets (in close proximity) or smoke. Protection is by mask, respirator or self-contained breathing apparatus (SCBA).
- *Ingestion:* This route is less likely to cause mass fatalities due to the dilution of any chemical agent or destruction by the cooking process or digestion. It may, however, be a significant route for the introduction of live biological agents with high infectivity. This route may be used for the targeting of individuals or small numbers. Protection is provided by water and food security and the restriction of eating and drinking during and post-attack.
- *Skin (percutaneous):* There are three methods for CBRN agents to pass through the skin:

- *Intact skin (transcutaneous)*: Although skin is protective to many CBRN agents, some agents may directly damage the skin (vesicants) or have chemical properties (fat soluble) to allow penetration.
- *Inoculation*: This is the intentional break in the skin in order to introduce a CBRN agent causing minimal trauma.
- *Wounds*: This is the gross loss of skin integrity allowing for the opportunistic entry of CBRN agents into the body.
- *Mucous membranes*: Although skin provides significant protection to biological agents, mucous membranes, which form the lining of internal cavities such as the mouth and rest of the gut, are more permeable and may allow an effective dose to be absorbed. Moisture on mucous membranes may also be reactive with some chemical agents such as chlorine causing immediate effects.
- *Eyes*: While eyes are not a good route for absorption, there are significant local effects on the eyes and conjunctiva. An example is the pinpoint pupils (miosis) associated with nerve agent vapour.

Severity of Effects

The severity of effects is defined as:

- *Lethal*: These agents have a significant risk of causing death even at low level exposures and/or without treatment. The level of lethality can be defined as:
 - *Lethal dose 50 (LD₅₀)*: This is the dose required, usually expressed as weight per kg or dose, to kill 50 % of the exposed population; the smaller the value, the greater the lethality. The LD₅₀ is usually specific to a route of exposure, e.g. skin or ingestion. LD₅₀ may also be expressed over a time period such as LD_{50/30} (30 days), and this is often used for irradiation.
 - *Lethal concentration time 50 (LCt₅₀)*: For the inhalation route, LCt₅₀ is used as it reflects the inverse relationship between concentration and the duration of exposure to cause the same effect (death) in 50 % of the exposed population.
 - *Case fatality rate (CFR)*: This is the number of deaths compared to the total number of cases, e.g. estimated pandemic influenza (3–4 %) and inhalational anthrax (95–100 %).
- *Damaging*: These effects are those that may not be associated with a high lethality but require significant medical resources, e.g. sulphur mustard.
- *Incapacitating*: These agents cause a reversible mental or physical disability and inability to function. Secondary effects may also occur and include trauma due to increased risk taking behaviour or heat illness due to the physiological effects of the agent. Examples include BZ (mental incapacitant) and adamsite (vomiting agent/physical incapacitant).
- *Iatrogenic*: These effects are due to the adverse drug effects of MedCMs. In all cases, the decision to implement a MedCM at a command or clinical level will

be based on a risk-benefit assessment; for example, a MedCM such as atropine with significant side effects may be used to mitigate a lethal CBRN agent.

Psychological Effects

CBRN agents may cause a variety of psychological effects. Some effects may be appropriate to the hazard (i.e. acute stress reaction) and may even enhance the response to an incident. Other effects will cause mental incapacitation with symptoms ranging from anxiety (acute stress disorder) to acute psychosis or delirium. Symptoms can occur at any time and include post-traumatic stress disorder (PTSD). Psychological effects due to CBRN agents may be direct, indirect (reactive and degradation) and psychogenic.

Summary of Chemical Agent (and Associated Chemicals), Effects and Management

See Tables 46.1, 46.2, 46.3, 46.4, 46.5 and 46.6 for summaries of nerve agents (tabun, sarin, soman, VX), cyanides, sulphur mustard, pulmonary (lung damaging) agents (chlorine, phosgene), anticholinergics (atropine, BZ) and methaemoglobin formers (nitrites, other TICs)

Table 46.1 Nerve agents (tabun, sarin, soman, VX)

Mechanism: inhibition of the enzyme acetylcholinesterase that breaks down the nerve transmitter acetylcholine. This results in overstimulation of the parasympathetic system, motor neurons (leading to paralysis) and central nervous system		QUICK LOOK	
		Consciousness	Seizures
		Resp rate	↑↑
		Eyes	Pinpoint
Mild	Miosis, eye pain, red eyes	Secretions	+++
Moderate	Secretions, wheezing, nausea, vomiting, diarrhoea, difficulty in breathing	Skin	Sweaty
Severe	Muscle weakness, respiratory fatigue, respiratory arrest, seizures, death	Other factors: for skin exposure – local fasciculation	
Antidotes	Anticholinergics (atropine), oximes (e.g. pralidoxime, obidoxime, HI-6), benzodiazepines (diazepam)		
Other agents	Organophosphorus pesticides, main route of exposure is ingestion, but possible airborne dissemination with varying effect. Treat as noted although pharmacokinetics may vary due to dose and route of exposure		

Table 46.2 Cyanides

Mechanism: cyanide inhibits the mitochondrial enzymes in cells. This stops cells using oxygen and metabolising glucose completely (aerobic respiration). This leads <i>rapidly</i> to a metabolic (lactic) acidosis		QUICK LOOK	
		Consciousness	Seizures/unconscious
		Resp rate	↑↑/Apnoea
		Eyes	N/dilated
Mild	Nausea, dizziness, agitation	Secretions	Normal
Moderate	Hyperventilation, confusion	Skin	Pink or cyan
Severe	Loss of consciousness, seizures, coma, respiratory arrest, death	Other factors: VERY RAPID ONSET (secs)	
Antidotes	Oxygen, dicobalt edetate, hydroxocobalamin (vit B12), sodium/amyl nitrite and sodium thiosulphate		
Other agents	Hydrogen sulphide (HS): bad egg gas that also causes aerobic respiration failure		
	Phosphine gas: produced by contact of aluminium phosphide and moisture, used widely as a rodenticide (not to be mistaken with phosgene gas) and similar effects to cyanide		

Table 46.3 Sulphur mustard (blistering agent)

Mechanism: Damage to DNA resulting in cell death of exposure tissue including skin and airway mucosa		QUICK LOOK	
		Consciousness	–
		Resp rate	↑
			Normal
Mild	Erythema (red skin), eye pain	Secretions	Normal/↑
Moderate	Skin blistering (small area), airway irritation	Skin	Red/blisters
Severe	Airway burns/obstruction, large area blisters	Other factors: note mustard has delayed onset – 12–24 h	
Delayed	Immunosuppression, acute respiratory distress syndrome		
Antidotes	None		
Other agents	Lewisite: based upon arsenic and causes immediate pain and silver-grey discolouration. May be lethal. (Antidote: dimercaprol), other chelating agents		
	Hydrofluoric acid (HF): causes chemical burn with immediate symptoms and hypokalaemia. (Antidote: calcium gluconate and calcium chloride)		

Table 46.4 Pulmonary (lung damaging) agents (chlorine, phosgene)

Mechanism: direct irritation of airways. Damage to cell membranes of the respiratory tract and lungs either directly or by the formation of free radicals		QUICK LOOK	
		Consciousness	–
		Resp rate	↑↑
		Eyes	Normal/inflamed
Mild	Eye pain	Secretions	Normal/frothy
Moderate	Airway irritation	Skin	Normal or cyanosed
Severe	Pulmonary oedema, death	Other factors: phosgene effects may be delayed or worsen with exercise	
Antidotes	None, possible role for inhaled steroids		

Table 46.5 Anticholinergics (atropine, BZ)

Mechanism: blocking anti-muscarinic receptors reducing parasympathetic tone and CNS effects		QUICK LOOK	
		Consciousness	Confused
		Resp rate	Normal
		Eyes	Dilated
Mild	Dry mouth, altered (blurred) vision	Secretions	Dry
Moderate	Dry mouth and skin, mild confusion	Skin	Dry
Severe	Severe disorientation and risk of heat illness “Mad as a hatter, blind as a bat, dry as a bone, red as a beet, hot as hell”	Other factors: confusion and possible hallucinations	
Antidotes	Supportive treatment, reassurance. AVOID physical restraint. Physostigmine		

Table 46.6 Methaemoglobin formers (nitrites, other TICs)

Mechanism: turns Fe ²⁺ Hb into Fe ³⁺ Met-Hb. This prevents the red blood cells carrying oxygen from the lungs to the tissues		QUICK LOOK	
		Consciousness	Agitated
		Resp rate	↑↑↑
		Eyes	Normal
Mild	No obvious effect	Secretions	Normal
Moderate	Cyanosis and shortness of breath	Skin	Blue
Severe	Severe cyanosis and shortness of breath, confusion, death	Other factors: cyanosis not improved with O ₂ . Chocolate-coloured blood	
Antidotes	Methylene blue		

Principles of CBRN Medical Incident Management

A CBRN incident has significant security and intelligence implications; however, with regard to incident management, the presence of a CBRN agent or TIM is simply another hazard that requires mitigation. A conventional incident response incorporates safety considerations and a standardised incident report that includes hazard assessment. Where there is a combined hazard (explosive and CBRN), the

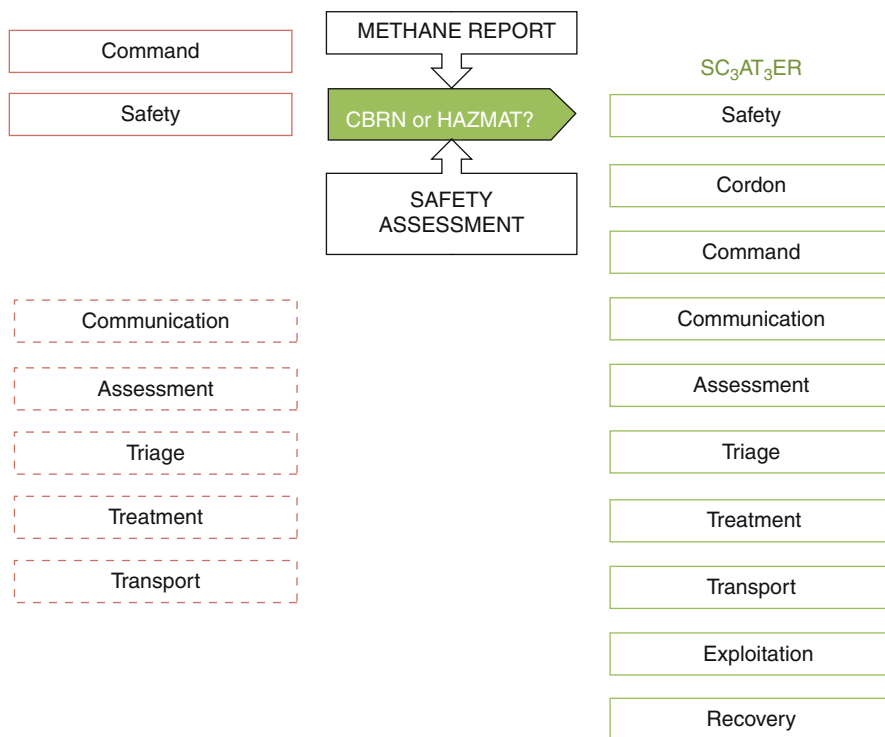


Fig. 46.2 Summary of CBRN medical incident management

presence of the CBRN agent may not be initially recognised, and an all-hazards approach is important. For covert releases, including outbreaks, an approach using epidemiological concepts is more likely. For an incident identified as a CBRN incident, the response can be optimised by modifying the conventional incident response. The principles of a CBRN medical incident response (SC₃AT₃ER) (Fig. 46.2) are:

- *Safety*: This includes evacuation of non-essential persons from the area, personal protective equipment (PPE) and hazard management. For all incidents, safety is of paramount importance, and safety assessments should be repeated.
- *Cordons*: This includes establishing hot, warm and clean zones as well as casualty decontamination areas (Fig. 46.3). For a significant biological incident with risk of person to person spread, cordons may support public health control measures with restriction of movement (ROM). ROM may include sovereign boundaries in the case of Public Health Emergencies of International Concern (PHEIC) as defined by the International Health Regulations (2005). The zones are defined as:
 - The hot zone is a non-permissive area where there is a direct hazard from the environment (firearm, explosive hazard or CBRN). This zone is sometimes referred to as the exclusion zone especially where PPE does not mitigate the hazard such as in the case of explosives or high dose radiation.

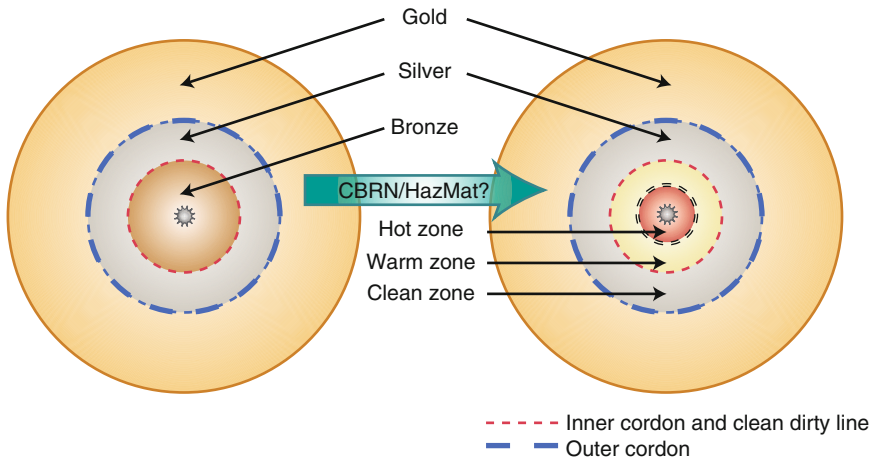


Fig. 46.3 CBRN and conventional zones. The conventional bronze zone in the diagram is contained by a inner cordon. It will be split into CBRN hot and warm (decontamination) zones contained by an inner cordon which is also the clean dirty line (Reproduced by permission S.A. Bland)

- The warm zone is a semi-permissive (buffer) area setup usually due to a continuing contamination hazard from casualties or equipment coming out of the hot zone. This zone is also referred to as the decontamination zone and demarcated by a clean dirty line (CDL).
- *Command and communications:* Each zone and area will require a vertical and horizontal command structure to allow for interoperability between specialist units and the chain of command. The chain of communication should mirror the chain of command and include updates following further safety assessments and on identification or exclusion of any hazard.
- *Assessment:* Concurrent environmental and casualty assessment is important and both have advantages and disadvantages with detection and diagnosis, respectively. Any report of a CBRN agent must include the source of the information (environmental sampling, diagnosis) and the confidence of the assessment (suspected, probable, confirmed).
- *Triage:* See discussion to come.
- *Treatment:* Treatments of individual casualties and agents vary between nations and are subject to national legislation. However, examples of significant chemical agents and suggested initial management are listed at the end of this chapter.
- *Transport:* The presence of a CBRN agent and risk of secondary contamination or infection has significant implications for casualty transport especially by air. Some methods may also be limited by aviation and international regulation.
- *Exploitation and recovery:* As well as the treatment of CBRN casualties, another implication of a CBRN event is the potential loss or compromise of a medical facility such as a hospital. The priority after casualty management has been completed is to recover back to an original state while also exploiting the scene for forensic evidence.

Principles of CBRN Casualty Management

The principles of CBRN casualty management are:

- Recognition (detection & diagnosis)
- Safety (personal and collective)
- Self-aid/first aid
- Triage
- Casualty assessment – ‘quick look’
- Life-saving interventions
- Casualty hazard management
- Supportive treatment
- Definitive treatment
- Rehabilitation

The provision of CBRN casualty care starts from point of exposure (PoE) and may continue to rehabilitation. The ability to provide care from PoE to hospital depends on the limitations imposed by the operational environment due to the presence of a primary or secondary hazard. Care within contaminated areas is limited to first aid and *Emergency Medical Treatment* (EMT).

The main zones (Fig. 46.3) using an all-hazards approach are described as:

- *Hot zone (non-permissive) management*: Casualty care in a non-permissive environment is limited by the direct risk to the responder and the protective measures or actions required (individual protective equipment, return of fire). This level of care is sometimes described as “Care under Fire (CUF)” with hazards including CBRN (primary exposure), an explosive device, effective fire or environmental. Management is limited to:
 - Self- and first aid
 - Triage
 - Casualty assessment (‘quick look’ include a trauma primary survey)
 - Life-saving interventions (T1 casualties) for CBRN and trauma
 - Evacuation to the Casualty Collection Point (CCP)
- *Warm zone (semi-permissive)*: Casualty care is limited due to the residual hazard from casualties or equipment (contamination, contagious disease) and personal protective equipment. This level of care is sometimes called “tactical field (medical) care” and may take place at the CCP before decontamination or during the decontamination process. It is limited to:
 - Triage
 - Casualty assessment (‘quick look’ including Trauma Primary Survey)
 - Life-saving interventions (T1 casualties)
 - Casualty hazard management, e.g. decontamination
 - Wound management

- Evacuation to the Casualty Clearing Station (CCS) or a medical treatment facility (MTF).
- For specific agents and depending on evacuation timelines, MedCM may be given to prevent the deterioration of T2/3 casualties.
- *Clean zone (permissive)*: Casualty care beyond the CDL allows optimal access to the patient, although treatment may still be limited by PPE due to wound contamination or contagious disease. Advanced medical care at this level is divided into:
 - *Supportive care*: During CBRN casualty management, the causative agent may not be known. Treatment may still be effective by adequate supportive treatment focused on managing observed effects such hypoxia and hypotension. Even when the agent is known, there may be no definitive treatment, and treatment remains supportive throughout the continuum of care including critical care with advanced respiratory and circulatory support.
 - *Definitive care*: Definitive treatment is the final level of care provided to return the patient to the highest degree of mental and physical capability possible. It includes further antidote treatment, replacement therapy, surgery and burns management. After definitive treatment, the casualty may undergo rehabilitation before being returned to duty. For some casualties such as irradiation and burns, definitive care may only be available at Role 4, in an allied nation or international network of medical facilities.

CBRN Recognition

Indications of a CBRN or other environmental hazards include:

- Any symptoms involving incident response personnel or Recce teams
- Multiple casualties with similar non-traumatic symptoms and signs
- Unusual taste, smell or mist
- Unexplained dead animals
- Unexplained symptoms including altered vision, eye pain, headache, chest tightness, excessive secretions and nonthermal burns
- Any unusual or unexplained symptoms, signs, morbidity or mortality

Different detection elements will also contribute to the recognition of a CBRN event, and some of these are provided by medical personnel. There is a cyclical relationship, and it is referred to as the *cycle of recognition* and is summarised in Fig. 46.4.

CBRN Emergency Medical Treatment (EMT)

The provision of prehospital medical support to CBRN casualties including trauma in a CBRN environment is described as EMT. EMT consists of:

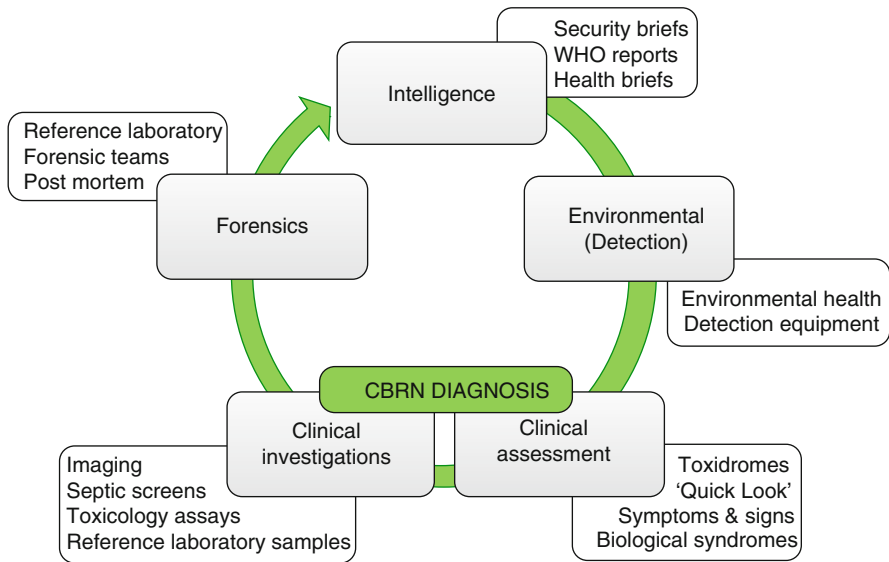


Fig. 46.4 Cycle of CBRN recognition

- Triage
- Casualty assessment ('quick look')
- Life-saving interventions (LSIs)
- Casualty hazard management

Medical treatment is provided for T1 casualties in the hot and warm zone, at the CCP, during decontamination, at the CCS and during casualty evacuation, as required. The treatment is likely to be concurrent with decontamination possibly provided by non-medical personnel at the CCP or in the stretcher decontamination lane (see section “Casualty hazard management”).

Triage

For any major incident including CBRN as demand increases, there is a requirement to allocate the finite resources available on a priority basis. This ensures that the casualties with the greatest need are treated first. The allocation of resources is based on the sorting (triage) of casualties. To support this, casualties exposed to a hazardous substance can be labelled as mild (T3), moderate (T2) and severe (T1), based on the known effects of specific agents. Triage categories are used for:

- The prioritisation for treatment
- The prioritisation for decontamination
- The prioritisation for casualty evacuation (transport)

Table 46.7 CBRN triage categories and features

Category		Severity			Implications
		Toxicity ^a	Sepsis	Radiation	
T1	Immediate	Severe	Severe sepsis or shock	Other criteria $\pm >2\text{Gy}^b$	Life-saving interventions Stretcher decontamination
T2	Urgent	Moderate	Sepsis	$>2\text{Gy}$	Stretcher decontamination, including incapacitated casualties
T3	Delayed	Mild	Pyrexia	$<2\text{Gy}$	Walking decontamination
T4	Expectant	–	–	$>8\text{Gy}$	“T1(hold)” or palliative care. Colour used varies with nations
DEAD	Dead	–	–	–	–

^aThe severity of the toxicity of a chemical exposure may be set by generic features (abnormal physiological parameters, convulsions, profound cyanosis and respiratory distress) and specific triage criteria specific to a chemical agent such as the presence of secretions for nerve agent exposure (see section “[Summary of chemical agents](#)”)

^bDose estimation is based upon a combination of physical dosimetry, clinical signs, haematological parameters and chromosomal aberrations

CBRN incidents use the same categories as conventional incidents to ensure consistency and ensure trauma, CBRN and combined casualties have the same casualty flow priorities. Table 46.7 shows the triage categories and features of each. The method of triage system used will depend on the CBRN incident zone, accessibility to the casualty and safety factors. A standardised approach with consistent triage categories is recommended from PoE to transport to a specialist unit, with likely choke points at decontamination, admission to intensive care and surgery. The levels of triage are:

- Life sign assessment
- Triage sieve (algorithm based) (see also Chap. 35)
- Triage for decontamination (algorithm based plus contamination burden)
- Triage sort (scoring system using physiological parameters)
- Triage for surgery (extended triage sort, clinical investigations and surgical opinion)
- Triage for intensive care (extended triage sort and end-organ function)
- Triage for specialist management, including burns care and advanced radiation therapy

In the context of this chapter, the first 3 are of particular importance.

Casualty Assessment: ‘quick look’

The Quick Look is a rapid focused initial assessment of a casualty for signs of trauma and intoxication. In the context of trauma, the assessment is for any catastrophic haemorrhage or respiratory distress due to an airway or breathing problem. Recognition of chemical casualties may be based upon the clinical signs of certain

Table 46.8 Abbreviated Quick Look

	Nerve	Cyanide	Opioid	Atropine	Sepsis
Conscious	Fitting	↓↓/Fitting	↓	↑	N/↓
Resps	↓↓/↓	↑↑/↓↓	↓↓	N/↑	↑↑
Eyes	Pinpoint	N/Large	Pinpoint	Large	N
Secretions	↑↑	N	N	Dry	N/sputum
Skin	Sweaty	Pink/blue	N/blue	Flushed	Sweating/pale
Other	D&V bradycardia	Sudden onset			High temperature

N normal, *D* & *V* diarrhea and vomiting

chemical agents using conscious level, respiratory pattern, eyes, secretions and skin (CRESS). Table 46.8 provides an abbreviated Quick Look for important CBRN-related agents and drugs. While the incident management for biological incidents is likely to be over a slower time frame, casualty assessment of life-threatening infections and sepsis is vital for life-saving treatment. Septic shock is a life-threatening condition, and fluid resuscitation should be started within 10 min of diagnosis in the warm zone/CCP.

Life-Saving Interventions

LSIs are actions that can be performed by any appropriately trained person to reverse life-threatening conditions or prevent deterioration due to a CBRN agent and/or trauma. A generic approach can be applied to both CBRN and trauma using the following priorities for treatment:

- <C> atastrophic haemorrhage.
- Airway management and antidotes
- Breathing
- Circulation
- Decontamination and disability
- Evacuation to more permissive environment

Immediate life-threatening conditions include:

- Catastrophic haemorrhage (<C>)
- Airway obstruction (A)
- Breathing difficulty (B) including:
 - Cyanosis (B)
 - Respiratory distress (B)
 - Tension pneumothorax (B)
 - Sucking chest wound (B)
- Circulatory failure (C) due to:
 - Shock due to loss of fluid or sepsis (C)

- Bradycardia due to nerve agent (C)
- Disability (d) including:
 - Unconscious (d)
 - Convulsions (a and d)
- Other signs of severe chemical intoxication, where an effective MedCM exists and a delay in administration may cause death (a)

LSIs should only be performed on the most severe casualties (T1) with immediate life-threatening conditions and include:

- Removal from the hazard (self-extraction or rescue)
- Application of tourniquet(s) (<C>)
- Application of pressure dressing and haemostatic agents (<C>)
- Basic airway management including suction (A)
- Early MedCM/antidote administration including anticonvulsant (a)
- Ventilation (as resources allow) (B)
- Administration of oxygen (B)
- Management of tension pneumothorax, such as needle decompression (B)²
- Management of sucking chest wound, such as application of dressing with valve (B)
- Fluid resuscitation (trauma, sepsis or combined injuries) (C)
- Management of severe sepsis and septic shock (fluids, oxygen and antibiotics) (C)

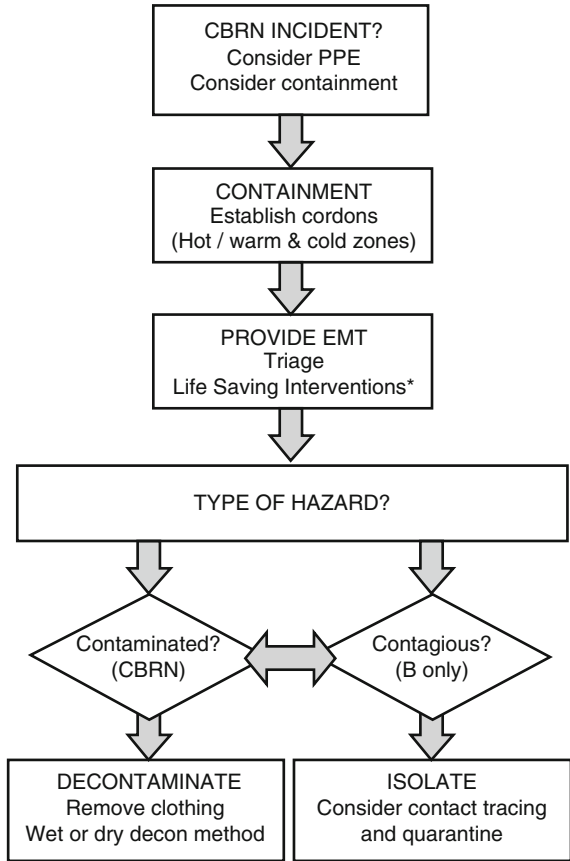
Hot zone casualty care is limited to the management of T1 casualties with catastrophic haemorrhage, airway problems, antidote administration and management of sucking chest wound and/or tension pneumothorax followed by evacuation to the warm zone and the forward Casualty Collection Point (fwd CCP). These measures have the acronym <C> AaBE. The fwd CCP is a key ad hoc point in the casualty evacuation chain where medical management rather than first aid can take place as the casualty starts to be decontaminated. In many circumstances, evacuation “scoop and run” to a more permissible environment may be a more effective intervention than “stay and play” in the hot zone.

Casualty Hazards Management

Casualty hazard management is the decision-making process for the handling of casualties with a secondary exposure risk due to either contamination or a contagious illness (Fig. 46.5). LSIs take priority over casualty hazard management although the removal of chemical contamination may reduce further exposure to the casualty and the responder and are life-saving also. The components of casualty hazard management are:

²In the CBRN environment, a tension pneumothorax should be suspected in any casualty with a penetrating chest injury (or suspected blast injury) and respiratory distress or circulatory shock.

Fig. 46.5 Casualty hazard management



* includes remove from hazardous area

- Containment
- Decontamination
- Isolation
- Quarantine
- Public health control measures

Containment

Containment is the immediate on-scene action to limit further spread. It should not, however, prevent the clearance of persons away from any immediate threat such as an IED or armed enemy. Containing the scene and exposed persons allows the Incident Commander to assess the risks of secondary spread and the requirement for decontamination.

Decontamination

Decontamination can be divided into external, internal (decorporation) and wound decontamination. External methods include:

- *Physical removal:* This is the mechanical removal of persistent chemical, biological and radiological contamination. The most common mechanical methods used alone or in combination are:
 - Removal of clothing.
 - Irrigation with copious amounts of water.
 - Dry adsorbents. Adsorbents draw in liquid contaminants, and examples include fullers' earth and baking powder. It should be noted that the agent is not destroyed and an off-gassing hazard remains after dry decontamination.
- *Chemical destruction:* This method involves the deactivation of an agent by altering its structure. This can be achieved by chemical reactions such hydrolysis, oxidation and active decontaminants.

Wound Decontamination

The management of wounds and the use of tourniquets and dressings mean that the potential for external contamination exists, and all dressings and tourniquets must either be replaced or covered in a clear well-marked protective dressing or wrap. Copious water or weak hypochlorite solution is recommended for initial wound irrigation. Skin decontaminants such as Fuller's Earth and some active decontaminants should be avoided in wounds due to complications and potential delayed wound healing. Surgical management of any traumatic injury should include a wide debridement (removal of dead tissue), whether CBRN or conventional. There is a theoretical risk that contaminated wounds (munitions fragment or impregnated clothing) may pose a threat to a surgical team. For light contamination, this is very unlikely. Standard surgical procedures including the use of aseptic technique and surgical instruments, such as forceps, will minimise any risk. Research has demonstrated that a single pair of latex surgical gloves may not provide adequate protection from some chemical agents where there is direct contact, i.e. wound probing, and therefore double nitrile gloves, which have greater chemical resistance, are the minimum requirement.

Isolation and Quarantine

In the context of CBRN casualty hazard management, isolation refers to the separation of casualties with an illness due to a suspected transmissible (contagious) biological agent. The principles of isolation include physical protection and hazard management. Isolation will generally use negative pressure, and barrier nursing

methods will be used and supported by the infection prevention and control nurses. Where there is more than one casualty with the same illness, a cohort facility or ward should be considered to reduce staffing and logistical demands. In the context of CBRN casualty hazard management and endemic disease, quarantine refers to the separation and observation over a period of time (usually the latency or incubation period) of a well person who may have been exposed to a suspected hazard or have an epidemiological link to a probable or confirmed case. Depending on the type of agent, severity, transmissibility and numbers exposed, the quarantined person may be under medical care, a responsible or regulatory organisation or agency. The latter may be the case for international travel as was seen during the SARS epidemic.

Casualty Decontamination Area

The requirement and level of casualty decontamination depends on the hazard present (hot/warm zone), persistency of the agent, protective equipment the casualty was wearing and decontamination method available (dry versus wet decontamination).

Elements of a CDA (Fig. 46.6) include:

- Commander (Officer or NCO), may be secondary role
- Casualty Collection Point
- Triage
- Ambulatory channel(s)
- Stretcher channel(s) with provision for EMT
- Body handling area
- Expectant (T4) area, as required
- Equipment decontamination
- Logistic support, as required
- Miscellaneous, including scribes (clerks) and runners

The clean dirty line (CDL) is the cordon at which point full decontamination (casualty, personnel and equipment) has taken place. The CDL is effectively the edge of the hazardous zone, sometimes referred to as the bronze zone and as such is also the *inner cordon* (Fig. 46.3).

For casualty management, this may be the first point that casualty documentation may have been generated, and a formal handover of care should take place. The handover should include as much information as possible and the minimum (AT-MIST) is:

- Age (if known)
- Time of exposure/injury and duration
- Mechanism of exposure, i.e. type of incident
- Injuries, intoxication, infection and irradiation suspected
- Symptoms and signs
- Treatment including antidotes and antibiotics given

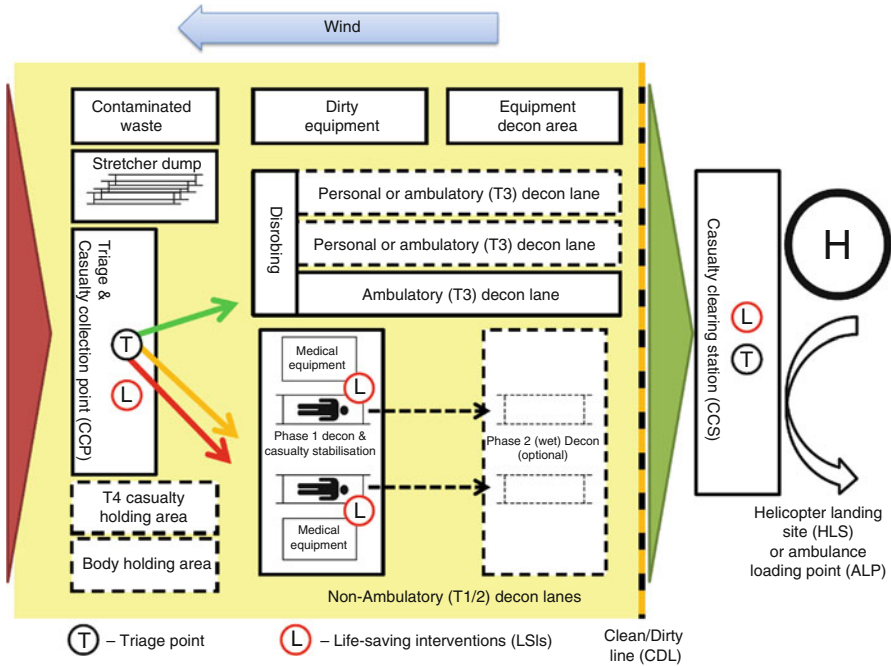


Fig. 46.6 Casualty decontamination area (with courtesy of S.A. Bland)

Although crossing the CDL implies decontamination has been completed, this should also be formally declared and any additional hazards such as wound or dressing contamination (or contagious in some cases) must be highlighted and recorded.

Post-CBRN Event Actions

Occupational Medical Advice

Following a CBRN incident, medical personnel may need to provide advice on measures including:

- Postexposure prophylaxis of responders that may have been exposed during the incident such as vaccination, antibiotics or anti-radiation countermeasures
- PPE to limit exposure of recovery workers
- Monitoring of the health aspects of working in a hazardous environment and PPE including heat illness

- Advice and monitoring hazard management measures such as limiting working times
- Pre-exposure prophylaxis of recovery workers to CBRN and other occupational exposures including hepatitis A and B
- Recording any MedCM use and potential exposures

Health Surveillance

There may be a requirement to start appropriate health surveillance by using health registries. Registries may be based upon a cohort of the population that share the same potential or confirmed exposure to a hazard substance or environment or the same symptoms, syndromes or specific illness. Members of the register are either casualties that have been entered in to the registry by the receiving hospital or other potentially exposed persons that volunteer to be added to the register. The benefit of this is to:

- Identify any delayed or long-term health effects including mental health.
- Communicate rapidly between exposed persons and health organisations.
- If there are no observed health effects, reassure the exposed population.
- Mitigate any delay health effects as they are identified in other members of the cohort.
- Comply with potential health and occupational regulations.

Aftercare of Responders

As soon as possible after being stood down, all responders should be checked to ensure there are no injuries or acute effects following any potential hazardous exposure. In addition, all responders' details should be logged and kept in case of health follow-up and any likely investigations into the incident and its response. Where there is a known hazard, responders should be given advice on health feature to look out for and where necessary primary or preventive health care informed. Following any significant incident and especially where there may have been multiple casualties and/or CBRN, stress is likely to have a number of effects on individual, and this is to be expected. The management of psychological stress should be managed by the team in a supportive way that initially is independent of any medical interventions. Many post incident stress management systems use a series of escalating interventions, and these may be of benefit:

- Voluntary team debriefings
- Unit commander risk assessment of individual

- Unit level counselling
- Referral for formal counselling
- Formal medical referral and interventions

Further Reading

CBRN incidents: clinical management and health protection handbook. Health Protection Agency.
NATO Management of CBRN Casualties Handbook (AMedP-7.1). <http://www.phe.gov.uk>.

Chapter 47

Women's Health

Brigid Hayden and Charles W.F.M. Cox

Abstract The term “conflict and catastrophe” encompasses all situations of human adversity on a large scale. It includes war and terrorism, as well as such devastating natural events as earthquake, tsunami and hurricane. Many apparently natural phenomena, including drought, flood and famine, are found, on closer inspection, to have political and commercial origins also.

According to the Uppsala Conflict Data Programme, one in five of the world's countries has experienced active armed conflict during the first decade of the current millennium (39 out of 192 countries, between 2003 and 2008). Innocent members of the population of these countries continue to suffer, with the United Nations often powerless to protect them, as the UN Secretary General Ban Ki-Moon freely admits.

Keywords Women's Health • Obstetric care • Gynecological care • Hostile environment • Violence against women • Maternal mortality • Traumatic Injuries • Military women • Civilian women

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Objectives

1. To outline the impact on women, according to the type of disaster and women's role within it
2. To suggest a management approach to the ill or injured woman in a hostile environment
3. To discuss the provision of obstetric and gynaecological care in a hostile environment
4. To highlight specifically the problem of violence against women

Introduction

The term “conflict and catastrophe” encompasses all situations of human adversity on a large scale. It includes war and terrorism, as well as such devastating natural events as earthquake, tsunami and hurricane. Many apparently natural phenomena, including drought, flood and famine, are found, on closer inspection, to have political and commercial origins also.

According to the Uppsala Conflict Data Programme, one in five of the world's countries has experienced active armed conflict during the first decade of the current millennium (39 out of 192 countries, between 2003 and 2008). Innocent members of the population of these countries continue to suffer, with the United Nations often powerless to protect them, as the UN Secretary General Ban Ki-Moon freely admits.

Natural disasters within a similar time frame include Hurricane Katrina, which hit the US Gulf Coast in 2005, killing 1,800 and making one million people homeless, likewise the two major tsunamis, affecting countries around the Indian Ocean in 2004 and Japan in 2011. The devastation wreaked by the latter was further compounded by partial meltdown in the Fukushima Nuclear Plant, making it the worst crisis which Japan had faced in the 65 years since the Second World War, with 24,000 people reported dead or missing and tens of thousands displaced.

In all of these hostile environments, women and children are victims, along with men, and their suffering is not necessarily apparent to the outside world. Whereas the experience of children in such situations is addressed in Chap. 48, the current chapter looks at the impact on women, starting with an outline of their distinct roles, namely military and civilian.

Women in the Armed Forces

There have been women serving active duty in most Western armies for the last 40 years, their profile rising over the last 10 years as a consequence of the conflicts in Iraq and Afghanistan.

Female service personnel take part in most of the duties performed by their male counterparts, including bomb disposal, and, in some situations, close combat.

Their role is particularly crucial in street patrols, where they interact with local women and undertake searches for weapons. It would often be culturally unacceptable for male soldiers to perform these roles.

