

Success in Academic Surgery

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Academic Global Surgery



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Success in Academic Surgery

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Foreword

Academic global surgery is developing at a breath-taking speed. One key factor for this development is the enthusiasm and optimism of students, residents, and young faculty, who appreciate and want to do something about the unacceptable health disparities that exist globally. In the last ten years, academic institutions, largely spurred by this whirlwind of interest, have started developing global health programs and centers, and more recently, academic global surgery programs and centers have begun to proliferate within departments of surgery.

Academic global surgery, as a field encompassing clinical care, education, and research, is in its infancy and requires more rigorous definition. Nevertheless, the global health community has come to appreciate the central importance global surgery will need to play if the lofty goals of the Lancet Commission on Investment in Health (Jamison et al. 2013) are to achieve grand convergence within one generation so that low- and middle-income countries (LMICs) make dramatic gains in health care. In 2015 alone, we saw the appearance of two landmark publications: *The Essential Surgery Volume of Disease Control Priorities* (Debas et al. 2015) and *The Lancet Commission on Global Surgery Report* (Meara et al. 2015). These publications herald the remarkable emergence of academic global surgery as a discipline in its own right.

The publication of *Success in Academic Surgery: Academic Global Surgery* is, therefore, timely and represents a unique contribution. It has brought together many experts who will not only further define academic global health programs but also provide guidelines to students, residents, and young faculty who are planning a career in this new field of opportunity. The future of academic global surgery, as did its beginning, will depend on the contribution of dedicated students and young surgeons who want to make a difference. This book addresses head-on and thoughtfully the challenges faced in trying to balance a global surgery career with traditional career and life demands. This book also addresses the most sustainable way academic global surgery can contribute to solving health-care disparities, i.e., through mutually beneficial and ethical partnerships and collaborations between institutions in high-income countries and those in LMICs.

As Paul Farmer has pointed out on several occasions, “Global Surgery is one of the most exciting frontiers in the quest for global health equity” (Debas et al. 2015). This book makes a critical contribution by helping young surgeons advance that frontier. We are grateful to the editors and contributing authors for stimulating and guiding the future leaders and practitioners of global surgery at its emergence as a recognized discipline.

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Preface

To the unfamiliar, the idea of global surgery conjures images of providing direct surgical care in remote places. While this is one component of global surgery, this book is dedicated to something different – the emerging field of academic global surgery (AGS). Every effort to improve surgical care worldwide is important, including traditional humanitarian surgery. Mission trips can provide desperately needed help, but they are typically short term and serve a limited number of people. AGS has a different goal, to support the delivery of high-quality surgical care to all, regardless of geographic location or economic status.

Surgery has been famously regarded as the neglected stepchild of global health. This was as much the fault of surgeons sequestering themselves to the operating room and not recognizing the importance of public health as it was the shortsightedness of global health policy in the past. However, recent landmark efforts have begun to change the view of surgery within global public health. The launch of the *Disease Control Priorities, Third Edition* (DCP3) at the Academic Surgical Congress in February 2015 and the release of the Lancet Commission on Global Surgery findings shortly thereafter foreshadowed what will likely be regarded as a pivotal moment in the recent courtship between surgery and public health. In May 2015, the World Health Assembly unanimously passed a historic resolution on *Strengthening Emergency and Essential Surgical Care and Anaesthesia as a Component of Universal Health Coverage*. The significance of this cannot be overstated.

What has curiously lagged behind is the acceptance of global surgery within academic surgery. Unlike the basic scientist or the health services researcher, the *laboratory* of the academic global surgeon may not necessarily be a concrete space in the institutional research tower, but instead could be dispersed in field locations halfway around the world. This can make the concept of global surgery harder to grasp as an academic pursuit. In reality, “global” is just the expanded geographic setting. At its core, the research is still the clinical outcomes, education, and basic science with which we are all familiar. In the recent past, placing *academic* in front of global surgery was met with significant skepticism, if not frank disbelief. However, because of the efforts of many surgeons, including the authors in this book, academic output in the area is now rapidly accelerating.

The landscape is changing on all fronts. With more than 80% of trainees asking for involvement in global surgery, the demand has necessitated a response from the American Board of Surgery and the Accreditation Council for Graduate Medical Education. In 2011, guidelines for international rotations were agreed upon and published by these organizations. Surgical societies, too, are taking notice. The Association for Academic Surgery, Society of University Surgeons, American College of Surgeons, and the Society of American Gastrointestinal and Endoscopic Surgeons are among many that now enthusiastically support development of their members in this new discipline. Suddenly, the application of research, education, and evidence-based advocacy toward clinical care in regions of health inequities worldwide does not seem to be a fantasy or a waste of time. Whether in rural North America, or in the far reaches of the world, it is obvious that the rigorous scientific method, dedication to training, and focus on quality outcomes that mark academic surgery are perfectly suited toward strengthening overall systems for surgical care wherever inequities exist.

The inspiration behind this book is the enthusiasm of the ever-growing population of medical students, residents, fellows, and faculty who ask, “What is academic global surgery? How can we get involved in the field? Can we make a career in AGS?” *Success in Academic Surgery: Global Surgery* is designed to serve as both an introduction into and a snapshot of current thought for those interested in the field, and as a much needed early-career navigation tool for the newest generation of academic global surgeons. Finally, it is our hope that this publication marks a coming of age for this field within academic surgery and makes obvious that AGS is not a fad but instead a burgeoning field that perfectly marries discovery, philanthropy, *and* academics with surgery. The critical momentum is here, and now the work truly begins.

Be the change you wish to see in the world – Gandhi

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Part I
General Considerations

Chapter 1

Global Burden of Surgical Disease and the Role of Academia

Doruk Ozgediz, Keith P. Martin, and Emmanuel A. Ameh

An estimated five billion people worldwide do not have access to safe and affordable surgical and anesthetic care. Most of these people live in low- and middle-income countries (LMICs). Great inequities and disparities exist and the burden of disease, when matched with available resources and capacity, continues to diverge between high income countries (HICs) and LMICs. Furthermore, even within LMIC or HIC countries and regions, inequities exist between communities.

This chapter will introduce some of the concepts relevant to the global burden of surgical disease and disparities in surgical care globally. Recent approaches and initiatives taken by the academic surgical community in this area will be summarized and possible future directions will be proposed. We will also discuss roles of the Academic Global Surgeon and relevant aspects of such a career, and examine the potential position of academic institutions in tackling the issues within global surgical care.

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Global Burden of Surgical Disease

Increased attention has been focused in recent years on the worldwide burden of surgical diseases. Many factors have played a role in this surge of interest, among them:

1. A greater visibility of global health disparities through improved communication networks and an increased number and scale of global health initiatives
2. The associated humanitarian imperative to tackle these disparities for greater global health equity
3. An increased engagement by surgical and perioperative health care providers in surgical care in LMICs
4. Evidence that the burden of surgical conditions in LMICs is significant and surgical care is more cost-effective than previously imagined
5. An unprecedented surge in the interest of students and trainees in HICs for experience, skills and mentorship in this area.

