

Andrew Furey, James Rourke, and Barth A. Green

When one teaches, two learn

Robert A. Heinlein

Natural disasters have affected more than 200 million people a year in the last 10 years [1]. The stages of a natural disaster have been defined in different ways by different agencies. The United Nations Educational, Scientific and Cultural Organization (UNESCO) names these stages as prevention, preparedness, response, and recovery [2]. In the UK, the Department for International Development (DFID) talks of context, disturbance, capacity to deal with disturbance, and reaction to the disturbance [3]. Perhaps the most frequently terminology used is as follows: preparedness, response, reconstruction, and mitigation [2].

The effectiveness and speed of the initial response to a disaster are largely influenced by the degree of local preparedness and the physical, geographical, and economic challenges of the region

[2]. Following the initial emergency response, the efforts for rebuilding and reconstruction begin. The lessons learned from the acute phase are noted during the mitigation phase in an effort to eliminate mistakes and better prepare for future disasters [2]. Thus, volunteer trauma care should be thought of as a number of stages leading to the “mitigation phase” which involves establishing effective continuity of care. It is this final phase, continuity of care – or perhaps the lack of it – which often causes a barrage of criticism directed at international relief organizations and has led many institutions to reconsider the approach to resilience and capacity building [1–3].

During the response phase, the primary focus is on rescue and first aid. This phase often involves national, international, and military organizations supplying relief and aid to the affected areas [1]. With respect to trauma care, the focus remains on rescue and treatment of acute injuries sustained in the natural disaster. This often occurs without access to medical infrastructure or appropriately trained personnel. The triage of injuries becomes paramount. Injuries largely dealt with are life and limb threatening and the treatment plan should be largely based on damage control principles.

As organizations assist with the response phase of disaster relief, the reconstruction phase becomes more urgent [2]. Some organizations begin to establish makeshift hospitals and treatment centers to deal with ongoing medical issues such as non-life-threatening injuries and diseases related to lack of

A. Furey, MD, MSc, FRCSC (✉)
Department of Surgery,
Memorial University of Newfoundland,
St. John's, NF, Canada
e-mail: andrewfurey@hotmail.com

J. Rourke, MD, MSc, FCFP (EM)
Office of the Dean of Medicine, Memorial University
of Newfoundland, St. John's, NF, Canada

B.A. Green, MD, FACS
Executive Dean for Global Health, Community
Service, University of Miami Miller School of
Medicine, Miami, FL, USA

clean water and sewage. In developed countries this phase may occur rapidly, but in a developing country, this process can take much longer [2]. International relief efforts generally work with local organizations to establish a working environment in order to meet on going healthcare needs with limited access to facilities and medical supplies. Volunteers and volunteer task forces must consider what effect any plans have on the local government, healthcare system, and any future disaster preparations [2].

Although strategies such as the UN International Decade for Disaster Response [4], the Yokohama strategy [5], the HYOOGO framework for action 2005–2015 [6], and the work by the Pan American Health Organization [7], among others, have improved performance during the mitigation phase, questions remain as to the effectiveness of establishing continuity of medical and trauma care.

As humanitarian surgeons, we have been privileged to be allowed to volunteer in areas of great need, and we must ensure these are left in a better situation than the one we arrived to. By this stage, the world's media has probably turned its attention to the next war or natural disaster. However, although less dramatic, this is the time when humanitarian organizations can have their greatest impact, by assisting the country's capacity to respond to the next disaster or *resilience*.

In humanitarian work, resilience can be defined as “the ability of countries, communities and households to manage change by maintaining or transforming living standards in the face of shocks or stresses without compromising their long term prospects”[3]. Resilience can be promoted through improving training of medical and paramedical personnel, infrastructure development, effective communication protocols, and interdisciplinary relations and networking.

50.1 Education and Training

The World Health Organization (WHO) has reported that one of the greatest disease burdens among younger individuals is trauma and injury [8]. As the demand for and use of motor vehicles in the developing nations continues to increase, this burden will continue to rise. In East Africa, for example, without improved surgical services, up to 10 % of the population will die from trauma [9].