Women currently make up approximately 10 % of those serving in the British Armed Forces (17,620 out of a total of 187,060 in 2008) [1]. The percentage is very similar in the United States Military, with women numbered at 220,000 out of two million service personnel [2]. Between 2001 and 2009, there were 5,000 war deaths recorded among US combatants, 2 % of them women.

Serious head, chest and abdomino-pelvic injuries may happen to male and female military personnel alike. Pelvic trauma in women potentially results in long-term pain, dyspareunia, sexual dysfunction and infertility.

Of particular concern is the vulnerability of women to rape and sexual assault, by hostile forces or occasionally by comrades in arms. Should pregnancy result, repatriation is undertaken.

Studies of US veterans of Iraq and Afghanistan have shown similar rates of post-traumatic stress disorder among men and women.

Civilian Women

For a variety of reasons, conflict and catastrophe are more prevalent in poorly resourced countries than in affluent ones, affecting the very nations which struggle to provide basic health care at the best of times.

In developing societies, often for reasons of culture and religion, women tend to bear the responsibility for child rearing and the care of animals and crops, and are generally less well educated than men. Women are usually smaller and weaker than men, and they undergo pregnancy and childbirth. All of these factors contribute to the global health disadvantage experienced by women.

It is all too easy to overlook the fact that women's reproductive role continues irrespective of war or natural disaster, with already-overstretched healthcare systems failing to provide them with basic medical and obstetric care.

It is estimated that in any crisis or refugee situation, approximately 20 % of the women of childbearing age will be pregnant [3, 4]. Conflicts and natural disasters put these women and their babies at extra risk because of loss of medical support, compounded by trauma, malnutrition, disease and exposure to violence.

Maternal Mortality Worldwide

It is estimated that 600,000 women die every year as a result of pregnancy, 99 % of them in developing countries.

In countries affected by conflict and catastrophe, the already high rates of maternal mortality and serious morbidity rise even further; the same is true of child mortality and morbidity.

Data collated in 2005 by WHO, UNFPA, UNICEF and the World Bank compared lifetime risk of maternal death across the world. The UK and other affluent nations showed similar figures, at approximately 1 in 8,200.

Figures from Afghanistan and the Democratic Republic of Congo, both poorly resourced countries in conflict, showed the risks at, respectively, 1 in 8 and 1 in 13.

The excess deaths and serious morbidities in times of conflict and catastrophe are accounted for partly by the direct effects of trauma but to an even greater extent by the disruption, or even complete destruction, of normal obstetric and medical services available to women. This happens through damage to health facilities and through the death or displacement of healthcare providers.

The International Health Protection Initiative [5, 6]

One further crucial factor to be taken into consideration is the deliberate targeting of healthcare professionals and health facilities in conflict zones. Such actions appear to be focussed on achieving political goals, such as ethnic cleansing or destabilisation of the government.

In response to this disturbing phenomenon, there have been recent calls for an International Health Protection Force to be set up under the auspices of the United Nations, via a Security Council agreement.

The UNFPA in Hostile Environments [7, 8]

The outlook for displaced women is often bleak, with many refugee camps ill-equipped to provide appropriate obstetric care.

However, the UNFPA is taking on a major role in situations of conflict and catastrophe, as evidenced in Thailand and Banda Aceh in the aftermath of the Indian Ocean tsunami of 2004, providing contraception as well as antenatal, intrapartum and postpartum care.

As a component of its minimum initial service package (MISP), the UNFPA has devised a reproductive health kit (RH Kit) for emergency situations, targeted at:

- Primary care level (10,000 population for 3 months)
- Health centre level (30,000 population for 3 months)
- Referral level (150,000 population for 3 months)

Clean delivery kits are supplied as part of the primary care level kits, including one sheet of plastic, two pieces of string, one clean razor blade and one bar of soap.

These kits can be used by women themselves or by traditional birth attendants (TBAs) and may be made up locally.

The health centre level kits include professional midwifery delivery kits, with equipment for vacuum extraction and suturing.

The referral level kits contain transfusion equipment, drugs and consumables, as well as reusable equipment.

Essential reusable equipment in hostile environments would generally include scalpels, clamps, tissue forceps, sponge forceps, ovum forceps, uterine curettes, needle holders, bivalve (Cuscoe's) specula and obstetric forceps.

It is important to recognise that the remit of MISP is far broader than the provision of kits of equipment; it entails a set of activities which are implemented in a co-ordinated manner and, crucially, without any "needs assessment" process, as the requirements are very similar in all such situations.

As an integral part of MISP, *ad hoc* delivery rooms are set up, sometimes in damaged buildings, with provision made for mobile health clinics and appropriate transport to allow staff to access remote areas.

Once the worst of the crisis has passed, the UNPFA takes steps to provide more comprehensive medical and obstetric services as part of a development programme.

Causes of Maternal Mortality

Five conditions account for 80 % of maternal deaths worldwide. These are:

Complications of early pregnancy

Haemorrhage

Obstructed labour

Infection

Eclampsia

Fifty percent of such deaths occur in the 48 h following delivery.

Malnutrition, anaemia and HIV infection, all common in hostile environments, add to the death toll.

Each of these conditions will be discussed next.

Complications of Early Pregnancy

Potentially life-threatening complications of early pregnancy comprise spontaneous miscarriage, with or without sepsis, and ectopic pregnancy. Each of these conditions may be associated with serious haemorrhage.

Miscarriage

Uterine evacuation is required when there is haemorrhage and/or sepsis in association with miscarriage. Broad spectrum antibiotics should be administered where sepsis is suspected.

Evacuation may be carried out under sedation if general anaesthesia is not available. In resource-poor countries, it is often performed without the benefit of either anaesthesia or analgesia.

A vaginal speculum is inserted, and the cervix is grasped with sponge forceps. Polyp forceps, a curette or a manual aspiration device may be used to remove products from the uterus. If instruments are not available, the procedure may be carried out digitally.

An ampoule of Syntometrine (a combination of Syntocinon and ergometrine), administered intramuscularly, serves to contract the uterus fully after evacuation.

In situations where it is not immediately practicable to undertake uterine evacuation, Syntometrine may be of use in “buying time” by reducing blood loss.

Misoprostol tablets, administered rectally, may be used to control haemorrhage in the absence of Syntometrine. Misoprostol has the advantage of being cheap and not requiring refrigeration.

Vasovagal collapse may occur during a miscarriage, if retained products of conception distend the cervical canal. This presents as shock out of proportion to the blood loss. Simply removing the products with a sponge forceps, allowing the cervix to contract down, may be life-saving in these circumstances.

The possibility that abortion has been induced with implements such as sticks or metal objects should be borne in mind. Sepsis is common under such circumstances, and causative organisms may include tetanus.

Ectopic Pregnancy

Ectopic pregnancies are most commonly located in one or other Fallopian tube; they tend to present with abdomino-pelvic pain, with or without vaginal bleeding, which may be thin and dark, resembling prune juice.

Ectopic pregnancy is known as “the great mimic”, as its presentation can be so varied.

If an ectopic pregnancy is left undetected, tubal rupture occurs, with potentially massive internal haemorrhage.

Consequently, a high index of suspicion is required in order not to miss this crucial diagnosis. A woman may not realise that she is pregnant at the time of presentation, so any woman of childbearing age (between 10 and 50) who presents with abdominal pain should be considered pregnant until proven otherwise.

Most importantly, shock without obvious cause in a female of childbearing age should be assumed to be due to ruptured ectopic pregnancy and managed accordingly.

Treatment is by surgical removal of the affected fallopian tube, in tandem with fluid resuscitation, and blood transfusion where available.

Haemorrhage in Established Pregnancy

Life-threatening haemorrhage may also occur in the second and third trimesters of pregnancy. Painless antepartum haemorrhage should raise suspicion of placenta praevia, and ultrasound scanning is invaluable in its diagnosis. Vaginal examination is contraindicated in this situation, as it may provoke massive haemorrhage leading to exsanguination and death.

In the absence of facilities to carry out Caesarean section, placenta praevia carries a high maternal mortality.

Antepartum haemorrhage due to placental abruption is generally associated with pain, and there is tenderness over the uterus on abdominal palpation. The fetus may not survive the insult. Maternal haemorrhage may be exacerbated by clotting abnormalities brought about by the abruption, known as disseminated intravascular coagulation (D.I.C.)

Haemorrhage After Delivery

Postpartum haemorrhage may be profuse and is commonly due to failure of the uterus to contract after delivery of the placenta. This is known as uterine atony.

The first step is to “rub up” a contraction immediately, by firm circular hand movements over the patient's lower abdomen.

Uterine contraction is further encouraged by bimanual compression (with a clenched fist in the vagina, and the other hand placed abdominally behind the uterus) while appropriate drugs are drawn up and administered.

The following drugs, used either singly or sequentially, may be life-saving:

Oxytocin (Syntocinon) 5 international units (iu.) IV, followed by an infusion of 10 iu. per hour.

Syntometrine 1 ampoule IM.

Misoprostol 800–1,000 µg (4–5 tablets of 200 µg) rectally.

Carboprost (Hemabate) 250 µg IM, repeated every 15 min (max. 8 doses).

NB carboprost needs to be stored in a refrigerator and is unlikely to be widely available.

If haemorrhage persists, intrauterine tamponade may be achieved by packing with ribbon gauze or by using a Rusch balloon or Bakri balloon, if available. The same effect may be obtained by the use of a “condom catheter”. This is made by attaching a condom to a Foley catheter with its balloon inflated, and tying a suture over the condom behind the Foley balloon to stabilise it. Once the device is inserted into the uterus, the condom is distended with fluid (500 ml. or occasionally more) until the bleeding stops. If a condom is not readily available, a sterile glove may be used instead.

If the bleeding does not stop with this “tamponade test”, it is necessary to look for other causes of bleeding, notably genital tract trauma, which may include vaginal or cervical lacerations or uterine rupture.

Careful inspection of the vagina and cervix should take place, with suturing as required, along with manual removal of any placental tissue or membranes. In the case of uterine rupture or of intractable uterine bleeding of any cause, hysterectomy is required. Subtotal hysterectomy, leaving the cervix in situ, is more straightforward than total hysterectomy and has a lower risk of urinary tract damage. However, total hysterectomy is required for major placenta praevia, as the placenta is attached over the cervix.

Clotting disorders may exacerbate postpartum blood loss; skilled intervention is required, along with the administration of blood and blood products. In resource-poor countries, fresh whole blood is the best option.

Obstructed Labour

Obstructed labour is commonly seen wherever there is inadequate access to maternity care. It may lead to uterine rupture, with fatal consequences to both mother and fetus.

Repair of the uterus may sometimes be technically possible, but it is rarely advisable in such settings, due to the high risk of further rupture in future pregnancies.

Hysterectomy, subtotal if possible, is indicated in such situations.

Where obstructed labour does not lead to uterine rupture, there may be fetal death in utero, followed by the eventual delivery of a macerated baby and the development of an obstetric fistula. A fistula is a direct communication between the vagina and the bladder, or less commonly between the vagina and the rectum, with long-term loss of control of bladder or bowel function. Where obstetric fistula is seen, it almost always affects girls and very young women, who are still physically immature, in their first pregnancy.

Sepsis

Pregnancy brings about relative immunosuppression, which makes pregnant women particularly vulnerable to all infections, including bacterial sepsis, HIV and malaria.

The outlook is worsened by malnutrition and anaemia, both of which are very common in austere environments.

The death toll from malaria is especially high in pregnant women in such circumstances, as it exacerbates pre-existing anaemia.

Obstructed labour is commonly associated with bacterial sepsis, due to chorioamnionitis from prolonged rupture of membranes.

Genital tract infection following delivery, known as puerperal sepsis or childbed fever, may be rapidly fatal. It presents with abdominal pain, pyrexia and offensive bloody discharge (infected lochia), sometimes in association with retained placental fragments.

Broad spectrum antibiotics may be life-saving in this condition.

Pre-eclampsia and Eclampsia

Pre-eclampsia classically presents with raised blood pressure, proteinuria and oedema, and may be of varying severity. Where antenatal care is available, its focus is largely on detecting and managing pre-eclampsia, with a view to limiting associated mortality and morbidity.

Severe pre-eclampsia may lead to cerebrovascular accident, HELLP syndrome (haemolysis, elevated liver enzymes and low platelets) or eclampsia.

The mainstay of management is to reduce the blood pressure and to deliver the fetus. However, it takes time to reverse the pathological process, and antihypertensive agents may be required for some weeks after delivery. Those drugs commonly used in the treatment of pre-eclampsia are methyldopa, hydralazine and beta-blockers such as labetalol.

Eclampsia refers to the development of seizures in a woman with severe pre-eclampsia. Occasionally, a seizure may present before the blood pressure rises, so vigilance is crucial.

Management of eclampsia entails protection of the maternal airway until the fit subsides, with the administration of magnesium sulphate, either intravenously (IV) or intramuscularly (IM), according to the following regimes:

IV: 4 g loading dose, diluted with normal saline, over 10–15 min
 1 g/h maintenance dose infusion for 24 h
 further fits: 2 g IV over 10–15 min

IM: 10 g loading dose, administered as 5 g into each buttock
 5 g every 4 h maintenance dose for 24 h

Magnesium sulphate toxicity may cause respiratory depression. Toxicity is unlikely to occur in the presence of normal renal function and in the dosages advised. The maintenance dosage should be halved in the presence of renal failure or oliguria.

Control of blood pressure and delivery of the baby are keys to the treatment of eclampsia. It is important to be aware that the risk of fitting may persist for up to 72 h after delivery.

In all of the life-threatening emergencies outlined earlier, the basic principles of life support should be followed in conjunction with obstetric and surgical intervention as required. These principles are outlined under the heading “Management of the pregnant trauma victim”, as taught in the MOET course and manual (Management of Obstetric Emergencies and Trauma).

Other Obstetric Emergencies

It is important to mention here two other commonly encountered obstetric emergencies, namely shoulder dystocia and breech delivery. The risk in these situations is mainly to the fetus, but severe maternal complications may also result, including haemorrhage and trauma.

Shoulder Dystocia

This is where the baby's head delivers, but the rest of the baby does not follow, due to entrapment of its shoulders behind the mother's pubic bone. It is most likely to occur when the baby is large or if the woman's pelvis is small or contracted by disease.

Immediate management, known as the McRoberts manoeuvre, is to lift up both of the woman's legs and press her knees to her ears, with full flexion at both hips and knees. This makes extra space in the pelvis and is usually successful in bringing about delivery. An episiotomy is advisable.

Breech Presentation

The golden rule is "hands off the breech", by which is meant resisting the temptation to pull on the baby's bottom when it becomes visible at the maternal perineum.

Pulling on the baby causes its head to extend (arch backwards), making the delivery difficult and hazardous.

When holding and supporting the baby during the delivery, the attendant should grip its femurs with his fingers, and his thumbs should be on the baby's sacrum.

It is important not to apply pressure to the baby's abdomen, as this can easily lead to trauma to the liver or other soft tissues.

It is important, also, to ensure that the baby's back remains upwards at all times, to facilitate delivery.

If the baby's after-coming head is not delivering, suprapubic pressure should be applied, ideally by an assistant, in order to push the baby's head into the maternal pelvis and to encourage it to flex. An episiotomy should be performed.

Delivery of the head should be controlled, in order to avoid compression followed by sudden decompression, which may lead to intracranial haemorrhage.

Traumatic Injuries to Women

This section will focus on traumatic pelvic injuries to combatant and civilian women alike, and on the management of the pregnant trauma victim.

Traumatic Pelvic Injuries

Non-obstetric trauma to the female genital tract is uncommon unless deliberately inflicted by rape or sexual assault. The exception to this is straddle injury, which affects the external genitalia and responds well to local pressure and haemostatic sutures.

Standard principles of trauma management apply in all cases, in line with the current recommendations outlined in the Advanced Trauma Life Support (ATLS) and Battlefield Advanced Trauma Life Support (BATLS) course manuals [9]. These principles comprise triage, primary survey, secondary survey, stabilisation, transfer (if necessary) and definitive care.

In the primary survey, attention must first be paid to airway with cervical spine control (A), breathing (B), circulation (C), dysfunction of the central nervous system (D) and exposure (E) in that order, with life-saving manoeuvres being applied as problems are recognised.

Examination of the abdomen, which is most commonly part of the secondary survey, should be followed by inspection of the genital area, noting any evidence of pelvic or perineal injuries [10].

Where possible, information should be obtained about the nature of the object causing the injury; sharp objects may have penetrated adjacent organs, and glass fragments may have been retained.

The area should be cleaned thoroughly, and the bladder should be catheterised where urinary tract injury is suspected and/or where retention of urine is evident. Clear urine in the tubing signifies an intact bladder.

General anaesthesia may be required in order to carry out a thorough examination, with suturing of lacerations and repair of deeper injuries.

The hymen should be inspected for tears, and a speculum should be used to inspect the vaginal walls, fornices and cervix.

Bleeding vessels should be ligated, and any devitalised tissue excised.

Vulval haematoma may be evacuated under local anaesthesia if no deeper injury is suspected.

Where there is suspicion of deep pelvic injury, with penetration of the peritoneal cavity, exploratory laparotomy must be performed. The mortality from infection in such situations is high, and antibiotic cover should be provided, as well as prophylaxis against tetanus infection.

Traumatic fistula, rectovaginal and/or vesicovaginal, may occur as a result of sexual violence.

If rape is alleged or suspected, it is particularly important to make detailed records of the findings and to comply fully with local legal requirements. Protection against bacterial sexually transmitted infections (STIs), particularly gonorrhoea, chlamydia and syphilis, should be provided, as well as post-exposure prophylaxis (PEP) against HIV, and hepatitis B immunisation where available.

Postcoital contraception in the form of oral hormonal medication ("the morning after pill") or an intrauterine contraceptive device (IUCD), should also be offered, where possible.

Psychological counselling, if it is available, may be of benefit.

Where definitive care cannot be provided locally, due to lack of appropriate facilities and/or suitably trained personnel, plans should be made for safe transfer to another centre wherever possible.

Trauma in Pregnancy

The principles of trauma management apply equally to the pregnant and nonpregnant woman, with certain specific considerations as outlined in the manual of the Management of Obstetric Emergencies and Trauma (MOET) [11]. These considerations are consequent on the anatomical and physiological changes due to pregnancy.

Anatomical Changes

After 12 weeks' gestation, the uterus is vulnerable to blunt and penetrating injury, as it is no longer protected by the bony pelvis. The uterine muscle wall becomes increasingly thin as the uterus enlarges, thereby conferring less protection to the fetus.

As pregnancy progresses, the maternal abdominal contents become increasingly displaced and "shielded" by the pregnant uterus, with increasing vulnerability of the fetus to injury of all sorts. Uterine rupture may occur as a consequence of abdominal trauma. Partial or complete placental abruption may likewise occur, presenting anything up to 48 h after the event.

Blunt or penetrating uterine injury may lead to premature labour.

It is important, also, to be aware of the possibility of associated pelvic fracture, which may cause blood loss of up to 3 l, with consequent hypovolaemic shock.

In late pregnancy, the engaged fetal skull may be damaged during trauma to the maternal pelvis.

Physiological Changes

In pregnancy, there is an increase in both maternal heart rate and circulating volume, leading to a greatly increased cardiac output. As a consequence, a large volume of blood is typically lost before the blood pressure drops. It is crucial to be aware of this in the management of the injured pregnant woman.

Pressure from the gravid uterus on the aorta and inferior vena cava (aortocaval compression) from the second trimester onwards, leads to a reduction in cardiac output when lying supine.

For this reason, a lateral tilt of 15–30° (left lateral by convention) should always be applied when the uterus is palpable at or above the level of the umbilicus (from around 20 weeks of pregnancy).

Where spinal trauma is suspected, the uterus should be displaced manually to the left, with the woman lying supine.

The provision of tilt or uterine displacement is particularly crucial where the woman's injuries, possibly including depressed conscious level, prevent her from modifying her own position.

Management of the Pregnant Trauma Victim

When managing a pregnant woman who has undergone trauma, it is crucial to remember that the wellbeing of her fetus is totally dependent on her own survival and thereby on adequate placental perfusion. Potentially life-saving procedures are undertaken as in the nonpregnant patient, and investigations including X-rays of cervical spine, chest and pelvis are carried out where the information thereby provided may be of benefit.

An exception to this rule is the use of diagnostic peritoneal lavage to detect blood in the peritoneal cavity, which may pose extra risks in pregnancy. Its use even in the nonpregnant patient is, in any case, declining, due to the advent of FAST scanning (focussed assessment with sonography in trauma).

In keeping with the principles of MOET, triage is followed by the primary survey; attention should be paid to A, B, C, D and E, as outlined earlier, with the patient in the left lateral position. Where oxygen is available, this should be administered via a facemask at a rate of 12–15 l/min.

Where a "C" (circulation) problem is identified, early aggressive fluid replacement should be instituted, with early recourse to blood transfusion when available. It must never be forgotten that a fall in blood pressure is a late sign of hypovolaemia in a pregnant woman, and that the fetus may already be in distress with a relatively normal maternal blood pressure.

Details of the mechanism of injury, if available, will aid diagnosis and management.

Examination of the pregnant abdomen takes place in between the primary and secondary surveys. Inspection should include fundal height, and any bruises or lacerations should be noted. Palpation will detect fetal lie and the presence of any tenderness or guarding. Fetal heart rate should be recorded.

Transverse lie in association with abdominal tenderness should raise the suspicion of uterine rupture.

Vaginal examination should be carried out next, possibly providing details of progress in labour or revealing evidence of pelvic injury. If the latter is suspected, then a rectal examination may also be required.

Delivery of the fetus by Caesarean section may be indicated as part of the primary survey, for example where abruption or uterine rupture is suspected as the cause of a "C" (circulation) problem. Delivery of the fetus also facilitates more effective resuscitation, as well as allowing access to intra-abdominal organs which may have been traumatised.

Pelvic fractures may be immobilised using a pelvic binder or a sheet, but definitive immobilisation of the pelvis by external fixation may not be possible until after the fetus is delivered.

The secondary survey takes place after dealing with any potentially life-threatening conditions which have been identified. This may mean deferring full top-to-toe, front-to-back examination until after laparotomy and delivery of the baby.

Rape and Sexual Violence

It is now well recognised that both sexual violence and domestic violence greatly increase in incidence during wartime, and that this situation continues long into the post-conflict era.

Rape may be seen as a manifestation of the breakdown of order and restraint within human societies. It is also a powerful weapon, used to control, subjugate, humiliate and intimidate, as well as being a means towards ethnic cleansing. Women and girls are most commonly the victims of such destructive behaviour, but it is worth remembering that men, too, may be raped or subjected to sexual violence.

In the chaos consequent on a war or natural disaster, families are disrupted and women and girls may be left vulnerable, often being particularly at risk in refugee camps [12]. Emergency food supplies commonly fall into the hands of unscrupulous military or paramilitary groups, who thereby exert power over women and girls, demanding sex in exchange for food, shelter and security, and often coercing them into prostitution or sex trafficking.

This situation is known to be continuing today in Iraq, Sudan and the Democratic Republic of Congo, and there have even been instances of such abuse taking place at the hands of UN peacekeepers.

In some settings, for example Uganda, this sexual abuse is recognised to have contributed to the spread of HIV infection.

In 2006, the International Symposium on Sexual Violence in Conflict and Beyond took place in Brussels, convened jointly by the Belgian Government, the European Commission and the UNFPA. The United Nations has taken up this issue in the Security Council, recognising sexual violence as a violation of human rights.

Mass rape, affecting an estimated 20,000–50,000 women and girls, took place during the Bosnian war of 1992–1995. This has been investigated as part of the War Crimes Tribunal of the Former Yugoslavia.

Sexual Violence and Human Rights

Concerns about the human rights of refugee women are being addressed in the existing framework of human rights conventions in international law [13].

These conventions include the Commission on the Status of Women and the Committee on the Elimination of All Forms of Discrimination Against Women (CEDAW).

The “Enough” Project to End Genocide and Crimes Against Humanity outlines on its website a strategy for protecting women and girls, which includes the following elements [14]:

1. Protection by peacekeeping forces
For example, at firewood collection routes and major water points
2. Accountability
Supporting efforts to prosecute rape as a war crime
3. Treatment
Expending additional resources on supporting survivors of sexual violence

Conclusion

The aim of this chapter has been to outline the care of specific groups of women in a hostile environment, against a backdrop of the types of adversity encountered, and to refer to some of the processes in place to address them.

It is clear that the world is still a long way away from adequately addressing the plight of women in situations of conflict and catastrophe.

However, motivated healthcare professionals can, and frequently do, make a valuable impact in these desperate situations.

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Chapter 48

The Care of Children in Complex Humanitarian Emergencies and Disasters

Patrick Hickey

Abstract In the complex humanitarian emergencies (CHE) setting, population health vulnerabilities are exacerbated by disruption of preventive medical services (particularly vaccination programmes), acute medical care, sanitation, food supply, and shelter. Children under the age of five are consistently found to experience higher mortality rates than any other age group, and for that reason, surveillance programmes should specifically tract under-five mortality (U5M) in addition to overall mortality and disease rates. Except in the immediate post-disaster setting of events such as earthquakes or events with sustained violence, trauma-related mortality and morbidity is overshadowed by that caused by infectious diseases. While the specific ratios of one disease over another may vary based on the unique characteristics of an affected population and the nature of the CHE/disaster itself, historically, four conditions consistently emerge as the most common killers of young children—diarrhoea, lower respiratory tract infections, malaria, and measles. Malnutrition serves as a major causal risk factor for mortality.

Keywords Children's health • Infectious diseases • Paediatric nutrition • Trauma • Neonatal • Paediatric mental health • Vulnerability • Paediatric protection • Paediatric mortality • Paediatric morbidity

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Objectives

- To discuss the impact of infectious diseases, malnutrition, trauma, and environment on the health of children and infants in complex humanitarian emergencies and disasters
- To discuss the global epidemiology of mortality and morbidity among children
- To discuss planning for care of this population
- To discuss paediatric protection and vulnerability of this population

Introduction: Global Epidemiology of Mortality and Morbidity Among Children

Recognition of the major causes of paediatric mortality globally provides context for the unique epidemiologic patterns seen in complex humanitarian emergencies (CHE) and the post-disaster setting that result from injuries and failures in sanitation, food supply, as well as preventive and curative medical infrastructure. World Health Organization statistics demonstrate that approximately 30–40 % of childhood deaths under the age of five occur in the neonatal period, and of these, approximately half are birth related, either due to prematurity or asphyxia. Lower respiratory tract infections and diarrhoea each account for approximately 15 % of under-5-year-old deaths, with malaria averaging 8–10 %. HIV/AIDS and injuries each comprise approximately 3 % of deaths. Though previously accounting for a higher percentage, as a result of enhanced vaccine distribution, measles now accounts for approximately 1 % of early childhood deaths. Malnutrition is a comorbid association in one-third of all deaths.

In the CHE setting, population health vulnerabilities are exacerbated by disruption of preventive medical services (particularly vaccination programmes), acute medical care, sanitation, food supply, and shelter. Children under the age of five are consistently found to experience higher mortality rates than any other age group, and for that reason, surveillance programmes should specifically track under-five mortality (U5M) in addition to overall mortality and disease rates. Except in the immediate post-disaster setting of events such as earthquakes or events with sustained violence, trauma-related mortality and morbidity is overshadowed by that caused by infectious diseases. While the specific ratios of one disease over another may vary based on the unique characteristics of an affected population and the nature of the CHE/disaster itself, historically, four conditions consistently emerge as the most common killers of young children—diarrhoea, lower respiratory tract infections, malaria, and measles. Again, malnutrition serves as a major causal risk factor for mortality.

Planning

A discussion of host-nation or local disaster planning and capacity building for the provision of care to paediatric populations is beyond the scope of this section. For organizations that will provide disaster response and work in CHE settings, planning for the care of young children and the provision of training to both medical providers and nursing staff is of paramount importance. While training and experience in the management of sick and injured children in high-income countries is valuable, preparation for the diagnosis and management of conditions uncommon outside of the low-income countries and the CHE setting is invaluable. Providers and planners should be well versed in both the standards of care appropriate to the conditions and treatment protocols endorsed by organizations such as the World Health Organization (WHO) and Médecins Sans Frontières (MSF). Readers are referred to the references section of this chapter for a selection of key resources.

Following training in importance is the availability of medications and medical supplies specifically intended for the treatment and prevention of the major causes of mortality and morbidity in children during CHEs. While the experienced organizational leader and logistician may be able to develop a tailored supply system specific to a particular population and event over time, international experience has demonstrated the value of pre-established supply kits for the initial phases of response. The Interagency Emergency Health Kits (IEHK), as well as interagency kits for diarrhoea management, reproductive health, nutrition, and immunizations, provides an evidence-based set of supplies with which one can deliver emergency and routine medical care services to a large population.

Particularly for organizations planning to provide surgical support or intensive medical care assets, attention to stocking a full range of sizes for vascular access devices, to include intravenous (IV) catheters, intraosseous (IO) needles, and potentially central lines, is warranted. Given the potential difficulty of establishing IV access in seriously ill infants and severely dehydrated or hypovolemic children, the availability of paediatric IO needles using a power drill insertion system can provide emergency vascular access without the higher level of expertise and training required to place central lines. If they are part of the supply system, nursing staff should be properly trained and utilize standard protocols for the care and maintenance of paediatric IOs and central lines. Infant and child nasogastric tubes also provide a less invasive method of delivering oral rehydration therapy (ORT), enteral nutrition, and medications to those intolerant or unable to eat or drink. Surgical and intensive care units should also ensure a full complement of infant- and child-sized nasal cannulas, face masks, ambu bags, laryngoscopes, endotracheal tubes, ventilator circuits, and in-line suction devices is stocked. The use of Broselow tapes, for estimating paediatric weights and thereby the dose of emergency medications and size of resuscitation equipment, has been validated in populations from low-income countries and is recommended in the emergency care setting. Broselow systems use

colour-coded packages corresponding to Broselow tape measurements for children 3–36 kg and provide a unified and well-organized stocking method. Utilizing this system in large-scale application in settings caring for large numbers of children has drawbacks of cost and the need to ensure that each kit is properly restocked after each use and may be problematic in mass casualty settings if a limited number of kits exist. Broselow systems do not include central lines, and users should ensure that items such as IVs, IOs, and oxygen tubing will properly interconnect and are compatible with other equipment stocked. Stockage of supplies to provide for the safe delivery of newborns, whether in a medical facility or not, is essential, as routine and emergent obstetrical care will be needed throughout all phases of disaster response and CHEs.

Paediatric Nutrition

Worldwide, approximately 10 % of children under the age of five suffer from severe malnutrition, and one quarter or more of all deaths in this age group are associated with malnutrition. Protein-energy malnutrition (PEM) may be divided clinically into marasmic (wasting), kwashiorkor (oedema), or mixed. A detailed discussion of the complexities involved in proper population-based nutritional surveys, implementation of feeding programmes, and the clinical management of severely malnourished individuals is beyond the scope of this document, and readers are referred to excellent protocols published by the WHO, MSF, and World Food Program (WFP).

Rapid assessments of the adequacy of the existing food supply and baseline nutritional status of the population, particularly those under 5 years of age, is extremely important. Without assuring an adequate general ration of food, malnutrition and associated complications will only escalate. Population-based screening for malnutrition will drive decision making on the need to open or expand supplemental (moderately malnourished individuals) and therapeutic feeding programmes (severely malnourished individuals). In the setting of an inadequate baseline food supply, blanket supplemental feeding programmes may be implemented on a larger scale to provide an additional supplement to the normal ration for all members of vulnerable groups regardless of anthropometrics (such as children under 5 years of age and pregnant or lactating women). Blanket supplemental programmes are intended as short-term gap measures to prevent mortality and morbidity until the food supply shortfall can be addressed.

Anthropometric assessment of children is based upon mid upper arm circumference (MUAC), height (standing ≥ 2 years of age, lying down < 2 years of age), and weight. Mid upper arm circumference is a rapid screening method to identify those likely to have moderate to severe malnutrition. A MUAC of < 115 is indicative of severe protein-energy malnutrition and carries a ninefold increased risk of mortality. The MUAC is unreliable in patients with oedema (kwashiorkor) and these patients by definition have severe malnutrition. The WHO also publishes age- and gender-based height and weight tables against which weight for height percentile,

weight for height index expressed as a Z score (observed weight median weight)/standard deviation), and weight for height as a per cent of the median (W/H % median) (calculated as observed weight/median weight at that height \times 100) can be calculated. Z scores are more statistically reliable and are generally preferred over W/H % median. Screening and anthropometric referrals are summarized next:

1. MUAC <13.5 cm and/or oedema should be referred for weight and height measurement.
2. W/H – 2 to –3 Z scores (70–79 %) should be referred for supplementary feeding programme.
3. W/H < –3 Z scores (<70 %) or MUAC <115 or oedema should be referred for therapeutic feeding programme.

Those directing the care of individuals enrolled in feeding programmes are referred to guidelines published by the WHO, MSF, and WFP for more detailed discussion. Therapeutic feeding programmes generally require an intensive, inpatient approach. In brief, the initial clinical approach in therapeutic feeding programmes during the first week emphasizes prevention, identification, and treatment of hypoglycaemia, hypothermia, and dehydration. Because of the unique electrolyte imbalances found in the severely malnourished, standard WHO ORT is not appropriate for use in this population. Ready to use packets of an ORT designed for the severely malnourished called ReSoMal is available. This formulation can also be approximated from WHO ORT by mixing one packet in 2 l of water (instead of 1 l) and adding 50 g of sugar (25 g/l) and 4 g of potassium (2 g/l). To minimize the risk of heart failure, oral rehydration, or even nasogastric rehydration, is preferred over intravenous unless a patient is in frank shock.

Adjunctive therapy for severely malnourished patients includes attention to micronutrient deficiencies and infectious diseases. These conditions are discussed in detail later in this chapter, but their role in the management of severe malnutrition is summarized here. Zinc therapy should be included in the management of diarrhoea. Unless administration is already documented, Vitamin A supplementation and measles vaccination should be provided to all individuals regardless of degree of severity of malnutrition. Because malnourished children may not manifest typical signs of infection, detailed examinations to assess for signs of sepsis, respiratory infections, malaria, as well as measles and its complications should be performed. Empiric antibiotics such co-trimoxazole for uncomplicated cases and ampicillin plus gentamicin for cases with complications are typically recommended. In areas of malaria transmission, a rapid diagnosis test should be performed at admission, and if the test is positive, or not available, therapy is indicated. Children with pallor or anaemia documented by measurement of haemoglobin should receive folic acid supplementation starting at the time of admission and iron supplementation after the second week of therapy. Iron supplementation is delayed because of both gastrointestinal intolerance and a high risk of exacerbating malaria and some common bacterial infections such as salmonella. Malnourished children over 12 months of age should be empirically dewormed with either mebendazole or albendazole, although albendazole has higher efficacy rates.

Nutritional support during the first week of therapy for severely malnourished children targets a total caloric intake of 100 kcal/kg/day and not more than 3 grammes protein/kg/day. Frequent feeding of high energy milk (HEM), consisting of water, dried skim milk, vegetable oil, and sugar plus a micronutrient mix or pre-made F75 formula, is utilized. After the first week, during the rehabilitation phase, mixed or pre-made F100 formula is utilized. Children with a 15 % weight gain can be transitioned from therapeutic to supplemental feeding programmes.

Supplemental feeding programmes are ideally operated in an outpatient or day-programme setting. These programmes utilize either wet rations consumed on site, dry rations intended for home cooking and consumption, or a combination of the two. The choice between the two types of ration should be guided by an assessment of what is most operationally feasible and minimizes disruption to the population served. Supplemental feeding rations, for wet rations often in the form of porridge, typically provide 500 kcal (and 15 grammes of protein) per day on top of the baseline ration and provide at least 1 kcal/ml and 10–15 % of the energy provided by proteins. Programme planners should anticipate a certain amount of redistribution of rations within households (particularly dry rations) and account for this by doubling or tripling the ration size to ensure the target individual is served.

Communicable Diseases in the Post-disaster Setting

Diarrhoea

Diarrhoeal diseases, whether presenting as dysentery (most commonly *Shigella* species), acute watery diarrhoea (rotavirus and enterotoxigenic *E. coli* are common causes), cholera (watery diarrhoea to high-volume rice water stools), or persistent diarrhoea (multifactorial and often associated with malnutrition), are among the most important conditions to prevent and plan for in the post-disaster and CHE setting. In camp settings, diarrhoea may account for up to 40 % of the mortality, with the majority of deaths in children under the age of 2 years. Syndromic surveillance for each of these classes of diarrhoea should be conducted. The WHO endorses the following case definitions for suspected cholera: a patient over 5 years of age developing severe dehydration from acute watery diarrhoea (often with vomiting) or any patient over 2 years of age with acute watery diarrhoea in an area where there is an outbreak of cholera. Lab confirmation of cholera cases as well as pathogen identification and sensitivity testing during outbreaks of dysentery provides critical information to health-care providers. The IEHK, in combination with interagency diarrhoeal disease kits, provides the supplies necessary to manage all of the conditions discussed.

Management of diarrhoea in children hinges upon a fourfold approach of oral rehydration therapy (ORT), zinc supplementation, nutritional support, and antibiotics for cases of dysentery or cholera. Oral rehydration has been shown to reduce the

severity of diarrhoea, prevent and treat dehydration, and reduce mortality. Even in cases of severe dehydration, for which IV therapy is indicated, ORT remains an adjunctive part of treatment. Zinc therapy, lasting 10–14 days, for children under the age of five is associated with decreased duration of diarrhoea, reduced risk for the development of persistent diarrhoea, and reduced diarrhoea associated mortality. Zinc therapy has also been shown to provide preventive effects by reducing the frequency of subsequent diarrhoea and respiratory infections in the following 3 months. Children should not have their diet restricted during or after episodes of diarrhoea. They should be encouraged to eat as much as tolerated, and families provided with counselling on locally available nutritious foods. Antibiotics should not be used in cases of watery diarrhoea unless cholera is suspected. Unnecessary antibiotic usage drives antimicrobial resistance in a community and can potentially lead to antibiotic associated diarrhoea, further complicating a child's care. For cases of dysentery, the WHO endorses empiric use of ciprofloxacin for all age groups. Due to extensive drug resistance found throughout the world, medications such as cotrimoxazole, erythromycin, and amoxicillin are not recommended. Alternative agents include azithromycin and ceftriaxone. Cholera management hinges principally on timely and sustained rehydration. Oral rehydration is preferred from a resource management standpoint, although intravenous therapy is often required for severe cases. Effective supportive care alone is capable of significant reduction in the risk of mortality, but the inclusion of an antibiotic such as doxycycline, tetracycline, or erythromycin will shorten the duration of diarrhoea. Establishing antibiotic sensitivity profiles are important during the early phase of a cholera outbreak.

The most important aspect of diarrhoea prevention in a post-disaster or CHE setting is the rapid establishment of a clean water supply and sanitation measures that reduce or eliminate the exposure of human and animal waste to water and food supplies. The provision of collection and storage containers that minimize secondary contamination, and soap for use at home and in latrines is an important component of this process. Antimicrobial prophylaxis for populations is not effective and is not recommended. Mass administration of oral cholera vaccine has been used to interrupt outbreaks and can be considered for use based on the scale of an outbreak and the availability of resources to carry out a programme. The results of these programmes continue to be assessed for ways to improve outcomes and their application for future emergencies.

Malaria

Falciparum malaria is a leading cause of childhood mortality in both pre-/post-disaster and CHE settings, with over 800,000 deaths due to malaria annually. Greater than 85 % of these deaths occur in children under the age of 5. In areas of stable high transmission, functional immunity and protection against severe disease are achieved in middle childhood and sustained by repeated mild or subclinical infections. Individuals from regions of seasonal/unstable transmission may not

acquire immunity until later in life, if at all. Factors amplifying the risk of malaria within a population include movement of people from endemic into malaria-free zones (importation of the pathogen) or from areas of low endemicity to hyperendemic areas (importation of susceptible hosts), disruption of vector control measures, disruption of health services, and standing water or flooding.