As a result, engagement of the academic surgical community in research and programs related to care of surgical conditions in LMICs has grown. As the target time for the Millennium Development Goals (MDGs) has arrived and focus has turned to the United Nations' Sustainable Development Goals (SDGs), there has been global consensus on the need for Universal Health Coverage (UHC). It has become increasingly clear that the latter cannot be achieved without including surgical care and addressing the diverging global burden of surgical diseases between HICs and LMICs. This concept is underscored by the findings of the Lancet Commission on Global Surgery released in early 2015. (www.thelancet.com/commissions/global-surgery). Working with collaborators in 110 countries throughout the world, they definitively state that surgical services are a prerequisite for the full realization of global health goals. The commission estimates that an additional 143 million surgical procedures/year would need to be performed, predominately in LMICs, by an additional two million providers to achieve the commission's goal of a minimum of 80 % coverage of essential surgical and anesthesia services per country by 2030.

In broad terms, *burden* refers to the individual, family, community and overall public health impact associated with surgical conditions. In the technical language of academic public health, however, 'burden' generally refers to the Global Burden of Disease (GBD) Study, through which the term *disability-adjusted life-year* (DALY) was developed in 1990 as a unique health metric. While previous studies of the burden of disease reported mortality alone, this metric was unique in trying to capture associated disability for those conditions with non-fatal health outcomes. Roughly, the DALY refers to a 'healthy' year of life lost. Over the last several decades, the GBD Study has remained a primary tool for academics, policymakers and the charitable sector as one input (among many) to guide resource allocation in LMICs. One of the advantages of a single metric is the ability to compare diseases

and risk factors objectively. However, the DALY metric has been controversial in public health circles for a host of reasons, and the 2010 iteration of the GBD study attempted to address a number of these shortcomings. Several of the greatest disadvantages have been the lack of practical meaning of the calculations generated, and the extensive statistical modeling required to arrive at national and regional estimates of burden in settings where data are limited.

Some individuals and groups have attempted to use GBD categories or data to estimate burden of surgical conditions, such as injuries, cancer, or emergency conditions. An initial very rough estimate in 2006, based on a survey of 18 international surgeons, was that 11 % of the GBD is surgical, and this number has been widely quoted in the literature surrounding global surgery. Many subsequent estimates, utilizing some of the methods cited below, have put this number much higher, up to 30 % of the GBD. Another approach has been to estimate the DALYs that would be averted for specific conditions or groups of conditions if outcomes in low-income countries would approach those in high-income countries, suggesting, for example, that two million deaths a year could be prevented in severely injured patients by improved trauma care. These efforts have been useful in generating numbers large enough as an advocacy tool to draw potential interest and attention from donors and policymakers. Among the most important work with DALYs have been estimates of cost-effectiveness of hospital wards and even specialist surgical interventions showing that surgical intervention is a much better 'buy' than previously estimated by public health experts. These findings were emphasized by the publication of the DCP3 or *Disease Control Priorities* 3rd edition (<http://dcp-3.org/surgery>) in Feb 2015, in which essential surgical procedures ranked among the most cost-effective of all health interventions. DCP3 estimated that while universal coverage of essential surgery would require about \$3 billion per year of annual spending over current levels, it would have a benefit to cost ratio of over 10 to 1.

A number of groups in recent years have expanded the discourse and application of surgical metrics far beyond the DALY. Early work attempting to quantify surgical burden and need was primarily limited to facility-based operative logbook analysis, sometimes linked to population data. Recent emphasis has focused on capacity surveys through measuring infrastructure and human resources of hospitals to care for essential and emergency conditions. There have been numerous such tools developed and piloted across countries and regions. Universally, they have measured deficiencies in capacity to treat high priority surgical conditions. The development of these tools and the documentation of capacity gaps have been critical for funding and advocacy efforts.

Given that a significant proportion of patients with surgical needs do not interact with the health care system in many LMICs, a greater number of population-based surveys have been performed to estimate surgical death and disability at the household level. This has resulted in a more accurate estimate of burden than what can be found through modeling from facility-based surveys alone.

Less work has been done in the area of qualitative research, which could help shed light upon aspects of burden that are less likely to be captured by other estimates of mortality and morbidity. This research may include evaluation of health seeking behavior, perception of disease, confidence in the health care system, impact of the system of traditional healers, social stigma or even economic consequences of surgical disease on vulnerable populations.

Nonetheless, more accurate and meaningful measures of surgical burden are needed to capture the broad dimensions of the need and consequences. Further needs include metrics that capture the tremendous access barriers and difficult choices faced by populations in these environments. Perhaps the most important work yet to be done involves translation of this knowledge to implement *surgical scale up* projects or programs with associated measurement of cost and burden.

Many challenges affect the development of meaningful metrics for surgical care, and the development of ‘packages’ of care. Surgical care has a broad reach and plays a critical role in many disease processes such as trauma and emergency surgical care (inclusive of disaster and conflict settings), emergency obstetric care, child health, infectious diseases and non-communicable diseases such as cardiovascular disease, cancer and diabetes. Due to this intersection with a wide range of disease processes, age groups, and breadth in urgency of intervention (from time-critical care to elective care), development of a coherent package to improve care can be a challenge. Furthermore, surgical treatment may be needed for only a subset of patients with certain conditions or at a certain stage of disease. Even the term *surgical care* has been debated, clarifying the difference between surgery, surgical conditions and surgical treatment. These distinctions are practically important as some conditions require the presence of surgical expertise and decision-making all the time, but may require an operation to be performed only rarely.

More broadly, concepts such as *met* and *unmet* need for health services and coverage of surgical services are also part of the discussion about surgical burden and require greater refinement and practical application. They have been used for other priority health interventions but not in detail or depth for surgical conditions. This has led to the general sense that surgery requires expansive *systems strengthening*. Still, some groups and individuals have called for resources to treat specific conditions only.

Due to this broad scope of disease and context of need, the public health disciplines that could inform solutions for surgical service delivery in LMICs are also wide-ranging, and include epidemiology, health policy, health services research, health economics, gender studies, medical anthropology, ethics and human rights related to health care, among others. In addition, it is important to remember that clinical surgery is truly a *team sport* that requires anesthesia and other perioperative care providers such as nursing and theater staff. Inclusion of these groups in surgical solutions is essential but often lacking. This may reflect overemphasis on the ‘operation’ that may be part of the care of a potentially surgical condition, rather than the package of resources needed for holistic care including adequate disease identification, and pre- and post-operative management.