One barrier to preventing such a tragedy is the lack of trained medical professionals. While volunteer surgical teams can assist in the delivery of trauma care, especially in the face of a disaster, intermittent and staggered surgical and acute care teams are insufficient to build local capacity and establish a legacy of improved healthcare delivery. To achieve the latter, cooperation must exist between local authorities and international organizations, and systems for training of local medical staff and personnel must be established (Fig. 50.1).

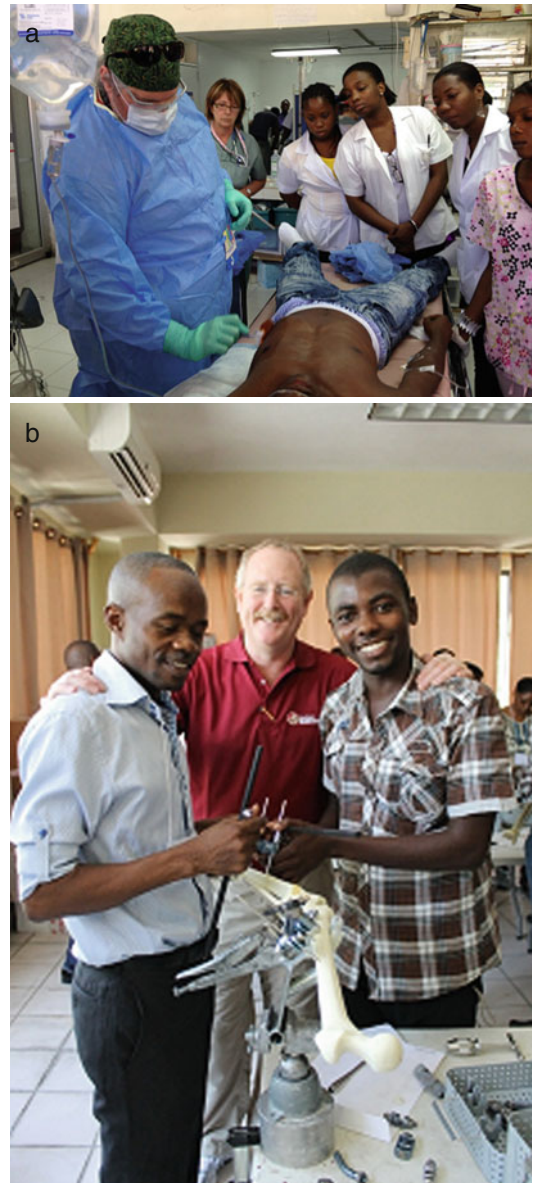


Fig. 50.1 (a, b) Training of local staff

In Haiti, there are very few orthopedic surgeons to service a population of 10.4 million people [10]. As in East Africa, recruitment and retention of junior surgeons are often difficult as they are attracted to higher-income employment opportunities [9]. Often the best surgical care is provided in private and nongovernment organization (NGO) hospitals [9]. While providing a service to the population, it is essential that these hospitals take more active leadership roles in promoting education and help to develop well-trained surgeons.

The most direct way that surgical training and support can occur on the ground is with volunteers directly teaching local staff in the operating room [4, 11]. Local staff can also take part in courses, such as those offered by the International Committee of the Red Cross in areas of war and post-conflict areas [9] or the Orthopedic Trauma Symposium in Haiti. These courses provide short duration but high impact teaching on a variety of skills. The next logical step to ensure capacity building and advancing care of trauma patients is establishing a curriculum that meets the needs of

the local health staff (Fig. 50.2). One such program is being actively developed in Haiti and is called the Orthopedic Trauma Care Specialist (OTCS) program for Haitian physicians [12]. This program aims to create surgeons for Haiti in cooperation with the local Haitian Orthopedic Societies. Participants do not graduate as traditional orthopedic surgeons capable of performing all orthopedic procedures. The focus is on recently graduated interns to become able to manage acute orthopedic injuries [12]. A 3-year program would offer a series of lectures, laboratories, and training in teaching skills, thereby creating the future trainers that are so needed in Haiti.