Malaria should be considered in the differential diagnosis of any severely ill child as well as those with fever without a readily apparent cause. Integrated management of childhood illness principles reinforce the recognition that malaria can present with both respiratory and gastrointestinal signs requiring an assessment even in cases of suspected pneumonia or non-bloody diarrhoea. Malaria rapid diagnostic tests (mRDTs) should be included in the medical planning of any response to an endemic region and are components of the IEHK. The use of mRDTs will reduce inappropriate prescription of antimalarial medications, enhance patient care, and improve the accuracy of disease surveillance reporting. While the WHO and/or ministry of health recommended antimalarial agent may vary from nation to nation, planners faced with the potential to respond to multiple locations should consider inclusion of both artemether-lumefantrine, the drug of choice in a large proportion of chloroquine resistant countries and a WHO first-line agent, and quinine plus clindamycin/doxycycline. Artemether-lumefantrine is recommended for use in children and pregnant women in the second or third trimester. Due to lack of safety evidence, quinine plus clindamycin is preferred in the first trimester. Artemether-lumefantrine, quinine, and doxycycline are components of the IEHK. These medications are also effective against non-falciparum malaria in most parts of the world.

Long-lasting insecticide-treated nets (LLITNs) are the preferred method of individual-based protection against malaria. Insecticide-treated tarp material and blankets have also been utilized and show promise for use in select settings. Chemoprophylaxis is difficult to effectively implement and is generally not recommended. Population-based malaria prevention should focus on vector control with indoor residual spraying by properly trained teams. This method is preferable to fogging and aerial spraying because of a longer duration of effect. Environmental engineering, such as drainage of water sources, or larvaciding breeding sites pose technical and logistical challenges that are problematic in the emergency response setting.

Respiratory Infections

Lower respiratory tract infections, and specifically bacterial pneumonia, are major causes of mortality for children under the age of five. The diagnosis of bacterial pneumonia, as opposed to viral pneumonia and bronchitis, is made difficult by relatively poor sensitivity and specificity of physical exam findings and, when available, radiographic findings. Uncomplicated cases of pneumonia can generally be managed with oral antibiotics such as amoxicillin. Severe and very severe cases of pneumonia (defined by WHO protocols to include the presence of retractions, increased work

of breathing, and cyanosis) should be treated with parenteral therapy in an inpatient setting, typically using either benzylpenicillin, ampicillin, or ceftriaxone. Children not improving after 48 h of therapy should have antibiotic coverage changed to include an anti-staphylococcal regimen.

Preventable factors that predispose to respiratory tract infections include poor ventilation and indoor cooking, overcrowding, and malnutrition. Improved access to medical care can reduce the morbidity associated with these infections. Vaccinations to prevent pneumococcal and *Haemophilus influenzae* type B infections do not have a role in the emergency phase of response but can be considered during the postemergency phase if part of the country's EPI.

Measles

Measles has historically been a major cause of death among children globally. As a result of well-organized mass immunization and vitamin A supplementation programmes, the burden of measles has been markedly reduced during the past decade. Its spread is facilitated by overcrowding and breakdown in routine medical care services. Mortality and morbidity is exacerbated by malnutrition, with fatality rates of 10–30 % among displaced populations. Measles is among the most infectious of diseases, and attack rates among exposed susceptible individuals approaches 100 %. Even short-term lapses in population vaccine coverage below 90 % can result in an outbreak.

Measles is heralded by a nonspecific upper respiratory infection presenting with cough, rhinorrhoea, and non-purulent conjunctivitis, making case identification difficult and problematic since patients are infectious during this time. Koplik spots in the mouth are transient, lasting only 1–2 days and often go unnoticed. Fevers intensify and the coalescing macular rash (which begins on the head and progresses caudally) appears on day 3–4 of the illness. Management includes Vitamin A supplementation (two daily consecutive doses plus a third in 2 weeks if complications occur), nutritional assessment and support, and management of complications such as diarrhoea, pneumonia, oral mucosal breakdown, and keratomalacia or purulent conjunctivitis. Among survivors, blindness due to vitamin A deficiency-related keratomalacia is a major cause of long-term morbidity. Malnourished patients with measles should not be admitted into feeding programmes but cohorted separately or treated at home.

Measles prevention hinges upon maintenance of near-universal immunization coverage (goal >90 %). In order to reduce mortality and morbidity, prophylactic vitamin A should be administered every 6 months to children between the ages of 6 months and 5 years. In a resource-limited setting, prioritization of vaccine and vitamin A should go to those groups most at risk of death or lifelong disability: (in order of priority) malnourished children aged 6 months to 12 years, all other children aged 6–23 months, then all other children aged 24–59 months. Vaccination programmes should be considered early into the emergency response and should not

wait until cases are recognized. A single case reflects an outbreak and should be reported to public health authorities.

Meningitis and Sepsis

Serious bacterial infections such as bacteremia and meningitis can present with a clinical presentation difficult to distinguish from severe malaria without the aid of a lumbar puncture and other laboratory-based diagnostic tests. Particularly in high transmission settings for malaria, comorbid bacteremia (most often non-typhoidal salmonella) complicates severe malaria in up to 30 % of cases. As a result, empiric therapy with an empiric antibiotic such as ceftriaxone is warranted for cases of severe malaria, particularly for those with altered mental status or hypotension.

Meningitis in children, occurring as both sporadic and epidemic disease, has epidemiologically unique aetiologies that dictate the response at both the patient and population level. Globally, major causes of sporadic paediatric meningitis include *Streptococcus pneumoniae*, *Haemophilus influenzae* type B (HiB), *Neisseria meningitidis*, and, in infants, Group B Streptococcus, *Salmonella species*, *Escherichia coli*, and *Listeria monocytogenes*. Epidemic meningitis is almost exclusively caused by *Neisseria meningitidis*, with serotype A being the predominant serotype in African outbreaks. Meningitis outbreaks are of particular concern in the sub-Saharan meningitis belt, with peak onset during the dry season when inhaled dust particles that irritate mucosal surfaces may enhance infectivity. In East Africa (outside of the meningitis belt), outbreaks of meningococcal meningitis typically occur in the wet season. Crowding, especially in a camp setting, further promotes the spread of *N. meningitidis*.

Because of this distinct epidemiologic difference, management of sporadic meningitis requires broad spectrum therapy, typically with ceftriaxone or combination ampicillin plus gentamicin. The duration of therapy lasts 7–21 days, depending on the organism. In outbreak settings with limited supply and nursing resources, targeted therapy for *N. meningitidis* with either ceftriaxone or oily chloramphenicol allows for single-dose regimens with high rates of clinical efficacy. Laboratory confirmation of *N. Meningitidis* in several patients should be made before a single-dose regimen is adapted. For patients with incomplete response after 24 h, antibiotics should be continued for another day or longer as indicated based on the patients progress. Parenteral dexamethasone is used in the treatment of meningitis for some of the organisms listed previously. If given before or with the first dose of antibiotic, there is a reduction in morbidity for children with HiB and adults with *S. Pneumoniae* meningitis. The WHO recommendation is that there is not sufficient evidence to recommend routine use of dexamethasone in all children with bacterial meningitis in developing countries.

During the emergency phase of a disaster or CHE, meningococcal vaccination programmes should be considered as soon as clustered cases of suspected or confirmed meningococcal meningitis occur. The decision to implement a vaccination

programme should be made in consultation with host-nation ministry of health and international organization/nongovernmental organization partners. The threshold to act in an emergency situation, particularly when overcrowding is occurring, is lower than the epidemic thresholds normally established in a stable situation. Children are among the highest risk population and those aged 2–10 years should be the priority group during a vaccination campaign. More than 80 % of cases will occur in those under age 30, and so other age groups can be targeted based on resources and the observed epidemiology. While serotype A is the most common cause of epidemic meningitis in Africa, serotype C and W135 are also recognized causes of outbreaks. Monovalent serotype A has historically been the most common vaccine utilized in Africa, but bivalent (A+C) and quadrivalent (A+C+Y+W135) are also available. Serotyping of culture isolates should be performed early on so that the proper vaccine can be selected. Pneumococcal and HiB vaccinations should not be considered in the emergency phase of a response but could be considered for use in the post-emergency phase if they are part of the national EPI.

HIV/AIDS

HIV/AIDS is a major cause of morbidity and mortality throughout the developing world, particularly in sub-Saharan Africa. HIV/AIDS, often complicated by poor nutrition, acute and chronic diarrhoea, tuberculosis, and other opportunistic infections, presents a complex medical challenge for which care in the early response phase following a disaster is generally not feasible. Guidelines for HIV/AIDS interventions in the context of emergency settings have been published and they do NOT include the delivery of antiretroviral therapy to persons already infected with HIV/AIDS. That level of care requires a sustained infrastructure and stable patient population which is not generally achievable in the initial phase of emergency response and stabilization. Emphasis is placed on prevention of new cases though interventions such as safe delivery of infants (including prophylaxis of children born to infected mothers if sustainable from a health infrastructure standpoint), prophylaxis following sexual assault, provision of barrier contraception to prevent new cases. For those already infected, they will benefit from improvements in water sanitation. Programmes providing HIV care in these settings should develop procedures to mitigate the impact of supply disruptions and re-establish clinical support for existing patients served, before expanding services.

Undifferentiated Febrile Illnesses

A number of undifferentiated febrile illnesses, beyond malaria and meningitis, can also occur in outbreaks associated with post-disaster and CHE settings. Vector-borne diseases such as dengue fever, louse-borne typhus, and yellow fever have the

potential to occur as a result of crowding and/or breakdowns in sanitation and hygiene. Tick-borne rickettsial infections may present with protean manifestations and requires both a high index of suspicion to recognize clinically and empiric therapy with doxycycline. Typhoid and both hepatitis A and E are globally distributed diseases that occur as a result of faecal contamination of food and water systems. While the specific epidemiology and management of each of these conditions is beyond the scope of this chapter, medical providers should be able to recognize and manage the endemic and epidemic diseases of the region in which they are working.

In tropical climates across the globe, dengue is responsible for millions of cases of febrile illness resulting in heavy morbidity within affected communities. In Southeast Asian nations, the highest burden of severe disease falls on young school-aged children. In Latin America, severe dengue cases have historically clustered in adolescents and young adults; however, recent experience from outbreaks in Latin America has shown a shift towards younger age groups. Because severe dengue is associated with secondary (or higher) infections of this four serotype virus, this shift represents more intense endemic transmission cycles with narrower time periods between changes in the predominant serotype of a particular region. For those presenting with severe dengue infections, manifested by capillary leak and the bleeding diathesis of dengue haemorrhagic fever (DHF), case-fatality rates can be <1 % when simple, but well-trained nursing care balances the capillary leak and resulting haemoconcentration with hydration therapy. For non-severe dengue, oral rehydration is the standard of care. For severe cases, although IV hydration is indicated at the initiation to care, patients should be transitioned to oral therapy as soon as possible. Inattentive or overzealous IV hydration, whether through failure to recognize the disease or understand its management, has resulted in outbreaks with mortality rates in excess of 10 %. As the vector is a day-biting mosquito that breeds in small vessels of water (often garbage or household items), the only effective population-based control measures are the elimination of breeding sites and larvaciding, both of which are labour and resource intensive.

Yellow fever is endemic in both Africa and South America. In South America, yellow fever is principally a sylvatic disease with infrequent urban outbreaks. Urban outbreaks, particularly associated with periods of civil unrest, occur more typically in Africa. Because of the high ratio of asymptomatic and undifferentiated cases relative to classic yellow fever, a single case represents an outbreak of disease. The WHO case definition is fever followed by jaundice within 2 weeks of onset of the first symptoms and one of the following: bleeding from the nose, gums, skin, or gastrointestinal tract or death within 3 weeks of the onset of illness. Lab confirmation is required to establish the existence of an outbreak. The overall case-fatality rate is approximately 5 %, but for patients with jaundice, it is 20–50 %. While vector control programmes, similar to that for dengue, can be considered, the primary means of prevention of yellow fever is a mass vaccination campaign targeting ages 6 months through adulthood.

Leptospirosis has been associated with large outbreaks following flooding in both Latin America and Asia. Shed in urine by rodents, cattle, and other mammals, and potentially viable in mud and water for several weeks, the most common route

of exposure is indiscriminate contact with water. Most case series describing endemic leptospirosis point to adult males as the highest risk group. In flood situations, however, children may make up the largest risk population. Leptospirosis presents with protean manifestations ranging from fever, malaise, and myalgias plus or minus a polymorphic rash to fever, jaundice, renal failure, and bleeding manifestations (Weil's disease). Icteric leptospirosis is seen in approximately 10 % of cases and is associated with a 10 % mortality rate despite therapy. Large outbreaks of severe leptospirosis manifested by pulmonary haemorrhage and respiratory failure, but without jaundice, have been observed in Latin America following floods. Though readily treatable with penicillin (or almost any other antibiotic), clinically recognizing cases of leptospirosis remains the primary obstacle to effective care. Leptospirosis mimics dengue, yellow fever, malaria, influenza, and acute viral hepatitis among other conditions. Even in the setting of advanced laboratory support, diagnostics for leptospirosis remain problematic and primarily rest upon acute and convalescent serologies. For that reason, empiric therapy with a beta-lactam antibiotic should be considered for any patient, particularly sporadic patients presenting outside of an identified disease outbreak, with fever, myalgias, and headache, with or without rash or jaundice. Factors that may increase the likelihood of this diagnosis would include an elevated WBC (compared with that seen in dengue or malaria) and recognized exposures to surface water and mud. Although there is evidence to support chemoprophylaxis with doxycycline in high-risk travellers for fixed time periods, there is no roll for this in a local population basis.

Trauma

Injuries comprise one of the leading causes of mortality and morbidity among people of all ages, with the highest burdens in school-aged children and early adolescents. Burns are an exception to this pattern, with over 95 % of fatal burns occurring in children under the age of five. While intentional trauma such as sharp-force wounds, gunshots, and blunt trauma occur in high rates during some CHEs, the majority of injuries are preventable and related to inadequate supervision, safety culture, and mechanical safeguards. Explosive blast injuries due to improvised explosive devices and military munitions may result in complex multi-system injury patterns. In settings where land mines and cluster munitions have been used, these threats may persist for decades, often rendering large tracts of land unusable and uninhabitable. Trauma such as that commonly seen in earthquakes and mudslides can be attributed, in part, to absence or lax enforcement of building codes and the economic pressures placed upon poor segments of society. Both the incidence of paediatric injuries and the associated mortality rate are inversely proportion to a nation's median income level.

While trauma care in high-income nations is both complex and expensive, this type of care is not required for effective care in most cases. Modest investments in training and resources can pay substantial benefits in terms of reduced mortality and morbidity for patients of all ages. For children, a key supply issue (discussed

earlier) includes the provision of appropriately sized airway management and vascular access devices. Lay first aid responders trained in basic principles of first aid and haemorrhage control can augment a smaller core of trained paramedics, greatly expanding the reach and efficacy of prehospital care. This is true even in settings where transport to hospital-based medical care remains informal, relying upon private and commercial vehicles or even nonmotorized transportation.

The WHO has identified several key trauma medicine services. These include opening and maintaining obstructed airways, supporting breathing until patients are able to breathe without assistance, recognizing and managing pneumothorax and haemothorax, controlling of haemorrhage, recognizing and treating shock, decompressing space-occupying lesions in traumatic brain injuries, recognizing and repairing intestinal and other abdominal organ injuries, correcting disabling limb injuries, recognizing and immobilizing early potentially unstable spinal injuries, and providing rehabilitative services to minimize impairment and medications to support these services as well as control pain.

Recognizing where in the development and function spectrum these services exist should be part of rapid needs assessments conducted at the onset of a response. While the management of trauma patients in a mass casualty setting always requires triage, the ability of a system to provide care for even the sporadic seriously injured patient must be considered. While acute life-saving interventions may be possible, providers should consider the resource burden and expected outcomes across the continuum of care. This is particularly true for severe paediatric head trauma, where the prognosis for good neurologic function is low, and third-degree burns involving greater than 30 % total body surface area with or without, an inhalational injury, when advanced burn care is not available. In these settings, the use of an ethics board that ideally includes a community representative can help inform decision making.

Neonatal

As discussed previously, globally, more than 30 % of childhood deaths occur in the neonatal period. Impacting this statistic in the context of a post-disaster or CHE setting is challenging; however, attention should be paid to several key preventive medical services. The WHO identifies basic antenatal care and attended deliveries as an essential primary health-care activity during emergencies. Responders are advised to have the capacity to deliver care, appropriate to their level of clinical care echelon, available through the interagency reproductive health kit, or be prepared to refer women to a site with this capacity. To order this kit, NGOs are required to have a memorandum of understanding with the United Nations Population Fund (UNFPA). In its most basic form, this kit provides for community or primary care level management of STIs, rapes, family planning services, and clean delivery kits for both attended and unattended deliveries. The second level of this kit provides for clinic- or hospital-based management of labour and delivery complications that do not require surgery. The referral centre level of the kit provides supplies to be used

by providers with advanced obstetric surgical training to manage complications of pregnancy and delivery and STIs.

Globally, neonatal tetanus currently causes 1 % of mortality under age 5 years. But given that the estimated rate of susceptible women, and hence their infants, is approximately 32 %, the incidence of this condition may spike in post-disaster and CHE settings where hygiene related to umbilical cord care declines. Case definitions for neonatal tetanus are suspected, death between 3 and 28 days of age in which the cause of death is unknown, or confirmed, any neonate with a normal suck and cry during the first 2 days of life, who then loses the ability to suck normally and displays typical rigid posturing or has seizures, between day 3 and 28 of life. Although tetanus vaccine is not a component of the interagency reproductive health kit, delivery of this vaccine through clinic-based services to women with incomplete or unknown history of tetanus vaccination is recommended. For pregnant women who have never been vaccinated or are of unknown status, 2 doses of a tetanus toxoid containing vaccine should be administered. Because a single dose is not effective in preventing neonatal tetanus, the first dose is recommended as soon as possible during pregnancy. The second dose can be administered 4 week later, preferably 2 weeks prior to delivery. This regimen is 80 % effective at preventing neonatal tetanus. As resources allow, vaccination of all women of child-bearing age with a total of 5 doses of vaccine is recommended. Given that the mortality rate exceeds 50 % even with medical care, and management is resource intensive, prevention is preferred.

Child mortality associated with diarrhoea and respiratory infections is reduced by exclusive breastfeeding for at least the first 6 months of life. Medical providers should encourage and support exclusive breast feeding for all women in disaster affected settings. Formula feeding and the use of bottles for any reason, to include the delivery of ORT, should be actively discouraged. Even in settings of high HIV prevalence or infants born to mothers known to be HIV infected, exclusive breast feeding for 6 months has been shown to reduce all-cause mortality compared to formula or mixed feeding methods. Formula feeding is considered a safe alternative to breast feeding only if the following conditions are met: the water supply is safe and sanitation is assured at the household level and in the community, the mother can reliably provide sufficient formula to ensure normal growth and development of the infant, the mother can prepare the formula cleanly and frequently enough so that it is safe and carries a low risk of diarrhoea, and formula can be supplied for at least 6 months and be exclusive of the need to supplement with breast milk. In general, these conditions cannot be met in post-disaster and CHE settings.

Vulnerability and Paediatric Protection

Children are a high-risk population for abuse and neglect in the post-disaster/CHE setting. All children, but particularly unaccompanied minors, whether due to separation or death of parents and caregivers, are in danger of not receiving necessary

nutrition, medical care, and shelter. Sexual exploitation, recruitment by armed forces, trafficking, exploitive or forced labour, and homelessness are some of the dangers. One of the first priority actions to protect children is the provision of safe spaces for children. Ideally, this is in the care of family, but monitored fostering or group care may be required. Systems by which children are identified and documented aid reunification with family. Access to information on unaccompanied children should be made available to local governments, aid groups, and the community. Clothing and other items carried by an unaccompanied child should be kept, as they may serve as a means of identifying family later. Ration systems, sanitation facilities (latrines), and shelter should be monitored to ensure that at-risk children receive the aid intended for them and they are not exposed to further potential harm in order to access it. Response staff (government or NGO) should be properly screened for past inappropriate behaviour towards any vulnerable group and have both training and work-place procedures to minimize the abuse of children and other vulnerable groups by authority figures. Across all sectors of disaster response, planners should incorporate ways to enhance the protection of vulnerable groups into their programmes and assess outcomes that result.

Paediatric Mental Health

In populations affected by a natural disaster or CHE, a critical component of addressing mental health needs is the provision of basic needs such as food, water, shelter, medical care, and security. Addressing the protection needs of vulnerable groups such as children, as discussed earlier, prevents both additional physical and mental harms. Perhaps the most important of these is family reunification and the provision of safe refuge to unaccompanied minors. Mental health services for parents and caregivers will positively affect the mental well-being of children. Disseminating key information that is understandable to pre-adolescents helps to minimize misinformation and anxiety. The restoration of community services, particularly schools, creates a framework of normalcy that helps restore balance to a child's life. For adults, the provision of meaningful work, such as teaching and reconstruction projects, fills a similar niche. With basic training, teachers and other care providers can serve as providers of effective mental health services extenders. By virtue of their close interaction with children, they are well suited to recognize maladaptive responses to the stresses experienced by the community and, when appropriate, bring them to the attention of more highly trained providers of mental health care. Preschool-aged children may experience regression in behaviour or developmental milestones. School-aged children may experience feelings of guilt, believing they caused a negative event to occur, or feel an inappropriate degree of duty to protect or care for others. Adolescents may display an emotional detachment from friends and family or may begin to act out with impulsive risk-taking behaviours. Other principles of psychological first aid for an affected population include empathic listening (but do not force a child to talk or undergo counselling),

encouraging positive coping strategies while discouraging negative strategies, establishing routines, and setting realistic expectations about behaviour.

Selected Resources

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Chapter 49

The Psychosocial and Mental Health of People Who Are Affected by Conflict, Catastrophes, Terrorism, Adversity and Displacement

Richard Williams, Verity J. Kemp, and David A. Alexander

Abstract This chapter is in four parts. It introduces salient topics that we hope are sufficient for people who are starting out in responding to the healthcare needs of people who are affected by conflict and catastrophes. We do not claim that this chapter is a comprehensive account.

Chiefly, it provides an overview of the psychosocial needs and the psychosocial care and of mental healthcare that people require who are affected, directly or indirectly, by catastrophes, disasters, major incidents, extreme events, terrorism, CBRNe events and adversity. It applies also to people who are refugees or internally displaced persons (IDPs) or asylum seekers. There is a plethora of terms used and, arguably, “*natural disasters, technological catastrophes, acts of terrorism result in [broadly] similar [psychosocial] consequences*” [p. 200]. Therefore, in this chapter, we refer to all of these situations as major incidents.

Keywords Psychosocial responses or impact • Mental health responses or impact • Conflict • Catastrophe • Terrorism • Diversity • Displacement • Stress • Distress • Children • Young adults • Psychosocial care • Psychosocial intervention • Resilience

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Objectives

- To consider briefly a selection of myths and realities about people's psychosocial responses and needs consequent on their involvement in conflicts, disasters and catastrophes
- To summarise a selection of the evidence-based knowledge about risk, risk assessment and risk communication related to managing the psychosocial impacts and people's behaviour when they are affected by major incidents
- To introduce the concept of psychosocial resilience
- To summarise the nature and impacts of stress and distress
- To summarise the psychosocial and mental health impacts on adults who are affected, directly or indirectly, by major incidents
- To summarise the psychosocial and mental health impacts on children and young people who are affected, directly or indirectly, by major incidents
- To outline a strategic approach to planning, organising and delivering psychosocial care and mental healthcare for people who are affected by major incidents

Introduction: The Context of Myths and Realities

This chapter is in four parts. It introduces salient topics that we hope are sufficient for people who are starting out in responding to the healthcare needs of people who are affected by conflict and catastrophes. We do not claim that this chapter is a comprehensive account.

Chiefly, it provides an overview of psychosocial care and of mental healthcare for people who are affected, directly or indirectly, by catastrophes, disasters, major incidents, extreme events, terrorism, chemical, biological, radiological, nuclear and explosive (CBRNe) events and adversity. It applies also to people who are refugees or internally displaced persons (IDPs) or asylum seekers. There is a plethora of terms used and, arguably, “*natural disasters, technological catastrophes, acts of terrorism result in [broadly] similar [psychosocial] consequences*” [1, p. 200]. Therefore, in this chapter, we refer to all of these situations as major incidents.

The contents are highly relevant to meeting the psychosocial and mental health needs of staff of rescue, first professional response and aid agencies and non-governmental organisations (NGOs), and personnel of military organisations. While Chap. 27 in this book focuses directly on the needs of staff, we advise that readers should read both chapters together if they wish to gain a more substantial understanding of current, evidence-based concepts. We begin with some definitions and contrast certain myths and realities to introduce the chapter's scope.

Definitions

A disaster is “... a basic disruption of the social context within which ... [persons] and groups [of people] function” [developed from [2], p. 651]. “Natural disasters, technological catastrophes, and acts of mass terrorism are more than individual-level events; they are community-level events that bring harm, pain, and loss to large numbers of people simultaneously. They are often brutal in their severity and broad in their scope. Many of them involve immediate trauma arising from exposure to death and injury (horror), extreme physical force (terror), and life-threatening situations” [1, p. 200]. Generally, the research community has accepted that people’s adaptation is more difficult following human-made events. However, this distinction is not always easy to make. Earthquakes, for example, do not, generally, kill many people but poorly constructed buildings do. Also, some flooding is not due solely to natural events, but also to lessons about preventative measures that have not been learned from earlier floods.

Psychosocial care and mental healthcare are not interchangeable terms but have distinct meanings. Psychosocial care describes the emotional and socially supporting care that single persons or groups of people may require as a result of their experiences and injuries. We use the term psychosocial to describe “*the emotional, cognitive, social and certain physical experiences of particular people and of collectives of people (in families, communities, and leisure, education and work groups as well as groups of strangers who are thrown together) in the context of particular social and physical environments*” [3]. This chapter uses psychosocial to refer to the psychological and social processes that occur within and between people and across groups of people who are exposed to major incidents.

Mental healthcare, by contrast, refers to the more specialised psychiatric and psychological assessments and interventions that people may require as a consequence of their injuries, care and treatment, any pre-existing mental disorders and mental disorders that they may develop as a consequence of their experiences of major incidents.

Everyone involved in major incidents needs psychosocial care, but only a portion of them needs mental healthcare.

Common Myths

There are many myths surrounding how people and agencies respond to any major incident. They include beliefs that everybody involved needs counselling or psychiatric treatment, PTSD is the main psychopathology, and first responders, aid workers and military personnel are immune to the effects of their work on major incidents. Chapter 27 deals with the latter and this chapter deals with the first two. However, one of the most powerful and persistent myths is that the first response of groups, communities or persons is panic.

All-too-often, contingency planners have incorporated the images of a hysterical or lawless mob in their discussions and response exercises. The myth of panic is difficult to dispel despite much research evidence to the contrary.

Quarantelli defines panic as an “... *acute fear reaction marked by loss of self-control followed by non-rational and non-social flight*” [4]. Sheppard et al. define panic as having the following elements [5]:

- Behaviour that is intended to increase a person’s chances of receiving apparently scarce or dwindling resources
- Putting personal safety ahead of assisting other people
- “Contagiousness”
- Irrational behaviours

We do not say that panic does not occur, but that its frequency is greatly exaggerated. The media apply the term, inappropriately, to describe goal-orientated, rational behaviour that solely satisfies the first of Sheppard’s elements. More often than not, the term is used, erroneously, to refer to people’s responses to the limited or inaccurate information that they have been given and to describe their rational and thought out actions to minimise the risks, as they perceive them, or gain an advantage in coping should the situation deteriorate.

True panic, which meets the defining characteristics of Shepherd et al., is more likely to occur when invisible agents that may affect people’s health are released accidentally or deliberately during CBRNe incidents and, particularly, when people [3] feel trapped and helpless, think there is no effective leadership or management and believe that what resources there are will be allocated to people unfairly.

This myth raises a particularly important aspect of psychosocially informed approaches to managing disasters. It is that planners and practitioners should understand the concepts of risk, risk perception and risk communication if they are to have an adequate understanding of the potential impacts of people’s responses and their own actions.

While evidence shows that people involved in a crisis may be stunned in the immediate aftermath, they are more likely to behave in an altruistic manner. People caught in the bombings in London on 7 July 2005, for example, created bonds with fellow passengers who were strangers and displayed high levels of altruistic behaviours. We consider this matter in more detail in the section on psychosocial resilience.

Realities: The Scale of Psychosocial Costs of Major Incidents

The psychosocial costs of major incidents can be huge. Research allows us to conclude that:

- Disasters put families, neighbourhoods and communities at risk.
- Disasters are associated with multiple patterns of outcome for the people involved.

- Outcomes depend on a dynamic interplay of risk and resilience factors and the interventions that are made available to people who are affected.
- Disasters cause serious psychosocial harm and/or mental disorders for a minority of people who are affected.

Major incidents do not spare children and young people despite society expressing great repugnance when the media reports children's involvement in violence and particularly so if they are the perpetrators [6, 7].

Families are now in the front line of war, conflict, terrorism and disasters as a result of paradigm shifts in the nature of conflict and war and growth of terror as a weapon. Civilians, including children, are now deliberate targets. Employing children as soldiers continues but is not new. Resident and displaced populations, refugees and famine-affected peoples are caught up in conflict and are particularly at risk of the psychosocial consequences of their displacement as well as the events that caused their displacement [7].

Some approximated facts relating to the decade 1993–2003 [8, 9] are:

- Two million children were killed and six million children were injured or permanently disabled in war zones.
- Of war-exposed survivors, one million children were orphaned and 20 million displaced to refugee camps or other camps.
- Civilians comprise 80–90 % of all who die or are injured in conflicts – mostly children and their mothers.

Other recent statistics show that this situation continues [7]. They include:

- More than one billion children and young people under 18 live in countries affected by war.
- Around 16 million children live as IDPs, refugees or asylum seekers.
- In late 2010, children were 44 % of the 15.4 million UN-recognised refugees.
- Of a further 837,500 asylum seekers, 15,500 were unaccompanied or separated children.

Massed events “*scar the memory of the individuals and communities they touch, they have the capacity to forever change the character and life style of individuals and communities, and they confront one's perceptions of the world and individual and collective vulnerability and strength*” [9]. However, despite this gloomy beginning, many people appear remarkably resilient. There are diverse impacts resulting from major incidents that can be exacerbated by the impact on mental health by effects on social conditions through increased poverty, threats to human rights, domestic and community violence and changed social relations [10]. We cover these impacts in section [Part B](#).

Alderdice, and Alexander and Klein provide good reviews of the psychology of terrorism [11, 12]. Terrorism has the aims of:

- Creating mass anxiety, fear and panic
- Creating helplessness, hopelessness and demoralisation
- Destroying our assumptions about personal security

- Disrupting the infrastructure of societies, cultures or cities
- Demonstrating the impotence of the authorities to protect citizens and their communities

The staff of aid organisations, healthcare agencies, NGOs and military organisations are also at risk of the psychosocial and mental health consequences of major incidents and their risk of developing serious responses lies between that for the general public and people who have been affected directly [1, 13]. There is emerging evidence that the deployed military healthcare staff in Afghanistan have elevated rates of developing persistent and/or serious problems when compared with their military colleagues in other roles. Chapter 27 focuses on the needs of, and care for staff.

We conclude that developing an understanding of how people involved in major incidents behave and are affected is very important because it affects how contingency planners, communities and aid agencies should prepare and respond.

The Approach to Intervention Advocated in This Chapter

Evidence-Based Frameworks of Care

This chapter describes evidence-based frameworks for providing psychosocial care and mental healthcare for people who are affected by major incidents, whether or not they are physically injured, professional responders or otherwise involved. The contents have been developed from evidence and a series of pieces of work that we have conducted for the North Atlantic Treaty Organisation (NATO) and the European Union (EU) (The European Network for Traumatic Stress (TENTS) programme) [1, 14, 15]. They are compatible with the Inter-Agency Standing Committee (IASC) Guidelines on Mental Health and Psychosocial Support in Emergency Settings and the Department of Health's guidance for England [16, 17]. We have used these sources to build on the work of Williams et al. and other published principles and stepped models of psychosocial and mental healthcare for affected people, their families and staff involved in their care [18].

The approach recommended is that everyone involved and their families should be offered psychosocial care, whether or not they also require specialist psychological, neuropsychological or psychiatric assessment and care [19]. A minority of people is likely to require specialised psychological or psychiatric intervention. There is evidence that adults and children who receive effective psychosocial care, including good social support, are less likely to develop psychiatric disorders and recover more quickly if they do.

People who are physically injured in the course of major incidents are highly likely to suffer pain and distress. People who have been involved but are not physically injured and their relatives also undergo great upheavals and short- and long-term changes in their lifestyles as a consequence of their experiences, recovery and rehabilitation, and the effects on their families that extend and continue beyond any injuries. Recovered people say that a vital part of all trauma services is a continuum

of psychosocial and mental healthcare delivered as a component that is fully integrated within the care pathway for every person.

A continuum of psychosocial and mental healthcare should be fully integrated with, and be a core component of people's physical healthcare. Success depends on practitioners and all aid workers recognising promptly people's psychosocial and mental health needs and responding to them effectively. It is vital that people perceive that psychosocial support is available to them. There should be no barriers to people receiving psychosocial care to protect their mental health and mental healthcare because there is abundant evidence that people are social actors and that group dynamics can trump individual personality in determining people's behaviour. This raises the vital importance of cultural sensitivity in developing policy, and designing, planning and delivering all services for people who are affected by major incidents.

Cultural Sensitivity

Barenbaum et al. say, *"In order to provide culturally sensitive assessment and treatment, it is essential to understand cultural practices and have local knowledge of the community. Delivery of mental health intervention in non-Western settings needs to incorporate prevailing cultural norms, including spiritual or religious involvement, basic ontological beliefs, and related issues ... Culturally sensitive diagnostic approaches are needed to assess trauma symptoms and associated impairment. Immediate relief operations can start with non-specific interventions to help groups of affected individuals organise around issues of feeling safe and promote perspectives for the future that involve mastery and engagement in rebuilding. It is important to instruct parents and teachers in recognising children's distress and applying appropriate strategies to address children's needs. Intervention considerations and their scope should be community orientated to promote normalisation of life and active child involvement"* [8].

The approach of this chapter takes into account concerns about the risks of over-medicalising concepts of, and responses to major incidents, and of being too ready to impose Western concepts and practices on non-Western societies after major disasters through globalisation of psychiatry. Williams has drawn attention to the importance of cultural sensitivity in mounting services for children and families after disasters, including their experience of violence [20].

There is a tension between opinion leaders. Advocates of the "cross-cultural universality" approach argue that syndromes hold true across cultures. They may recommend application of screening, assessment, diagnostic and intervention techniques that have been developed in Western approaches to mental healthcare. Proponents of "cultural specificity" argue that the significance of experiences and symptoms should be understood in relationship to the culture from which affected people come.

The approach we take in this chapter incorporates both principles into the stepped approach to service delivery and design that we commend in which interventions of graded specialisation are titrated progressively against need.

The Scope of This Chapter

The psychosocial impacts of major incidents are very broad. Figure 49.1 illustrates the topics that we have introduced, but even this broad approach does not deal with all of the psychosocial aspects of disasters.

This chapter provides an introduction to certain of the topics highlighted in Fig. 49.1. It is presented in four sections that are linked to the curriculum for the Diploma in the Medical Care of Catastrophes (DMCC) that is offered by the Worshipful Society of Apothecaries of London. The sections are:

- Part A: Psychosocial aspects of risk
- Part B: People’s psychosocial and mental health responses to major incidents
- Part C: The implications of major incidents for children and young people
- Part D: A model of care

Part A: The Psychosocial Aspects of Risk

Preparation of and Communications with the Public and Responders

The stepped model of care described in section Part D in this chapter advocates that preparation for major incidents is an important step in planning and delivering

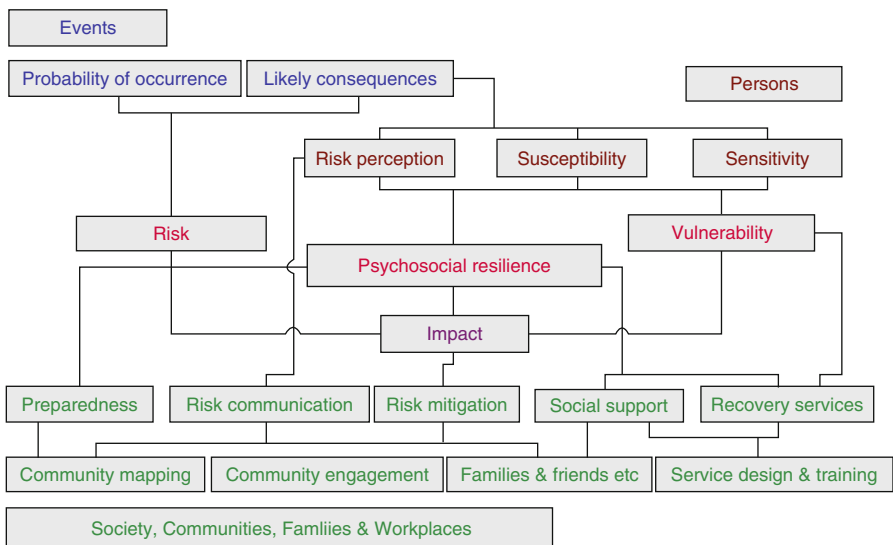


Fig. 49.1 Psychosocial aspects of major incidents, disasters, catastrophes and conflict (Copyright R. Williams, 2010. All rights reserved and reproduced with permission.)

psychosocial care for people who are affected by emergencies. An important aspect of this is considering risk.

There is a dynamic for governments, responsible authorities, experts and the public who might be affected by any untoward event. Each of these groups of people has its own perceptions of risk. Protecting populations from risks of harm from major incidents is one of the responsibilities of the authorities. Preparing people to take the best courses of action to help themselves requires authorities to take advice from experts about formulating advice for the public and then communicating it in ways that are most likely to be heard by the persons at risk and then guide their responses and behaviour. This is a growing area of science and social science. All staff of aid agencies should be aware that their values and actions have an influence on the public whether wittingly or otherwise.

Conventionally, risk is considered to consist of two main components. First is the likelihood of a particular event occurring and causing harm. Second are the consequences for populations if that event occurs. Each type of event has a profile with respect to these matters. How they are communicated to the public is important because that influences how key messages are heard and whether or not they are acted on effectively. Therefore, perception of risk by the populations which are potentially affected and how this is communicated are essential parts of preparations carried out by responsible authorities and the agencies that become involved.

Risk Perception describes the process by which people understand risk-related choices that they and societies face. *Risk Communication* is the process that determines how communication between responsible authorities with lay and professional people, and between members of the population at risk, enhances or degrades their decision-making abilities. Both of these processes should aid effective communication with the people who are involved in emergencies, be they professional responders or people affected, by promoting design and delivery of messages that inform and educate rather than provoke anxiety. Fischhoff says, "*Risk communications should focus on those facts that people most need to understand but have yet to learn*" [21].

Reasons for Providing Information

It is good practice to provide people with high-quality information. There are many reasons why providing high-quality information for the public and teams of people who respond to their needs is so important. It is core, and not an add-on to the main responsibilities of deployed staff of aid agencies.