Despite the ongoing needs and work yet to be done, mounting evidence such as the DCP3 publication and the Lancet Commission report, make it quite clear that surgery is indeed an integral and inseparable part of comprehensive universal health care. As a reflection of this and a hopeful nod to the future, in May 2015 the 68th World Health Assembly ratified a historic resolution on strengthening Emergency and Essential Surgical and Anesthesia Care as a Component of Universal Health Coverage.

What Is an Academic Global Surgeon?

Academic work in global health has greatly increased over the last several decades, but much of this focus has been in communicable disease research such as HIV, TB and malaria. Along with a surging literature related to surgery in LMICs, recent papers and textbooks have discussed the concept of *Global Surgery*, building on previous similar conversations defining *Global Health* as a science. These terms are quite loosely defined, but an Academic Global Surgeon generally refers to a surgeon interested in surgical conditions affecting vulnerable populations, often in resource-poor environments where health access may be limited. While this often includes vulnerable populations in LMICs, it may include similar populations in HICs.

The academic aspect may be most broadly interpreted as some focus on scholarly activity related to the above, often in association with education, research, advocacy or service delivery. An academic focus may be in contrast to an exclusive focus on service delivery and surgical humanitarian aid more primarily focused on direct patient care, often through the model of a short or long-term mission. A role as an Academic Global Surgeon may be less recognized as an esteemed position compared to the more traditional roles of the academic surgeon scientist with a focus on basic science, the surgeon-educator, and-or the surgeon clinical-researcher. Nonetheless, all of these skill sets have roles to play in surgical global health.

The Academic Global Surgeon most commonly has ties to a university and may use this academic base to translate the needs and consequences of limited surgical care in LMICs into action. Time spent in the resource-poor setting for the Academic Global Surgeon may vary from full-time to part-time. In addition, an increasing number of surgeons associated with relief organizations and humanitarian groups have engaged in valuable scholarly activity through planning, implementation and monitoring and evaluation arm of these organizations.

Skill sets of the Academic Global Surgeon often include familiarity and experience with the delivery of surgical care to vulnerable populations in the resource-poor setting, as well as the many barriers associated with health care access for these populations. Those with experience in health disparities research and access to care, as well as surgical education, in the HIC setting may apply these concepts to the LMIC setting through academic collaborations. Experience with clinical service delivery in resource-poor areas coupled with a public health mindset can help to translate the clinical and access challenges into meaningful research studies.

Questions such as, *Why is this patient here now?*, *What are the challenges and possible solutions for surgery in this environment?*, and *Who are the local champions for surgical care?* are a starting point that lead to focused areas for development and implementation. Another critical aspect is the ability to work with not only surgical colleagues at other institutions and regionally, but also colleagues in anesthesia and nursing providers. Surgical solutions require a multidisciplinary approach.

Scholarly activity for the Academic Global Surgeon can take many forms, and may include research into the concepts outlined in first section of the chapter, such as burden of surgical disease, met and unmet need for surgery and health care access and disparities. Research into these areas is generally conducted through collaborations with clinicians or researchers in LMICs where knowledge creation may have the greatest impact. Some academic surgeons may spend minimal time away from their home institution while remaining heavily involved in research of this kind. Planning and conduct of such research, as well as authorship in publications related to this work, should also be shared in equitable research collaborations.

The area of ethics in global health research has garnered more attention in recent years with increased experience in the areas that have received the most funding, generally communicable diseases. Much can be learned from the successes and challenges faced by some of these longstanding collaborations. One of the reported pitfalls of this work has been the extractive nature of some of the research, where knowledge generated does not clearly feed back to the setting where it is most needed.

Academic Global Surgeons may also be involved in research related to innovation of equipment and devices tailored to the resource-poor setting. As has been well-described, one of the most significant barriers to surgical care in resource-limited settings is the lack of equipment and supplies. In the last decade, an increasing number of providers have tried to develop locally sustainable, low cost supplies and equipment suited for resource-poor areas. Academic Global Surgeons are often involved in this process, from the identification of essential equipment to the process of device development and testing. This process often requires collaboration with other disciplines as well. The reverse situation is also possible, in that practitioners in resource-poor settings may develop a more cost-effective practice or use novel technology that could reduce costs in HICs.

Scholarly activity may take many other forms as well. For example, many academic surgical collaborations have a focus on improvement of training and education to support surgical capacity of trainees in the LMICs. The design of short courses suited to the LMIC context or the measurement of skills transfer for outreach activities targeting surgical education may be another area of focus. Others have edited textbooks geared to common clinical surgical scenarios (in general surgery or in surgical subspecialties) in the resource-poor setting or have engaged in curriculum development with colleagues in LMICs. Furthermore, some have made a long-term commitment to development of post-graduate and sub-specialty train-

ing programs in LMICs supported through American universities and/or the faith-based community, private philanthropy or international development organizations. A number of recent global health textbooks, policy briefs and new editions of classical surgical texts now include chapters on global surgery. Academic Global Surgeons have also been involved in an increasing number of university-based global health courses and programs by planning modules focused on global surgery and full courses devoted to global surgery that may run through a department of public health.

As previously noted, there has been an unprecedented surge in interest from students and trainees in HICs for exposure to global surgery. There remains a gap, however, between the growing number of young trainees with this interest and the limited number of Academic Global Surgeons with a career focus in this area. Academic Global Surgeons frequently mentor students and trainees with this interest in either the research or clinical realms. Ideally this mentorship may also involve modeling around ethical global health collaborations and relationships. On a broader level, many Academic Global Surgeons have led their institutions to forge collaborations with institutions in LMICs. Development of these types of collaborations requires sensitivity to the needs in LMICs and extensive work in the medico-legal aspects of establishing these collaborations, in addition to the establishment of funding to support these activities.

Some Academic Global Surgeons have worked through professional societies such as the Association for Academic Surgery, Society of University Surgeons or various specialty surgical societies to raise the visibility of global health activities of the membership and to increase the scope of work that these organizations do related to surgical care in LMICs. Examples of such work include: *global surgery* committees with a wide scope of activities, such as the funding of research projects in these areas; research panels and presentations with a focus on surgical care in resource poor areas; supporting funding of selected LMIC providers to attend meetings in North America; and, establishment of clearinghouses for short courses geared to the HIC surgeon who is engaged in volunteerism with a focus on clinical scenarios, surgical techniques or challenges in the resource-poor setting. Others work closely with or have created their own non-profit organizations of varied size and scope to support or coordinate surgical care in LMICs. Many such organizations have developed in the last decade alongside university-based collaborations to fill the critical gaps to advancing the global surgery agenda. A major driving force moving forward, as in other areas of global health, is to explore if and how some of these organizations can work together.

Perhaps the most important role of an Academic Global Surgeon is as an advocate for surgical providers and service delivery in LMICs to populations in need. This requires close working relationships with LMIC counterparts, often developed over time through mutual trust. It requires an ability to work with local providers not only to identify needs, but also to help prioritize these needs and translate these needs to practical solutions. This also requires the identification of *local champions*,

or providers in the resource poor setting with a great commitment to improve local health care. Most successful collaborations in global surgery and in other disciplines have identified the presence and involvement of such a champion as essential.