When implementing such a program, levels of costs and benefits should be always examined. The OTCS program is projected to have a cost-effectiveness ratio of \$133.97 per disability-adjusted life years (DALY) averted, well below the threshold for Haiti of an estimated \$1200 per DALY [12]. Whether it is a short-term or a long-term educational programs and curricula, volunteering in trauma surgical teams should involve training of local future educators.



Fig. 50.2 Training of future trauma carers

50.2 Infrastructure

Volunteer trauma teams should be encouraged and challenged to promote local resilience and to leave a positive legacy. Often in a disaster, there is an immediate collapse of the public health infrastructure (Fig. 50.3). More people may die as a result of the ensuing chaos than from the disaster itself [10]. Medical facilities are frequently lacking, with poor working conditions as reported by the Ptolemy Project [13]. Volunteer trauma teams should liaise with local administrators to determine the local needs of the population. A very important contribution may also be to engage in direct fundraising and grant applications to be used to improve local medical infrastructure [14]. Adequate facilities will allow for continued delivery of care in the absence of volunteers, continued education and improved public health delivery to facilitate future projects. In addition to the immediate medical benefits of improved facilities, engaging local contractors and private sector and government agencies will foster shared responsibility and ownership of the new and improved facilities [1].

The WHO recognized the importance of establishing appropriate health facilities in their position paper from 2011. They urge the development of safe and prepared facilities built and located safely and for existing facilities to be examined for safety concerns and updated if required [15].

50.3 Communication

Communication is a critical component to success of volunteer trauma care [16]. In a disaster, communications are hampered initially by the effects of the disaster itself. However, communications between NGOs and agencies can also be affected negatively by perceived rivalries and lack of cooperation [16]. This is a hurdle that must be overcome in order to establish effective continuity of care of trauma patients.

In the initial response phase in Haiti, for example, when relief workers and NGOs arrived, they assumed that the UN, who had been involved in Haiti for years prior to the 2010 earthquake, would have substantial information and data about existing infrastructure and operations [16]. Many assumed they would have access to the data and demographic information on health facilities and available systems. Instead there was a void of information, resulting in relief agencies starting the collection of data from the beginning [16]. This not only highlighted the importance of communication in the effective delivery of an early response, but more importantly, it highlighted the need for an adequate system for sharing information (Fig. 50.4). The rapid exchange of relevant information and data among agencies and organizations is of critical importance [17]. Agencies and NGOs often conduct reconnaissance missions on



Fig. 50.3 A total loss of local infrastructure undermines local resilience

health facilities, water centers, etc., but the data is often not shared, resulting in a lack of coordination, duplication of services, and inefficient use of time [17]. Some relief databases have been created in an attempt to address this issue, but they have not been met with great success. For example, the UN's established Relief Web has suffered from a lack of submissions from NGOs and academics [17]. This lack of data can not only lead to a reduced level of care but in fact hamper the delivery of care [18].

Volunteer trauma missions should be willing to share trauma databases and information. Sharing information will minimize redundancies and maximize the efficient use of limited funds.

Fig. 50.4 International teams must establish effective communication systems between agencies and with local officials



50.4 Interdisciplinary Cooperation and Networking

Operating in isolation will not allow a volunteer medical project to be sustainable. Creating strategic relationships is an integral part of building the capacity to ensure a positive legacy. The interdisciplinary nature of this approach requires cross-sectional cooperation and interdisciplinary partnerships, in order to achieve maximal benefit [1] (Fig. 50.5). Creating an adequate trauma care infrastructure and educational opportunities cannot take place in a vacuum. All stakeholders must be involved in the process of attempting to advance local healthcare delivery. It is necessary to integrate government



Fig. 50.5 Interdisciplinary cooperation and networking

departments, private sector investors, contractors, small business, healthcare administrators, university administrators, and national/international support agencies to create a shared framework and responsibility [1]. There is often the criticism that volunteer missions implement their strategy without the transfer of knowledge or the consideration of the local management skills or strategies [1]. The WHO suggests that in order to strengthen the role of local healthcare authorities, these must be provided with leadership roles and access to resources and enhanced training and planning [15]. Communities and local and national governments are empowered at all levels by their involvement in the development of a sustainable effort and process. The UN, recognizing the importance of sociopolitical relationships in order to achieve a sustainable approach to relief and development, has suggested several guidelines, many of which emphasize the importance of capacity building within local communities and governments [1].