"Communication is essential to maintain trust and credibility. However, the window of opportunity is limited, especially with ... [a] stressed audience. Messages that seem irrelevant or disrespectful can make people less likely to listen, especially if vital information seems to have been hidden" [22]. Furthermore engaging with the media is neither an option nor should it be viewed as an encumbrance because it has important roles to play in managing major incidents. If staff of aid agencies take negative attitudes without good cause, there is a risk that those attitudes may be

communicated to the public. All organisations should actively manage their contacts with the media. The reasons for providing good information include:

- Meeting a right
- Involving and responding to the media
- An essential component of command, control and communication actions [C³]
- Giving the public information before their exposure to a threat in order to
 - Reduce public fear or apprehension
 - Align the public to a wise course of response
 - Align the public to evidence-based responses to or interventions for events as they unfold
- Assisting people to make effective and wise decisions for themselves that are in the interests of themselves, their families and wider society
- Building the resilience of persons and communities
- Keeping people well and sustaining their resilience after events
- Providing information as part of a wider package of psychological first aid after events

Fischhoff summarises, “*Without good information, people may find themselves living with choices they do not understand or want. Feeling they have been denied critical information further complicates an already difficult situation. If things go badly ... having misunderstood the risks ... citizens’ dissatisfaction may extend to leaders and officials ...*” and, “*Reducing these social risks means providing citizens with relevant information in a credible comprehensive form*” [21]. High-quality, accurate information about risk is important because people’s perceptions of risk have a significant impact on the possibility of their developing disorders.

In order to achieve these objectives, communication plans must:

- Take in principles from theories that are within
 - Personal construct psychology [23]
 - Social constructionism and social identity social psychology [24]
- Be a two-way process because: “*Without listening to people, it is impossible to understand what they know and value, hence impossible to provide them with relevant information in a comprehensible form*” [21]
- Be based not only on facts, but also on planners’ understanding of people’s values, attitudes, beliefs, societal culture and public trust in the authorities because “*Just as citizens need information in order to respond effectively, policymakers need to understand citizens’ beliefs, in order to create behaviourally realistic policies*” [21].

How to Communicate: Principles of Effective Communication in a Crisis

There is a substantial and growing literature on how best to communicate, though not all of it is based on scientific evaluation. Fischhoff has formulated evidenced

advice on designing and executing a communications programme [21]. He says that it is important to:

- Characterise the decisions that people are likely to face
- Describe people's existing beliefs and values
- Develop and evaluate communications that are designed to bridge the critical gaps between what people know and what they need to know if they are to have the best chance of making choices that achieve what they value

Four sources of expertise are required: subject matter experts, risk and decision analysts, behavioural scientists and communication practitioners [21].

Bish et al. summarise core findings from a review of the scientific evidence relating to communication during the flu pandemic in 2009–2010 [25]. They conclude that:

- Demographic and attitudinal factors can influence people's protective behaviour.
- Communications designed to highlight people's perceptions of risk should be combined with advice on how the perceived threat can be lessened.
- Communication plans should maximise levels of public trust and satisfaction with the communication.
- Trust in the responsible authorities is especially important in situations that are uncertain.

Advice about the content of risk communications is developed from the work of Bish et al. and the literature. Risk communications should:

1. Involve people: communication is more effective in influencing people when the public feels involved by
 - Acknowledging the gravity of events and the tragedy for people affected
 - Recognising public concern and their efforts to manage the risk
 - Assuring the public that officials are doing all they can, provided, of course, that is a true statement
2. Express a coherent and consistent approach
3. Be open and transparent about
 - The likely course of the incident
 - How the incident is being handled
 - What people can do to protect themselves
4. Provide clear, simple and brief communication by
 - Ensuring new terms are explained
 - Being sensitive to cultural differences
 - Ensuring messages are scientifically accurate
5. Provide information by
 - Including quantitative risk estimates in numbers rather than percentages
 - Framing ambiguous messages about risk negatively
 - Presenting risk information visually as well as textually, whenever possible

6. Provide summaries of possible protective actions
7. Acknowledge uncertainty
8. Commit to earning and keeping public trust.

Part B: People’s Psychosocial and Mental Health Responses to Major Incidents

This section describes the psychosocial and mental health responses of people of all ages to their direct or indirect involvement in major incidents. It also applies to people who are refugees, internally displaced people or asylum seekers who are subject to detention. Section [Part C](#) focuses on children and young people because they are a large fraction of the populations of developing countries and are likely to be directly or indirectly involved in natural and human-made major incidents and deprivation. We recognise the shift of age-related demographics of Western societies in which the numbers and proportion of older citizens is rising. Increasingly, major incidents in Western societies impact on older people. We refer readers to a chapter by Brown et al. for further information [26].

Often, people talk of noxious events as being traumatic. There are many ways in which that term is used. Researchers have distinguished patterns of response on the basis of the nature of the major incidents and people’s responses to them. Traumatic events can be differentiated by their repetition or otherwise. “Event trauma” refers to sudden, unexpected occurrences that are limited in time and space and to the psychosocial impacts caused by single, life-changing incidents. “Process trauma” is characterised by people’s exposure to repeated events and enduring stress from events including such as adversity, abuse, and war. In the past, some authors have called the two patterns Type 1 and Type 2 Trauma while, more recently, the second pattern may be included in the term complex trauma. There are also crossover patterns identified between the two types. This chapter focuses on the first pattern. But, readers should be aware that people’s responses provoked by long-standing or repeated ordeals may result in anticipation, massive denial, dissociation, self-anaesthesia, identification with the aggressor and rage.

While there is insufficient space to review post-traumatic growth (PTG), it is important to be aware that there may be positive effects for some people from their exposure to major incidents. PTG emphasises the necessity of decision-makers understanding the risk factors that affect the likelihood of people coping well or otherwise with the psychosocial impacts of disasters or of developing mental disorders. This means that decision-makers must understand:

- The health risks faced by people after major incidents
- The range of emotional and dysfunctional behavioural responses that people may experience
- The mental disorders that people may develop
- The anxieties about survivors that relatives, friends and many other people may experience [3].

Research has established that people who are affected by the psychosocial aspects of major incidents go through phasic processes in their adjustment after disastrous circumstances. *“Therefore, what one may see when looking at ... [people] after episodic or recurrent violence depends on where they are in their personal trajectory of [experience and] recovery that involves responding to the impact, recoil afterwards followed by a longer period of adjustment”* [20].

Stress, Stressors and People’s Psychosocial and Psychiatric Responses to Major Incidents

There is a challenge in agreeing definitions and terminology to describe how people respond psychosocially on and after exposure to untoward events and adverse situations.

Stress

Stress is a term that is widely used and, often, misused or used inconsistently. Sometimes the word is used to refer to a stimulus or other people use it to refer to people’s responses. Some sources use the word to describe people’s unpleasant feelings about, or their disadvantageous responses to events, circumstances and relationships, thereby equating stress with undesirable responses. Others point out that stress describes a syndrome of human psychological, physical and behavioural responses to external and internal challenge and strain. Thus, stress may refer to people’s physiological and biochemical responses, which are deleterious to them. But, that syndrome is adaptive in most cases. Most often, pressure or strain may be a positive motivating factor, or it may be negative because it induces adverse emotional, psychological or physiological change. Other authorities use the word to identify a syndrome occasioned by the person’s ability to cope with being overwhelmed.

We use stress to describe the challenge to people and groups of people that may arise from untoward events that are of such a nature and/or severity as might cause them psychosocial motivation but also distress or harm. It is clear is that most of the people who are involved in major incidents experience stress in the manner in which we use the term. It may have effects that range from stimulating their resilience and personal and interpersonal responses through to provoking serious mental disorders. In other words, stress may be alerting, galvanising, improve resilience and raise performance, but it may also cause the emotional experience of distress, reduce performance to the point of temporary and, sometimes more sustained dysfunction, and, particularly if the stress is sustained, provide a risk to mental health. Often, the differences in response turn on personal characteristics; people’s developmental experiences and life experiences; training; family, team and group memberships; and the leadership and social support offered to people.

Primary and Secondary Stressors

Primary stressors are defined as stressors that are “*inherent in particular major incidents, disasters and emergencies and arising directly from those events*” [3]. People who are affected by major incidents are highly likely to suffer pain and distress. They and their relatives may undergo great upheavals and short- and long-term changes in their lifestyles as a consequence of their experiences, injuries, physical care, recovery and rehabilitation and the effects on their families that extend and continue beyond the injuries and illnesses and adversity they experience. All of these experiences are stressful.

Secondary stressors, by contrast, are circumstances, events or policies that are indirectly related or “*non-inherent and consequential*” on major incidents [3]. Typically, the term is used to describe situations that persist for longer than the events. Some secondary stressors are entities in themselves, whereas others are unresolved and persisting primary stressors. They can include problems such as infrastructure failure and challenges to returning to normality and repairing structures. They may also include the impacts of policies and plans made prior to events that inadvertently limit people’s recovery or adaptation.

General Responses of People to Major Incidents

Everyone who is involved may experience stress arising from primary and secondary sources. They may also be affected by a variety of other secondary stressors. As a result, people’s responses to crises depend on many factors that include the nature and circumstances of the events in which they are involved. The responses that they may show vary across a spectrum, which includes:

- Psychosocial resilience:
Good mental health despite people’s exposure to significant adversity: this response includes people who experience distress temporarily before they spring back to full capability
- Non-disordered psychosocial distress or acute stress reactions:
- Distress that may be of longer duration, but the people affected do not show dysfunction
- Grief
- Increased prevalences of mental disorders and neuropsychological disorders and substance use and misuse

In addition, people in humanitarian settings may develop new episodes of previous mental disorders because major incidents impact on the social conditions that shape mental health through their exposure to poverty, threats to human rights, domestic and community violence, and changed social conditions. This makes the point that how people respond to major incidents turns on their previous and current experiences and varies with their life narratives [10].

People's Responses to Specific Events or Agents

Certain types of events may also affect people in particular ways and the types of events may be associated with particular forms of impact and trajectories of people's responses. One example is that of flooding and a second arises from emissions of potentially damaging invisible agents.

Floods

An example is that of floods, which may so damage the infrastructure that the primary stressors are sustained over extended periods after the water had receded and while the damage is repaired. In these circumstances, the secondary stressors, which result from how societies struggle more or less effectively to cope with the primary event and restore communities, are very substantial and may be long-lasting. This may be reflected by an extended pattern of impacts on the people who are affected.

The staff of agencies, which respond to the needs of people who have been affected directly, are likely to experience people in states of sustained distress who are affected by resource gaps that arise after extra services developed to respond to the aftermath of floods stand down [27]. At these times, people who are affected may still have substantial and, in the case of flooding, possibly rising psychosocial and mental health needs. Commonly, they experience frustrations with the limitations of the capacities of services that are routinely available to cope with extra need and demand.

Emissions of Invisible Agents

Our second example is of the psychogenic illnesses that people may experience after possible emissions of invisible, toxic agents, which may be released accidentally or deliberately by terrorists. There is potential for vast numbers of people to fear that they have been affected and seek assistance from medical and support services, and this is particularly so when the symptoms of anxiety are similar to the prodromal symptoms produced by agents of this kind of agent, which is often the case. The sarin gas attacks in the underground railway in Tokyo killed fewer than 20, but more than 1,000 people attended hospital shortly after the attack with symptoms of what could have been sarin gas poisoning. The majority was anxious rather than affected physically by the agent [28].

Psychosocial Resilience and Coping with Stress

The Nature of Psychosocial Resilience

Many people suffer transient distress that is not associated with prolonged or sustained dysfunction after they survive major incidents or adversity. These resilient

people spring back quite rapidly from acute stress and distress. Thus, good psychosocial resilience is not about absence of short-term upset or brief distress, but how people adapt and recover afterwards. The corollary is that people who show resilience after major incidents should not be assumed to be unaffected psychosocially.

Modern theories of psychosocial resilience emphasise the capacities of people, organisations and communities for adapting to situations that are changed by the course of events rather than solely recovering to the level of their abilities to function before events occurred. There is a great deal that all practitioners and family members can do, by offering psychosocial care and social support, to accelerate people's adaptation and recovery with the intention of alleviating their short-term suffering and to prevent them from developing mental disorders in the medium and longer terms.

A substantial majority of people are psychosocially resilient and remain so if they are offered support. Psychosocial resilience has two components: personal and collective.

- Personal psychosocial resilience describes *“a person’s capacity for adapting emotionally, cognitively, socially, and physically reasonably well and without lasting detriment to self, relationships or personal development in the face of adversity, threat or challenge”* [6].
- Collective psychosocial resilience refers to the way in which groups of people and crowds of people *“express and expect solidarity and cohesion, and thereby coordinate and draw upon collective sources of support and other practical resources adaptively to deal with adversity”* [6].

Psychosocial resilience is an interactive concept. The interactions are between people's perceptions of external threat and the risks posed; people's internalised personal capabilities and their values; and the responses of other people, strangers and familiar people, to particular people's plights.

People who survived the 9/11 terrorist attacks and who were more likely to be resilient showed five core qualities. The abilities of people to accept and use social support and the availability of it are two of those key features of resilience. Depending on the circumstances, social support may have greater effects than the dose effect or degree of people's exposure to noxious events. Resilient people tend to have greater abilities to accept the realities of the situations in which they find themselves without being overly optimistic or catastrophising. They also tend to have beliefs in themselves, which are supported by strongly held values, and the ability to improvise. In summary, the core features of people who have good psychosocial resilience are:

- They perceive that they have, and actually receive social support: the abilities of people to accept and use social support and the availability of it are two of the key features of resilience that may have greater effects than may exposure to events.
- They tend to show strong acceptance of reality.
- They have belief in themselves that is supported by strongly held values.
- They have abilities to improvise.

People's psychosocial resilience is influenced by many factors including genetics, their previous experiences, and how they deal with life events, relationships and attachments; how they interpret and make use of their life experiences; the nature of the major incidents in which they are involved; and, how all these factors relate to one another. As result, resilience is not solely a feature of individual persons, but is a dynamic interactive concept that:

- Is specific to particular people, events, circumstances and narratives
- Focuses on how particular people deal with specific external risks, threats and events
- Is related to specific contexts and personal circumstances

A chapter by Williams and Kemp offers a summary of recent research on the psychosocial resilience of children and young people [29].

Coping with Stress

Research in the last decade has provided considerable information about how people cope with stress. A survey carried out 5 years after the Bosnian war found four types of coping among adolescents [7, 30]. They are likely to apply to people of all ages and are:

- *Influencing*: efforts made by people to directly influence the stressor or their reactions to it (consisting of emotional expression, problem-solving and emotional regulation).
- *Adapting*: attempts made by people to adapt to the stressor or their reactions to it (comprising acceptance, distraction, cognitive restructuring and positive thinking).
- *Disengaging*: people's coping by avoidance, denial and wishful thinking.
- Developing *involuntary stress responses*: some people suffer poor coping and the signs of that include their arousal, rumination, intrusive thoughts, and impulsive actions.

Usually, the first two are positive mechanisms. Depending on the circumstances, the third may help people to cope temporarily but is to be avoided in the longer term, and the fourth is the least helpful to people's responses and recovery.

Rumination is a potent mechanism by which life events and adversity may lead to people experiencing stress. However, that link can be challenged positively by social support. Rumination is linked with low self-esteem and pathological mood states. Dealing with rumination is an important consideration when responding to the needs of people who do become unwell as a result of their experiences, and it is a focus for cognitive behaviour therapy. These findings emphasise the importance of recognising and providing support for people if they get caught in circles of non-progressive thinking and worry and, especially so, if that should progress to persistent rumination.

Acute Stress and Distress

People's immediate responses to emergencies are often characterised by feelings of:

- Stunning and numbness
- Anxiety and fear
- Horror and disgust
- Anger
- Loss of trust
- Demoralisation, hopelessness and helplessness
- Survivor and performance guilt [12]

When adverse circumstances prevail or major incidents occur, the majority of people who are involved in a major incident are upset, acutely stressed or distressed at least temporarily soon after they experience major incidents. Distress is a term that describes the experiences and feelings of people after events that challenge their tolerance and adaptation. It is initiated and maintained by primary and secondary stressors and subsides if the stressors disappear or as people adapt to the changed circumstances. At least temporarily, they have insufficient emotional, cognitive, social or physical resources to cope. Thus, distress describes the emotional, cognitive, social and physical experiences of people after events that challenge their tolerance and adaptation. Distress goes beyond mild anxiety, but it is an anticipated human response and not a disorder when it and any associated psychosocial dysfunction emerges and persists in proportion to external stressful situations. Differentiation between ordinary levels of worry and anxiety, distress and disorder is personal, subjective and, therefore, evaluative because it is open to cultural beliefs and differing personal perceptions and values.

But, a minority of people may suffer distress of such severity, chronicity or dysfunctional impacts on their lives that it is appropriate to say that they have developed a mental disorder. Table 49.1 summarises the short-term psychosocial responses of people to traumatising events and Table 49.2 summarises 10 features of acute stress.

These lists of experiences are similar and overlap with the symptoms of anxiety disorders including PTSD. As a result, distinguishing acute stress, more sustained distress and pathological responses turns on the severity and persistence of people's experiences and the impact on their lives.

Grief

Many people who are involved in major incidents are likely to experience loss. Grief is a multifaceted response to loss.

While loss of life is usually the most upsetting of all kinds of loss, and particularly if it involves a significant person and their death was witnessed, there are other kinds of loss including loss of loved ones, of property, of dignity, trust and safety, and of livelihood. Recent research suggests that each person grieves in his or her

Table 49.1 Anticipated reactions to traumatic events

Emotional reactions	Cognitive reactions
Shock and numbness	Impaired memory
Fear and anxiety	Impaired concentration
Helplessness and/or hopelessness	Reduced confidence or self-esteem
Fear of recurrence	Confusion or disorientation
Guilt	Intrusive thoughts
Anger	Dissociation or denial
Anhedonia	Hypervigilance
Social reactions	Physical reactions
Regression	Insomnia
Withdrawal	Hyperarousal
Irritability	Headaches
Interpersonal conflict	Somatic complaints
Avoidance	Reduced appetite
	Reduced energy

Content from Alexander [31]. Reproduced with permission of Advances in Psychiatric Treatment (Royal College of Psychiatrists Publications)

Table 49.2 Indicators of acute stress (from TRiM)

The person:
1. Has upsetting thoughts or memories about the event that come into the mind against the person’s will
2. Has upsetting dreams about the event
3. Acts or feels as if the event is happening again
4. Feels upset about reminders of the event
5. Has bodily reactions (such as fast heartbeat, stomach churning, sweatiness, dizziness) when reminded of the event
6. Has difficulty falling or staying asleep
7. Is irritable or has outbursts of anger
8. Has difficulty concentrating
9. Has heightened awareness of potential dangers to self or others and is jumpy or is startled at something unexpected
10. Reports or shows symptoms of dissociation (e.g. someone feeling as if they or the world is not real, things seeming in slow motion, memory loss of important aspects of the event) during the interview

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own way and that it is unusual to see people progress through fixed stages of grief in orderly ways [33]. Bonnano suggests that there are four trajectories:

- Resilience: “The ability of adults in otherwise normal circumstances who are exposed to an isolated and potentially highly disruptive event, such as the death of a close relation or a violent or life-threatening situation, to maintain relatively stable, healthy levels of psychological and physical functioning” as well as “the capacity for generative experiences and positive emotions.”

- Recovery: When “... *normal functioning temporarily gives way to threshold or sub-threshold psychopathology, e.g., symptoms of depression or post traumatic stress disorder, usually for a period of at least several months, and then gradually returns to pre-event levels.*”
- Chronic dysfunction: Prolonged suffering and inability to function, usually lasting several years or longer.
- Delayed grief or trauma: When adaptation seems normal, but then distress and symptoms increase months or years later.

Bonnano’s research shows that resilience plays a large part in the processes that enable most people to deal with grief. Similar trajectories have been identified in relation to people’s adaptation to serious trauma [34].

The implications of research evidence about the psychosocial needs of people who are affected by major incidents and the risks to their mental health is that responders should take their personal and collective psychosocial as the anticipated responses, but certainly not as inevitable [3]. Therefore, aid agencies, NGOs and military organisations should design and implement a model of training and care for staff, which should enable them to provide an evidence-informed and values-based approach to mitigate the risks faced by the people who are affected.

Mental Disorders

A proportion of people who are affected by major incidents may suffer more severe or prolonged distress and/or dysfunction. They require more specialised assessment and/or treatment because some of them may be developing mental disorders.

The term disorder is used when people’s experiences, emotions and behaviours are more intense, frequent, sustained or incapacitating than might be expected of the general population or when these features deviate from an anticipated norm and culturally sanctioned responses to external circumstances and situations [35]. The disorders that are most common are:

- Anxiety disorders (e.g. post-traumatic stress disorder [PTSD])
- Mood disorders and particularly depression
- Substance misuse
- Prolonged, traumatic and secondary grief
- Suicide
- Longer-term effects on temperament and personality

These disorders may be provoked by people’s traumatic experiences, but they are also common in community samples of the population. Thus, some people who are injured may have histories of mental disorder, and their pre-existing problems may be exacerbated by their traumatic experiences.

In some instances, people’s psychosocial experiences and/or symptoms and their mental health needs may be directly related to the nature of their physical injuries.

Also, they may develop symptoms of more than one mental disorder over time. Comorbidity is especially common in people who develop PTSD. Clinicians should be aware of the risks of comorbidity, because it may complicate assessment and treatment of their patients.

Neuropsychiatric Disorders and Brain Injury

In addition to common psychiatric disorders, physically injured patients may present with or develop neurological symptoms and signs, and/or changes in their levels of consciousness. Common conditions include delirium, and traumatic brain injury. The most common form of brain injury is mild traumatic brain injury (mTBI). It may be defined as traumatically induced physiological impairment of a person's brain function when that person had an initial score of 13–15 on the Glasgow Coma Scale 30 minutes after the event, loss of consciousness for no more than 30 minutes, post-traumatic amnesia of no greater than 24 hours and a normal CT scan, when available.

Patients with each of these conditions may be challenging to assess and manage. Furthermore, the recoveries and prognoses of patients who have mTBI may relate to how well they are enabled to manage the psychosocial factors in their lives. Mental health practitioners, neuropsychologists and neuropsychiatrists may make important contributions to assessments of and care planning for people who have mTBI. These are the reasons why a proportion of people who have suffered traumatic injuries in major incidents may require skilled psychological, neuropsychological, psychiatric and neurological assessments whether or not they have comorbid mental disorders.

Risk Factors

Despite the great resilience of very many people, there are risks to their mental health and they may show increased prevalences of mental disorders after traumatic events. Indeed, the risks remain for a substantial time after the events though there is much that aid and other agencies can do to reduce the risks.

People involved in major incidents who have physical injuries are at greater risk of developing mental disorders. Other populations that are at increased risk of psychopathological morbidity following disasters include women, children and adolescents, older people, people who have pre-existing health problems, people who are directly involved, people who have witnessed the deaths of other people and less affluent people [3].

Table 49.3 provides a broad list of the short-, medium-, and long-term factors that increase the risk of people developing psychiatric morbidity after major incidents [3, 36, 37]. Table 49.4 summarises situations shortly after disasters, which increase the risk of acute stress developing into mental disorder [32].

Table 49.3 Risk factors for developing a mental disorder [3]

<p><i>Pre-traumatic event factors</i></p> <p>Personal capabilities and attributes</p> <ul style="list-style-type: none"> • Poor attachment capacity • Few current attachments • Female gender • Extremes of age and development (children and older people) <p>Past personal experiences</p> <ul style="list-style-type: none"> • Sexual abuse in childhood • Substance misuse • History of a previous psychiatric disorder • Disadvantage (social, educational and/or economic) <p>Environment</p> <ul style="list-style-type: none"> • Concurrent life stressors • Lower social capital <p><i>Peri-traumatic event factors</i></p> <p>Nature of incident/disaster</p> <ul style="list-style-type: none"> • Human-made disasters • Sudden and unexpected events • Exposure to grotesque scenes and sensory experiences • Proximity (there is, generally, a dose–response relationship) • Nature of involvement (closer involvement increases the risk) • Extended exposure (e.g. entrapment) <p>Impact of the event</p> <ul style="list-style-type: none"> • Higher perceived level of threat to life (self or others) • Physical injury • Extensive personal loss <p><i>Post-traumatic event factors</i></p> <p>Response to the event</p> <ul style="list-style-type: none"> • Severe acute stress responses • Presence of survivor or performance guilt <p>Burden consequent on the event</p> <ul style="list-style-type: none"> • Lack of social and/or family supports • Perception of lack of social and/or family support • Relocation or displacement • Financial, social or relationship problems • Adverse reactions from others (e.g. blame or rejection of suffering) 	<hr/>
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The risk of psychiatric morbidity in the medium to long terms is greatest for people who:

- Perceive that they have experienced high threat to life
- Face a circumstance of low controllability and predictability
- Have experienced high levels of loss and physical injury
- Live with the possibility that the disaster might recur
- Have been exposed to dead bodies and grotesque circumstances
- Have endured higher degrees of community destruction
- Either have not received or perceive that they have failed to receive adequate social support

Table 49.4 Risk factors for people developing more severe responses to traumatic events (from TRiM)

The person:

1. Thinks that they had little or no control over their behaviour/reactions during the event
 2. Thought they faced serious injury or death during the event
 3. Blames or is angry towards others about aspect(s) of the event
 4. Expresses shame or guilt about their behaviour relating to the event
 5. Experienced acute stress following the event
 6. Experienced substantial life stressors (e.g. problems with work, home or health) since the event
 7. Is having problems with day-to-day activities
 8. Has had difficulties dealing with previous traumatic events
 9. Reports problems gaining access to social support
 10. Has been drinking alcohol excessively or using prescription drugs to cope with their distress
-

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Distinguishing Distress from Disorder

It is important to be able to differentiate the distress people experience following major incidents from the effects on them of longer-standing adversity and from the symptoms and signs of mental disorder. This is not necessarily easy in the medium term because the experiences of people who are distressed or who have short-term acute stress are similar to the symptoms people have when they develop mental disorders. Being upset during and after major incidents does not necessarily indicate that a person has a mental health problem. It is important that everyone who is distressed and anxious is not regarded as unwell or failing to cope or adapt and particularly so if their experiences:

- Are proportionate to the stress
- Diminish with social support over a short time
- Are not associated with work-related, social or personal dysfunction [35].

However, everyone involved is likely to benefit from social support, which reduces the risks of people developing a disorder and also reduces its duration and severity [6, 18, 19].

People whose experiences are more likely to be symptoms of emerging mental disorder require timely and effective assessment for referral for mental healthcare. Furthermore, distress may lead to the development of dysfunction, which may be temporary, or more sustained and can, in some circumstances, lead to, or may be a component of mental disorders. Dysfunction means any persisting impairment or abnormality, however caused, of function in the social, emotional, physical and/or cognitive domains.

Thus, aid agencies and their staff should be familiar with the importance of distinguishing people who have short-term and non-disordered distress from people who have disorder. They should understand the rudiments of what is involved in making the distinction and their medical and/or healthcare advisers should have a

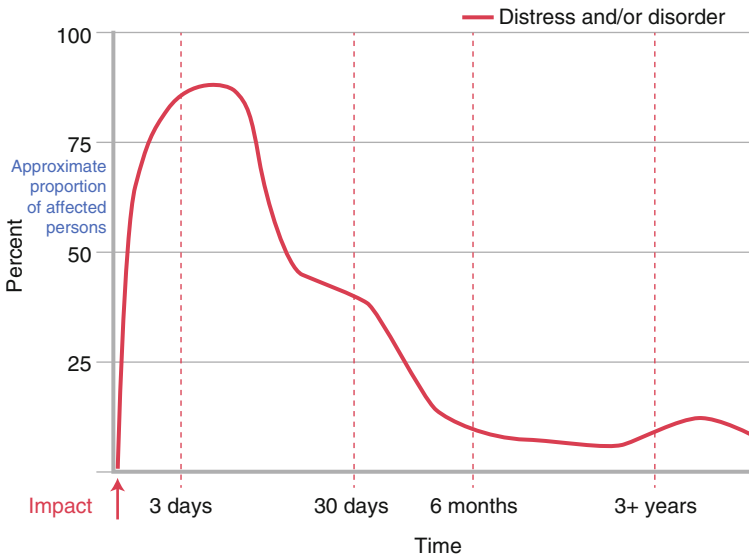


Fig. 49.2 Responses of a population of people to single incident disaster of sudden onset

more substantial knowledge and capability in this domain. Usually, that distinction requires assessments of the pathways or trajectories of people's responses over time and the severity and duration of any associated dysfunction.

Trajectories of People's Responses to Major Incidents

As we have indicated, it is important to understand the trajectories or pathways of people's distressed responses to major incidents in order to take account of the interactive, dynamic and systemic description of psychosocial resilience and to be able to determine when and if intervention that goes beyond informal psychosocial support is required. Here, we offer three ways of looking at these trajectories.

Figure 49.2 summarises how a population of people might be anticipated to respond to single traumatic events. The steep curve depicts the high percentage of resilient people who are affected by events and who develop short-term distress and recover with psychosocial care. The bulge in the downward part of that curve illustrates that some people take longer to recover than do others because they suffer more sustained, non-disordered psychosocial distress; have acute stress reactions; are grieving; take longer to recover because they are affected by persisting secondary stressors, which maintain their distress; or are in the process of developing a mental disorder.

Bonnano and Norris have summarised common patterns of people's responses over time to major incidents, conflict and disasters as a series of trajectories [33, 34]. They fit with our experience. Our adaption of these trajectories is:

- Resilience: people who show resilience may suffer mild, moderate or more severe distress followed by a rapid reduction in its severity

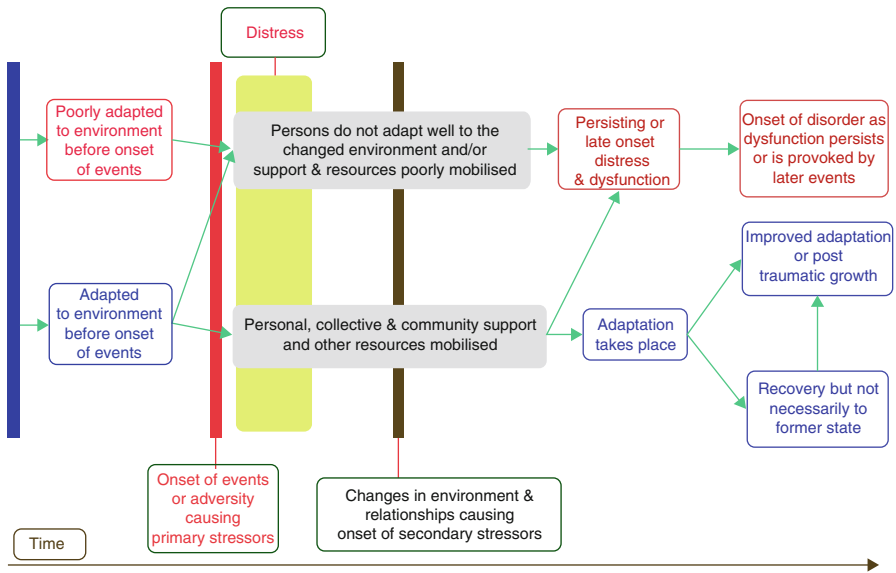


Fig. 49.3 The roles of adaption and past experiences in shaping people’s responses to major incidents (Copyright R. Williams et al. [19]. All rights reserved and reproduced with permission)

- Recovery: often, people who follow a trajectory of recovery experience moderate to severe distress followed by a gradual reduction in its severity
- Relapsing problems: people who follow this course may experience moderate to severe distress in the aftermath of events followed by remission and relapse subsequently and the pattern may not be stable
- Delayed problems: people who follow this trajectory may or may not experience distress in the immediate month after events but develop dysfunction subsequently
- Chronic problems: people who follow this pattern may have medium- and long-term experiences of moderate to severe stress that is accompanied by dysfunction or disorder that persists over substantial periods of time

Another important aspect of people’s responses to traumatic events relates to how well they adapt to their changed circumstances. Figure 49.3 illustrates how important to people’s recovery are the ways in which they respond to stress and the levels of psychosocial support they receive.

Part C: The Implications of Major Incidents for Children and Young People

The Context

Universally, adults wish to protect children from the effects of major incidents. Nonetheless, there are also many awful things that societies do to put children more

at risk and lapses in their care of children are reported recurrently. Also, a tiny proportion of young people may become perpetrators of violence, abuse and atrocities.

While the other parts of this chapter apply equally to children, it is important to remember that they are developing people who depend on the care of adults and are influenced strongly by how adults cope with events. This affects how they experience major incidents, adversity and abuse and show upset, distress and disorder. Furthermore, their experiences combine with their genetics and epigenetic factors to be vitally formative in shaping the adults that they become.

The authors draw on their own work and other people's research since 11 September 2001 (9/11) and on research on adolescents from Bosnia-Herzegovina and Croatia to build on the forgoing material to enable readers to better understand children's experiences [8, 36–38]. It emphasises the importance of endeavouring to normalise children's environments as soon as possible by, for example, reinforcing family relationships, reopening schools and using educational performance as a screening criterion in assessing children's recovery and schools as important places for intervention [39, 40].

Historically, there has been controversy about whether children and young people are more, less or similarly vulnerable to the psychosocial consequences of major incidents and adverse or abusive circumstances when compared with adults [41]. However, it is reasonable to start by assuming that children are potentially as resilient as are adults to the harmful effects of violence [42–44], but that their dependence on how adults respond and support them increases their vulnerability.

Children, Young People and Resilience

The resilience of minors has been shown to be remarkable [6, 29]. Southwick, Litz, Charney and Friedman say, "... *resilience develops as a set of abilities and processes including positive attachment, the capacity to attract social support, self-motivating rewards [that are] critical for mastery and self-efficacy [,] effective modulation of the stress response, and successful monitoring and regulation of emotions*" [45, p.xiv].

Our notion of resilience as applied to major incidents and adversity is developmental, personal, relational and interactive. People's longer-term capacities for being robust in the face of challenge may be adversely affected if they are exposed to overwhelming events during childhood. The effects of continuing adversity on development may lead to more profound longer-term risks that extend into adulthood. These negative developmental effects appear more likely if children experience repeated or repetitive process trauma or live in unpredictable climates of fear. Thereby, these experiences may affect how adults respond to challenge and adversity later.

While, exposure to major incidents may imperil young people's later resilience, it may also, perhaps surprisingly, enhance some children's development and resilience despite strong evidence that exposure to disasters and adversities in childhood

may detract from resilience in the longer term [46]. One large study showed that 75 % of Israeli adolescents exposed to one or more terror incidences reported feelings of growth, while 41 % reported mild to severe post-traumatic symptoms [47]. Thus, the legacy of traumatic experiences in childhood may be very wide ranging from strengthening their development through to long-term impairment. So much turns on how adults respond to the children around them [41, 43, 47].

The Impacts of Major Incidents on Children and Young People

Children are remarkably resilient and most of the impacts on them can be understood as manifestations of short- to medium-term distress. Event trauma in childhood may produce peri- and post-traumatic experiences that are similar to those of adults as well as specific fears, anxiety and depressive symptoms, repetitive and regressive behaviours, loss and grief and developmental effects as well as changed attitudes to self and others [48].

Process trauma may produce post-traumatic stress, but also a spectrum of developmental, emotional and behavioural problems that are associated with the impacts of children's experiences and chronic stress on their developing personalities. Repeated exposure of children and young people to continuing or repeated crises may result in negative effects on their reactions and also have longer-term effects on their ability to cope with stress when adults. However, other impacts on a smaller proportion include their developing mental disorders in the short and medium terms, and, within this group of children and young people, anxiety, depressive and behaviour disorders are not uncommon. Others may develop longer-term disorders including PTSD.

Childhood adversity is associated with poor adult mental health and may have a graded association with a range of negative health outcomes. Vulnerability pre-enlistment (based on recall of negative family circumstances, relationships and experiences when a child) is an important risk factor for ill health in military men, and these factors are important in understanding post-combat psychiatric disorder [49]. How children are helped to prepare for and cope with major incidents has an important influence on whether their paths are towards growth or greater risk.

In summary, some children and adolescents can and do develop mental disorders as a consequence of their exposure to and involvement in major incidents of all kinds and many more become temporarily distressed. There is some evidence too that catastrophes which affect their homes and sources of security and permanence, such as flooding, have particularly powerful and longer-lasting impacts on children.

The spectrum of circumstances that harm children and their responses are very wide, but there is a pattern. There is an extensive literature reviewing the direct and indirect psychosocial impacts on children and young people of violence, serious ill health, death, divorce and accidents. Bullying is one of the most common of childhood experiences of threat.

Children are likely to be multiply affected by major incidents because they may be direct victims of major incidents, indirect victims (as a consequence of the effects that crisis has on adults and through compromising the abilities of carers and parents to look after, protect and nurture their children) and perpetrators of violence [20].

Factors Affecting Children's Reactions to Major Incidents

Children's reactions to crises and other traumatic events vary according to their:

- Age and developmental level
- Proximity to the events
- Exposure to events that impact on family members and whether those family members have been directly affected or not
- Personal, family and material losses
- Families' and communities' responses

As regards age and developmental level, *“Pre-school children are said to be less aware of the nature and meaning of threat, rely on “parental-referencing”, and may become disorganised in their emotions and behaviour, and lose some of their developmental capacities such as bowel and bladder control. School-aged children have greater ... appreciation of the dangers, may be disrupted in their sleep, appetite and academic performance, and lapse into a variety of anxiety, depressive and somatic disorders. Adolescents may show more adult-like responses, with an open fear of death, or a hedonistic resort to impulse, delinquent, sexual, substance misusing, acting-out behaviours that add to the danger ... They may lose faith in all adult security and sink, ultimately, into an apathetic or angry rejection of authority”* [50].

Children's psychological responses to overwhelming stress are determined by biological factors, psychosocial factors, levels of emotional and cognitive development, intensity and duration of exposure to stressors, degree of injury or life-threat, losses of family members and disruption of continuity of communities, schools and/or families [44].

Research shows links between children's proximity to violent events and their degree of psychosocial distress. Barbarin et al. propose a principle of social propinquity in which expectations of directly experiencing violence increase when it occurs to someone with whom a child has a relationship or identifies [51]. Thus, violence affecting families appears to have greater effects than violence in communities.

Staged or Phased Responses

Just as for adults, children's and young people's reactions vary with the time that has elapsed after major incidents.

Immediate and Short-Term Distress

Children and young people are subject to the full range of potential immediate reactions. Commonly, they have temporary short-term reactions as a component of their resilient response, just as do adults. They may regress behaviourally and/or emotionally immediately after crises, but, usually, recover fairly promptly. Short-term behaviours and feelings (Tables 49.1 and 49.2) are commonplace in children and constitute anticipated reactions. Usually, they ameliorate reasonably quickly with passage of time and provision of adequate family, community and school support. When reactions of this nature are temporary and diminish gradually after events subside or when the people affected are provided with adequate support, they may be best considered a form of distress.

We advise that children should not be considered to have mental disorders unless their adverse responses persist for a substantial period after the impacts of major incidents have been relieved and/or if they are precipitated into a persisting disorder, which meets the requirements for caseness in a classification system (e.g. ICD10).

Short- to Medium-Term Responses

While most resilient children gradually return to previous or appropriately changed patterns of adjustment, others may also develop more enduring symptoms of mental disorder. Conventional Western diagnoses are similar to those for adults, but, importantly, they include in addition:

- Conduct problems
- Adjustment disorders
- Somatoform disorders
- Affect regulation problems

Williams has summarised the experiences of distress and the symptoms of acute stress responses in children [36]. Tables 49.5, 49.6 and 49.7 are reproduced from his publications and draw on the WHO/SEARO Physicians Manual and other sources [8, 42, 52–54].