To promote the essential right to surgical services, advocacy may also take place at the level of major international organizations such as the International Red Cross, the United Nations, and the World Health Organization. This effort is often accomplished through official documents, policies and guidelines that may guide health planning in LMICs and help set the agenda for philanthropy.

Given that global surgery is emerging as a new field, the academic surgeon has the opportunity to shape this field and to further establish its legitimacy as an academic pursuit.

The Role of Academic Institutions

To reduce the burden of surgical disease (BSD) and to narrow inequity and disparity gaps requires targeted collaborative partnerships between HICs and LMICs. Academic institutions have a key and central role to play in this regard, as they are strategically positioned and structured to provide leadership and develop innovative solutions. Such collaborative partnerships can be achieved through traditional functions and responsibilities of academic centers.

Teaching and Training

There is currently a severe shortage of surgical providers in LMICs, including the support staff required to provide safe surgical care. This situation is compounded by the limited training opportunities available to increase the numbers of providers. For some surgical specialties, training opportunities do not exist at all. In some settings, there are not enough doctors and those taking up surgical training are even fewer. There are also few active surgical trainers, who are often over-burdened with provision of essential surgical services at the same time.

Reduction in the BSD and existing disparities in surgical care cannot be achieved without significantly expanding the workforce capacity in LMICs. Such expansion is best achieved through training and provision of appropriate support for training.

Academic institutions in HICs can leverage their wealth of surgical expertise and resources to develop partnerships that would create and develop training programs where none exist or to support and strengthen existing training programs through curriculum enhancements, development of effective and innovative training tools and continuing development of trainers.

Research

This is discussed in-depth in a separate chapter. However, as discussed in the first section, accurate and reliable data on BSD in many LMICs is not readily available, and data on surgical capacity to address the high BSD are often lacking. The cost effectiveness of surgery and surgical interventions in resource poor settings has not been fully ascertained, though a number of studies, including the DCP3, suggest surgical care is a better investment for public health than previously assumed. Given the current data, developing targeted solutions to address the BSD becomes quite challenging. Also, the surgical epidemiology, treatment and outcome profile of many surgical diseases in LMICs remain under-studied. Furthermore, innovative, context-specific solutions to address the BSD need to be developed and implemented. As an example, there has been much discourse on the role of mid-level surgical and anaesthesia providers and task sharing to address workforce shortages in LMICs. However, their acceptability, safety and overall impact remain controversial. Novel approaches and programs addressing these workforce shortages are needed. Academic institutions, with their wealth of expertise and resource base are in a vantage position to cultivate research partnerships that would help to adequately define and provide accurate and reliable data for all needed research.

Service

Academic institutions, by nature have a social obligation, which includes bringing services and developments to areas where these are limited or do not exist. This obligation provides the Academic Global Surgeon with a unique opportunity to influence change in populations that are under-served and under-resourced. Given the current limitations in surgical workforce, infrastructure and equipment in many LMICs and resource poor areas, it would take some time to scale up the capacity to meet local needs and address the BSD. Partnerships that provide and support surgical services are needed and can be quite effective in addressing BSD, at least in the short term. Academic institutions can provide the relevant personnel and resources to support and strengthen existing surgical services. Where services do not exist, new services (including specialized services) can be developed by partnering with local surgical champions and institutions.

These service-oriented partnerships need to have clearly defined focus and context-specific goals and can be in the form of:

- (a) Short visits with surgical team, for a few weeks or months at a time, but regularly at least every year
- (b) Long-term, continuous commitment: a surgical team always available all year round

- (c) Surgical outreach: surgical team visiting and providing surgical care for only a few days at a time

Whichever type of service partnership that is developed should include scaling up of local workforce capacity through training and introduction of sustainable initiatives. This would help avoid a long-term cycle of dependence.

As partnerships are developed, multidisciplinary collaborations are important, as safe surgical care cannot be provided without the involvement of relevant specialties such as anesthesia, nursing and biomedical engineering. The capacity for most of these complementary services in LMICs is limited and often poorly developed.

Advocacy

With their visibility in the public eye, academic centers have a unique ability to act as ongoing advocacy platforms for Global Surgery. They can achieve this in a variety of ways including, promotion of a standing center for Global Surgery within their own institution, joining with similar institutions such as has been done with the Consortium of Universities for Global Health (CUGH), or through partnerships with NGO's to advocate for improved care of surgical diseases of particular concern in their partnership region. Furthermore, academia can effect policy change through collaborative international partnerships that could campaign to include surgical care in universal health coverage and post-MDG sustainable development goals. An attempt at this latter type of collaboration has come recently in the form of the G4 alliance (The Global Alliance for Surgical, Obstetric, Trauma, and Anaesthesia Care: www.g4alliance.org), which is an advocacy-based organization of academic centers, professional societies, and NGO's dedicated to building political priority for surgical care.

It's encouraging to note that academic groups and academic institutions have had great impact in other areas of global health, including infectious diseases and, maternal and child mortality. The role of HIC academic institutions in alliance with LMIC partners in the fight against HIV/AIDS provides an encouraging example of what can be achieved through academic collaborations in global health. Through such partnerships, HIV/AIDS changed from a fatal disease to a now manageable chronic disease condition. The prospect for academic surgery to achieve comparable or greater success in addressing the global burden of surgical disease is exciting and promising.

Academic institutions in LMICs do not have the same wealth of personnel and resources as those in HICs, but are desirous of mutually beneficial partnerships. In forging partnerships, it is critical to identify already existing partnerships in a given area and setting to:

- (a) Avoid undue duplication of activities
- (b) Avoid unhealthy competition
- (c) Minimize redundancy in a setting where multiple academic groups are working

- (d) Maximize impact of activities and programs
- (e) Harmonize and pool resources, where this would be complementary

Whom to Partner With

Partnerships are most commonly with universities, as these institutions would already have existing structures and avenues for collaborative partnerships. However, universities in LMICs are few and may not always be appropriate for all collaborative partnerships. Other partnering bodies exist and should always be considered (Table 1.1).

Joining with non-profit organizations and agencies can be helpful and should be explored whenever possible and necessary. Some non-profit organizations already have established programs, networks and extensive experience in LMICs. Partnering with them would bring on their unique capacities and capabilities, experience and resources in actualizing the desired goals of academic global surgery. However, non-profit organizations may have goals and objectives that conflict with those of Academic Global Surgery, and such potential conflicting areas should always be addressed and eliminated from the outset of any partnership. Any successful partnership requires significant planning at each step, maintains clarity with regard to roles and responsibilities, and always balances the needs of both sides (Fig. 1.1).