50.5 Economics of Building a Legacy in Trauma Care

Surgical disease has not been a main focus for aid or political attention in developing countries. Yet surgical conditions often lead to permanent disability or death and contribute to the economic burden of illness of any country. Four major types of surgery have been identified as critical for saving lives: trauma, obstetrics, acute abdominal surgery (e.g., appendicitis), and elective care for relatively simple procedures (e.g., cleft lip repair) [19]. There is an abundance of evidence suggesting that providing surgical care is cost-effective by limiting the disability of surgical conditions such as trauma.

Given that treating surgical injuries and diseases can be cost-effective lifesaving measures in developing countries, one must consider how the economics of these programs can assist in developing resilience and legacy building. The answer to this lies in the cost-effective analysis of training local medical professionals to treat injuries surgically. As previously mentioned the benefits of this have been suggested in a cost-effective analysis of a new orthopedic surgical residency training program for Haiti OTCS [12].

50.6 A Case Study: Team Broken Earth-Project Medishare

Haiti's health indicators published by the WHO are alarming [20]. Medecins Sans Frontieres (MSF) has reported that Haiti has a public health crisis [21]. One of the notable issues contributing to the crisis is the insufficiency of numbers of trained medical professionals, and the weaknesses in the training programs that exist, with only 25 doctors per 100,000 people [22].

The current mission of Project Medishare [14] and Team Broken Earth is to train physicians, nurses, and allied healthcare professionals in the proper medical procedures for trauma, critical care, and rehabilitation in order to provide services on par with the World Health Organization (WHO) critical care standards in Haiti [20]. These specially trained personnel are expected to become leaders in their field and will proceed to train and instruct the next generation of healthcare providers.

Team Broken Earth was founded following the 2010 earthquake with the intention to provide a fully self-contained multidisciplinary team to provide medical aid in a hospital setting. The concept was to provide a team of nurses and doctors in fields including ICU, family practice, pediatrics, emergency medicine, internal medicine, surgery, orthopedic surgery, plastic surgery, anesthesia, and rehabilitation medicine. Since its inaugural trip, multiple full teams from across Canada, with 26–30 professionals per team, have traveled and worked in one of the few trauma critical care hospitals in Port-au-Prince. With the support initially of Memorial University and now other Canadian medical schools residents have become key team members, highlighting bi-directional clinical service learning.

Each team has four distinct tasks: to help local staff provide care to the patients of Port-au-Prince; to provide education to local staff; to work with them to develop safer policies, protocols, and procedures; and finally to provide resources to improve facilities within the hospital infrastructure.

Education remains one of the key mandates for every team. Team members are involved with working closely with local staff to ensure that practical skills are passed on to them through each procedure and facet of patient care. Training takes place

through a series of lectures on a variety of topics in trauma and acute pediatric care. In addition the team has provided local simulation training for emergency situations and an orthopedic lecture series.

The team has secured funds to build new infrastructure and water treatment facilities on site. The team sits on the administrative board of the hospital working with local administration and staff to establish working guidelines and a common approach to fundraising, grant writing, and program management. Information and data are also shared with multiple agencies. The team has developed and maintained close relationships with local universities and the Ministry of Health to ensure it is providing a desired partnership that is being delivered in a way that is mutually beneficial.

Beyond direct patient care, the most significant contribution has been teaching and training. Team Broken Earth works with the local doctors and nurses to build their capacity and expertise to deal safely and effectively with patients who require major medical and surgical care. The management of logistics is also vitally important. Each team must ensure maximum effectiveness and efficiency but also safety and security.

Conclusion

When considering the delivery of volunteer trauma care in austere environments, it is essential that more than the immediate needs following a disaster are planned for. Humanitarian organizations must develop a plan to build local capacity and resilience.

Education and training, infrastructure, economics, communications, and interdisciplinary relations should all be considered. Employing this framework will allow for effective continuity of care of trauma patients and ensure a positive legacy.

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