Table 49.5 Pre-school children

Irritable, crying excessively
Clinging
Intense fear and insecurity
Excessively dependent behaviour
Fear of water – including water used for domestic purposes
Excessive quietness and withdrawn behaviour
Thumb sucking, bedwetting, excessive temper tantrums
Play activities spontaneously involving aspects of the disaster
Frightening dreams and waking frequently

Reproduced with permission from Williams and Current Opinion in Psychiatry (Wolters Kluwer Health) [36]

Table 49.6 School-age children

Feeling nervous and unable to concentrate
Attention and learning problems
Loss of interest in studies, school refusal, reduced academic performance
Withdrawal
Guilt
Feelings of failure
Anger, rage and aggression
Fearfulness, anxiety or suspiciousness
Low mood, decreased activity and interaction level
Irritability, arousal, insomnia and loss of appetite
Recurrent fear
Recurrent memories or fantasies of events leading to avoidance of reminders
Reactivation or intensification of specific fears
Fantasies of playing “rescuer”
Intensely preoccupied with details of events
Unexplained abdominal pain, headache, vomiting, rapid breathing or fainting
Dependent and regressed behaviour

Reproduced with permission from Williams and Current Opinion in Psychiatry (Wolters Kluwer Health) [36]

Table 49.7 Adolescents

Similar to children, but, in addition, young people may claim that <i>there is nothing wrong</i>
Young people may show:
• Diffuse excitation
• Oppositional behaviour
• Changes in preferred relationships
• Risk-taking

Reproduced with permission from Williams and Current Opinion in Psychiatry (Wolters Kluwer Health) [36]

Medium-, Long-Term and Chronic Responses

Responses that pass beyond a number of months after events include the mental disorders, which adults may develop, but, in addition:

- Adjustment disorders
- Conduct disorder
- Somatoform disorders
- Attention deficit/hyperactivity disorder

Several authors overview the psychiatric effects of disasters on children and their management [55–57]. The prevalences reported for PTSD in children are variable and population-based surveys may overestimate it.

Table 49.8 Possible effects on children's psychological development

Affect control
Identity
Perception of the world
Perception of self, self-esteem and self-efficacy
Trust
Safety
Interpersonal skills
Interpersonal relations
Moral development

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Table 49.9 Possible effects on children's emotional development

Reflecting on own feelings
Painful memories
Poor impulse control
Preoccupation with/compulsive repetition of aggression
Risk-taking

Reproduced with permission from Williams and Current Opinion in Psychiatry (Wolters Kluwer Health) [36]

Comorbidity is as common in minors as it is in adults who develop disorders. They are also likely to have problems in non-health arenas including, particularly, their family and social relationships, schooling, substance use and attitudes towards risk-taking. Comorbidity is particularly common when PTSD is the main diagnosis and that diagnosis may not be sufficient to explain children's responses to major incidents for reason of co-occurring problems in other parts of their lives [58].

Effects on Children's Psychological and Emotional Development

Major incidents may have long-term effects on children's psychosocial development. Tables 49.8 and 49.9 based on research, summarise these potential impacts [42, 44, 54, 59].

Pathways of Risk and Resilience

This section illustrates the pathways for risk and resilience for certain types of event and process trauma. Although the paradigm presented in this book is that of taking resilience as the default condition, the risks of children and young people developing a disorder emphasise the importance of:

- Providing children and young people with adequate family, peer and school social support

- Endeavouring to normalise as soon as is possible the affective as well as the physical environments in which minors live
- Being aware of children's emotional, social, cognitive and physical needs and of the importance of responding to those needs effectively
- Responding purposefully and effectively when children and young people develop mental disorders

Event Trauma: Terrorism and Children and Young People

Lubit and Eth studied the responses of children to the events of September 11, 2001 finding that affected children "... *were likely to have been overwhelmed by the blitz of media coverage and feelings of increased vulnerability*" [42]. The severity of the crisis, degree of exposure, the developmental stage of each child, lack of family support, social disorganisation and the degree of life disruption are important predictors of children developing chronic post-traumatic symptoms.

Process Trauma: Child Soldiers

The review of the literature to 2003 of the psychosocial impacts on children exposed to war by Barenbaum et al. is excellent place to start to study the psychosocial and mental health impacts on children and young people of them becoming soldiers [8].

It is a war crime to recruit children under 15 to armed forces or employ them in combat, and 18 is the minimum age at which people may be directly involved in warfare. Nonetheless, using children as soldiers has a long history and is still widespread. They may be employed in a number of logistic roles as well as in combat. Barenbaum et al. summarise motivation for survival and the economic, cultural, social, ideological and political pressures on children who become soldiers. They provide an account of how children are indoctrinated and hardened. Wessells provides an authoritative source of information about young combatants, their entry into armed groups, their invisible wounds, their transition to civilian life and community reconciliation [60].

There are particular threats to children's development that stem from them being perpetrators of violence and from their exposure to violence and brutality while they are learning control of their own impulses and aggression [44]. On putting down arms, children's moral outcomes may be related to the length of time that they spent in an armed group and whether they see themselves as victims and express remorse or continue to use violence to exert control [8]. The factors that affect children's responses include:

- The intensity, type and duration of the major incident
- Their degree of participation in forced military activities

- Whether or not they were involved in victimisation by mutilation
- Whether or not they witnessing killing of their parents, family members and other villagers
- The increased risk of displacement faced by child combatants
- The difficulties of returning child soldiers to their communities given the events in which they have been involved
- The children's developmental phases at the time
- Children's fantasy lives and their interpretation of events [20, 43]

Process Trauma: Children and Young People Who Are Refugees or Internally Displaced Persons

Findings from recent research literature relating to children who are refugees, internally displaced persons (IDPs) or who have been child soldiers are:

- More than 75 % of children are distressed
- The main sources of distress for children who are refugees are separation from families, greater risk of violence and daily stressors of living in new adverse environments
- Children who are refugees or internally displaced persons cope better with the distress related to their flight if their parents accompany them
- Key protective factors for refugee children are stable settlements and social support from parents, families, friends and schools
- Many pre-school children show substantial developmental delay, attachment problems or behaviour problems
- Between 5 % and 30 % of children develop mental disorders
- Children need holistic, community-level interventions [7]

Process Trauma: The Effects of Parents' Deployment on Children and Young People in Military Families

Concern has grown in recent years about the impacts on children and families of deploying one or both of their parents to a conflict zone. After controlling for caregivers' stress and symptoms, children aged three or more who have a deployed parent may exhibit more behaviour problems as compared with peers who do not have a deployed parent [61]. Another study has shown a dose-response pattern linking parental deployment and higher rates of diagnoses of mental disorders for their children [62]. There are other risks to children's health including child neglect and other forms of maltreatment. The risk of parental deployment for the children of military families is a topic that requires further evaluation and research.

Part D: A Model of Care

Psychosocial and Mental Healthcare

This part of the chapter covers the principles for intervening and a strategic stepped model for delivering psychosocial care and mental healthcare for people who are affected by major incidents. They are as applicable to people who are physically injured as they are to people who are affected, but not physically injured. This section also applies to children, young people and older people.

The Principles and Components of Psychosocial Care and Mental Healthcare

The Principles of Psychosocial Care

The principles for psychosocial care are based on the evidence we have presented thus far but also on the recommendations of Shalev, “*Early interventions in communities suffering mass trauma should consist of general support and bolstering of the recovery environment rather than psychological treatment*” [63]. Leaders of aid and military organisations should create plans to support survivors of major incidents. They should be aware that:

- A majority of people is likely to suffer transient distress, a smaller proportion may develop more sustained but non-pathological distress or acute stress.
- Socio-economic disadvantage and interpersonal problems that may follow crises may predict long-term problems and enter affected people into cycles of disadvantage and poor health.
- A substantial minority of people involved in crises requires timely access to mental health services.

There are two approaches to supporting people to sustain their resilience, which are drawn from evidence in the domains on personal and collective psychology. Plans for psychosocial and mental healthcare should draw on both.

Lessons from Personal Psychology

Practice should focus on the principles formulated by Hobfoll et al. relating to personal psychological tasks, which affected people face [23]. Our version of these principles is that actions taken should include:

- Helping people to normalise their experiences while being aware that some people do develop a disorder
- Enabling people to care for themselves and others by providing social support

- Providing reflective listening and honest, accurate and timely information
- Helping people to restore their agency and perceptions of themselves as effective persons
- Enabling people to seek further help

Lessons from Collective Psychology

Recent research is clear on how important are people's identities as members of families, groups and communities. Thus, social support to help people to restore their relationships aids people's recovery from major incidents [6, 7, 24, 64]. Everyone involved is likely to benefit from supporting arrangements in the immediate aftermath of major incidents, whatever their cause, source or scale.

Plans to provide psychosocial support should build on principles derived from studies of collective resilience, and the evidence provided by the concepts of social identity and psychological safety. They indicate that there are important roles for staff of aid agencies and military organisations in organisational planning and actions to sustain people who are affected [1, 3, 15, 17, 27, 53, 63–66]. Aid and military agencies should:

- Provide survivors with information and activities that normalise their reactions, protect social and community resources and signpost access to additional services because these actions are fundamental to effective psychosocial responses
- Build and maintain teams that enable people to trust each other, the agencies and encourage them to offer each other mutual support
- Attend to culture in families, groups and communities: they should be aware of and endeavour to mitigate the risks of affected people developing acute stress by taking active steps to develop the collective psychosocial resilience of affected people and, thereby, assist them to maintain their resilience
- Base early psychosocial interventions for people affected by major incidents on offering general support and bolstering the environment in which they recover rather than psychological treatment

The Interventions Required

This section of the chapter describes the interventions that may be required by people involved in or affected by major incidents.

Assessment

All staff of aid and military organisations which are involved in delivering care following a major incident should be aware of the common experiences of stressed and distressed people.

They should be aware of the significance of the trajectories of their adaptation and recovery and be able to understand the importance of distinguishing distress from disorder. On the basis of their experiences and/or symptoms, it is difficult to distinguish the reactions of people who are resilient, but experiencing transient distress after events, from others who have acute stress, or from the reactions of the people who are developing longer-term problems, including mental disorders. Recognising the trajectory of people's responses and the severity of their dysfunction is the best basis for distinguishing people who are distressed from others who are developing a disorder.

As a result, we support adoption of the principle of an initial four week period of "watchful waiting" prior to specialist intervention after disasters that affect adults and children [67]. This wait applies to only to psychiatric interventions and not to psychosocial care, which is intended to promote recovery and reintegration and restoration of communities. While that is a challenging task, staff should monitor the psychosocial needs of people involved and make timely referrals for more specialised assessments, if, where and when that is available.

Psychological First Aid (PFA)

PFA is intended to reduce people's initial distress in the immediate aftermath of severe events and foster their adaptive functioning. It is not a single intervention or treatment, but an evidence-informed modular approach that is designed to respond to people's psychosocial needs after emergencies [65]. A summary of its main components can be found in the NATO guidance as Figure 19 on page 91 [3]. There is much in common with the approach recommended by Sphere and the contents of psychological first aid (PFA) [53]. The World Health Organisation (WHO) has recently published a guide to PFA [66]. Forbes et al. provide a summary of the core components of PFA [68]. Our summary of its components includes:

- Initiating contact and engaging with affected people in a nonintrusive, compassionate and helpful manner
- Providing immediate and continuing safety
- Providing physical and emotional comfort
- Assisting survivors who are overwhelmed or distraught to stabilise
- Gathering information to determine the immediate needs and concerns of people who are affected in order to tailor interventions
- Providing practical assistance to help survivors to address their immediate needs and concerns
- Connecting survivors with people who can provide social support and with services in the community
- Reconnecting survivors with their families and communities
- Providing information about events and services and about how best to cope
- Linking survivors with more specialised services, if they require them

Staff of aid agencies, NGOs and military organisations may find helpful in their work during the immediate and continuing phases of assessment, care and

Table 49.10 The CALMER approach [69]

<i>C</i>	<i>Consider</i>	The situation; the needs of the person; your needs
<i>A</i>	<i>Acknowledge</i>	The situation; who you are; your intent; what has happened
<i>L</i>	<i>Listen</i>	Deploy listening skills, learn from what people say
<i>M</i>	<i>Manage</i>	Safety; the situation; needs; monitor changes
<i>E</i>	<i>Enable</i>	Explanation and empathy, facilitate decision-making, facilitate contact with others
<i>R</i>	<i>Resources</i>	Know where to get support

intervention the principles and practices of the CALMER model of PFA, which was developed and tested by the British Red Cross Staff (Table 49.10) [69].

Access to Specialised Psychological and Mental Health Services and Neuropsychological and Neuropsychiatric Care

Aid and military agencies should ensure that liaison arrangements are in place with specialised mental health services so that prompt access can be provided to specialised assessment and care facilities that are able to offer assessment and access to a variety of interventions that include trauma-focused cognitive behaviour therapy.

Screening and monitoring by specialist neuropsychologists and neuropsychiatrists of selected patients who have altered states of consciousness and post-traumatic amnesia (PTA) should be available to patients who have suffered major traumatic injuries and isolated head injuries.

People who have each of these conditions may be challenging to assess and manage. Furthermore, the recoveries and prognoses of patients who have mTBI may relate to how well they are enabled to manage the psychosocial factors in their lives. Mental health practitioners, neuropsychologists and neuropsychiatrists may make important contributions to assessments of and care planning for patients.

Intervening with Children and Young People

The general principles for psychosocial and mental healthcare apply to children and young people as well as adults. Tables 49.11 and 49.12 summarise aspects of psychosocial care that are specific to children and young people.

A Stepped Model of Psychosocial and Mental Healthcare

Guidance published by NATO recommends a stepped model of care, which begins at the scenes of major incidents and continues thereafter [3, 17, 19]. The responses should be titrated against recurrent assessments of the needs of the people affected and their progress over time.

Table 49.11 Intervening with children

<p>Ensure infants/children remain close to their mothers/families</p> <p>Ensure adequate nutrition and meet all physical needs</p> <p>Encourage and help families to re-establish children's previous routines with eating, playing, studying, sleeping and interacting with others</p> <p>Engage children in activities: drawing, storytelling, drama, games (do not encourage too strongly children to express disaster-related feelings; allow children control over the decision whether or not to think about the trauma and to express feelings about it)</p> <p>Encourage the families (in groups) to facilitate the play activities and especially the group games of the children</p> <p>Advise families/community leaders to recommence teaching school-age children until they are able to return to their usual schools</p> <p>Advise parents and families not to discourage children when they verbalise their feelings</p>
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Table 49.12 Intervening with adolescents

<p>Ensure privacy and confidentiality while interviewing adolescents</p> <p>Be cautious about gender sensitivity issues (including interaction with and physical touching)</p> <p>Help adolescents to decide their future courses of action</p> <p>Encourage secondary and higher-education students to continue formal education</p> <p>Involve young people in forming community groups</p> <p>Encourage older adolescents to participate in humanitarian activities</p>
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The World Health Organisation has produced a similar stepped model of psychosocial care in response to the tsunami in Southeast Asia [10, 16]. It is based on (1) family and community care, (2) primary mental healthcare provided by trained community workers, (3) secondary mental healthcare delivered by psychologists and other staff and (4) very specialised interventions delivered by psychiatrists. The Sphere Project has codified a framework for corporate and clinical governance [53]. This emphasises core principles of good practice. It advises that special measures are taken with respect to children and adolescents.

The NATO model of care for survivors, which is based on the principles outlined in this chapter and outlines a continuum of care for people who are affected by major incidents, focuses on ensuring more successful outcomes, reducing the risks of affected people developing mental disorders and mitigating the effects on people who do. Care should be proportionate to people's needs. There are three main tasks:

- Early intervention: sustaining the psychosocial resilience of people who are involved and promoting their recovery from distress by basing care in the aftermath on the principles of psychological first aid
- Continuing psychosocial care: recognising and responding to the wider psychosocial needs of survivors including affected persons and their families and

Table 49.13 A strategic stepped model of psychosocial and mental healthcare (developed from the NATO Model of Care [3])

Intent	Nature of activity	Step or level	Actions	Time scale
Develop and sustain collective and personal psychosocial resilience	Preparedness	1	Strategic planning	Continuing
		2	Develop community resilience	
	Public welfare, social and healthcare paradigms	3	Humanitarian aid and psychological first aid	Immediate and continuing
		4	Develop families and communities	
Deliver responses to personal psychosocial and healthcare needs	Personal psychosocial and healthcare paradigms	5	Augmented primary health and social care	Medium term
		6	Specialist mental healthcare	Medium and long term

providing more substantial assessments and interventions for selected people who suffer more severe and/or persistent distress

- Mental health and neuropsychological care: founding a comprehensive approach to effective mental healthcare on a platform of psychosocial care in which that care is offered alongside effective specialist treatments for mental disorders

There is provisional evidence that founding a comprehensive approach to effective mental healthcare on a platform of psychosocial care in which that care is offered alongside effective treatments for mental disorders is effective in preventing and treating PTSD and reducing its long-term effects. Also, there is some evidence that people who receive good psychosocial care are more likely to recover if they do develop a mental disorder. This evidence reinforces our opinion that mental healthcare, if and when required, should build on a platform of good quality psychosocial care. This means that all survivors should be offered psychosocial care and selected people may require mental healthcare.

Table 49.13 summarises an updated version of this stepped model of care.

Forbes et al. offer their recommendations about a stepped model of care [68]. It provides more details of the mental healthcare interventions that are required. It is compatible and consistent with the NATO model. Table 49.14 draws the two models into a coherent approach.

The Implications of the Stepped Models of Care for Aid Agencies and Clinical Services

Staff of aid and military organisations who provide humanitarian aid, welfare aid or physical healthcare have important roles in providing psychosocial care for people affected by major incidents. These roles include recognising and responding to the

Table 49.14 The stepped model of care integrated with recommendations from Forbes et al. [68]

Level	Intervention	Target population	Examples of interventions	Interventions conducted by
3	Psychological first aid (PFA)	Most of the people who are affected	Restoring immediate safety Restoring contact with loved ones	All responders and aid workers
4	Community development	Communities after large-scale events	Schools, sports, meetings, newsletters to unite groups of people	All responders and aid workers
5	Skills for psychosocial recovery (SPR)	People whose distress is sustained by bereavement or secondary stressors	Brief needs assessment Problem-solving Social support	Healthcare practitioners and workers trained in the skills
6	Psychosocial interventions for medium- and long-term problems	People whose distress is sustained and associated with functional impairment	Trauma-focused cognitive behaviour therapy	Staff of mental healthcare facilities

psychosocial needs of people involved and their families. The roles of professional responders, including aid workers, include:

- Initiating the continuum of psychosocial and mental healthcare that is recommended in this chapter
- Ensuring that this continuum is sustained through into the medium and longer-terms, according to need, although, in many instances, they are able to provide important elements of the psychological first aid that most patients require
- Making timely and appropriate referrals of selected people to mental health services

The Actions at Levels 1 to 3 of psychosocial care (Tables 49.13 and 49.14) should be integral to the work of agencies that deliver any aid or care for people following major incidents. This means asking staff of aid and healthcare agencies to provide:

- Immediate and short-term responses to sustain the psychosocial resilience of all people including responders.
- Empathic, practical and pragmatic support for everyone that is delivered by, and through the staff of health services for people who are affected; families; and community groups whose actions and interventions should be in accordance with the principles of PFA.
- Access to more specialised interventions for selected people who suffer more significant and/or persistent distress.
- Access to mental healthcare for people who have pre-existing disorders or who have developed mental disorders – this means assessing people who remain

distressed at around a month after events and referring them for further assessment if that is required.

- Training staff of aid agencies and military organisations to conduct these roles and supporting them in doing so.

Conclusions

It is clear from our survey in this chapter that:

- People's psychosocial (emotional, cognitive, social and physical) responses to traumatic events are extremely common.
- It is difficult to predict who will be affected most, but certain risk factors are known.
- The profile of psychosocial responses varies with time and the circumstances.
- Socio-economic disadvantage and interpersonal problems that may follow may predict long-term problems and enter victims into a cycle of disadvantage and poor physical and mental health.
- A smaller but substantial proportion of people who are affected may develop mental disorders.
- Good management at the time of the major incident and subsequently with effective follow through and good, broad care planning may lessen the immediate, short- and longer-term impacts, reduce people's suffering and reduce the prevalence of mental disorders.
- How their psychosocial responses are managed may define the extent and success or otherwise of people's recovery.
- The social fabric of communities is critical to the psychosocial and mental health effects of all forms of disaster and people's recovery.
- The effectiveness of the responses made depends on the knowledge of leaders about the resilience and vulnerabilities of affected communities.
- Information and activities that normalise reactions, protect social and community resources and signpost access to additional services are fundamental to effective psychosocial responses.
- Everyone involved is likely to benefit from supporting arrangements in the immediate aftermath and short and medium terms.
- A substantial minority of survivors require timely access to effective psychosocial care and mental health services.

Delivery of effective care requires:

- Good planning, strategic leadership and management are core to good psychosocial and mental healthcare.
- Good day-to-day leadership, management, realistic standards for practice, supervision, information sharing, unforced sharing of experiences and psychosocial support are core to good psychosocial and mental healthcare.

- Psychosocial and mental health responses to the needs of people who are affected should be based on the principle of proportionality in which everyone is offered psychosocial care, but only a selected proportion receives mental healthcare – to do otherwise would fail to recognise the impossibility of providing specialist mental healthcare for everyone, which is unnecessary.
- Initial interventions should be based on the principles of psychological first aid:
 - Social support is vitally important and can mitigate the risks of stress and of developing mental disorders later.
 - People should not be put under pressure to share or re-experience the events and their feelings.
 - There are personal, family and community components to providing adequate support.
- Medium-term and later interventions for people who have either persisting or new problems should include providing access to timely mental healthcare for selected survivors who have psychosocial problems of longer duration that are associated with dysfunction that might be disorders.

These conclusions make the case for developing a strategic, stepped, continuum of psychosocial and mental healthcare that creates a comprehensive pathway for caring for people who are affected by major incidents.

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Part VI

Resources

James M. Ryan, David MacGarty, and Adriaan P.C.C. Hopperus Buma

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This final section provides the reader with advice on where to find suitable resources, equipment, for example, and other important information. The use of the Internet is included, as access is available even in remote and austere environments and is increasingly relied upon for advice and guidance. Other related and allied topics are also covered here. The difficulties in building and resourcing field laboratories are highlighted. The potential use of the military as a resource is suggested. Dr. Millar's chapter on enablers and confounders provides an illustration of real life complexities in the deployed setting. In concluding, the section provides information on accreditation in Field Medicine and suggests the DMCC examination as an exemplar.

Chapter 50

Preparing to Deploy: Materials and Information

Jessica Tucker, David MacGarty, and Adriaan P.C.C. Hopperus Buma

Abstract Deploying organisations will usually provide medicines for the population at risk and most will provide drugs and equipment for deploying staff. Often, medics still prefer to carry their own emergency pack. Prepacked first aid kits are available from suppliers (see suppliers list later in this chapter) but many of you will wish to customise medicines and equipment, adapting to locations, logistics and length of deployment. The following equipment lists, advice and suppliers are not exhaustive, but should offer a good basis for those planning a comprehensive medical kit bag.

We live in the information age, and the proliferation of online Internet textbooks, databases and up-to-date reports has made deployment information much more accessible. Indeed the Internet is now the easiest way to research what is required of an aid worker and how to get involved. Advances in technology have made Internet access in the field much more consistent, with laptop and telephone access by satellite and Internet cafes proliferating all over the world.

The publications listed in this chapter are in addition to references and further recommendations at the end of the other chapters in the handbook. Specialist bookshops will carry a range of the weight of publications in the field of humanitarian operations. The questions are what to read, what to buy and what to take on deployments. Publications covering topics in the field of medical care in hostile environments subdivide into clearly recognisable categories.

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Keywords Medical Preparations • Checklists • Suppliers • Medicines • First Aid • Life support packs • Aids • Prevention • Dental health • Vaccinations • Travel health advice and medical supplies • Medical equipment • Information • Researching the field • Prospective employers • Training • Standards and accountability • Safety • Country information and maps • Resources for medical students • Additional websites for the Netherlands • Publications • References • Handbooks • Articles • Pamphlets

The materials and information you need depend very much on what you are doing, where you deploy to and for how long. There is a wealth of information out there for you to explore; the following should provide a good starting point! Please note all websites/references were correct at the time of writing.

Objective

- To provide checklists for medical preparations, supplies and suppliers, as well as organisations and publications that are sources for information before and during deployment

Medical Preparation, Checklists and Suppliers

Introduction

Deploying organisations will usually provide medicines for the population at risk and most will provide drugs and equipment for deploying staff. Often, medics still prefer to carry their own emergency pack. Prepacked first aid kits are available from suppliers (see suppliers list later in this chapter) but many of you will wish to customise medicines and equipment, adapting to locations, logistics and length of deployment. The following equipment lists, advice and suppliers are not exhaustive, but should offer a good basis for those planning a comprehensive medical kit bag.

It is impossible to pack everything. As with planning an expedition, less can often be more. Consider existing healthcare provision in the region you plan to deploy to and attempt to tailor your kit accordingly. Materials – what is the nature of the project? What can be brought and what can be sourced locally? What might cause you problems at customs? How can supplies be replenished? What emergencies will you make provision for and what are your exit strategies and the local resources available in the event of an emergency (e.g. helicopter evacuation? road evacuation? length of time before you reach a secondary centre?)? Are the materials available locally – are you offering sustainable treatments which don't raise expectations on local services when you leave?

Medicines

Pack all medicines with care, label them and, if possible, keep them in the containers used for initial dispensing. Check expiry dates. As a rule, your pack should include the items listed herewith:

Analgesics.

Antacids.

Antibiotics – take expert advice on choice and routes of administration.

Antidiarrhoeal tablets and electrolyte replacement salts.

Antiemetics (for nausea and travel sickness).

Antifungal creams and powders.

Antihistamine tablets and rub-in creams.

Anti-inflammatory tablets and creams.

Antimalarials.

Anti-mountain sickness if at risk.

Antiseptic ointments, creams, liquid sachets or sprays.

Antiworm medicines – take advice on choice.

Bite and itch lotions or creams.

Cold sore medicines – take advice.

Drops for sinusitis.

Eye drops and ointments.

Insect repellents – pure DEET liquid, spray or gel.

Laxatives.

Sleeping medicines – take advice.

Suntan lotions/creams and sunscreen.

Lip salve.

Vaginal infection medicines – take advice.

Water purification tablets or solutions.

N.B. Non-medically qualified personnel should seek pharmaceutical and medical advice in choosing items for packing, storage and use.

First Aid

Ensure you make a comprehensive list to present during customs and security checks:

Cotton wool

Crepe bandages – various lengths and widths

Medi-swabs

Non-adherent wound surface dressings

Safety pins

Scissors

Sterile gloves
Steristrips for wound closure – various sizes
Tapes – micropore and zinc oxide
Triangular bandage
Tweezers (tissue forceps) – toothed and non-toothed
Wound cleaning antiseptic solutions, creams and powders
Wound dressing pads and gauze
Wound plasters and band-aids
Compeed (blister plasters)

Life-Support Pack

Airway maintenance devices – oro- and nasopharyngeal devices
Cannulae for needle decompression – tension pneumothorax
Chest drains (trained personnel only)
Interosseous needles for children under 6 years (NB adult versions now commercially available but there is a considerable training requirement)
Intravenous (IV) administration sets
IV solutions – crystalloid
Large-bore vascular cannulae (Nos. 12, 14, 16 for adults; nos. 18, 21, 23 for children)
Large wound pads for haemorrhage control
Needles and syringes – various sizes
Selection of basic limb splints (e.g. SAM splints)

Aids Prevention

If you are going to an HIV or Hepatitis B prevalent area, specialist packs containing sterile needles, IV administration sets and IV fluids can be purchased. Postexposure prophylaxis (PEP) packs can be purchased or borrowed from some hospitals' occupational health services for use in the case of HIV exposure whilst abroad.

Dental Health

The best advice is to see a dentist at least 3 months before you deploy! However, you should also consider taking an emergency dental kit containing emergency dressings for lost fillings, temporary filling material (zinc oxide eugenol), analgesics and antibiotics. Some kits contain material for temporary replacement of crowns, bridges and caps.

Further Advice

<http://www.who.int/medicines/publications/essentialmedicines/en/index.html> – WHO model list of essential medicines

<http://www.steinergraphics.com/surgical/manual.html> – WHO primary trauma care manual

Vaccinations, Travel Health Advice and Medical Supplies

<http://wwwnc.cdc.gov/travel/> – The US Government’s Center for Disease Control provides travel advice and health warnings. Includes an A–Z of health topics.

<http://www.dh.gov.uk/en/Policyandguidance/Healthadvicefortravellers/index.htm> – The UK Department of Health’s advice for travellers in Europe and further afield.

<http://www.nathnac.org> – The National Travel Health Network and Centre is funded by the UK Department of Health to improve quality of travel health advice.

<http://www.tripprep.com> – The website of Travel Health Online offers detailed information on illnesses, vaccinations, travel medicine providers and destinations.

<http://www.masta-travel-health.com/> – UK-based organisation offering travel advice, clinics, vaccinations and first aid kits.

<http://www.thehtd.org> – The Hospital for Tropical Diseases, London (part of University College London Hospitals NHS Trust), is dedicated to tropical diseases and travel-related infections. Its travel clinic offers vaccinations, advice for complex cases, a travel healthline and travel products. Mortimer Market, Capper Street, off Tottenham Court Road, London WC1E 6JB. Telephone: 020 3456 7890 or 020 3456 7891. It has an online shop: <http://www.thehtdshop.org/>

<http://www.nomadtravel.co.uk> As well of all types of general kit, Nomad Travel runs travel clinics, vaccination services and sells medical kits (bespoke or ready-made). Nomad Travellers Stores, 3-4 Wellington Terrace, Turnpike Lane, London, N8 0PX, 0208 889 7014. Multiple other locations in London and around the UK.

www.interhealth.org.uk – Interhealth, Ground Floor, 111 Westminster Bridge Rd, London, SE1 7HR, UK, 0207 9029000. Travel clinic, advice and health supplies.

Medical Equipment

Sites which give information on a wide variety of medical equipment and products from individual items to complex equipment systems:

Durbin (formerly ECHO International Health Services Ltd). 020 8660 2220.

Equipment, training material and drugs

<http://www.durbin.co.uk>

SP Services (UK) Ltd, Unit D4, Hortonpark Estate, Hortonwood 7, Telford, Shropshire, TF1 7GX, UK, 01952 288999. Medical, first aid and emergency rescue equipment

<http://www.spservices.co.uk/>

First Aid Warehouse, 17 Chesford Grange, Warrington, WA1 4RQ

<http://www.firstaidwarehouse.co.uk>

Information Prior to Deployment

Introduction

We live in the information age, and the proliferation of online Internet textbooks, databases and up-to-date reports has made deployment information much more accessible. Indeed the Internet is now the easiest way to research what is required of an aid worker and how to get involved. Advances in technology have made Internet access in the field much more consistent, with laptop and telephone access by satellite and Internet cafes proliferating all over the world.

Researching the Field

- Government or National Organisations

Department for International Development (UK) – <http://www.dfid.gov.uk>

Foreign and Commonwealth Office (UK) – <http://www.fco.gov.uk>

US Department of State (USA) – <http://www.state.gov/>

US Agency for International Development (USA) – <http://www.usaid.gov/>

- Directory and Gateway Sites

Alma Mata Global Health Network

UK-based network which provides regular updates on global health news, events, education and careers. Also runs lectures and conferences.

www.almamata.net

BUBL Link

A UK information service for the higher education community. Includes links to the Humanitarian Practice Network, a mechanism for information exchange in the field of humanitarian aid, and Charity Choice, a listing of over 10,000 UK charities. Please note, as of April 2011 the BUBL service is no longer being updated but is still worth a look.

<http://bubl.ac.uk/link/h/humanitarianrelief.htm>

Childs' Rights Information Network

An organisation dedicated to disseminating information on the Convention on the Rights of the Child. Contains themes including health, conflict, HIV and AIDS and list over 1,700 NGOs as members.

<http://www.crin.org/themes/ViewTheme.asp?id=13>

The DMOZ Open Directory Project

Developed in the spirit of Open Source, the Open Directory Project is maintained by a global community of volunteer editors. The site provides links to the organisations listed.

Organisations are also listed by region.

http://dmoz.org/Regional/Europe/United_Kingdom/Society_and_Culture/Organisations/Humanitarian/

European Community Humanitarian Office (ECHO)

The European Union is a substantial humanitarian aid donor, providing emergency assistance to victims of natural disasters, outbreaks of fighting or comparable exceptional circumstances. This site contains details of its work worldwide with links to sites on humanitarian aid, human rights, working for a safer world and related news items.

http://ec.europa.eu/echo/index_en.htm

European Council on Refugees and Exiles (ECRE)

ECRE is a pan-European network of refugee-assisting NGOs that promotes protection and integration of asylum seekers, refugees and internally displaced persons. Website resources include papers, news, press statements and other publications giving an excellent overview of the problems associated with refugees. It provides 14 pages of links to related sites, including many law-related sites.

<http://www.ecre.org/>

Euforic

A social network connecting projects, events, people and organisations engaged in international cooperation and development.

<http://euforic.org/>

Global Focus Aotearoa

A New Zealand NGO which administers the Global Focus Fund, aimed at international development and global issues (formerly Development Resource Centre). Also an Associate Member of DevNet, a development network based in New Zealand which links people and organisations across the Pacific and further afield.

<http://www.globalfocus.org.nz/>

<http://www.devnet.org.nz/>

Humanitarian Resource Institute

A US university consortium supporting economic, social, cultural and humanitarian initiatives worldwide.

<http://www.humanitarian.net>

Institute of Development Studies

The Institute of Development Studies, based in Sussex, is a leading global organisation for teaching, research and communications on international development. Includes links to UK-sourced international development research and the Eldis Gateway, which contains a health systems resource guide.

<http://www.ids.ac.uk/go/home>

Reuters Foundation AlertNet

Reuters provides a site called AlertNet which provides global news and other services to humanitarian relief agencies and workers. Contains up-to-date news on areas of humanitarian interest and also includes job opportunities.

<http://www.alertnet.org/>

Source Resource Library

Search this contacts database for links to international health or disability organisations and a wide variety of humanitarian agencies.

<http://www.ids.ac.uk/sourcesearch/contacts.htm>

Voluntary Organisations in Cooperation in Emergency (VOICE)

VOICE is a network of around 80 European NGOs which are active across the field of humanitarian assistance. VOICE runs seminars and meetings aimed at fostering cooperation and the site summarises the work of these meetings, provides regular updates from conflict and catastrophe areas and provides links to other humanitarian resources. VOICE also acts as an interlocutor with the European Union on emergency aid, relief, rehabilitation and disaster preparedness and seeks to involve its members in information, training, advocacy and lobbying.

<http://www.ngovoice.org/>

- International and Intergovernmental Sites

European Parliament

The European Parliament publishes a series of factsheets including sheet 6.4.4 on humanitarian aid, which deals with the legal basis of humanitarian aid and is of interest to humanitarian volunteers.

http://www.europarl.europa.eu/factsheets/6_4_4_en.htm

International Committee of the Red Cross

The Red Cross works exclusively with the victims of war and violence. This is a highly recommended web site. It includes a comprehensive section on humanitarian law and useful online resources.

<http://www.icrc.org/eng>

International Federation of the Red Cross and Red Crescent Societies

This is the world's largest humanitarian organisation consisting of 185 Red Cross and Red Crescent societies. Its goals are to reduce death, illness and injury resulting from disease or disaster, to increase local capacity to deal with such events and to promote respect for diversity and human dignity. Includes links (under partners), publications and news.

<http://www.ifrc.org>

International Labour Organization

The ILO is the tripartite UN agency which brings together governments, employers and workers in its member states to promote social justice and human and labour rights. <http://www.ilo.org/global/lang--en/index.htm>

Organisation for Security and Co-operation in Europe (OSCE)

OSCE is a European security organisation of 56 participating states with an international remit. Its purposes are early warning, conflict prevention, crisis management and rehabilitation after conflict. Other linked areas include human rights, antiterrorism and education.

<http://www.osce.org>

United Nations Children's Fund (UNICEF)

UNICEF is active in 191 countries promoting child survival and development, health, protection and education. Information is listed by country.

<http://www.unicef.org/infobycountry/index.html>

United Nations Economic and Social Development Council

This UN department is concerned with the environment, human rights, human settlement and other issues surrounding humanitarian assistance and governance. Begin with the site map.

<http://www.un.org/esa>

United Nations High Commissioner for Human Rights

UNHCR was established to care for the world's refugees. A-Z directory including the organisation's links to publications, statistics, research and events. Highly recommended.

<http://www.unhcr.org>

United Nations Office for the Coordination of Humanitarian Affairs

OCHA is the part of the United Nations Secretariat responsible for bringing together humanitarian actors to ensure a coherent response to emergencies. It ensures a framework within which each actor can contribute to the overall response effort. Highly recommended.

<http://www.unocha.org>

United Nations Index to Programmes

Links to UN programmes alphabetically, from Accident Prevention to Youth.

<http://esa.un.org/subindex/pgViewTerms.asp?alphaCode=A>

United Nations Statistics Division

Useful source for global and national economic and environmental statistics. Site map at:

<http://unstats.un.org/unsd/sitemap.htm>

Includes demographic and social statistics:

<http://unstats.un.org/unsd/demographic/>

World Bank Group

The World Bank Group's mission is to work for a world free of poverty. Cooperating closely with many NGOs, particularly in the field of development, it provides many pertinent links.

<http://www.wbg.org>

World Health Organisation (WHO)

The WHO is the directing and coordinating authority for health within the UN and its site is one of the most useful. Includes information on various health topics including disease outbreaks and emergencies. Links to publications, statistics and programmes. Search for sitemaps by region.

<http://who.int/>

World Trade Organisation

International organisation dealing with global rules of trade and interfacing with NGOs in developing countries and in regions afflicted by war and disaster. Includes resources for NGOs and research.

<http://www.wto.org>

Prospective Employers

- Relief Personnel: Providers and Employers

<http://reliefweb.int/jobs> – Jobs section of the humanitarian information website.

<http://www.redr.org> – The RedR website lists organisations which provide services and employ personnel in the humanitarian field.

<http://www.peopleinaid.org> – People in Aid exists to help improve and support good management of people within the humanitarian sector. See also a related network Humanitarian HR online – <http://www.peopleinaid.net/Forums/HHROnline> which exists to assist recruitment of appropriate personnel by organisations.

<http://www.idealists.org> – Opportunities to volunteer at home or abroad and a list of volunteers for organisations to access.

<http://www.interaction.org> – American Council for Voluntary International Action provides a monthly newsletter of jobs and volunteering opportunities with international relief and development agencies but this is not a free service.

- Nongovernmental Organisations

The editors suggest the following selection of NGO websites but many more exist:

Amnesty International – <http://www.amnesty.org>

Care International – <http://www.careinternational.org>

Catholic Agency for Overseas Development (Cafod) – www.cafod.org.uk

Doctors of the World – <http://www.doctorsoftheworld.org>

Doctors Without Borders – <http://www.dwb.org>

International Islamic relief Organisation – <http://www.iirosa.org>

Leonard Cheshire – <http://www.leonard-cheshire.org>

Medecins Sans Frontieres – <http://www.msf.org>

Mercy Corps International – <http://www.mercycorps.org>
 MERLIN – <http://www.merlin.org.uk>
 Oxfam International – <http://www.oxfam.org>
 Oxfam UK – <http://www.oxfam.org.uk>
 Physicians for Human Rights – <http://www.physiciansforhumanrights.org>
 Red R – <http://www.redr.org/>
 Save the Children – <http://www.savethechildren.org>
 Tropical Health and Education Trust (NHS Links) – <http://www.thet.org>

Training and Further Education

<http://www.redr.org.uk/en/Training/> – RedR’s courses cover all aspects of humanitarian work from security to management to communications.

<http://www.reliefweb.int/rw/rwt.nsf/doc211?OpenForm> – Relief Web’s training directory.

<http://www.apothecaries.org> – The Faculty of Conflict and Catastrophe Medicine runs a part-time diploma course in the medical care of catastrophes, Society of Apothecaries, London. The Faculty also holds talks and awards academic prizes.