Benefits of Involvement in Surgical Care in Resource-Poor Settings

Involvement in surgical care in resource poor settings can be gratifying and offers several types of benefits for both the individual and the institution:

Table 1.1 Partnership organizations for academic global surgery

Academic institutions
Universities
University Hospitals
Research Institutes
Public and governmental organizations
Ministries of Health
World Health Organization
Others
Non-profit, non-governmental organizations
Humanitarian
Surgical Mission Groups
Academic Groups
Training colleges

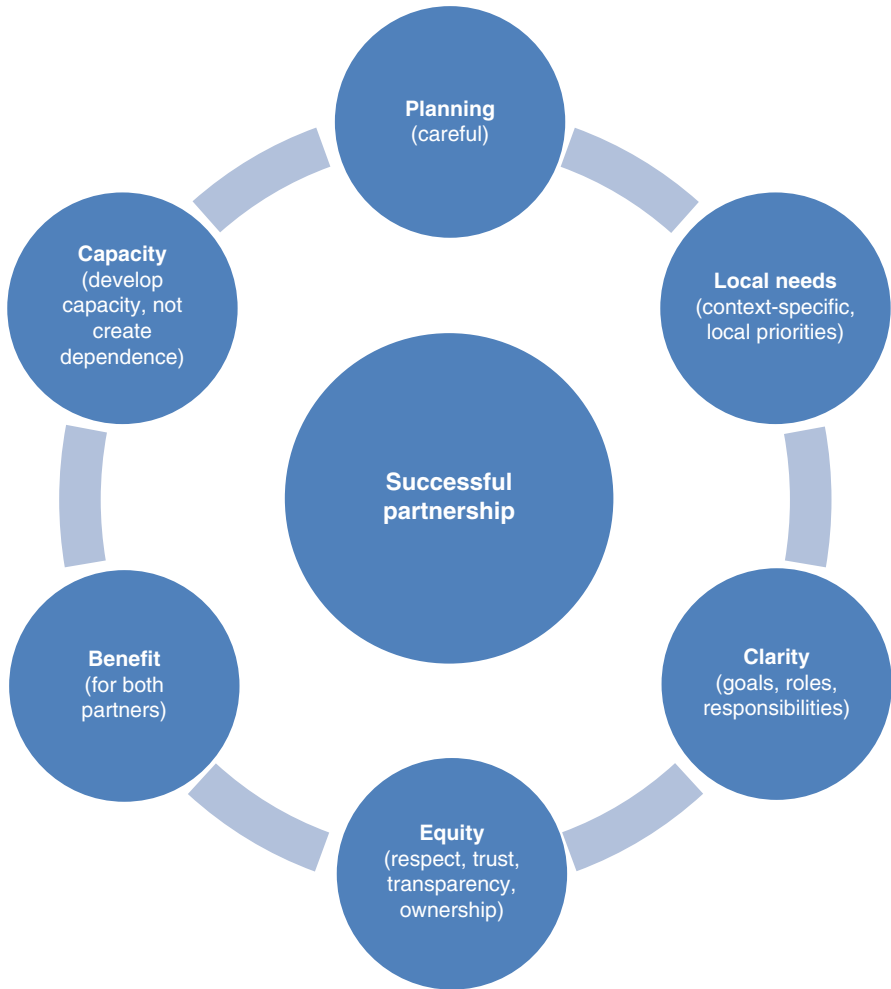


Fig. 1.1 Cycle for successful collaborative partnerships

1. Trainees in the HIC may develop interest in the field
2. Cost-conscious medicine: involvement in resource poor settings often creates the necessity to avoid wastefulness and only do that which is necessary, relevant, and effective.
3. Investigations into diseases or care delivery models may benefit patients in all settings.
4. Supporting surgical care and surgical systems would invariably result in improvements in the entire health system in HIC and LMICs.

Conclusion

The global burden of surgical disease is increasingly recognized as a significant public health issue. This is a stark departure from the past landscape of global health that often reserved surgical involvement to no more than a mission activity. Academic institutions can and should be involved in supporting this nascent field by engaging in training, research, and service delivery to vulnerable populations in resource-poor areas. Similarly, the global surgeon can contribute significantly with scholarly work and a wide range of skill sets. Despite existing challenges, the prospects are promising for a career in academic global surgery. For any partnership between an individual or institution and a resource-poor region to be successful and sustainable, the collaboration must be truly bilateral and mutually beneficial.

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Chapter 2

Promoting, Developing, and Sustaining Academic Global Surgery Programs

**Raymond R. Price, Marilyn W. Butler, Catherine R. deVries,
and Fizan Abdullah**

Introduction

Academic global surgery programs are increasingly becoming a vital part of many surgery departments. Not only are faculty members participating in various capacities to improve surgical care in low- and middle-income countries (LMICs), but a majority of surgical residents prioritize international electives above all other electives and plan to engage in global surgery work during their careers. Traditionally surgeons have formed collaborations in LMICs either full- or part-time, often using vacation time to do so. Increasingly surgeons have approached these collaborations with an academic focus, sharing experience and education with their host surgeons, and incorporating research and evaluation of their experiences.

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This chapter addresses the importance of promoting global surgery programs as legitimate endeavors beneficial to universities and academic surgery departments. These programs are critical to developing the next generation of surgical leaders capable of addressing and identifying solutions to the challenges of surgical care worldwide, particularly in LMICs. The present chapter identifies and outlines steps to promote and develop a global surgery program at an academic institution. The chapter also demonstrates how these programs can advocate for access to high-quality low-cost surgical care at national and international levels. Finally, it describes the importance of developing relationships and collaborations within an institution in order to strengthen and sustain the global surgery program.

Promoting and Developing an Academic Global Surgery Program

Many factors come into play when establishing a global surgery program at an academic institution. While the lack of surgical care for over five billion people may be reason enough for the development of academic global surgical programs, global engagement is often misconstrued as simply a volunteer humanitarian effort. It is often not recognized for its academic potential or appropriateness for institutions of higher learning. Sir James Learmonth, during the delivery of his talk in London in 1949 on the ‘Contributions of Surgery to Preventive Medicine’ recognized this important concept:

An idea may be lost or its application retarded because it is put forward diffidently or at a time which is not opportune, just as an idea may be opposed merely because its sponsor is too vocal, or too confident, or too sweeping in his claims. (Learmonth, J. (1951). *The Contributions of Surgery to Preventive Medicine*. London, Oxford University Press, Geoffrey Cumberlege, Publisher to the University, p 20.)

Experience dictates that four areas must be addressed in creating new global surgery programs within academic institutions:

1. Developing alliances with those with similar interests.
2. Aligning the mission of the Global Surgery program with that of the academic institution.
 - (a) Define the field.
 - (b) Educate leaders and faculty about the true scope and definition of academic global surgery.
3. Promoting the program proposal to key administrative leaders including:
 - (a) Demonstrate the academic potential of global surgery endeavors.
 - (b) Underscore the value of the program to the academic institution.
 1. Expanding the Academic Spectrum and Enhancing Recruitment Opportunities.
 2. Augmenting Economic Investment.
 3. Faculty and Trainee Health Benefits.
4. Identifying and proposing sources for adequate funding.

Developing Alliances

Many faculty members frequently feel isolated and alone in their quest to advance the concept of global surgery programs as a legitimate academic pursuit. Yet, surprisingly in most institutions, with minimal reconnaissance, a group of stakeholders with similar vision can be organized to begin sharing ideas. Some of these stakeholders may come from within the department of surgery and others from related departments such as emergency medicine, gynecology, nursing, neurosurgery, orthopedics, ophthalmology, dermatology, or anesthesia. Broadening the potential scope of academic global surgery might find compatriots from disparate disciplines such as engineering, public health, law, business, anthropology, social work, and others. Once the core group of stakeholders is identified, they can map out the local academic landscape and then develop an institutional value proposition.

Aligning Missions of Global Surgery with the Academic Institution

Define Academic Global Surgery

The Merriam-Webster dictionary defines global as involving the entire world or involving all of something. Global Surgery therefore includes all things related to the ecosystem necessary to provide surgical care worldwide, both locally and abroad. Global Surgery requires a broader understanding of different systems and interactions within and between other disciplines (Fig. 2.1).

Overcoming misperceptions about the scope of global surgery at an academic institution is one of the most difficult challenges. This is because surgeons have

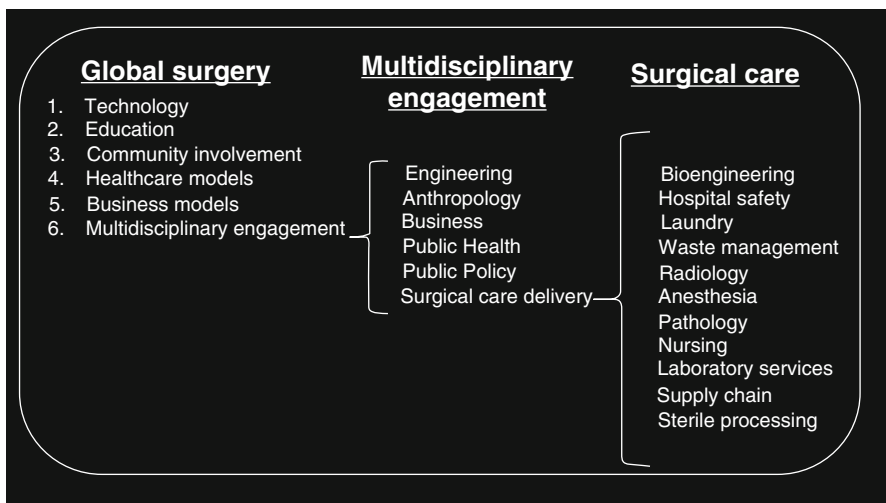


Fig. 2.1 Key areas for global surgery education and research

historically traveled to poor countries as volunteers and provided care on a charity basis. In the new paradigm of “global surgery”, the argument must be made that there is a science to strengthening surgical care and that systems of care can be studied in the context of global health. As with academic surgery in the home institution, LMIC technical training, perioperative medical education, outcomes measures and other activities can be successfully considered in the academic context. The perception that suboptimal care is acceptable in settings with limited resources and that poor follow-up is a regrettable norm must be vigorously challenged. While some even question the value of providing or teaching anything more than basic surgical care where healthcare spending per capita is low, the case has been amply supported by cost comparison data that the benefits of surgical care to large communities is significant to a point that has previously been unrecognized by the public health community.

Institutions of higher education provide the right milieu for engaging the multi-disciplinary approach to critically analyze the component challenges to accessible, affordable surgical care. Universities can benefit from the opportunity to discover innovative solutions for both LMICs and high-income countries (HICs).

Understand the Scope and Potential for Academic Global Surgery

As medical schools and post-graduate residency programs have begun to develop and embrace global surgery within their curricula, individual training programs have approached the field from different angles. Some support clinical or research resident rotations in LMICs; others provide opportunities for earning advanced certificates or degrees during or after residency; a few have developed formal courses (traditional and on-line). Several institutions have formalized global surgery fellowships; others have organized multidisciplinary teams focusing on the development of affordable, high-quality products to curb the cost of surgical care. Currently academic global surgery programs are at various stages of development and may focus on specific diseases, disciplines, methods, or areas of the world. However, most, if not all, support a common mission theme:

To develop the next generation of global surgical and anesthesia leaders to develop systems for quality, affordable local and international surgical care, accessible to all through education, research, service, development and advocacy.

Carefully ushering the development of global surgery programs from conception to realization requires deliberately planned steps to achieve the critical administrative support to enact such a broad mission.

Promoting Global Surgery at Academic Institutions

Formal departmental grand round lectures, resident education seminars, and guest lectures in medical student, graduate, and undergraduate classes provide

opportunities for generating broad support within the academic and local community. Frequent updates, formal presentations, and discussions in departmental and division meetings focusing on specific global surgery and anesthesia successes as well as presenting ideas for potential expansion and growth broaden the discussion among local leaders.

Social media such as Twitter, Facebook, Instagram, Snapchat, blogs, YouTube, and online discussion sites can showcase individual efforts and build consensus. It also has the potential benefit of catching the attention of local university and health science leaders; social media can increase national and international recognition for the home institution and partners abroad. However, while social media can be very powerful, as with any healthcare discussion between professionals when brought to a public forum, misguided comments could also have disastrous results. In planning any educational endeavor, careful preparation to answer questions from critics will help mitigate their concerns.

Demonstrate the Academic Potential of Global Surgery Endeavors

The word academic implies education: teaching, research, and discovery. It includes the examination of the past as well as discovery of new ideas and creative solutions that are disseminated and applied beyond the local institution for the overall good worldwide. Successful introduction of global surgery programs into academic institutions requires integrating these fundamental academic concepts into all aspects of global surgery endeavors. Peer reviewed publications, books, book chapters, abstracts, poster presentations, movies or films and national and international presentations that examine the issues surrounding global surgery provides a portion of the evidence highlighting the academic potential for global surgery. Teaching formal university courses, organizing conferences, and participating in panel discussions or symposia at academic meetings inculcates the educational nature and interest in global surgery. Establishing resident rotations and fellowships, and creating opportunities for advanced degrees provides excellent opportunities for broadening the scope for academic global surgery. As part of the development of the field of global surgery, systematizing and certifying knowledge and competency not only in the field of professional expertise, but also in the ethics, logistics, economics, and research methods pertinent to global health creates additional credibility. Certification may come from academic institutions, professional organizations such as regional and international colleges, and academies of surgeons, anesthesiologists, nursing, or other professional societies. Furthermore, since surgery functions within the context of healthcare in general, it is advisable that practitioners of global surgery have an identifiable proficiency in the principles of public health. Designing and showcasing these accomplishments to clinical as well as administrative leaders demonstrates the legitimate academic nature possible with global surgery work (Box 2.1).