<http://www.who.int/hac/techguidance/training/en/index.html> – WHO’s Health Action in Crises links to training courses.

<http://www.ophi.org.uk/teaching/short-courses/> – The University of Oxford’s Poverty and Human Development Initiative’s list of short courses.

<http://www.international-alert.org/ourwork/traininglearning/overview> – International Alert provides training for peaceworkers.

http://www.aafp.org/online/etc/medialib/aafp_org/documents/about/rap/curriculum/disastermed.Par.0001.File.tmp/Reprint290.pdf – American Academy of Family Physicians Disaster Medicine curriculum.

<http://abpsus.org/disaster-medicine> – The American Board of Physician Specialties Disaster Medicine certification.

<http://www.rsm.ac.uk/academ/forcc.php> – The Royal Society of Medicine’s Catastrophes and Conflict Forum runs conferences and talks throughout the year.

www.rgs.org/go – The Royal Geographical Society, London has a “Geography Outdoors” section (formerly known as the Expedition Advisory Centre) which runs a goldmine of general information on fieldwork and expeditions training and advice, including advice on practising medicine in remote locations and health and safety abroad.

<http://www.manchester.ac.uk/postgraduate/taughtdegrees/courses/parttime/course/?code=08264> – The University of Manchester, UK, offers a new Masters (MA) in Humanitarianism and Conflict response which may offer a long-distance learning option in the future.

<http://www.dismastermaster.org/> – The European Masters in Disaster Medicine has many international links with aid agencies and academic institutions. It is a year-long, distance learning course (with a 2-week live-in component in Italy).

Also see individual NGO websites, e.g. the UK’s MERLIN for training courses.

Standards and Accountability

<http://www.sphereproject.org/handbook/> – The Sphere Project humanitarian charter and minimum standards in disaster response

www.alnap.org – Active Learning Network for Accountability and Performance in Humanitarian Action

http://www.dh.gov.uk/en/Publicationsandstatistics/Publications/PublicationsPolicyAndGuidance/DH_065374 – *Global Health Partnerships: the UK contribution to health in developing countries*. The Crisp Report

Safety and Security

The following sites can provide useful information on security:

<http://www.fc.gov.uk/travel> – The British Government's Foreign and Commonwealth Office site for travel advice including security, legal and consular matters. Highlights areas of risk

<http://travel.state.gov> – US State Department travel advice for US citizens

<http://www.redr.org.uk/en/resources/index.cfm/safety-and-security> – Link to RedR's safety and security advice

<http://www.icrc.org/eng/resources/documents/publication/p0717.htm> – Downloadable version of the ICRC publication *Staying alive: safety and security guidelines for humanitarian volunteers in conflict areas*

<http://www.aidworkers.net/?q=advice/security> – Aidworkers Network guide to field security planning

<http://www.aidworkers.net/?q=node/809> – ECHO Generic Security Guide for Humanitarian Organisations

Country Information and Maps

<http://www.who.int/countries/en/> – World Health Organisation information by country.

<https://www.cia.gov/library/publications/the-world-factbook/index.html> – The CIA World Factbook contains detailed geographic, demographic, historical and security information on countries worldwide.

<http://www.humanitarianinfo.org> – Links to several humanitarian information centres, provided by OCHA.

<http://reliefweb.int/countries> – Country info and up-to-date news.

<http://earth.google.com> – Google Earth provides free, easy to use satellite imagery online.

<http://maps.google.co.uk> – Google maps provides free online maps of the world.
<http://www.stanfords.co.uk> – The UK's leading specialist retailer of maps, travel books and other travel accessories.

Resources for Medical Students

<http://www.medsin.org> – MEDSIN. Network of healthcare students in the UK, educating and acting upon health inequalities.
<http://www.physiciansforhumanrights.org/students/> – Physicians for Human Rights' student pages including links to online courses.
<http://www.skipkids.org.uk> – Students for Kids International Projects. National children's charity with projects around the world conducted by students from various UK medical schools.
<http://www.star-network.org.uk> – Student Action for Refugees. National organisation supporting refugees in the UK with branches at many medical schools.
 Student wilderness medicine societies (find your university one – or set one up!) and the annual National Student Wilderness Medicine Conference (held at a different medical school each year) are also great ways to meet likeminded people.

Additional Sites for the Netherlands

Because of the mainly international setting of conflict and catastrophe medicine most Dutch readers will find the international sources well accessible. However, some specific national sites are listed herewith:

- Governmental Sites

<http://www.minvws.nl/> – Ministerie van Volksgezondheid, Welzijn en Sport
<http://www.minbuza.nl/> – Ministerie van Buitenlandse Zaken
<http://www.minbzk.nl/> – Ministerie van Binnenlandse Zaken en Koninkrijksrelaties
<http://www.mindef.nl/> – Ministerie van Defensie
<http://www.rivm.nl/> – Rijksinstituut voor Volksgezondheid en Milieu (RIVM)

- Nongovernmental Organisations

<http://www.rodekruis.nl/> – Het Nederlandse Rode Kruis
<http://www.cordaidmemisa.nl/> – Cordaid Memisa
<http://www.oxfamnovib.nl/> – Oxfam Novib
<http://www.artsenzondergrenzen.nl/> – Artsen zonder Grenzen
<http://www.healthnettpo.org/nl/> – Health Net TPO
<http://www.vluchtelingenwerk.nl/> – VluchtelingenWerk Nederland

- Human Rights Organisations
<http://www.amnesty.nl/> – Amnesty International Nederland
<http://www.johannes-wier.nl/> – Johannes Wier Stichting
- Infectious Diseases and Tropical Medicine
<http://www.lcr.nl/> – Landelijk Coördinatiecentrum Reizigersadviesing
<http://www.rivm.nl/cib/> – RIVM, Centrum Infectieziektebestrijding (Cib)
<http://www.amc.nl/> – Tropencentrum AMC
<http://www.kit.nl/> – Koninklijk Instituut voor de Tropen
<http://www.travelclinic.com/> – Travel Clinic Havenziekenhuis Rotterdam
- Emergency and Catastrophe Medicine
<http://www.alsg.nl/> – Stichting Advanced Life-Support Groep
<http://ghor.startkabel.nl/> – extensive information site on GHOR

Publications

Introduction

The publications listed in this chapter are in addition to references and further recommendations at the end of the other chapters in the handbook. Specialist bookshops will carry a range of the weight of publications in the field of humanitarian operations. The questions are what to read, what to buy and what to take on deployments. Publications covering topics in the field of medical care in hostile environments subdivide into clearly recognisable categories.

Reference Texts

These can be large, specialised and often expensive. As larger texts with multiple authors can take years to prepare, some information may already be out of date on publication – they are, however, usually the best source of core knowledge. For the impecunious aid worker they are best not purchased, but consulted.

Handbooks and Related Publications

These can be specialist or general, usually affordable but often hard to access. Some are water proofed and suitable for deployment. Shorter publication times mean that they are more likely to be up to date than larger reference texts.

Articles and Reports

Editorials, reviews and scientific and evidence-based papers provide the most up-to-date information. Mission specific reports are often available on NGO agency websites and can be accessed online.

Guidelines and Schedules

A broad and expanding spectrum is covered by publications from government, academic, NGO and IGO sources. Care should be taken in establishing a hierarchy of sources in the event of conflicting advice.

Pamphlets and Booklets

Produced by various agencies as noted, they typically contain advice on specific topics such as vaccination and protection against communicable disease.

Reference Texts

Politics

- *World politics – trends and transformations*, 2011–12 edition, C.W. Kegley, S.L. Blanton, Wadsworth, 2011, Boston USA.
- *The Globalization of World Politics: An Introduction to International Relations*, 5th edition, J. Baylis, S. Smith and P. Owens, 2010, Oxford University Press, Oxford.
- *The Practical Guide to Humanitarian Law*, revised edition. F. Bouchet-Saulnier, Rowman & Littlefield Publishers, 2006.

Preventive Medicine

- *Disease Control Priorities*, 2nd edition. D.T. Jamison, editor. The World Bank, US, 2006.
- *Disease Control Priorities Related to Mental, Neurological, Developmental and Substance Abuse Disorders*. World Health Organisation, Geneva, 2007.

Psychological Medicine

- *Critical Incident Debriefing: Understanding and Dealing with Trauma*, F. Parkinson. Souvenir Press, London, 1997.
- *Critical incident Stress Debriefing: An Operations Manual for CISD, Defusing and Other Group Crisis Intervention Services*, 3rd edition. J.T. Mitchell, G.S. Everly. Chevron Pub Corp, 2001.

Terrorism

- *Globalisation, Democracy and Terrorism*, E. Hobsbawm. Little, Brown, 2008.

Victims of Torture

- *Guidelines for the examination of survivors of torture*, 2nd edition, 2000, Produced by the Medical Foundation for the Care of Victims of Torture, (www.freedomfromtorture.org)

Trauma

- *Ryan's Ballistic Trauma: A Practical Guide*, 3rd edition. P.F. Mahoney, J. Ryan, A.J. Brooks, J. Clasper, M. Midwinter, T.J. Hodgetts, Springer-Verlag, London, 2011.
- *Emergency Care: A Textbook for Paramedics*, 2nd edition. I. Greaves, K. Porter, T. Hodgetts, M. Woollard. Saunders, Philadelphia, 2005.
- *Bailey and Love's Short Practice of Surgery*, 25th edition, N.S. Williams, P.R. O'Connell and C.J.K. Bulstrode, Hodder Arnold, London, 2008.
- *Trauma Care Manual*, 2nd edition, I. Greaves, K. Porter, J. Ryan, J. Garner, Hodder Arnold, London, 2008.
- *War wounds of limbs – surgical management*, R.M. Coupland, Butterworth-Heinemann, Oxford, 1993.

Tropical Diseases

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Chapter 51

Diagnostic Laboratories, Rapid Diagnostic Tests, and Collecting and Handling Diagnostic Specimens

Timothy D. Healing

Abstract Successful treatment of patients in the earliest stages of a disaster can be undertaken purely on the basis of their symptoms. However, as a disaster relief programme progresses, and particularly if the programme is to be a long-term one, if serious disease outbreaks occur or if patients require more than basic care, there is a need to decide if laboratory support to the medical programme is required.

For a laboratory to produce satisfactory results, it must receive appropriate specimens that are taken properly with the correct sampling equipment, preserved with the right media and in the correct type of container and stored and shipped under the right conditions.

Keywords Diagnostic laboratories • Mobile and Portable laboratories • Testing • Rapid Diagnostic Tests • RDT • Specimen • Collection • Storage • Shipping • Sampling • Preservative • Media • Packaging • Transport

Part A: Diagnostic Laboratories in Emergencies and the Use of Rapid Diagnostic Tests (RDTs)

Objective

- To examine how to decide whether or not to set up a static or mobile diagnostic laboratory or use a local diagnostic laboratory, how to maintain skills and quality control and what diagnostic tests to offer

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Introduction: The Need for a Diagnostic Laboratory

Successful treatment of patients in the earliest stages of a disaster can be undertaken purely on the basis of their symptoms. However, as a disaster relief programme progresses, and particularly if the programme is to be a long-term one, if serious disease outbreaks occur or if patients require more than basic care, there is a need to decide if laboratory support to the medical programme is needed.

Diagnostic laboratories should be able to offer a range of microbiological, haematological and biochemical tests to allow the physician to confirm diagnoses and monitor the treatment of patients. However, in resource-poor settings, the range of tests available is usually limited (Table 51.1). (Activities such as the testing of water and food samples and the performance of environmental monitoring are usually done in public health laboratories, but these generally can be set up when the situation has stabilised.)

Basic laboratories are rarely able to culture bacteria and undertake antimicrobial sensitivity testing. They are also usually unable to undertake diagnosis of viral infections beyond some basic serology. However, it should be noted that with the improvements that are occurring to rapid diagnostic tests (RDTs) and the development of portable equipment for advanced tests such as RT-PCR, there is an increasing possibility that advanced diagnostics can be offered at field level.

Should You Set Up a Laboratory?

Once a decision has been made to include laboratory support in a programme, it becomes necessary to determine whether local laboratory facilities are available (referred to as an external laboratory (EL) in this document) and if so:

Table 51.1 Tests offered by basic laboratories

Malaria
Smears
Rapid diagnostic tests (RDTs)
Other RDTs
Blood
Typing
Hepatitis B tests
HIV tests
Differential white cell count
Urine
Cell counts
Bacteria
Microscopy for:
Gram's stain (Gm +ves, Gm -ves)
Bacterial meningitis (from spinal fluid)
TB (Ziehl-Neelsen)
Parasites (internal/external)
Water quality

- Whether they can provide the sort of tests required
- And/or could do so with appropriate support in terms of supplies (reagents, stains etc.)
- And/or if such a laboratory could function given appropriate rehabilitation, staff training, new equipment, etc.

If not then, consideration should be given as to whether it will be necessary to set up a laboratory facility for the programme staffed by members of the team (programme laboratory (PL)).

Regardless of whether the laboratory is to be an EL or a PL, a series of basic questions must be answered satisfactorily in order to assess the suitability of the facility (or to plan a new one) (Table 51.2). If it is anticipated that a laboratory may be needed in a programme, consideration should be given to include a laboratory specialist in the initial assessment team from the agency.

Setting up a PL has a number of implications for the funding and for the staff make-up and the management of the programme. A laboratory specialist should be employed to design and establish the facility, and the programme managers will need to know what resources will be needed in terms of accommodation, infrastructure equipment, reagents and staff and if there are any safety requirements. This last item is one that needs careful consideration when decisions are being made about setting up laboratories. In many parts of the world where emergency medical programmes are to be set up, there is a risk of exposure to very dangerous organisms. It may not be possible to do all the tests that are required because safe working cannot be guaranteed.

Table 51.2 Suitability of a laboratory

Can the laboratory undertake the types of test required and do so accurately?
Does it have a satisfactory quality control (QC) system in place?
Can it handle the specimen load?
Numbers
Types
Storage
Shipping
Can it handle the data required and distribute the results?
Is it:
Secure?
Safe?
Comfortable for the staff?
Does it have an adequate infrastructure to allow it to provide a continuous service?
Power
Water
Drainage
Is it easily accessible?
If it is an EL:
Can it handle the extra workload you are proposing?
Can it expand its activities to include extra tests (staff, training)?
What financial arrangements may be needed?

The laboratory staff will be responsible for the technical aspects of the laboratory work, but laboratories work better if those who will be running or participating in the medical programme (and hence using the laboratory to support their medical activities) have a proper understanding of what such a laboratory can offer and what they need to do to maximise the use of such a facility. They need to know:

- What tests the lab can do
- What these mean (*sensitivity* [the proportion of positives which are correctly identified] and *specificity* [the proportion of negatives which are correctly identified])
- The specimens required and how to take, preserve and transport them
- What other information is required
- Any imitations on lab output

Maintenance of Skills and Quality Control

Problems can occur if a laboratory only handles small numbers of specimens. Laboratory staff members need to perform a certain number of tests daily to keep their skill levels up. In addition, small numbers of specimens may lead to wastage of media and reagents.

Laboratories need quality control (QC) systems, not only to monitor staff performance but also to ensure that the testing system takes account of batch-to-batch variation in stains, media and reagents. The use of standard test slides, cultures, etc. allows for internal QC to be undertaken. All laboratories must have a system of external QC whereby their work is regularly checked by suitably qualified reference laboratories.

Mobile and Portable Laboratories

Mobile laboratories are available “off the shelf” in varying levels of complexity and may suit some programmes, but they are expensive (you usually have to buy a vehicle as well as the laboratory fit-out) and they have a number of limitations including their size, storage capacity, infrastructure and temperature control.

Much advanced laboratory equipment is now highly portable, and advanced laboratories for certain types of tests can now be taken into the field and set up where needed. Portable PCR units include HANAA (hand-held advanced nucleic acid analyzer) and a similar system called RAZOR. The necessary protective safety hoods, are also available in portable form.

Rapid Diagnostic Tests (RDTs)

RDTs have been put forward as replacements for the diagnostic laboratory, and they have a role to play where labs are not available. However, not all can be used in simple labs or at the bedside, many need trained personnel for best results, some have rather limited operating temperature and storage ranges, and there can be issues with sensitivity and specificity. For example, when used correctly, malaria RDTs can provide a useful guide to the presence of clinically significant malaria infection caused by the species of parasite they are designed to detect and can help in case management, particularly when good quality microscopy-based diagnosis is unavailable. However, WHO recommends that decisions about the management of patients with malaria should not be based on the RDT result alone.

Many different types are available, the most commonly used including various tests for malaria and kits for testing individuals and blood for HIV and Hepatitis B. In addition there are numbers of biochemical and haematological kits including kits for testing urine (for glucose), pregnancy tests and tests for blood typing. Many others for the diagnosis of a range of infectious agents are under development. The field is a rapidly changing one, and useful information about current activities, availabilities, etc. can be obtained from website such as:

- RDTinfo: www.rapid-diagnostics.org
- PATH (Center for Point-of-Care Diagnostics for Global Health): www.path.org
- FIND (Foundation for Innovative New Diagnostics): www.finddiagnostics.org

There are several problems associated with RDTs:

- Exposure to high temperatures and high humidity are major contributors to poor performance by RDTs. Most RDTs should be shipped and stored between 4 °C and 30 °C, but if they are exposed to temperatures exceeding the recommended limits, shelf life will be reduced and sensitivity lost.
- Most RDTs have a specified operating temperature range. Outside this range the tests may not be valid.

Shipment of Specimens

It may be necessary to send specimens to a larger laboratory, either in the country affected by the disaster or elsewhere, for several reasons. These include:

(a) Clinical reasons

More accurate identification or tests on specimens may be needed for clinical purposes than can be managed locally. The common reasons include the

need to determine antibiotic sensitivity or to identify an organism precisely so that appropriate therapeutic agents can be used.

(b) *Epidemiological reasons*

Epidemiological investigations may be based on descriptive data or on the basis of symptomatic diagnoses. However, given the many sources of error inherent in these types of data source, ideally laboratory confirmation of the cause of a disease problem is needed. The small field laboratories described here are not generally capable of providing the levels of identification of the causes of disease that are needed for epidemiological work.

(c) *Reporting*

Infections with some organisms (such as *Vibrio cholerae*) have to be reported to WHO under the International Health Regulations and thus identification is required.

Details of methods for the collection, preservation and shipment of specimens are given in section B, “[Specimen Collection, Storage and Transport](#)”.

Part B: Specimen Collection, Storage and Transport

Objective

- To provide information on the methods for the collection, preservation and shipment of specimens for laboratory diagnosis

Introduction

For a laboratory to produce satisfactory results, it must receive appropriate specimens that are taken properly with the correct sampling equipment, preserved with the right media and in the correct type of container and stored and shipped under the right conditions.

This chapter is not intended as a comprehensive guide to this process (which would require a much longer text). It is intended to highlight the major pitfalls and problems that can occur.

If you are including laboratory tests in your medical programme, whether these are to be undertaken by your own or by an external laboratory, you are strongly advised to obtain specialist advice from clinical microbiologists when planning a sampling programme to get information about:

- What specimens are needed
- When to collect them
- How to collect them
- Collecting them safely

- How to store them
- How to ship them
- Time schedule of these activities

When to Collect Specimens?

Specimens need to be collected at the appropriate point during the course of an infection if they are to provide the desired result. For example, antibody levels in the blood rise during the course of an infection, so a single sample taken early in the course of the infection is unlikely to give a positive result. In this case paired samples are usually taken, one early in the infection and a second about 3 weeks later when antibody levels should be high. Similarly, for some infections the organism itself may only be detectable early in the course of the period when the patient is clinically ill.

Specimens should ideally be taken before antimicrobial chemotherapy is started in order to maximise the chance of recovering the organism. However, treatment must never be delayed just for samples to be taken.

You should collect specimens from deceased patients as soon as possible after death.

Use the Right Sampling Equipment

It is most important that the correct equipment is used when collecting samples. For example, while swabs for bacteriology can be taken using any type of swab, including cotton swabs or swabs with wooden sticks, samples for virology should only be taken using sterile dacron or rayon swabs with plastic shafts. Calcium alginate or cotton swabs or swabs with wooden sticks may contain substances that inactivate viruses and inhibit PCR and some rapid diagnostic tests (RDTs).

Use the right type of container for the sample. For example, for blood use tubes with or without anticoagulants (depending on what tests are required), for stools use a clean, dry, leak, proof-screw cap container and for urines a clean, screw-top specimen transport container (“universal” containers are often used).

Use the Right Type of Media/Preservatives

- Stools for bacteriology:
 - Appropriate bacterial transport medium (especially for rectal swabs from infants) (Carey Blair medium is the most commonly used).
 - For samples for detection of parasites, use a parasitology transport pack (10 % formalin in water, polyvinyl isopropyl alcohol (PVA)).

- Blood:
 - Blood culture media
- Viral specimens:
 - Viral transport media
- Urine
 - Boric acid

Collect the Correct Specimens from the Right Place in the Body

For example, most types of influenza are found in the upper respiratory tract, and therefore this should be the main target of sampling for a sample of the virus:

- *Upper respiratory tract:*
 - Nasal swabs with nasal secretions (from the anterior turbinate area)
 - Nasopharyngeal swab
 - Nasal wash
- *Lower respiratory tract:*
 - If the patient is intubated, take a tracheal aspirate.

However, avian influenza (H5N1), which has recently been causing concern, is found only in the lower respiratory tract and so is unlikely to be found purely by upper respiratory tract sampling (though this should be done to detect other pathogens). In addition this virus is found in the intestinal tract while many other types of influenza are not.

Label Specimens Correctly and Fill in the Forms Completely!

Failure to complete the forms accompanying the sample will hinder the ability of the laboratory to provide answers correctly and speedily. Standard forms are available, but whatever form is used, it should provide, as a bare minimum, information about:

- What type of specimen is it?
- What information/tests do you want from the lab?
- Specimen number
- Date
- Details of patient
 - Name/number
 - Age

- Sex
- Details of illness
- Location – community/clinic/ward
- Who are you?
- How can the lab contact you?

Specimen containers should always be labelled on the body of the container and not on the lid as the latter may become separated from the container during processing in the laboratory. Always use indelible markers for labelling.

Do You Need to Sample Anyone or Anything Other Than the Patient?

When collecting samples from a patient, you should always consider whether you need to take (or arrange to have taken) samples from another source such as contacts, animals or the environment. Sampling from contacts may be necessary for:

- Early detection of infected individuals
- Searching for asymptomatic/subclinical cases
- Studies of the prevalence of infection
- Assess possible susceptibility to infection

If there is the possibility that the infection is due to a zoonotic agent or a contaminated water or food source, then you may need samples from livestock, wildlife, food, water or the environment.

Sampling Safety

The safety of individuals collecting samples is of vital importance. Many emergency aid programmes are carried out in areas where extremely dangerous pathogens may occur (e.g. viral haemorrhagic fevers). Even if the pathogen being sought is not considered particularly dangerous, the patient may have another infection that presents a real hazard.

Standard precautions should always be taken, and adequate supplies of PPE and facilities for hand decontamination must always be available. Provision must be made for:

- Safe handling and disposal of sharps
- Safe disposal of clinical waste
- Safe handling of contaminated linen
- Correct methods for dealing with spillages of blood and body fluids
- Decontamination of reusable devices and equipment

Some procedures are inherently dangerous. For example, sampling from the respiratory tract is hazardous because the operator is very close to patient and the procedure can generate aerosols and droplets.

Personnel who undertake sampling procedures, especially during outbreaks, should be monitored carefully. If a member of the clinical or laboratory staff becomes ill, check whether they have been collecting or handling samples and if so what, when and where. If an incident occurs during sampling, those involved should be watched for signs of illness for the incubation period of the infection (including daily temperature measurement). View any evidence of illness in that period as a suspected case of the disease and treat appropriately.

Storing and Shipping Specimens

To get a satisfactory result, you must always store and ship specimens under the appropriate conditions. Transport media are designed to keep the relevant organisms alive but can only do so if the specified conditions are maintained. This often means the involvement of a cold chain.

Storing Specimens

- Specimens should be transported to the laboratory as soon as possible.
- Samples for virology should not be stored in a domestic-type freezer but should either be kept on ice or in refrigerator at +4 °C or should be frozen to –80 °C or lower.
- Blood serum for PCR or antibody determination can be stored at –20 °C (in a domestic freezer) and can be stored at 4 °C for up to a week.
- Samples for virus isolation should never be stored in dry ice (solid CO₂) unless they are sealed in glass vials or sealed, taped and double plastic bagged because CO₂ can inactivate viruses.
- Samples for PCR for some viruses can be stored in absolute ethanol at room temperature. (Check if this is suitable for the organism you are seeking.)
- Samples for antibody detection can often be stored and shipped air dried on special filter paper.

Repeated freezing and thawing of samples (e.g. for subsampling) can damage organisms and antibodies. It is much better to divide a specimen into several subsamples before it is frozen.

Why Ship Specimens?

In the developed world and under normal conditions in many other countries, specimens will reach a laboratory within an hour or two of the sample being taken.

However, in countries with poor or damaged infrastructures and especially in wars and disasters, there may be a need to send a specimen to a laboratory at some distance from the sampling site, and in some instances it may be necessary to send the specimen to a laboratory in another country. The reasons for the latter can include:

- Local or national labs cannot provide tests needed.
 - Identification (some pathogens are difficult to isolate or otherwise identify in the laboratory – viruses, anaerobic or microaerophilic bacteria, some aerobic bacteria, some fungi).
 - Precise identification often requires technically complex tests.
 - Antimicrobial sensitivity.
- The standard of local or national laboratories is inadequate.
- It is necessary to send a specimen to an international reference laboratory for confirmation or special testing,

Packing and Shipping Specimens

If specimens are to be shipped out of the country, the demands of time mean that it is almost always necessary to send them by air. If this is to be done, you must follow official requirements when shipping specimens.

- Specimens must be sent according to the rules laid down for this activity.
- You cannot take infectious substances or diagnostic specimens on passenger aircraft as carry-on baggage.
- Infectious substances cannot be shipped in diplomatic bags.
- Transport of specimens within national borders must comply with national regulations.

There are very detailed regulations laid down by the International Air Transport Authority (IATA) governing the shipment of specimens which are known or are reasonably expected to contain pathogens (that is to say organisms (viruses, bacteria, Rickettsias, fungi, etc.) or agents (such as prions) which can cause disease in humans or animals). These are divided into two categories, A and B. These are defined as:

- Category A

An infectious substance which is transported in a form that, when exposure to it occurs, is capable of causing permanent disability, life-threatening or fatal disease in otherwise healthy humans or animals.

- Category B

An infectious substance which does not meet the criteria for inclusion in Category A.

Details of the substances covered, guidance as to what is included in the different categories and the methods by which they need to be shipped are summarised in the

WHO publication “Guidance on regulations for the transport of infectious substances 2011–2012.” (This document is revised about every other year, and it is always worth checking the WHO website to ensure that you have the latest version.) In broad terms:

- *Packaging*: The specimens have to be shipped in specially designed triple packaging systems that can contain any leaks and must be labelled appropriately. If refrigerants are involved, the container must be labelled to identify these. Extensive documentation is required including import or export licences (see the WHO Handbook for details).
- *Airmail*: Some specimens (such as air-dried blood spots on filter paper) can be sent by air mail, but Category A substances cannot and airmailing of Category B substances requires the use of basic triple packaging and appropriate labelling. Substances exempt from the IATA regulations can be shipped by airmail without problems.
- *Packing specimens*: Substances in Category A must be packed for shipment by specially trained packers. Since this training is expensive, it is unlikely that a normal aid team will have a suitably trained staff member available (although some laboratory workers are trained for this work and a local hospital may have such a staff member). Specialist shipping companies can provide this service, but it is expensive as a packer will have to travel to the country where the team is operating to undertake the work. This has major implications for the costs of the programme, and this must be taken into consideration at the planning stage when laboratory activities are considered. Special packers may also be required if particular refrigerants or other chemicals are involved.
- *Other considerations*: Specimens cannot be carried on board aircraft in hand baggage nor can they be shipped in diplomatic bags.

Refrigerants

Specimens must be kept at the correct temperature during shipment and this implies the use of a suitable refrigerant. Specimens that can be kept at normal refrigerator temperatures (+4 °C) can be sent chilled with wet ice or cold packs. However, if lower temperatures are required, then either dry ice or liquid nitrogen must be used and these present some problems.

- Both substances are asphyxiants and must therefore be handled in well-ventilated spaces.
- Both are very cold (dry ice = -78.5 °C, liquid N₂ = -196 °C) and appropriate protective equipment must be worn (e.g. gauntlets, footwear, apron, eye protection) especially when handling liquid N₂.
- They need special insulated packaging
- The containers must be able to vent evaporated gases to the air to prevent explosions.

- Liquid nitrogen can cause metals to become brittle. It can only be sent by air in a device called a dry shipper in which the liquid is bound to an absorbent compound so that it cannot spill.
 - A charged dry shipper will last up to 5 days.
 - A charged dry shipper can be sent into a country by the shipping company or the receiving laboratory.
 - Dry shippers should be marked with ownership details and arrangements made to return the shipper to the originating laboratory

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Chapter 52

Enablers and Confounders: Achieving the Mission

Ken N.A. Millar

“The best laid schemes o’ mice and men gang aft agley”

Abstract You have planned extensively to achieve your mission; your preparation, you think, is perfection itself. What could possibly go wrong after all the hard work you have done? Actually, quite a lot can either go wrong or at least not go quite right, as the quotation from Robert Burns in the heading of this chapter indicates. It is said in military circles that no plan survives first contact with the enemy. This healthy cynicism is equally applicable to any plan, which relies on assumptions on the behaviour of others, including plans to deliver medical care in support of the victims of conflict and catastrophe. Prime Minister Harold Macmillan perhaps put it in a nutshell. When asked what constituted his biggest problem, he replied, ‘Events, dear boy. Events’. Events for which we have not planned, or which are outside our control, can throw us into confusion if we have no available response to them. Even a small event can have major consequences – the so-called butterfly effect in chaos theory. As I hope you will glean from this chapter, there are a lot of butterflies about!

Keywords Preparation • Intelligence • Team selection • Team Preparation • Reconnaissance • Equipment • Information • Communication • Coordination • Infrastructure • Contingency Plans • Rehearsals • Delegation • Hierarchy • Sustenance

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Objectives

- To assess whether or not, in terms of achieving a mission, all the enablers are harnessed and by so doing whether most of the confounders have been isolated, by analysing this through the lenses of preparation, information, communication and coordination.

Introduction

You have planned extensively to achieve your mission; your preparation, you think, is perfection itself. What could possibly go wrong after all the hard work you have done? Actually, quite a lot can either go wrong or at least not go quite right, as the quotation from Robert Burns in the heading of this chapter indicates. It is said in military circles that no plan survives first contact with the enemy. This healthy cynicism is equally applicable to any plan, which relies on assumptions on the behaviour of others, including plans to deliver medical care in support of the victims of conflict and catastrophe. Prime Minister Harold Macmillan perhaps put it in a nutshell. When asked what constituted his biggest problem, he replied, 'Events, dear boy. Events'. Events for which we have not planned, or which are outside our control, can throw us into confusion if we have no available response to them. Even a small event can have major consequences – the so-called butterfly effect in chaos theory. As I hope you will glean from this chapter, there are a lot of butterflies about!

So what is suggested is that to ensure that your plan has the greatest possible chance of success, you must be prepared to ask yourself a few more questions. If you do not, then perhaps your efforts may falter as you step on a number of banana skins and may not have the outcomes you foresaw or desired. There are a number of potential enablers to maximise the effectiveness and efficiency of your efforts – conversely, there are many confounders to frustrate your hard work. Diligent attention to the enablers may reduce the effects of most confounders – but if the existence of these two related spirits, benign and malignant, is not recognised, then woe betide you, your sponsor organisation and your target population!

The questions you need to ask are designed to discover if you have harnessed all the enablers and by so doing isolated most of the confounders. They involve looking closely at yourself, your team and your mission. They also involve taking a wider look at what is going on round about you. It is often easy to become fixated by the detail of your own, highly specific tasks and lose sight of the larger picture within which you and your team need to operate. None of us (individuals or teams) can work effectively in a vacuum; the proper appreciation of our necessary interfaces with others represents an important enabler; this will be enlarged upon later.

It is not intended to list every enabler or confounder – indeed, it would be impossible to do so, as each new situation will have its own peculiarities. Each different mission must be analysed to seek out the confounding factors that could cause drag or even failure and identify the streamlining enablers that will add value to your

work. Most of the factors that will be dealt with here are covered either explicitly or implicitly elsewhere in this book; however, this chapter gives a reality checklist which can be applied relatively simply to any potential situation.

We are dealing here with an almost infinite spectrum of possibilities. The emergency may occur against the gamut of geographical, climatic and political backgrounds. The response may be defined as contingency (pre-planned reactions to specific catastrophes – such as the London Major Incident Plan) or emergency (immediate reactions to the previously unforeseen such as response to the Asian Tsunami). The nature of the catastrophe may be conflict, man-made disaster or natural disaster. The spread of possibilities is clearly too great for a detailed examination of all potential enablers and confounders; thus an approach which should be applicable to any planning process has been adopted. This should, it is hoped, give you the necessary tools to make the best of every situation. All that needs to be done is to apply coherent thought, adopt a different perspective and (perhaps most important of all) accept with sufficient humility first that your plan may be less than perfect and second that its success or failure depends heavily on external factors.

The chapter will use the following broad headings to cover the topic; but beware, as this is not a compartmentalised discipline. The headings have been used purely to allow some order in the setting down of these points on paper, rather than to separate or allocate any priority, although the order in which the headings appear reflects a logical sequence of planning events. These factors are all interlinked and interdependent and of course may have quite different weighting in specific situations. Examples of confounders are given where practical (and if the point is not already obvious) to illustrate the importance of the thought process involved. No apology is offered for what may appear to be blinding glimpses of the obvious; what is clear to one may be obscure to the next reader. The broad headings are:

- Preparation
- Information
- Communication
- Coordination

Preparation

Before responding to any catastrophe or indeed making major contingency plans against foreseen major incidents, there are certain preliminaries that need to be undertaken. There may, or may not, be time for all of these to be properly attended to in every instance. If they are not at least considered, then matters may conspire to confound the outcomes. The major contingency plan is not dealt with in separate detail here, except for some words on rehearsals. This is not to say that these plans are less important, but that the abundance of time and resources available to make such plans is all that sets them apart. The factors that need to be taken into consideration in the contingency plan are, broadly, the same as for any emergency response.

Intelligence

Before making any plans, certain intelligence is essential. This includes the following:

- What is the plan meant to achieve? In military terminology, what is the mission? If you do not know, then success in achieving it is unlikely! Does your mission accord with that of your sponsor organisation?
- To whom are you (and your team) responsible? Is this the same point of contact you will use for all matters such as resupply? There will always be confusion here, especially if something goes wrong. You need to know your points of contact – and their perceptions of their responsibilities need to agree with yours!
- Are there any major constraints? These could be in terms of time, money, manpower or politics. If your plan fails to consider these factors, it may be unrealisable.
- Geography and climatic considerations, including endemic disease, may impact on your choice of personnel, apart from anything else.
- Is anyone else involved? Other agencies are bound to impact on the execution of your plan – the more so if you have not considered them.
- What is the size and shape of the problem? Numbers and types of casualties likely to be involved should shape your response.

Team Selection

In selecting your team (provided you are given any choice in the matter), there are a number of factors worth considering if you are to increase your chance of success. You may care to think about:

- Motivation
- Experience
- Accreditation
- Physical and mental fitness
- Ability to work together

Reconnaissance

The value of a visit to the affected area cannot be overstated. Actually seeing the problem on the ground will dispel preconceptions which may be totally erroneous and which could lead to an inappropriate response. If it is impractical to visit in the time frame concerned, the next best option is to meet with someone who has recent experience of the area. I say ‘meet with’ rather than e-mail or telephone – a

conversation is more likely to bring out difficulties than a response to a series of questions based, essentially, on your preconceptions. Even if you are conducting a physical reconnaissance, do not miss the chance to tap into the personal experience of others.

The ‘map recce’ is the poorest option. While it may give a general impression, it cannot show the whole picture. For example, maps of the Falkland Islands in 1982 showed an extensive network of tracks. To the UK or Northern European observer, used to that interpretation of a track, this suggested that road evacuation of casualties would be possible. The reality was that these ‘tracks’ merely indicated a general route over blanket bog, passable only with extreme care by the local population using specialised knowledge, and never using the same wheel ruts twice. Any attempt to have relied on these tracks for military wheeled transport would have been a total failure. Luckily, the wrong conclusions were not drawn on this occasion!

Reconnaissance can deliver a host of information if it is properly conducted. Preceding reconnaissance, the value of taking steps to speak to those with prior experience of the area is again stressed; this can avoid unnecessary work, can point you in the right direction as to any personalities you may need to contact during your visit, and may even cause you to alter your entire approach. Do not be afraid to ask questions or to change the nature of your planned response as a result of such conversations. Carry out your recce as early as possible, with a small team of the relevant experts (this might be only yourself, of course). Prior to departure you need to be aware of specific questions you wish to have answered and if possible have a list of people, organisations and places you need to visit. It is not possible to give an exhaustive list of questions you might like to have answered, as clearly these will vary from situation to situation. It should also be remembered that reconnaissance is applicable to major contingency planning, although the parameters may differ substantially. A list of headings for a recce in preparation for emergency deployment could include:

- *Time and space*: How long will it take you to get from your point of arrival to the location in which you will be operating? What about your initial supplies and indeed resupply?
- *Infrastructure*: Water and food for your team and your patients? What about power supply? Roads and routes? Telephones and other information communication capabilities? Accommodation for your team?
- *Local medical facilities – indigenous*: Who, what, where, how stretched and what assistance do they need?
- *Local medical facilities – other (NGO, etc.)*: How will you interoperate with these? It is important to know before departure what other agencies are likely to be involved, and if possible establish points of contact with them.
- *Local political contacts*: These are necessary to facilitate cooperation, manpower and coordination of requirements. You may need their assistance from day one of your deployment, for example, to speed the passage of your team – and their equipment – through Customs/Immigration.
- *Local sensibilities*: A ‘feeling’ for local religious and political sensibilities.

Team Preparation

The available time to prepare your team is likely to be limited. It would be ideal if the team could be brought together before they meet in some departure lounge, but this may not be practical. There are certain matters that need to be attended to as a matter of urgency even if the team cannot meet before the event. As the team leader, guidance on these will have to come from you (if things go wrong, your head is the one which is likely to roll, even if the error is made by one of your team). What do you need to think about?

- *Passports and visas* – in date and valid?
- *Immunisation and prophylaxis* – including antimalarials. It is remarkable how many individuals manage to rationalise their non-compliance with these essentials – particularly in relation to antimalarials. (Rationalisation, in this context, may be defined as the mental gymnastics involved in justifying illogical or even insane actions!)
- *Briefing of the team before departure* – this can be in the departure lounge, but it must happen.

Equipment

The question of equipment is of clear importance. There are two aspects: personal equipment and team equipment. Both are essential to the effective achievement of your mission. You need to think about:

- *Clothing* – not only should it be appropriate to the climate, the non-availability of laundry and the comfort of the individual, it must also avoid upsetting local sensitivities. Military style or even colour should perhaps be avoided. Modesty is considered a personal matter for many, but female modesty is of great importance to some religious faiths.
- *Personal equipment* needs to be robust and adequate for the reasonable comfort of the individual depending on the situation. Weight restrictions need to be remembered for air travel and because of the potential need for this to be carried by the individual – taxis and porters tend to be in limited supply in disaster areas.
- *Medical equipment* needs to be appropriate both to the task and to the expertise of the team. It needs to be in sufficient quantity to allow operation until such time as resupply is likely to be available.
- *The team should either fly with their equipment or follow it immediately.* On no account should the team be separated from its equipment – an obvious statement to us, but not necessarily to those concerned with drawing up cargo and passenger manifests.

Major Disaster Contingency Plans and Rehearsals

A major incident response contingency plan may be (indeed should be) practised, and such practice should allow the plan to be modified prior to its having to be realised. However, rehearsals will not throw up the lessons necessary if they are not conducted with adequate realism, with the proper involvement of all ‘players’ and with a critically objective evaluation process. This demands, it is suggested, an external peer review, rather than an internal management assessment. The plan must convince the external assessors that it will work, not merely convince an internal team that a plan exists! To achieve this, rehearsals should always impose real-time delays, real times for treatments and patient movement, and must involve all departments, including subcontractors responsible for cleaning, catering, supplies and the like. The one phrase which must never be heard during such rehearsals is ‘Ah, but for real we would...’. This (quite prevalent) attitude is perhaps the greatest enemy to genuine assessment of the flaws in any plan.

Information

We have already hinted at the importance of information in relation to intelligence gathering in preparation and reconnaissance. However, there is more to this topic than the mere gathering of facts upon which to base your plan, and there are certain caveats regarding information which need to be taken into account to bolster the chances of success.

Information not only has to be sought by you to construct – and of course to amend – your plan; it will also be sought of you. It is an unfortunate truth that others (your sponsor organisation, local government officials or other aid agencies) will press for a variety of seemingly irrelevant information from you and your team. It is also Murphy’s Law that such information will be sought when you are at your busiest, doing what you thought you were there to do! To minimise the impact of this additional burden, it is worthwhile having in place a system that will gather such information in advance of the question being put. This will avoid having to go back over work, having to bother team members and having to erode the time available either for your main effort or for rest.

Basic details on numbers and types of casualties treated, any specific diseases which may be prevalent, levels of available stocks and any critical factors which might diminish your capacity need to be maintained as records. Records also need to be kept for immunisations administered; this information is likely to be sought by local government after the initial crisis has passed. The ability to respond rapidly to requests for such information, apart from making your team look good and reducing unnecessary work surges, has the knock-on effect of giving you a perspective of

your efforts which could convince you to adjust your approach. It also has the potential, when you seek information from 'above', to convince the relevant agencies that, as an efficient and competent team, you actually merit their urgent attention!

This sort of detail cannot be maintained without the compliance of your team. You will need to convince them that record keeping in the emergency situation is just as relevant as it is in their normal environment. Without records from previous emergencies, of course, there are no parameters against which to plan for the next one. Records of your current deployment will potentially be the basis for the next emergency relief operation; lessons can be (and should be) identified from such information. You may note that I have used the term 'Lessons Identified'. Often this is quoted as 'Lessons Learned' – but unless we can be absolutely sure that this is the case, they have merely been identified. For example, it has long been identified that debridement and delayed primary suture was the appropriate immediate surgical treatment for many penetrating battle injuries. However, this lesson seems to have to be relearned by at least some of the surgical participants in every new conflict! Education is required, by the proper passage of that information, to ensure that the lessons are indeed learned.

There will be a mass of information available to you if you seek it out, as you must. Not all of it will necessarily be of direct relevance to what you are setting out to do – or it may appear to be irrelevant. Interpretation of the information is needed to apply it to the construction and execution of your plan. First, you need to assess its veracity. Always check your source, and ensure the accuracy of any information you receive before acting on it. Messages may be corrupted in passage, particularly if they are less than clear in the first place. The old chestnut of 'Send Reinforcements, we are going to advance' becoming 'Send three and four pence, we are going to a dance' may be silly, but it serves to demonstrate the importance of confirming the exact text of any message. Each snippet of information should be interrogated by the simple question 'So what?' If the answer really is 'So nothing', you can pass on. But before doing so, it is worth applying a second interrogation, namely, 'But what if...'. In other words, individual items of information may be of little apparent relevance, but when taken together may gain importance. You need to explore in depth, investigate if the information is incomplete, extrapolate if necessary and thereafter adapt your approach if that is your reasoned conclusion. Sticking rigidly to the original plan may be the easy way, but it is unlikely to be the most successful.

Do not, therefore, be afraid to be critical of your plan or indeed of the master plan into which yours must fit. That does not necessarily mean that you have to shout the odds with your employer or sponsor agency over the fine detail, but neither must you stay silent if you perceive a major confounder. To give yourself the necessary opportunity to adopt a critical approach, as a team leader, you must allow some time for contemplation. If you are exhausted, you have neither the will nor the capacity to make a reasoned appraisal.

Communication

Information without communication is, of course, worthless. This brings us to the topic of communication, which does not just mean the use of radios, telephones and the Internet – although all of these are important. I will deal with matters involving electronic communication first, before moving on to a more general examination of the ‘whys’ and ‘wherefores’ of communication.

We have all become dependent on electronic communication systems, and they clearly are of enormous benefit to the proper conduct of a relief operation. But there are downsides to the proliferation of electronic communication means in this context, of which you need to be aware if only to ensure that the glitches do not come as a complete surprise to you. These are:

- *Information overload:* The ability to access information and communicate with ease may produce such a quantity of information that we are unable properly to interpret it. This is also true in reverse; the ability to seek information may mean that an excessive amount of time is spent answering detailed questions – the answers to which, of course, add to someone else’s information overload!
- *Inappropriate conversations:* The relative ease with which individuals can communicate with friends and mentors at home may produce difficulties. It is not unknown for individuals to embark on separate therapeutic management schemes from those agreed within the team as a result of electronic chat with others at home, who may not be fully aware of the situation for which their advice is being sought.
- *Security matters:* Indeed, security does matter! Careless talk on the Internet can leak and end up in the wrong hands. The intention of the naïve correspondent on the net is not to breach security, but his chat can end up either with ‘the bad guys’ or with the press. This can, at best, lead to a loss of confidence in your team by sponsors, other organisations or the population you are attempting to assist.
- *Misinformation:* The Internet is potentially a source of much more rubbish than truth!
- *Capacity limitations:* The very availability of instant, personal and worldwide communication facilities means that everyone wants to use it at once. Unfortunately, the channels available are limited in their absolute capacity to carry information – particularly if the information package is large. You may have to fight for dedicated times, bandwidths or radio frequencies in order to do your business effectively, as there may be many competitors for these. The key here is to minimise the use of your communication means, rationalise your messages and stick to the essentials.

But there is more to communication than handsets, screens and chat lines! For any complex task to be successfully completed, the communication of ideas, instructions and methods is vital. That communication needs to be rapid and needs

to involve (although in differing levels of detail) everyone involved in the job. Earlier, I spoke of the need to brief your team before departure to the theatre of operations. This is the start of a process that needs to be carried out at regular intervals from the beginning of the deployment to the last moment before the team leaves for home. Everyone will have their own methods of carrying this out, based on the situation, their personality and the personalities of the team, but there are certain basic parameters that should guide leaders in the proper conduct of this function:

Input: You will be unable to brief your team in an information vacuum. You need to attend briefings yourself, take notes and filter that information downwards. If no such briefings exist, it is most strongly suggested that you demand them of whoever is the head of the overall relief operation. If, of course, you are that individual, it is down to you to brief all dependent team leaders. Input, of course, is not in one direction. As the leader, this is your opportunity to be briefed by your key personnel on any problems they may have and make any necessary changes.

Clarity: You need to be absolutely clear of your mission. If this fits into a larger operation, you need to understand fully the larger mission. This is perhaps the single most important concept to grasp. Without clarity of your task within the larger task, it is not only possible, but likely, that you and your team will find yourselves moving away from the original task, driven by your essentially limited local perceptions from day to day, and thus fail to achieve what was originally intended. This is known, in military circles, as ‘mission creep’ – a gradual loss of focus on the original notion for which the operation was funded, manned and equipped, resulting in an inevitable limitation of success in a changed mission – for which different levels of manning, equipment or indeed funding would probably have been required.

Output: As a leader, you need to pass on information and instruction to your team. If this is not formally carried out, with a set list of attendees at a regular time each day, then mistakes will occur. In the absence of officially sanctioned information, human nature will concoct rumour. For your part, you must avoid speculation – for if the rumour source is the leader himself, it gains credibility. It is suggested that briefings of key personnel within the team need to take place daily – even if the leader is not formally briefed daily. Only by so doing can rumours be quashed at birth, can problems be identified before they are unmanageable and can the team maintain its cohesion.

Identification: The formal briefing may be the only time that the various protagonists come together. Thus it gives them the opportunity to have an overview of the complete operation, therefore allowing them better to identify their place within the whole. It also gives them the opportunity to understand that others have problems with which they are struggling, therefore perhaps putting into perspective their own. It also, significantly, demonstrates to each individual attending the briefing that they are of equal importance to the success of the plan, that they are considered so by the leader and that their voice is heard. Their voice is heard, of course, in open forum; this validates their viewpoint by the presence of witnesses, whereas a private conversation with the leader may not.

Coordination

What exactly do I mean by coordination? I have already alluded to the need to fit in with other players in the formation and execution of your plan; these players may include some you may not have originally considered as being directly relevant. It is the potential impact of these external forces that needs to be remembered if barriers to the successful achievement of your mission are not to be needlessly encountered.

Let us consider some instances where a failure to recognise the impact of outside influences could have effects on the effectiveness of your plan, and how proper coordination of effort can lead to better cooperation, greater overall understanding and increased efficiency. Some of these external influences are glaringly obvious and need little expansion here; these might include such matters as airport/port capacity affecting the ability to get your team or their supplies into the country, the existence of a military 'situation' where you are trying to deliver humanitarian aid or serious damage to the area's infrastructure leading to shortfalls in basic utilities (water, power, waste disposal, communications). All of these are likely to have been taken into consideration either by you or by the major coordinating agencies involved in the specific operation. But it is the little things that tend to pass unnoticed in the heat of emergency planning that are likely to cause you problems.

It is reasonably assumed that your plans will have looked at the various contingencies that will affect it internally, that you have the manning and equipment relevant to do the job in hand and that within your team the plan coordinates individual functions to deliver an effective whole. In no particular order, I will suggest some areas you may have forgotten and indicate how these apparently minor matters can have a deleterious effect on the outcome of your carefully constructed plan. I mix, to an extent, the home-based major disaster plan with the overseas humanitarian effort; the thought process needs to be applied both to the proactive contingency plan and to the reactive relief plan.

Exits and Entrances

The 'doors' to your facility are important, as are the controls you place upon them. Access through the front door needs to be kept fairly tightly controlled if you are not to be overwhelmed by inappropriate patients, let alone their immediate families, the so-called worried well and of course the media and (unfortunately) the 'rubbernecker's'. But care needs to be taken that this control is sensibly applied and that inappropriate gatekeeping does not create a problem. For example, in a major incident, there are likely to be police cordons established to control population movement. If the police gatekeepers are not involved and informed, they are likely to prevent staff reaching the hospital – not just medical staff but all the other essential workers needed to ensure the major disaster plan works.

What is your plan for the management of the 'worried well'? Have you identified and secured an alternative location where they can be diverted and managed? How are they to get there?

What about the so-called walking wounded? The operative word here is, of course, 'wounded'; such cases must not be neglected or they will deteriorate. Staff and particularly space need to be dedicated to these, who are likely to represent a large proportion of the overall casualty load. If possible, following triage they should be directed to a separate area in order that they do not inappropriately divert the attention of staff from the more serious priorities.

What about the back door of your facility? How are patients to be discharged, and to where? Can they be traced subsequently? Have you identified a suitable area for the dead? Are the facilities for the dead adequate, including if necessary provision of cold storage?

Is there a simple and foolproof method to identify the whereabouts of individual patients? Relatives will be attempting to trace their kin, and without such a method, they will inevitably clog the switchboard – the electronic entrance to your facility.

Friends and Neighbours

There are many who may wish to help or be available to help. Their assistance will be enhanced if it is planned, focussed and coordinated. Obvious sources of this assistance include other medical organisations, such as neighbouring trusts which should be involved in major disaster plans to spread the load. Other sources may need more careful management; the voluntary organisations will be keen to help, and it is suggested that they may be better employed as an adjunct to, rather than a replacement for, the professional teams. It may be tempting to allocate them to specific tasks, such as caring for the 'worried well', but they represent an unknown quantity and as such need careful management.

Other locations may need to be examined to help in your plan, for example, the identification of non-medical facilities to use as overflows for the less serious, as a morgue or for the containment of relatives seeking information. Schools, warehouses and halls in the vicinity can all be used; it is much easier to achieve this if major contingency plans have not only identified the locations but also ascertained the means of access and the permission of the owners in advance.

The various levels of command involved in management of either a major disaster plan or a relief organisation are, of course, on your side. But are you sure that they understand your thought processes – and of course that you understand theirs? Lack of coordination at the higher levels may be caused simply by a failure to communicate; it is important that the thought processes at the various levels are shared to avoid confusion. This cannot be achieved without representation by the medical component, or at least a recognised point of contact, at each level of command. Different priorities will exist; the authorities may be concentrating on damage limitation following an event, rather than on the direct consequences of that event. Thus

their focus may be on tight control of movement, closure of routes, channelling of population and maintenance of order rather than on enabling the medical plan in support of the initial occurrence. Unless they are appraised of your problems, they will be unaware of their existence and therefore can do nothing to alleviate them.

The media will inevitably be involved. If handled appropriately, they are a power for good. However, if they are not given the facilities and information they require, they may become a serious obstacle to the proper execution of your plan. It is important to remember that if the media are not given facts, some of them may resort to rumour and speculation. It is suggested that you need a dedicated media spokesman and that all other staff members are dissuaded from communicating with the press. You will need to ensure that inappropriate access is not permitted if patient confidentiality may be compromised either in words or in pictures.

Delegation and Hierarchy

The need to be able to delegate tasks is paramount. Delegation needs to be associated with a clear demonstration that you trust the person to whom the task has been given both to carry it out and, most importantly, to come back to you if there are any problems. Delegation does not, of course, absolve the delegator of the responsibility of ensuring that the task is completed, so a degree of sensitive supervision is advisable, especially in the early stages. The key word here is 'sensitive', or the perception that you trust the person to whom the task has been delegated may be undermined!

The ability to delegate assumes the existence of some sort of hierarchy. The structure and function of that hierarchy needs to be fairly clear to all, as without that clarity the potential for matters to fall between the gaps is magnified. A simple hierarchy is best, with each individual or group within the structure having a single point of contact in the level above. If this is not the case, instructions will be confusing, reporting of problems will fail to produce results and responsibility for shortcomings in execution may slip from the sloping shoulders of those who find a loose structure a useful excuse for their incompetence!

The other benefit of a tight hierarchy is that it tends to drive towards a more efficient utilisation of resources. Overlaps and duplication of effort can quickly be spotted; conversely gaps in the matrix are also more immediately obvious.

Actions and Reactions

Things will undoubtedly go wrong, even in the best of plans. Applying the 'What if...?' question may have helped to establish a set of reactions to the problems it forecasts, but there will still be the unexpected event which throws everything out of kilter. There are two potential responses to this major confounder: the first is the headless chicken response; this is common, highly stressful, unproductive and not

recommended. The second is to draw together the team, work through the factors that are confounding your activity and agree a response. The response may not be the right one, but the process has been established, and the response can at least be justified. To do this, you need to have thought about the following in advance – in other words your basic plan needs to include how you will react to the unforeseen:

- Identifying and nominating your hot planning team
- Having a callout procedure for that team
- Identifying points of contact in the hierarchy above your group/team
- Maintaining clarity of purpose – your mission remains the same
- Pre-identifying alternative locations and routes

Infrastructure and Sustenance

In order for the team to function, it needs a good deal of infrastructure. This is often relegated to the ‘someone else’s problem’ category and as such may throw up unforeseen difficulties. Although these matters may not be your direct responsibility, it is strongly suggested that you neglect them at your peril. The list here is potentially endless, but I will restrict myself to a few examples where consideration prior to the event may avoid pitfalls on the day!

- *Transport*
 - How does your team get to the location in which it is to function?
 - How do casualties move out of the back door of your facility?
 - Are there other trusts or organisations involved? What about Trades Unions or contractors?
 - Have you enough labour to act as porters?
- *Communications*
 - Are there dedicated telephone lines for urgent clinical matters?
 - Are there backup switchboard personnel to deal with the public remembering the need for 24-h cover? Have the Trades Unions been consulted?
 - Are there direct links to other relevant agencies?
 - Is there a policy on minimisation of usage?
- *Catering*
 - If the plan involves callout of all staff, have you made arrangements to feed them?
 - Have catering contractors (including suppliers) and the Trades Unions been involved in the planning process?
 - In humanitarian relief, have you deconflicted the needs of your team from the food shortages in the locality?

- *Clerical*
 - Have you considered the clerical workload?
 - How and where are you going to maintain clinical records?
- *Utilities*
 - Is there enough water to maintain basic hygiene in the facility (including blood and human waste)?
 - Is the power supply sufficient to maintain your technical equipment?
 - Have you a backup power supply, and does it work?
 - In humanitarian relief, is there a burial plan for the dead?
 - Can you rely on your fuel sources?

Random Thoughts

I draw together this meandering through the potential minefield surrounding the effective planning and delivery of medical support to a catastrophe with a few random thoughts and end with an apology.

The thoughts are not, of course, entirely random, but are intended as a reminder of the complexity of the situations in which we may find ourselves, and some of the thought processes which may help. They are in random order, however, and many are applicable to any emergency planning and deployment, not only those with a medical component:

- *Assumptions:* You are likely to have made many assumptions in constructing your plan. One difficulty is that you first need to identify all of these assumptions, as many will have been made subconsciously. Where at all possible, these assumptions should be tested. This may be simply by running them past someone else – preferably someone with a degree of experience who will be prepared to shoot you down. Sycophants need not apply for this task!
- *Mould to the Environment:* The environment in which your plan must function is outside your control. You cannot therefore mould the environment to suit your plan, so you need to adapt accordingly. The environment includes such matters as geography and climate but also involves religious and political sensibilities and the other agencies with which you need to cooperate.
- *Expectations:* Different groups will have different expectations of the outcomes of your plan. Be careful not to give the impression that you can do more than is practical. Your own expectations should also be pragmatic; if your targets are set so high that they can never be achieved, your morale, and the team's morale, will suffer. The expectations of the local population are also important; the delivery of high-tech medical support for a short period in a country where this cannot be replicated after you leave raises a number of important philosophical and ethical problems.

- *Exit Strategy*: When is your task over, and what do you do then? Is there a specific end point involved, such as your tasks being taken over by another team? Have you a plan to hand over responsibilities without any break in function? How will you leave the population you have served in terms of continuation of care? To whom will you hand over your records?
- *Judgement Calls*: The statement is frequently heard that such and such an action was the result of a ‘judgement call’. What is usually meant, unfortunately, was that a mental coin was tossed, rather than any critical evaluation taking place! ‘Judgement’ implies a process – however brief – balancing the potential costs and benefits of the various options. The mental discipline to apply the ‘What if...’ formula to every situation is hard to develop, but it bears considerable fruit.
- *Leadership*: Leadership may be considered a dirty word by many, implying that the democratic process is put in abeyance. However, when the chips are down, most of us have the need to turn to someone for guidance – that is, we look for a ‘leader’. The hierarchy referred to earlier assumes a degree of leadership; it also assumes a degree of trust in those either appointed or elected in that capacity. Being a ‘leader’ means taking on the responsibility for failure as well as success and also implies taking responsibility for the care and maintenance of the team. Such care and maintenance involves a number of duties, such as:
 - Monitoring the team to identify illness or stress early
 - Ensuring that team members have adequate rest periods (do not forget that you, as a leader, are also subject to fatigue)
 - Setting an example in terms of behaviour, both on and off duty
 - Intervention where interpersonal relationships become frayed
 - Ensuring that the team’s health is maintained by monitoring antimalarial prophylaxis, personal hygiene and the like
 - Listening to what the team members have to say
- *Critical Appraisal*: Stand back from your plan, try to see it from the outside and be rigorously critical. There will always be areas where it can be improved, either in terms of its overall effectiveness or in terms of efficiency – making it easier for team members to function. Despite the fact that the plan is your baby and that the birth pangs were dreadful, that baby needs the appropriate input if it is to develop into a fully functioning adult. Sometimes doting parents are less perceptive of their baby’s shortcomings or needs than they might be!
- *Audit*: Be prepared to substantiate the outcome of your plan, both during and after its execution. It is likely that you will be invited (directed?) to produce a report or reports. To facilitate this, keep notes as you progress. Bear in mind that the audit may be of assistance to future deployments, and try not to consider it as either self-flagellation or self-justification.
- *Flexibility*: Be prepared to bend with the wind. Rigidity in any plan is the likeliest cause of its failure to deliver what is required of it. But beware of gross changes on a daily basis – this only serves to confuse and will lose you the attention and loyalty of your team more rapidly than anything else. ‘Bending with the wind’ still implies having your roots in the same place – in your mission.

I feel I must apologise to the majority of readers for telling them what they probably already know. I excuse that by making the point that there will always be those who are suddenly placed in a position of responsibility in an area where their previous knowledge and experience is deficient. Indeed, even those of us who do have that experience and knowledge may still benefit from a checklist to help in what may be a fairly fraught time. In contrast, I apologise for what I have inevitably left out! There can be no absolute list, covering all eventualities, in an area of medicine that has so many variables. Indeed, to claim any list as exhaustive would be to fall headlong into the very trap of arrogance and rigidity that awaits us all if we are not careful, and which this chapter specifically tries to avoid.

Chapter 53

The Military Approach to Medical Planning

Martin C.M. Bricknell

Abstract This chapter will discuss the military approach to medical planning within the context of supporting both military and non-military populations. In addition to providing health service support (HSS) for military operations, military medical services have a long history in providing assistance in complex humanitarian emergencies. Military medical forces may be the only medical services available in the immediate aftermath of conflict and are often required to co-ordinate the re-establishment of civilian services. Military medical personnel were an integral element of the Allied Military Government of Occupied Territories that followed behind combat forces in the Second World War to re-establish the civilian infrastructure. UK medical personnel provided essential services in the immediate aftermath of the invasion in Suez in 1956. UK military medical services have also been directly tasked to provide humanitarian support as demonstrated in following an earthquake in Nepal in 1988, genocide in Rwanda in 1994 and forced population migration in Macedonia in 1999. Since 2001, in Afghanistan NATO military medical forces have been supporting the development of the civilian health system under the guidance of the Afghan Ministry of Public Health and International Agencies such as the World Health Organisation. More recently, UK medical personnel provided emergency medical services to civilians and undertook the first health needs assessment in Basra and Southern Iraq in 2003. The UK has provided emergency medical care and assistance with health sector development in Helmand Province in Afghanistan since 2006.

Keywords Military approach • Medical planning • Mission analysis • Medical CBRN • Medical C41 • Medical logistics

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Objectives

- To understand the military approach to medical planning within the context of supporting both military and non-military populations, on the basis of the UK Joint Operational Estimate using the following six steps:

Step 1 – Understand the Operating Environment (Framing the Problem)

Step 2 – Understand the Problem

Step 2a – Mission Analysis

Step 2b – Evaluate Objects and Factors

Step 2c – Commander's Confirmation

Step 3 – Formulate Potential Courses of Action (COA)

Step 4 – Develop and Validate Courses of Action

Step 5 – Evaluate Courses of Action

Step 6 – Commander's Decision

Introduction

This chapter will discuss the military approach to medical planning within the context of supporting both military and non-military populations. In addition to providing Health Services Support (HSS) for military operations, military medical services have a long history in providing assistance in complex humanitarian emergencies. Military medical forces may be the only medical services available in the immediate aftermath of conflict and are often required to coordinate the re-establishment of civilian services. Military medical personnel were an integral element of the Allied Military Government of Occupied Territories that followed behind combat forces in the Second World War to re-establish the civilian infrastructure. UK medical personnel provided essential services in the immediate aftermath of the invasion in Suez in 1956. UK military medical services have also been directly tasked to provide humanitarian support as demonstrated in following an earthquake in Nepal in 1988, genocide in Rwanda in 1994 and forced population migration in Macedonia in 1999. Since 2001, in Afghanistan NATO military medical forces have been supporting the development of the civilian health system under the guidance of the Afghan Ministry of Public Health and International Agencies such as the World Health Organization. More recently, UK medical personnel provided emergency medical services to civilians and undertook the first health needs assessment in Basra and Southern Iraq in 2003. The UK has provided emergency medical care and assistance with health sector development in Helmand Province in Afghanistan since 2006.

This chapter discusses the principles of Health Services Support (HSS) planning with specific consideration of the formal military planning tool called the 'Estimate'. HSS planning contributes within the planning cycle from strategic to tactical level and across the military staff branches. There are two discrete outputs from the

medical contribution to this process. The first output develops the health promotion and preventive medicine advice and actions required to assist in the maintenance of the physical, psychological and social health of the force. The second output develops the plan to provide missions and tasks for the medical elements of the force.

The medical planning cycle draws information from, and contributes to, almost all aspects of the operational estimate. For this reason the term ‘medical estimate’ is not accurate; what is discussed is the medical contribution to the estimate process. Medical staff will need to be fully engaged with the staff planning process in order to understand the wider context of the military operation and to frame the medical planning requirements. The medical contribution utilises standard staff tools and conforms to the standard staff format to ensure coherence between the operational, logistic and medical functions. There are a number of different military formats including the NATO Operational Planning Process, the UK Joint Operational Estimate and the UK Army ‘7 Questions’. This chapter is based on the UK Joint Operational Estimate using the following six steps:

Step 1 – Understand the Operating Environment (Framing the Problem)

Step 2 – Understand the Problem

Step 2a – Mission Analysis

Step 2b – Evaluate Objects and Factors

Step 2c – Commander’s Confirmation

Step 3 – Formulate Potential Courses of Action (COA)

Step 4 – Develop and Validate Courses of Action

Step 5 – Evaluate Courses of Action

Step 6 – Commander’s Decision

This generic structure is used for the operational level estimate though may have utility from the grand strategic level to the tactical so long as time permits. It is most suitable at the initiation of a military operation or when there is to be a major change of plan. Specific tools, unique to the medical function (such as Casualty Estimation and Health Risk Management), are introduced within Step 2 – Understand the Problem. The factors to be analysed fit a generic structure but the level in the chain of command at which the estimate is conducted will determine the breadth and depth of the consideration. This will be different for the officer commanding a Close Support Medical Squadron compared to the medical staff of a Joint Force Logistic Component Headquarters. Medical units or medical staff may develop specific checklists for use under each factor to support medical planning at their level.

At each stage the ‘3-column format’ is used. This is designed to allow the identification of a factor, the generation of a list of deductions that arise from considering that factor and finally the generation of outputs¹ that arise from the factor. The factor or deduction should be discarded if the consideration does not result in a task or constraint. An example is given in Table 53.1

¹Outputs should be a definitive action: Task, Request for Information, Specified Risk, etc.

Table 53.1 An example of the three-column format for creation of specific checklists used by medical units or medical staff to support medical planning at their level

Factor	Deduction	Output
Ground: Routes: main supply Route is 300 km	Max speed of blue-light ambulance travel on MSR is 50 kph. Amb response nodes are needed every 75 km if 1 h rule to advanced resuscitation is to be met (allowing for notice to move)	Task: put Amb response nodes at start, 75, 150, 225 km and end of MSR

It is designed to allow the identification of a factor, the generation of a list of deductions that arise from considering that factor and finally the generation of outputs

Staff Timeline

At the beginning a staff timeline should be constructed that shows what staff actions must be complete and by when in order to ensure that orders are conveyed to subordinates in time for them to conduct their own planning cycle. As a guide 30 % of the time can be allocated to understanding the situation and defining the problem; 50 % to formulating, developing and validating potential Courses of Action; and 20 % to producing and issuing formal direction.

Step 1: Understand the Operating Environment (Framing the Problem)

Step 1 concentrates on gathering and analysing sufficient information to enable the commander and staff to understand the true nature of the operating environment. This will invariably involve consultation upwards (to the higher command), sideways (allies and other agencies) and downwards to subordinates. It is important to obtain as much background material as possible. This may include maps, orders from higher formations, intelligence summaries, a Medical Intelligence Assessment, a Medical Warning Notice and even information downloaded from the Internet (see list of websites at end of chapter). The following key elements will be required: the history of conflict, geostrategic position, physical geography, national and regional infrastructure, population and culture, political and social situation, economy and nature and role of actors in conflict. The medical staff will be expected to develop the Medical Intelligence Assessment at this stage.

Step 2: Understand the Problem

This step converts the framed problem into an understanding of the mission and tasks that the military force will be required to undertake. It is divided into three sub-steps – Mission Analysis, Evaluation of Objects and Factors and Commander’s Confirmation.

Step 2A: Mission Analysis

Ideally the estimate process begins with Mission Analysis based on the mission statement provided by the higher headquarters. This mission statement should be a unifying task with a purpose. However, it may be difficult to write concise mission statements for the medical elements of the force and so a series of tasks may be used. As a general guide, the medical mission statement should include some guidance on where, when and for how long, at what distance, what type of operation and the size of the force or population to be supported. In many circumstances the medical commander will not be given a mission statement and so it may be necessary to start by deriving a medical mission statement from the operational commander's mission statement.

The purpose of Mission Analysis is to establish what effect a commander has to achieve in his superior's concept of operations. This requires an understanding of the superior's end state and main effort. A commander is required to understand his superiors' intent at two levels above in order to place his own actions into full context. A Warning Order should be issued at this stage.

There are four key questions to be considered in Mission Analysis:

Question 1: What is the higher commander's intent? What outcomes are sought and what objectives are deemed necessary to reach them?

Question 2: What is my role in the higher commander's plan?

Question 3: Do I have the freedoms, capabilities and authorities to achieve my mission?

Question 4: Has the situation changed and, if so, how does this affect my mission?

Examples of mission statements given to military medical forces in post-conflict operations are in Box 53.1.

Box 53.1: Examples of Mission Statements Given to Military Medical Forces in Humanitarian Operations

Kurdistan 1991 – To assist in the provision of security and humanitarian assistance in order to expedite the movement of Kurdish displaced persons from refugee camps directly to their homes

Rwanda 1994 – To provide humanitarian assistance in the Southwest of Rwanda in order to encourage the refugee population to stay in that part of the country

Iraq 2003 – To assess and regenerate the Iraq medical system as smoothly as possible, in order to create the conditions for a stable and secure medical environment in Iraq

Step 2B: Evaluation of Objects and Factors

The Evaluation of Objects and Factors Step of the Estimate is designed as a series of tools and checklists to ensure that all aspects of the problem are considered. An object is a person, group of people or things to which the commander's action is directed. For HSS this will certainly be casualties of conflict as defined by Population at Risk (PAR). Factors are those issues from which important deductions that affect the operational plan can be drawn. The following are mandatory: environment (including ground and weather), enemy, friendly forces (including combat service support), surprise and security, and time. In addition the following medical factors (which generate specific staff actions) may be used: Casualty Estimate, Medical Force Protection, Medical Capabilities, Medical Logistics, Medical CBRN and Medical C4I. The generic structure is designed to enable the Evaluation of Objects and Factors to be performed by a single individual or divided amongst several officers working within a medical staff or a unit headquarters.

Environment (Distance, Destination)

This factor considers the climate, topography, infrastructure and distance where forces are to be located. The use of graphical techniques (map overlays, etc.) allows multiple sources of data to be integrated into a single source of information for medical planning. Distances between map features should be converted into time to facilitate the link between the clinical timelines and potential locations of units.

Enemy Forces (Threat Evaluation)

Threat Identification

Threat Evaluation is the process that links the enemy's military capability to an assessment of the types of casualties that might be expected. The medical staff should discuss with intelligence staff the types of weapon systems that might be utilised by the enemy in order to generate a list of the range of injuries that might require treatment as a result of military operations. These may be the result of direct violence such as small arms, indirect fire and airborne delivery systems. Weapon systems may cause indirect violence from mines, improvised explosive devices, etc. The effects of emerging weapon systems such as enhanced blast weapons (e.g. Fuel Air Explosives) and directed energy weapons (DEW, lasers, etc.) should also be considered. The disease threats should be included within the Threat Identification list to provide a comprehensive start point for the Health Threat Integration conducted within the Medical Force Protection factor.

Threat Evaluation

Threat Evaluation links Threat Identification with the enemy's doctrine for the tactics likely to be used against friendly forces. Intelligence staff may produce a graphical overlay that will allow assessment of the locations where casualties might be generated. This should also determine effect of the threats identified on the human body (e.g. gunshot wounds are very different from those caused by improvised explosive devices).

Friendly Forces (Population at Risk)

Population at Risk (PAR)

A formal assessment of the PAR is required to determine the dependency of the military health system. This should be appropriate to the level at which the estimate is being conducted and may include the following forces: UK forces (force troops, Contractors on Deployed Operations (CONDO), UK civilians, and Land, Maritime, Air, Logistic and Special Forces components), Allied Forces, prisoners of war (PW), nongovernment organisations (NGO), local civilian population and displaced persons (DPs). In humanitarian operations the PAR can be considered as two groups, those providing the humanitarian response and those who will be recipients of the humanitarian response. It is vital that the medical planner considers the health needs of those providing the humanitarian response in order they are suitably screened for pre-existing illness prior to deployment and that there is a 'safety net' in case of severe injury or illness. The health needs of the recipient population should be estimated prior to deployment and then confirmed by a formal assessment.

The Commander's Operational Plan

The medical plan must be aligned to the operational plan. The operational overlay, usually produced as part of the commander's plan, will show the distribution of the PAR on the ground. Specific phases of war may generate specific medical planning considerations, e.g. the medical plan for an obstacle crossing should have medical facilities on both sides of the obstacle.

Surprise and Security

The location and marking of medical units are important factors to be considered within surprise and security. Commanders may wish to constrain the medical plan to ensure that the tactical signatures of medical units (size, Red Cross, etc.) do not provide operationally sensitive intelligence to enemy forces. Conversely the overt

display of medical units may be used to reinforce the military potential by demonstrating the preparations for the treatment of military casualties.

Time

This factor does not consider the impact of time on medical support but determines the important timings that will affect the medical plan. These should be extracted from the intelligence picture and the products of the operations staff branches (or orders). The framework for a medical synchronisation matrix may be created from this information.

Casualty Estimate (Demand, Capacity)

The Casualty Estimate links the Threat Evaluation with the Population at Risk to produce an estimate of the numbers and types of casualties that will require treatment and evacuation. Intelligence, operational analysis and medical staff work together with J5 and J35 staff to produce the figures for battle casualties. Medical staff produce the figures for disease and non-battle injury (DNBI). These figures combine to produce a daily attendance rate (demand). The breakdown of these figures by distribution of injury, type of illness and severity enables an assessment of resource utilisation (capacity). At the operational level, these calculations will lead to the Medical Resource Requirement for admissions to hospital, hours of surgery, bed occupancy, strategic aeromedical evacuation and the theatre-holding policy. At the tactical level, calculations will lead to the throughput of medical units and evacuation requirements.

Force Health Protection

Force Health Protection describes the medical contribution to Force Protection and the Management of Risk. It uses the Health Risk Management process described in a separate chapter to identify actions that need to occur to reduce the risks to the health of the force as far as is reasonably practical commensurate with the commander's plan. The Casualty Estimate has already linked the Threat Assessment with the Population at Risk. Risk Assessment matches the severity of the outcome with the risk (Casualty Estimate) in order to prioritise the Medical Force Protection tasks. Risk Management joins control measures, medical countermeasures, information, instruction and training, treatment and hazard monitoring into an integrated package. Finally audit and surveillance is used to assess the effectiveness of the Risk Management process.

Medical Capabilities

This should consider the requirement for the clinical elements of the seven capabilities of care: prehospital care, primary care, deployed hospital care and medical

evacuation.² These should be listed, e.g. 5 primary healthcare clinics, 1 mobile hospital with 2 surgical teams and 2 intensive care beds, 1 fixed hospital with 4 surgical teams and 6 intensive care and 30 general care beds, 20 ambulances, etc.

Medical Logistics

Medical Logistics merits a separate heading due the technical complexity of the subject. In addition to medical equipment modules, it is necessary to undertake detailed planning for supply of individual line items, oxygen, blood and blood products (e.g. fresh frozen plasma) and clinical waste. Special attention needs to be paid to the storage and distribution chain to ensure that medical material is kept within specified temperatures.

Medical CBRN (Chemical, Biological, Radiological, Nuclear)

The proliferation of CBRN weapons may mean that the health consequences of their use become a significant planning factor in conflict and public health emergencies in the future. Many Western public health systems have undertaken detailed planning and preparation to mitigate the consequences of a deliberate release of CBRN agents as a result of a terrorist attack. Such planning includes organisational issues, equipment issues (protective equipment and treatment kits) and training for healthcare staff. This subject will not be considered in any further detail here.

Medical C4I (Command and Control, Communications, Computers and Intelligence)

The efficiency of the health services system is dependent on the effectiveness of the Medical C4I system of the various medical elements in a Theatre of Operations. The treatment and movement of a single casualty may involve coordination across a number of headquarters and command boundaries. The interface between medical and personnel information systems should also be considered within this factor. There will be a need for extensive liaison if the medical plan has provision for the use of Allied or Host Nation Medical facilities. This factor should specifically include the requirement for Reports and Returns (R2) to provide health surveillance and healthcare governance. It may be necessary to establish liaison officers, communication links and other means to enable information to be passed efficiently between medical agencies involved in the public health crisis. Post-event inquiries almost invariably identify issues relating to C4I that hampered the effective

²The seven capabilities of care are defined as force health protection, prehospital care, primary care, deployed hospital care, medical evacuation, medical C4I (command, control, communication, computerisation and information) and medical logistics.

implementation of the emergency plan. It is vital to consider the training requirements for the decision makers in the plan under this factor.

Other

There may be other factors that are relevant to the HSS analysis. For example, in complex humanitarian response operations, the HSS analysis may need to consider the health needs of the affected indigenous population. The ten priorities for health interventions in humanitarian response may be a useful checklist: initial assessment, measles immunisation and vitamin A supplementation, water and sanitation, food and nutrition, shelter and site planning, emergency healthcare, control of communicable disease, public health surveillance, human resources and training and coordination. A forced population displacement in the winter in the Balkans of previously well-fed and healthy civilians will create very different challenges than severe flooding affecting a malnourished, resident population in Mozambique. The principle task is assessment. There are a number of information-gathering tools for use in humanitarian emergencies. Ideally, the humanitarian community should rapidly establish a common system so that all agencies can contribute to the data collection for the initial assessment and that this information can be collated into a shared database. The Internet is increasingly being used as the basis for the common information architecture. The United Nations Office for the Coordination of Humanitarian Affairs set up an Internet site for this purpose for the crisis in Iraq in 2003. The UK military medical services set up rapid assessment teams to visit medical facilities in the Southeast of Iraq immediately after each town had been secured to determine the healthcare needs of the population and provide information for the humanitarian agencies.

The detailed information required to enable planning to meet the needs of a displaced or refugee population in regard to water, food, shelter and sanitation and the other priorities is discussed in other chapters of this book. Even during the emergency phase, it is vital that the humanitarian community establishes a pragmatic balance between needs of the affected community and creating expectations and dependencies that are unsustainable as the crisis moves from the emergency phase to long-term development.

The central long-term task for all members of the humanitarian community is coordination. Each agency, including military medical forces, will have specific rules regarding their involvement with both the dependant community and each other. It is vital that each agency accepts the moral responsibility to coordinate their work through a central authority, often the local offices of the United Nations or World Health Organization, in order to ensure that the distribution of humanitarian aid is humane, equitable, sustainable and not in competition between agencies.

Assessment of Tasks

The Assessment of Tasks is a key product of Step 2. This captures complete list of medical elements (units or subunits) required to deliver each of the seven

capabilities of care to support each component (Joint, Maritime, Land, Air or Special Forces). It also identifies which components are required to support the other elements of the Joint Force (e.g. the Air component will always provide strategic aeromedical evacuation for all forces).