Box 2.1: Developing a Center for Global Surgery at the University of Utah

A small group of key faculty members at the University of Utah made a conscious decision to promote the idea of a Center for Global Surgery (CGS) by developing academic opportunities and alliances for faculty and students. The following successful ventures from the University of Utah provide a few initial ideas for other training programs:

1. 2007: Initial request for CGS (turned down).
2. 2008: Community Global Surgery Roundtable discussion group and presentations by faculty, residents, medical students and surgeons from the community.
3. 2008–2014: Ongoing talks and formal presentations, departmental grand rounds (surgery, urology, public health, pediatric surgery, others); classes on global surgery in the schools of medicine, nursing, law, anthropology, social work, and bio-engineering. Lectures and mentorship were also provided to the undergraduate International Leadership Academy (ILA).
4. 2008: Sponsored an American College of Surgeons Utah Chapter meeting including multidisciplinary presentations (General Surgery, Orthopedics, Obstetrics and Gynecology, Pediatrics, Urology, Nursing, Ethics, and Otorhinolaryngology).
5. 2008–2014: Faculty serve in leadership roles for global surgery initiatives in national and international organizations (World Health Organization Global Initiative for Emergency and Essential Surgical Care (WHO-GIEESC), American College of Surgeons, IVUmed, Society of American Gastrointestinal and Endoscopic Surgeons (SAGES), and the Dr. WC Swanson Family Foundation Surgical Outreach).
6. 2009 (and resumed in 2014): Global Surgery and Public Health Course, graduate level course developed with the Department of Family and Preventive Medicine, Division of Public Health.
7. 2009: Collated the current engagement in global surgery activities within other divisions in the department of surgery and other surgically related departments. Began discussions for synergism.
8. 2009: Partnered with school of engineering Bio-design program to include making affordable surgical equipment and supplies for resource-poor areas that could potentially be reverse engineered and disrupt the current high-cost of surgical care in HICs. Led to the initiation of the “BioWorld: Sustainable Design for the Developing World” program:
 - (a) Operating room light affordable and appropriate for district level hospitals (won \$10,000 award)
 - (b) Design cost affordable laparoscopic equipment including light source, CO₂ insufflator, camera, and scopes

9. 2010: Book: *Global Surgery and Public Health: a New Paradigm* written by faculty members.
10. 2008–2014: surgical resident, undergraduate (engineering, accounting, business, public health, film) and medical students, and faculty participate in global surgery programs and publish results in peer-reviewed journals, deliver podium presentations and posters at local, national and international meetings, publish book chapters, and create short videos.
11. 2011–2014: Re-present the idea of a CGS highlighting the volume of academic accomplishments leading to funding of the CGS at a basic level for a director and a staff member through clinical revenue from the surgery department. Faculty also highlighted the recent articles indicating the dramatic interest of medical students and surgery residents in global surgery.
12. 2011–2014: CGS web page designed (medicine.utah.edu/globalsurgery/), Facebook page (www.facebook.com/globalsurgery) and Twitter (@UUCGS) with new logos added. YouTube videos of lectures from Extreme Affordability conferences and other productions uploaded and linked from home page.
13. 2011–2014: CGS clerkships offered.
14. 2012–2013: CGS sponsors the Extreme Affordability conference combining surgery, bio-engineering, public health, and business into a ‘think tank’ for cost-affordable methods for addressing the entire ecosystem of surgical care.
15. 2012–2014: CGS fellowships integrated with advanced degrees including Master of Public Health (MPH).

Underscore the Value of the Program to the Academic Institution

With the current economic demands facing academic institutions and healthcare in general, any institutional support for global surgery must be accompanied with a value proposition. Value has been defined as the benefits divided by the costs (Fig. 2.2).

Defining and publicizing the benefits of academic global surgery programs becomes a critical strategic undertaking. A broad array of benefits includes not only expanding the spectrum for traditional academic activities and providing enhanced recruitment options, but also augmenting prospects for improved economic

$$\text{Value} = \frac{\text{Benefits}}{\text{Costs}}$$

Fig. 2.2 Value equation

investment, and potentially even benefits towards participant wellness. In turn, these can lead to increasing opportunities for expansion of the institution’s national and international reputation.

Expanding the Academic Spectrum and Enhancing Recruitment Opportunities

School admissions officers and surgery program directors are becoming increasingly aware of the importance of having a global surgery program in order to recruit high quality medical students and residents (Table 2.1). Global surgery rotations in LMICs provide residents with unique and impactful experiences that reinforce all six core competencies required for surgical training (and a proposed seventh, skills competency, imperative for surgical care) (Table 2.2).

These global experiences give medical students, resident physicians, and faculty new cultural insight to better care for people with diverse needs at home institutions. Assisting international or rural colleagues in developing high-quality services accessible in resource-poor settings teaches an appreciation of cost-effective measures that balance community needs with available resources, a much needed skill in high-income academic institutions as well. Some have reported that upon returning from work abroad, they are more cost-conscious, have developed improved skills for working in teams, and have better adaptive skills in the operating room to deal with unforeseen problems. Diversity is yet another benefit to institutions and training programs because the field of global health in general and of global surgery in particular attracts trainees from broad backgrounds. Finally, a focus on global surgery provides institutions the enhanced opportunities to recruit a wider breath of dynamic faculty.

Augmenting Economic Investment

In collaboration with bioengineering and business programs, global surgery programs have begun to develop multidisciplinary “reverse innovation” initiatives

Table 2.1 Examples of academic global surgery programs

Institution	Name of global surgery center
Brigham and Women’s Hospital	Center for Surgery and Public Health
Duke University School of Medicine	Duke Global Surgery
Emory University School of Medicine	Global Surgery Program
Harvard Medical School	Program in Global Surgery and Social Change
Johns Hopkins University	Johns Hopkins Global Surgery Initiative
Oregon Health and Science University	Global Health/International Surgery Program
Stanford University	Center for Innovation in Global Health
University of British Columbia	Branch for International Surgical Care
University of California San Francisco	Program in Surgery and Global Health
University of Toronto	Office of International Surgery
University of Utah	Center for Global Surgery

Table 2.2 Core competencies and impact from global surgery experience

Core competency	Impact of global surgery experience
1. Medical knowledge	Experience with high volume of common diseases Exposure to diseases that are uncommon in HICs
2. Patient care	Improvement in physical exam skills due to lack of modern diagnostic equipment
3. Interpersonal and communications skills	Increased cultural competence due to working across culture and languages
4. Professionalism	Intensive experience with altruism, service, suspension of self-interest, and accountability
5. Practice based learning and improvement	Opportunity to evaluate and teach quality improvement methods
6. Systems based practice	Heightened awareness of and responsiveness to the larger context and system of health care Ability to call on system resources to provide care that is of optimal value in the a variety of settings
7. <i>Skills (proposed surgery-specific core competency)</i>	Improvement in open operative skills Reliance on basic surgical skills Exposure to surgical cases uncommon in the HICs

focusing on affordable products that might not only be useful to low-resource areas of the world, but that might also disrupt the high-cost of surgical care in high-income countries. Examples include: a low-cost high-definition disposable laparoscope that can attach to multiple types of display screens (television, computer, tablet) for about US \$30.00; a low-cost operating room light that can work on battery power but still deliver the same high-intensity lumens; a US \$4.00 lens for cataract surgery; an inexpensive simple nail for femur fracture repair. Some of these have developed into thriving businesses. With four billion people needing access to high-quality low-cost surgical care the possibility for business and patent development with significant economic return is substantial.