An example of the list of tasks that were derived from the UK medical estimate to support humanitarian operations in Iraq in 2003 is shown in Box 53.2.

Box 53.2: List of Tasks from the Post-conflict Medical Estimate in Iraq 2003

Regeneration of Medical Services in Iraq. The regeneration of medical services requires:

1. The locating and recruitment of medical personnel from the occupied population. Medical personnel include professionally qualified individuals from all specialities, managers and ancillary staff.
2. The locating and assessment of medical facilities. Information may be available on medical installations in Iraq, their previous capacities and capabilities. However, medical assessment teams will be required to provide up-to-date assessments of those facilities.
3. The locating and assessment of medical materiel and equipment (including such items as ward equipment, pharmaceuticals and ambulances).
4. During the regeneration of medical infrastructure, the occupying force has the right to redistribute medical assets from one point to another. This may be required in order to generate as much capability and capacity as possible from within existing resources and lowering the overall burden of UK forces to replicate lost facilities.
5. Also of importance is an understanding of the medical funding pre-conflict. UK medical care is free at the point of consumption. It may not be so in Iraq. It may be inappropriate to provide free medical care as this might upset the local medical economy and hinder the return of civilian medical staff to their posts.
6. *NGO Arrival.* It has been stated that NGOs will not be in a position to offer assistance for at least 30 days. However, their arrival could be eased by a free exchange of information now, in order for the NGOs to queue their assets according to need.
7. *Possible Resource Requirements.* The following capabilities might be required during the regeneration phase of the occupation of urban areas:

Generators
 Water filtration equipment
 Hospital equipment of all natures
 Obs/Gyn staff
 Paediatricians
 Geriatricians

Step 2C: Commander's Confirmation

This is the opportunity to consolidate the analysis and confirm the emerging deductions with the commander. The Casualty Estimate and Medical Resource Requirement will almost certainly be scrutinised at this stage as the medical units required will require strategic force generation.

Step 3: Formulation of Courses of Action

This is often the most difficult but most important part of the estimate process. The medical tasks generated in the Assessment of Tasks need to be converted into a series of mission statements or task lists for the medical elements of the force. Ideally the estimate process will lead to a number of key problems, some of which may have a series of options. These should be examined as individual Courses of Action (COAs). It is important to remain focussed on the level in the chain of command at which the estimate is being undertaken. It is likely to be wrong for the medical staff of a Land Component Headquarters to site Unit Aid Posts, but it may need to direct the number of Role 2 (Light Manoeuvre or Enhanced) units being deployed to the theatre. A Joint Headquarters should certainly consider options for Role 3 medical support such as use of UK facilities, Allied facilities or Host Nation facilities. Examples of problems requiring COAs are linear or 'hub and spoke' medical laydown, location of Force Support Hospital, size of medical reserve and predictive or demand-driven medical evacuation.

Step 4: Develop and Validate Courses of Action

Each of the COAs identified in Step 3 should be developed into credible alternative COAs that meet the 'FACES' test (feasibility, acceptability, completeness, exclusivity, suitability). Those COAs that cannot be developed to this level should be discarded.

Step 5: Evaluation of Courses of Action

Each HSS COA should be evaluated against the HSS '4Cs' of capability, capacity, convenience and continuity of care from the patient's perspective. This comparison may be qualitative or quantitative, but the result should be internally consistent and allow the commander to make a decision between COAs.

Step 6: Commander's Decision

At the end of the linear planning process, the commander makes his selection from the combination of COAs presented and confirms the other decisions taken during the planning process. This is transformed into the Commander's Concept of Operations (CONOPS) which will usually include his intent, scheme of manoeuvre, main effort and end state. The commander is also likely to personally approve the mission statements for each of his subordinate commanders. The staff will produce the supporting detail to enable the production of directives, operation plans (OPLANs), contingency plans (CONPLANs) and operation orders (OPORDs).

Planning Tools

Medical units and medical staff may use general staff planning tools to assist with the development of the medical plan. The time sequencing of the medical plan may be displayed in a synchronisation matrix derived from the commander's operational plan derived under friendly forces factor, the framework created under the time factor and the information contained in the Assessment of Tasks. This should be linked to the Force Element Table (FET) to ensure that the medical plan develops incrementally with the increase in the PAR for the initial deployment to a Theatre of Operations. Medical staff and units should be closely involved in any wargaming undertaken by the operations staff.

The Reality of Military Operational Planning

Whilst the previous section described military operational planning as a single linear process, the reality is that it is usually an iterative process involving a number of cycles of planning activity. These cycles increase both the understanding of the problem and also the precision of the plan to resolve it. This is often summarised as Plan-Refine-Execute-Assess.

The relationship of the medical function to these cycles is summarised in Fig. 53.1. The medical planning team reviews the outline Threat Assessment and operational plan provided by the intelligence and planning staff. This is informed by casualty planning equations and ratios provided by operational analysis staff to provide a draft Casualty Estimate for the operation. The Casualty Estimate provides data for a Medical Resource Planning to determine the medical organisation required to support the operation and forms the basis of a draft Health Services Support plan. This is likely to be communicated as an annex to the main operational order. The next phase of operational planning is likely to include wargaming which will

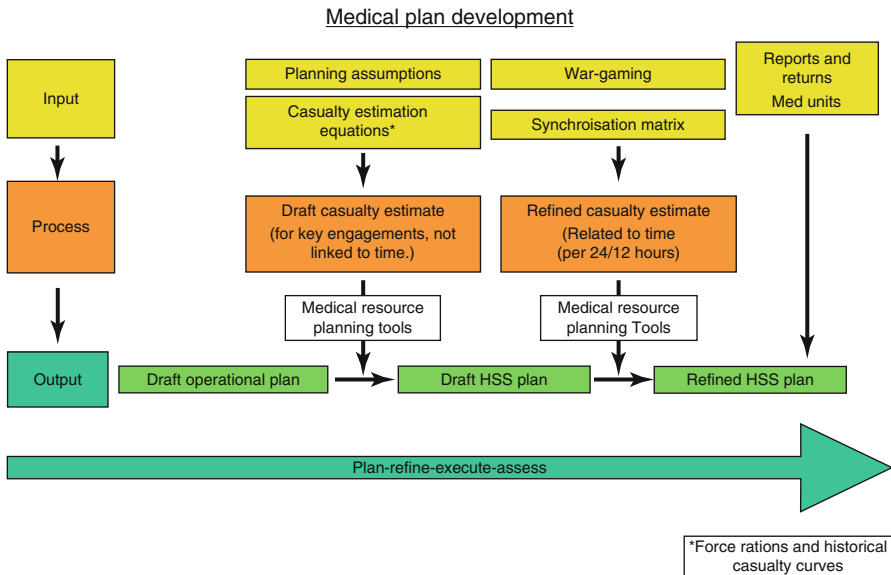


Fig. 53.1 Medical plan development

confirm the operational design and lead to a synchronisation matrix of operational activities. This allows the Casualty Estimate to be converted from an activity base (i.e. for key engagements) to a time base (i.e. to determine the casualty flow over time). The Medical Resource analysis is similarly refined into to allow decisions to be made over the location of medical units and the time sequence of medical evacuation requirements. This leads to the production of the definitive medical plan, which would be contained in the medical annex of Fragmentary Orders (FragOs) for each phase of the operation. This is illustrated in Fig. 53.1.

The effectiveness of the medical plan is assessed by a matrix of Reports and Returns that provide information on the activities of the medical evacuation system and the medical units. This provides the basis for further adjustments in the allocation of resources to provide medical support to the operation.

Summary

This chapter has considered the planning process for military Health Services Support within the wider framework of the military general staff process. It has described a six-step analysis, structured on the military estimate process, to consider specific medical factors in order to develop a medical plan. The chapter has closed by considering how this theoretical model is actually used within the Plan-Refine-Execute-Assess construct for military planning.

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Chapter 54

Accreditation in Field Medicine

Ken N.A. Millar

Abstract If you are reading this book, you probably already have an inkling of the benefit of some sort of accreditation to ensure optimal delivery of care in the complex situations likely to be encountered in this field of medicine. Some, however, may not fully share this view, perhaps considering the expertise they possess by virtue of their professional qualification is per se sufficient. Others may feel that they are in some way delivering the gift of their experience to a medically deprived population or that they are acting under some divine guidance; thus, their perception of any need for either additional training or accreditation is diminished. These contrary views can be used as arguments against the need to allocate the necessary time (in an already full academic life) to gain accreditation in this special area. A robust defence of accreditation thus has to be available in support of funding or other resource allocations!

Keywords Accreditation • Field Medicine • Training

Objectives

To examine:

- An argument for accreditation
- The components of accreditation
- Training resources
- Available routes to accreditation
- The Faculty of Conflict and Catastrophe Medicine

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Introduction

If you are reading this book, you probably already have an inkling of the benefit of some sort of accreditation to ensure optimal delivery of care in the complex situations likely to be encountered in this field of medicine. Some, however, may not fully share this view, perhaps considering the expertise they possess by virtue of their professional qualification is per se sufficient. Others may feel that they are in some way delivering the gift of their experience to a medically deprived population or that they are acting under some divine guidance; thus, their perception of any need for either additional training or accreditation is diminished. These contrary views can be used as arguments against the need to allocate the necessary time (in an already full academic life) to gain accreditation in this special area. A robust defence of accreditation thus has to be available in support of funding or other resource allocations!

The Argument for Accreditation

Almost every branch of medicine¹ now requires specific and focussed training, backed up by an assessment process, before its practitioners are “let loose” on the public. This is broadly accepted as a rational approach by the majority of medical practitioners and, indeed, is expected by the general public who are their “customers”. Each separate training and assessment scheme takes as its baseline the primary medical qualification and builds on skills and knowledge already in place to develop the different expertise required for the speciality concerned. Accreditation in the chosen sphere usually demands a recognised training scheme and a validating examination.

Conflict and Catastrophe Medicine is no different from any other specialisation in this respect. Whatever the pre-existing skill set of the individual, it cannot be exercised effectively in this difficult sphere without additional training and some alteration in focus of the thought process. It is not considered acceptable for a patient base that is, by definition, vulnerable, to be exposed to medical practice which could in any way be substandard; indeed, with such vulnerable populations, it is essential that the highest possible standards of care are available. Practitioners must, it is suggested, be demonstrably “Safe to Help” their target population in the disaster setting – just as they must be in their everyday practice.

The environment in which they may be asked to deliver care is unknown. The need may arise at home or abroad; the emergency may occur in areas of geographical and climatic extremes; the response could be an emergency relief operation or the bringing into action of a detailed local contingency plan. It might involve war, natural disaster, man-made disaster or any combination of these. To ensure that patients are safely cared for in all the varied and difficult environments under

¹The words “medicine” and “medical” are used throughout this chapter to include Medicine, Dentistry, Nursing and the Professions Allied to Medicine.

consideration should need no further explanation. That safety, however, depends on every practitioner having the necessary skills and informed mindset to respond appropriately to all of the scenarios in which that assistance is required. If “help” is to be delivered, then practitioners must be capable of performing to the maximum of their ability in adverse situations – without themselves becoming a drain on scarce resources or, indeed, a casualty.

It is worth looking at the rationale for accreditation from different viewpoints, as these may assist in convincing individuals of the value of any extra work they may need to undertake to become properly involved in this rewarding area of medicine. The following viewpoints are considered:

- The dependent population
- The individual’s professional body
- The employer (whether formal or informal, governmental or NGO)
- The law
- The individual

The Dependent Population

The dependent population has become so because of some event (or chain of events) that has caused an imbalance between their medical (and other) needs and the immediately available capabilities (infrastructure, resources, medical skills) to meet these needs. In order to restore this balance in the shortest possible time frame, with the least possible mortality and morbidity following intervention, only the highest standards of competence in planning, basic care and specialised medical assistance are acceptable.

That dependent population may be a large number of refugees from strife in a Third World country, or they may be the citizens of a First World country caught up in a terrorist incident. The deployment of untried, untrained and well-intentioned amateurs to remedy these situations is unlikely to produce the best possible outcome. While it is probable that many of those deployed will be untried, their undoubted good intentions need to be supported by some training, and the populations involved deserve that such training is properly accredited. Indeed, in the case of the First World disaster response, the population positively demand to be looked after by fully trained personnel whose qualifications to perform their tasks are visible and quantifiable.

The Professional Bodies

The medical, dental and nursing professions are subject, certainly in the First World, to intense public scrutiny. Any inkling that the delivery of care is in any way sub-standard – no matter what the setting – is likely to produce an adverse press response.

In the absence of a process of accreditation, it may be difficult to justify either action or inaction in the medical response to a catastrophe. Accreditation is therefore of importance in maintaining the overall credibility of the various professions in the presence of a potentially hostile press.

The Employer

Employers may include Government Departments and Agencies, NHS Trusts, the Armed Forces, the larger NGOs and smaller charitable and voluntary organisations. Governmental employers are, of course, accountable through the government of the day to the electorate (or perhaps it would be closer to the truth to say “to the taxpayer”). NGOs and charitable organisations are also accountable to those who fund them; they need to show that charitable contributions have been put to the most effective use. Again, if it can be seen that untrained, unaccredited personnel have been deployed, it may be difficult to justify expenditure – especially where the outcomes have been less than successful.

The Law

It is ever more important to remember that litigation may follow medical intervention, no matter how well intentioned. To protect both individuals and employers from potential litigation, a recognised system of training, with associated valid accreditation, will go a long way towards reducing the number of potential legal actions related to medical care in catastrophe situations. To bring this home, one need only consider how one might answer the potential question from the Claimant’s Barrister: “Can you tell me what formal qualification you held to practise medicine in this highly specialised situation?”

The Individual Practitioner

Any practitioner would clearly wish to give of their best in a situation where there is much suffering to be relieved. The author of this chapter, in the distant past, found himself in situations where he felt he had less than adequate training to equip him for the task that faced him at the time. His chief fear was that this lack of training would make it difficult to give the dependant population the correct level of assistance. In these distant days, there was no training or accreditation in the various areas which were relevant; thankfully, these days are now past, with such schemes as ATLS/BATLS, MIMMS, Dip IMC RCS(Ed) and the existence of such qualifications as the Diploma in the Medical Care of Catastrophes (DMCC) which will be covered later

in this chapter. What training and accreditation can give to the individual practitioner is confidence that he or she has the necessary skills to attend to the job in hand, and such knowledge will dispel both the fear and the reality of inadequacy.

The Components of Accreditation

The concept of the practitioner's being "Safe to Help" has already been mentioned. Clearly, achieving this for the huge spread of potential situations in which a practitioner may be deployed in support of conflict or other catastrophe is a fairly tall order! However, there are certain basic components which it is considered must be achieved by any candidate for accreditation; each of these is firmly grounded in the "Safe to Help" concept. These components include:

- *Survival and field skills* – to ensure that the practitioner and the team are capable of survival and efficient operation in adverse conditions and that they do not represent a further drain on an already weakened infrastructure.
- *Emergency medical skills* – all relevant members of a team need to be competent in appropriate emergency medical skills, such as ATLS, no matter what their base speciality. Radiological, biological and toxic contamination responses also need proper consideration. Triage in the emergency situation is essential and needs to be appropriate to the resources available, casualty numbers and communications infrastructure.
- *The nature of catastrophes* – an understanding of the types of casualties likely to be encountered in the different potential disaster situations that may be encountered is essential to prepare and to plan.
- *Tropical medicine and extreme environments* – the impact of endemic disease on both the team and the dependent population needs to be understood if it is to be minimised. The effects of heat and cold and measures to prevent injury and illness from these climatic extremes need to be known.
- *Public health aspects* – this is a broad topic and includes such matters as vector control, waste disposal, population needs assessment, maintenance of records, immunisation and prophylaxis. All of these areas can affect the medical plan, its execution and its outcome.
- *Ethical, legal and political considerations* – religious sensibilities, neutrality, refugees and IDPs, the Geneva Conventions, the primacy of the host government and the place of the military all need to be taken into consideration. Dealing with the press is also a matter of some importance.
- *Planning and mounting a response* – many topics need to be appreciated here, such as the use of intelligence, the place of reconnaissance, logistics, appropriate skill selection, medical supply and cooperation with other agencies.
- *Psychological aspects* – responses by both the target population and the team to stresses need to be discussed. The prevention of psychiatric breakdown both during and after the aid operation is an important facet of the plan.

This list is not intended to be in any way exhaustive; fuller exposure of the components may be elicited from the websites of accrediting authorities shown later in this chapter. However, it gives a taste of the broad spectrum of skills and knowledge required – which, it is suggested, are not covered comprehensively in any other formal medical training structure. A list of the Core Knowledge necessary for the Diploma in the Medical Care of Catastrophes can be found on the Society’s website (see later in chapter).

Training Resources

Training is complex, because of the broad mix of skills required to gain accreditation. However, many of the separate components may be achieved over a period of time as part of more “standard” medical training; for example, ATLS training is already a requirement in some hospital specialties. Some groups, such as the Armed Services’ medical branches, may already receive a large proportion of the prescribed training as it corresponds with their operational role. The majority of civilian candidates for accreditation, however, may find certain elements of the required training quite difficult to access unless they utilise the resources provided through the accreditation authorities. This is perhaps particularly true of the requirement to demonstrate the ability to live and work in an adverse environment (although some would say that NHS Trust residents’ accommodation is adverse enough!).

A full gamut of the necessary training is available via the Society of Apothecaries; details are at: <http://www.apothecaries.org/>.

Liverpool University also offers training; this can be accessed at: http://www.liv.ac.uk/lstm/learning_teaching/post_grad/DiplHumAssis.htm.

Available Routes to Accreditation

There are, at the time of publication, only two known routes to formal accreditation in this area. These are the following:

The Diploma in the Medical Care of Catastrophes (DMCC): The DMCC is granted under the auspices of the Society of Apothecaries of London. This Diploma is specifically medical and has the basic entry requirement of full professional registration as a doctor, dentist or nurse. Broadly, the DMCC, as a medical Diploma, concentrates on clinical matters in addition to the planning and ethical considerations. A new format for the examination was introduced in February 2011 and applies to all new candidates from that date. The Diploma is in one part, rather than the former two, and the examination comprises a written, short answer question paper and an objective structured clinical and skills examination. Candidates sit both elements on the same day (or on subsequent days). Full details are provided in

the Guide to the Diploma and the Administrative Guidance to Candidates, which can be found at <http://www.apothecaries.org/>.

The Society of Apothecaries runs a specific course to prepare candidates for the Diploma. This is run over a series of weekends, and candidates may opt to attend those course modules they specifically require or to attend the entire Course. Details of the Course are available at <http://www.apothecaries.org/>.

The DMCC is now formally linked with the Masters programme in Humanitarianism and Conflict Response delivered by the Humanitarian and Conflict Research Institute (HCRI) of the University of Manchester. Diplomates holding the DMCC may be eligible to receive up to 60 credits through the accredited prior learning (APL) scheme – applications will be considered on a case-by-case basis and should be submitted via the usual online route as detailed at <http://www.hcri.ac.uk/study/ma/index.htm>. This link also provides details about the structure of the programme which comprises 120 credits plus 60 credits for the dissertation.

The Diploma in Humanitarian Assistance (DHA): The DHA is granted under the auspices of Liverpool University's School of Tropical Medicine. This Diploma is not specifically aimed at the medical professions, but at all who may be involved in humanitarian work. Thus, the clinical aspects are not covered in any great detail, and the many non-clinical candidates involved in Humanitarian Assistance will therefore find this course of more relevance than the DMCC. The DHA is, effectively, a 6-week residential course-based Diploma.

Details of the DHA are available at: http://www.liv.ac.uk/lstm/learning_teaching/post_grad/DiplHumAssis.htm (It should be noted that Liverpool University also run two Masters degrees; one is the MSc in Humanitarian Programme Management, and the other is the MSc in Humanitarian Studies. Details of these can be obtained at: http://www.liv.ac.uk/lstm/learning_teaching/masters/HumPM/MScHumPM.htm and http://www.liv.ac.uk/lstm/learning_teaching/masters/HumStud/MScHumStud.htm).

The Faculty of Conflict and Catastrophe Medicine

The Faculty of Conflict and Catastrophe Medicine arose from the DMCC and the recognition that this area of medicine required a coordinating base. Its aims and objectives can be found at <http://www.apothecaries.org/>.

Chapter 55

Humanitarian Work in the Era of Modernising Medical Careers

Jessica Tucker

Abstract Modernising Medical Careers (MMC) is the training and career structure for UK NHS doctors, in place since August 2007. It was brought in with the aim of delivering a modernised and focused medical career structure through major reform of postgraduate education.

The implementation of MMC has not been without its critics within the sphere of humanitarian operations and beyond – there are ongoing concerns as to whether the move towards early specialisation will reduce the broad spectrum of medical knowledge and skills required by the aid worker in the field. There is also the question of whether a system geared towards achieving completion of training as swiftly as possible will support time spent not directly towards this goal.

Keywords Modernizing Medical Careers (MCC) • Humanitarian work • Less than full time training (LTFT) • Time Out of Programme (OOP)

Objective

- To consider how changes in UK doctors' training will influence undertaking humanitarian work

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Introduction

Modernising Medical Careers (MMC) is the training and career structure for UK NHS doctors, in place since August 2007. It was brought in with the aim of delivering a modernised and focused medical career structure through major reform of postgraduate education.

The implementation of MMC has not been without its critics within the sphere of humanitarian operations and beyond – there are ongoing concerns as to whether the move towards early specialisation will reduce the broad spectrum of medical knowledge and skills required by the aid worker in the field. There is also the question of whether a system geared towards achieving completion of training as swiftly as possible will support time spent not directly towards this goal.

Consideration, however, has been made of the benefits of humanitarian work to the doctor in training, and a number of options as to how this may be achieved have been included within the MMC process. In the Department of Health's *Reference Guide to Postgraduate Specialty Training in the UK (The Gold Guide)*, explicit mention is made of the recommendation of Lord Crisp's report, *Global health partnerships: the UK contribution to health in developing countries (2007)* that:

An NHS framework for international development should explicitly recognise the value of overseas experience and training for UK health workers and encourage educators, employers and regulators to make it easier to gain this experience and training ... GMC should work with the Department of Health, Royal Colleges, medical schools and others to facilitate overseas training and work experience.

Ways and Means

There are two principle ways that a doctor in training under MMC can work in the humanitarian field of operations without jeopardising their NHS career and, potentially, even enhancing it. These are by taking advantage of less than full-time (LTFT) training or by taking time out of programme (OOP).

Less Than Full-Time Training (Flexible Training)

Flexible training has been introduced to enhance work/life balance and hence retain doctors who might otherwise have left the profession. It may also suit the humanitarian worker to take up a slot/job share position or a permanent flexible post (if available) in order to work in the field whilst continually progressing along the training path. The Postgraduate Dean may also consider the creation of individualised, supernumerary posts, with approval from the General Medical Council (GMC) to meet specific needs.

Flexible training meets the same requirements as full-time specialty or GP training except that the weekly hours are reduced. Minimum weekly commitment is 50 % of full-time hours. Applications can be made at point of application to training or at any point after acceptance into the training process and should not affect the candidate's competitiveness in selection.

Applications for flexible training and how it might best be conducted are through discussion with the Postgraduate Dean who will prioritise applications according to "well-founded individual reasons." Humanitarian assistance would fall under a Category 2 priority of doctors in training with "unique opportunities for personal professional development," "religious commitment" or "non-medical professional development."

Limitations are the minimum overall commitment, certain specific time requirements and the statement that trainees will not normally be permitted to take other paid employment.

More details can be found in the titles under further reading.

Time Out of Programme (OOP)

Under certain circumstances trainees will be permitted to take time out of their chosen specialty programme. This can be time out of programme for clinical experience (OOPE), for approved clinical training (OOPT), for research (OOPR) or for a career break (OOPC). A number of features are common to each:

- The Postgraduate Dean must agree them.
- They will not normally be permitted during the first year of training unless a request for deferral of the start of the programme has been agreed. Deferral will usually only be granted on statutory grounds such as maternity leave or illness.
- As much notice as possible to the Postgraduate Dean and the employer will facilitate the process. Three months is the minimum notice required.
- As much detail as possible will also assist, especially where GMC approval is required.
- The out of programme documentation must be submitted annually to maintain contact and demonstrate continuing commitment to return to the programme.

Time Out of Programme for Clinical Experience: OOPE

Time out of programme for clinical experience is the most obviously intended device for humanitarian work. It can be requested in order to "...enhance clinical experience for the individual so that they may experience different working practices or gain specific experience in an area of practice and/or support the recommendations in Global health partnerships..."

It does not require prior GMC approval but will not count towards the Certificate of Completion of Training (CCT). OOPE is usually for 1 year in total but may be extended up to two with the agreement of the Postgraduate Dean. The trainee can retain their National Training Number (NTN) throughout this time.

The principal disadvantage of this means is that the experience gained, whilst theoretically recognised as personal professional development, will not allow competencies to be signed off and will not progress the trainee along the programme of training.

Time Out of Programme for Approved Clinical Training: OOPT

Time out of programme for approved clinical training can potentially include overseas training posts, which may suit the humanitarian worker. Training can count towards CCT, but it is critical that GMC prospectively approves the training and assessment. The Postgraduate Dean will advise on seeking prospective GMC approval and must approve and sign the application. It is a legal requirement that this training be supervised. Colleges and Faculties must confirm that training has been completed satisfactorily and satisfies curriculum requirements.

Trainees' NTN will be retained as long as there is prospective approval, assessment requirements are maintained and the OOPT document is completed. OOPT is usually granted for a maximum of 1 year, but in exceptional circumstances this may be extended to two with approval from the Postgraduate Dean.

Opportunities to utilise this means may be limited by the ability and indeed willingness or appropriateness of institutions in the developing world to satisfy the training and assessment criteria of GMC, and careful consideration should be taken of whether it is achievable. Possible avenues to consider are training conducted in developing world institutions linked with NHS Trusts – see the Tropical Health and Education Trust (resources section) for such links – and the possibility of trainees abroad being supervised by UK qualified consultants.

Drawbacks are that whilst this maintains training progress, it may be hard to satisfy GMC training and assessment requirements, and many organisations working within the humanitarian field state that priority must be placed on the clinical work or training local health workers, precluding time for expatriate training in the field.

Time Out of Programme for Research: OOPR

Research is an area of focus in the Chief Medical Officer's report, *Health is global: proposals for a UK government-wide strategy (2007)*, and the *Gold Guide* states that trainees with an interest in research should be encouraged and facilitated. Research in the humanitarian area may be included as long as its relevance to the programme of training or higher educational degree is demonstrated.

Time out of programme for research requires approval by GMC if to count towards CCT. GMC states that if the trainee's curriculum includes research as an optional element, time OOPR will be recognised towards CCT. Both the College/Faculty and the Deanery must support applications for OOPR, and once complete, the College/Faculty must confirm that the training and research satisfies the curriculum requirements in order for GMC to award the CCT. Formal assessment documentation must be submitted annually to the review panel.

If OOPR is not to count towards CCT, then GMC approval is not required.

If a clinical element, counting towards CCT, is to be maintained throughout the OOPR, it must be prospectively approved by GMC, and at least 50 % of time must be spent in approved clinical training. The Training Programme Director should be consulted as to the suitability of the clinical training. The NTN can be retained.

OOPR is usually for a registerable higher degree, for example, Master's, MD or PhD. Duration will normally be up to 3 years or under, and OOPR is not usually granted in the final year of training.

As an alternative to OOPR, trainees may wish to undertake academic training, which includes dedicated amounts of research time, which it may be possible to tailor towards humanitarian areas, in the programme.

Time Out of Programme for a Career Break: OOPC

Time out of programme for career breaks allows a trainee to take time out but with a guarantee of being able to return to the programme at an agreed date and can be used for other interests or responsibilities, for example, humanitarian deployments abroad.

The break must be agreed with the Postgraduate Dean who is limited by the ability of the programme to cover the resulting gap (a temporary replacement NTN may be available) and must confirm the trainee's commitment to an eventual return to training. Priority can be given to those with "a clearly identified life goal, which cannot be deferred."

OOPC cannot be used to defer start of training. Duration is usually limited to 2 years, although this may be negotiated higher with the Postgraduate Dean in exceptional circumstances. The NTN may be retained for 2 years but after longer will usually be relinquished and reapplication will be competitive.

Six months' notice of return is required and trainees may have to undergo skills refreshment. In the future, trainees will have to consider the effect on their ability to maintain the GMC licence to practise.

For all time out of programme, the message from Postgraduate Deans is clear – approval must be sought with as much notice and as much attention to detail as is possible, to facilitate applications being approved. For time to count towards CCT prior GMC, approval is mandatory with appropriate supervised training and assessment in place.

Short-Term Deployment

Not all humanitarian deployments will require great lengths of time out of the country. Natural disasters may require foreign medical assistance for a week or 2, and some medical NGOs may rotate specialised personnel, often surgeons and anaesthetists, as frequently as every 3 weeks.

For shorter-term commitments, the major consideration is not for training, which can be made up before or after, but for employment concerns. Individual NHS Trusts have their own guidelines for granting doctors time to work abroad, but NHS employers recommend the following to facilitate the process:

- To discuss plans with managers as soon as possible
- To help the employing Trust to ensure they have adequate cover at home before they leave
- To arrange aid work through an aid relief organisation, which would be prepared to support them when applying for leave from their employer

When to Go

The question of when in training to deploy is a matter of striking a balance. In the field, a volunteer may be the only doctor in the area, unsupervised, unsupported and without the ability to consult colleagues or the luxury of a library of books. Deploy too soon in training and the doctor may not possess sufficient skills, experience and confidence to work effectively. As training progresses, however, especially under MMC, the trainee becomes more and more specialised and may leave behind the broader base of knowledge that is so useful in the field. As an example, Medecins Sans Frontieres states that you need to at least have completed 1-year post foundation programme (i.e. be at ST2 level) for them to even consider you as a medical doctor. Realistically, being at the level of a competent specialist registrar (ST4+) is more apt in order to be able to cope with clinical demand in the field.

A word on natural career breaks, there is usually at least one or two natural career breaks within a training pathway. The first time many doctors consider taking a “gap year” is 2 years post MBBS, after completion of the foundation programme and before applying for specialty training. At this level, doctors are far too junior and inexperienced to be competent to work as an effective humanitarian in the field; however, the year may be useful in terms of gaining higher qualifications towards humanitarian medicine, such as completing a diploma, or other relevant training courses.

The second natural break generally comes 4 or 5 years post initial MBBS qualification. Medicine, surgery, anaesthetics, psychiatry and emergency medicine all no longer have run through training numbers, which means after 2–3 years, specialty trainees have to apply again for higher specialty training in open competition. Taking a “gap year” to work in the humanitarian field is more appropriate at this

level than immediately post foundation programme, although many doctors may still lack the necessary experience.

“Gap years” are great in that there is no form filling or GMC approval needed, unlike with LTFT training or time OOP. However, there are limitations – the doctor may still be too inexperienced to be considered for humanitarian work, the year will not count towards completion of CCT and there is no guaranteed job to come back to. The trainee will have to make sure they are able to complete the application and attend interviews in the UK for the next stage of training they wish to proceed to, and it is likely prudent to demonstrate, at least in some way, a continuing commitment to your chosen specialty (if very different to humanitarian medicine).

Leaving voluntary work abroad until consultant level has been reached avoids concerns over time out of training, but at this level, skills have become specialised and UK commitments at work and in terms of home and family life are likely to have increased.

In terms of other ways of gaining related field experience whilst still a junior doctor, expedition/wilderness medicine is an option. Many doctors who choose to take a year out between the foundation programme and the start of specialty training enjoy volunteering as an expedition medic with a reputable gap year/expedition company. Furthermore, many expeditions are short – 10 days to 2 weeks – and it is possible to fit them into your annual leave whilst in specialty training.

Pay and Conditions

These options all refer to varying times away from the home hospital and programme, and these will have differing effects on the trainee’s pay and statutory rights under terms and conditions of service. Those considering time out of programme should seek expert advice from the Deanery’s human resources department and from their professional associations such as the British Medical Association on career and financial effects such as pay, increments to salary, maternity leave and related interests.

Conclusion

The message from the Department of Health, GMC, the Royal Colleges and NHS Employers remains that experience in the field of humanitarian operations greatly enhances a doctor’s personal professional development as well as his/her life skills, and this message is now incorporated into options to take time out of training for such work. As current trends towards the establishment of a specialty of Disaster Medicine progress, there may be options for permanent paid employment in the field. At present, however, the situation continues as it has been, and dedication, persistence and a willingness to sacrifice will be required by the doctor in training.

Where there is the will, however, MMC has offered a number of ways, and how easily these are achieved is will come clearer over years to come. Some final advice for those who do deploy in training is offered by the Royal College of Surgeons:

“Trainees who choose to undertake a period of this kind of work during their specialty training should ensure that they document their experiences, are able to reflect on it and discuss how it has enhanced their capabilities as a surgeon.”

Case Study: Timeline of an Emergency Medicine Trainee/Expedition and Humanitarian Doctor (as of June 2012): Dr Amy Hughes, Age 32

July 2003: Qualified as a doctor from Nottingham University Medical School.

Aug 2003–Aug 2005: Preregistration house officer (PRHO) year and Senior House Officer (as the roles were known then) in the Royal Devon and Exeter Hospital. Rotations completed in medicine, surgery, intensive care and anaesthetics, emergency medicine and paediatrics.

Aug 2005–Aug 2006: Year away from training before applying for next stage. Attended an Expedition Medicine course in the Lake District, completed the 3-month full-time diploma in Tropical Medicine and Hygiene in Liverpool and worked as a volunteer expedition doctor with Blue Ventures diving conservation expedition in Madagascar. She then attended the Wilderness Medicine Training course in Chamonix and went on to be an expedition doctor with Trekforce in Borneo and later Belize (this last filming Adrenaline Junkie with Jack Osbourne).

Aug 2006–Aug 2007: Amy came back to training in the midst of the Modernising Medical Careers changes. She worked for a year at Addenbrooke’s NHS Trust in Cambridge, completing 6 months in Intensive Care and 6 months in Emergency Medicine.

October 2006: Team doctor for 10-day charity trek to Great Wall of China

March 2007: 10 days in Namibia as team doctor for multi-challenge race (Prince’s Trust)

June 2007: Membership of the College of Emergency Medicine (MCEM) Part A completed

Aug 2007–Aug 2008: Amy was therefore able to enter the (then) new Acute Care Common Stem (ACCS) training pathway at an ST2 level, completing her second year in the Severn Deanery and gaining her run-through (as was the case then) national training number (NTN). When she entered at ST2 level, she was placed in 6-month rotations in intensive care and anaesthetics; this means, at some point, she still needs to complete a 6-month acute medicine rotation before all her ACCS training competencies can be signed off.

October 2007: 10 days in Borneo as team doctor for extreme event (Prince’s Trust)

November 2007: MCEM Part B completed

Jan 2008: Began the European Masters in Disaster Medicine (EMDM), which mainly comprises distance learning, with a 2-week residential course in Italy

Feb 2008: Polar medicine training course, Norway

March 2008: Anaesthetics and Critical Care prehospital course, UK

April 2008: Chief Medic, Ultra Marathon, Iceland (1 week)

June 2008: MCEM Part C completed

July 2008: Chief Medic, Ultra Marathon, Iceland (4 days)

Aug 2008–July 2009: ST3 ACCS emergency medicine training pathway: 6 months of orthopaedics in Bath, 6 months of paediatric emergency medicine at Bristol's Children Hospital

Sept 2008: 10 days as Chief Medic for a coast-to-coast adventure race in Costa Rica

October 2008: Chief Medic for Health Centre Build in Kalunga region of Brazil

Dec 2008: EMERGO (simulation training in disaster medicine) Senior Instructors Course, Sweden

Feb 2009: European Masters in Disaster Medicine (EMDM) awarded

April 2009: Medical Director, Namibia Ultra Marathon, Blue Peter film

July 2009: Careflight Medical Registrar, Australia:

Instead of progressing to ST4 emergency medicine, Amy then took an Out of Programme Experience for Training year (OOPT) and went to Australia where she worked in aeromedical retrieval and prehospital trauma medicine in Queensland.

July 2009: Postgraduate Certificate in Aeromedical Retrieval (ongoing)

October 2009: Medical Lead, Adventure Race, Borneo

Feb 2010: After a lot of thought, Amy made the decision to resign her emergency medicine national training number in order to pursue aeromedical and prehospital trauma work for longer and humanitarian work with MSF whilst at a good time in her life.

Feb 2010–May 2011: Prehospital Helicopter Emergency Medical Service (HEMS) registrar, flying with Kent Air Ambulance, UK

Nov 2010: Amy became the Medical Director of Expedition Medicine, a provider of expedition, wilderness and remote medicine training courses to medical professionals both in the UK and overseas. She has taught on various courses.

Feb 2011: Medical Director, polar medicine training course, Norway (with Expedition Medicine)

March 2011: Medical Director, UK expedition medicine course, Keswick (with Expedition Medicine)

May 2011: Medical Director, desert medicine course, Namibia (with Expedition Medicine)

July 2011–Jan 2012: Medecins Sans Frontieres (MSF) emergency doctor, northern Sri Lanka, Humanitarian Emergency Mission. Amy was the emergency department clinical and education lead; working with an internally displaced population, post conflict.

April 2012: Co-organiser and speaker at the Extreme Medicine Conference, London, organised by the team at Expedition Medicine

June 2012–Feb 2013: London HEMS registrar, flying with London's Air Ambulance

Feb 2013: Due to start as doctor with the paediatric emergency South Thames Retrieval Service, specialising in inter-hospital transfers of critically ill children in South London, Kent, Surrey and Sussex

Afterwards – Perhaps back to training or another adventure awaits?

Acknowledgement We would like to acknowledge that James I.D.M. Matheson was the author of this chapter in the previous edition, and that chapter served as the starting point for this updated and revised chapter.

Further Readings

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Department of Health. A reference guide for postgraduate specialty training in the UK. The gold guide. 4th ed. London: Stationary Office; 2010.

NHS Employers. Doctors in flexible training: principles underpinning the new arrangements for flexible training. London: Stationary Office; 2005.

Online, visit www.mmc.nhs.uk for up to date information on MMC and both publications in this list as downloads.

Chapter 56

Code of Behaviour

James M. Ryan and Adriaan P.C.C. Hopperus Buma

The editors and authors recommend the code of behaviour that follows and completes this handbook.

Humanitarian volunteers are not tourists. They arrive, often uninvited, in a country or region devastated by war or disaster. The atmosphere in a war or disaster setting is unique. Displaced people are vulnerable and often dependent on volunteers who may have little knowledge of their religious beliefs, culture or way of life. They may have never encountered foreigners. There is enormous potential for misunderstanding, suspicion and, on occasion, downright hostility. Ideally, expatriate volunteers should be fully briefed on these aspects, but urgency or a sense of crisis may mean deployment at short notice without adequate political, religious or cultural briefing. Volunteers must approach refugees and displaced people with great sensitivity if they are to avoid gaffes. As an example, a group of soldiers deployed on a humanitarian operation and working with displaced families were seen to wear T-shirts with the logo “Travel the world, see interesting places and people – kill them!” Although meant in jest, the potential for offence is obvious.

The following words of advice have been gleaned from a variety of individuals and sources and may help to keep you out of trouble:

- Do your work in a spirit of humility and understanding – keep a low profile.
- Take time to listen and understand the cultural mores of the people you are helping.
- You are not a tourist. Be sensitive when using your camera – always seek permission.

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- Avoid displays of wealth and ostentation – do not offer gifts of money.
- Do not make promises that cannot be kept.
- Do not collect war souvenirs and keep away from unexploded ordnance (mines and other munitions).
- Avoid illegal drugs and be temperate in your use of alcohol.
- Be careful with your mode of dress.
- Treat local staff with kindness and respect – listen when they offer advice.
- Avoid political or religious comment and debate and keep away from political and religious rallies and meetings.
- If provoked, be polite, patient and courteous.

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