Faculty and Trainee Health Benefits

Many academic health leaders worry that allowing students and faculty members to travel to poor countries will create risk for the academic institution. They worry about risk both from disease and from physical injury. These can be manageable with proper consideration and planning both in advance and throughout the periods of travel. However, there are frequently unrecognized health benefits accruing to those who volunteer abroad. Over 40 studies have documented the health benefits from volunteering. Those that volunteer on a regular basis tend to live longer and are happier. They have a 20 % lower risk of death, lower level of depression, increased life satisfaction, and enhanced wellbeing. With these types of benefits, institutions might do well to consider an innovative internal wellness program encouraging their employees to volunteer on a regular basis, including global surgery volunteerism.

Identifying Funding and Ongoing Revenue Support

Funding academic global surgery programs remains a challenge. Regardless of the myriad of benefits that global surgery might provide, unless adequate funding sources are identified, increased costs will eradicate the value proposition for the academic institution. Potential sources of funding include grants, philanthropy, partnerships, clinical revenue, innovative courses, and revenue from patents or products derived from global surgery product development. Surgery has traditionally not been recognized as an integral component of national or international public health initiatives, which has severely limited access to possible grant funding. However as more research continues to identify surgery's critical role not only for improved health but also for strengthening national security, opportunities for grant funding are expected to improve. Furthermore, recent developments, such as the findings of the Lancet Commission on Global Surgery and the recently unanimously passed World Health Assembly resolution on Surgery as an integral part of basic public health will have an increasing impact on the field.

Marketing global health to the philanthropic communities has been very effective for some specialties, such as plastic surgery and ophthalmology. For other surgical specialties, this funding approach is a less natural fit. However, some universities have partnered with non-governmental organizations (NGOs) that are able to raise funds in ways not possible for academic institutions. This allows their residents and faculty access to global surgery experiences that bring academics to the NGOs and the resources of the NGO's to the academic institution. Examples include: Partners in Health (NGO) with the Brigham and Women's Hospital and Harvard University (Haiti, Rwanda, Peru, Lesotho, Navajo Nation, Mexico, Malawi, Russia); IVUmed (NGO) and the Dr. WC Swanson Family Foundation with the Center for Global Surgery at the University of Utah (Nigeria, Ghana, Mongolia, Haiti, Honduras, India, Tanzania, Kenya, Mozambique, Senegal, Vietnam); and Jhpiego (NGO) and Surgeons Over Seas (SOS) with Johns Hopkins University (currently active in over 40 countries).

While departmental clinical dollars have occasionally been directed to support global surgery initiatives, this is not likely to be a sustainable source of funding. For most institutions, courses have the potential for raising some departmental funds, but carry some financial risk.

Lowering the costs, or increasing the revenue sources supporting global surgery, has become central to establishing and sustaining academic global surgery programs. Surgeons have not been as engaged in sharing their stories as other health-care professionals, however, as surgeons and their surgical colleagues articulate their poignant stories, there will likely be new sources of funding for surgical initiatives distinctly separate from current global health initiatives.

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Chapter 3

Ethics in Global Surgery

Purvi Y. Parikh and Fiemu E. Nwariaku

Introduction

Interest in making contributions to medical practice and research in low and middle income countries (LMIC) has become increasingly prevalent. The greatest strides have been made in preventive and primary care health measures applied toward vaccination strategies for infectious diseases, maternal and child health, and the HIV/AIDS pandemic. However, for many reasons, addressing surgical disease in LMIC's has been a challenge. Although individual groups continue to deliver surgical care throughout the world, an organized agenda for surgical care has been lacking. Concentrated efforts by organizations such as the World Health Organization Global Initiative for Essential and Emergency Surgical Care (WHO-GIEESC) and more recently, the Lancet Commission on Global Surgery and the advocacy-based Global Alliance for Surgical, Obstetric, Trauma, and Anaesthesia Care (G4 Alliance) are finally yielding benefits by building political priority for surgical care as part of the global development agenda. In May 2015, the World Health Assembly (WHA) passed a landmark resolution on the importance of surgical care in the universal health care plan. The WHA mandate was a significant step towards mobilizing vital surgical initiatives, individuals, institutions, and health care teams. Given the significance of these initiatives, it is imperative and timely, that the ethical issues surrounding global surgery are delineated and better understood. Surgeons who function in this realm carry a significant burden of responsibility to provide safe,

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cost-effective, culturally-appropriate and good quality care in the most ethical manner possible.

The aim of this chapter is to highlight a few of the ethical issues associated with delivering surgical care and conducting surgical research in LMICs, including issues surrounding resource allocation, sustainability, non-maleficence and informed consent. Furthermore, we will identify potential pitfalls and provide examples of appropriate solutions to these ethical dilemmas. Although the list of ethical challenges is not exhaustive or comprehensive, we hope to begin a discussion that can serve as a basic platform for additional discourse.

Resource Allocation

Overall Resources for Surgery

The issue of resource allocation is ever present in medical ethics as there are multiple areas of need in LMICs. Resource allocation toward surgical diseases has thus far lagged behind efforts focused on traditionally-recognized public health issues such as sanitation, malnutrition and infectious diseases. These conditions require less capacity and capability than what is needed to provide surgical care, such as operating room teams, equipment, supplies and postoperative care. The accessibility to clean water and vaccinations are easier to provide than what may be needed for an individual surgery. However, recent data show that provision of basic and emergency surgical care in LMICs is not only necessary from a population standpoint, but is also comparatively cost-effective and therefore an appropriate goal to aspire towards.

Surgical Missions

The site chosen for a clinical surgical mission is another potential ethical conflict of resource allocation. Aside from delivery of valuable medical care, surgical missions often provide donated resources, educational materials and an exposure to new technologies and skills that together can lead to regional inequity when not distributed appropriately. Furthermore, poor coordination of care and duplicated efforts by various medical teams can compound this problem. For a successful mission, the surgical teams must ensure that they go where they are wanted and/or needed and the resource-poor setting has expressed a desire for this engagement. Anecdotal evidence suggests that many mission locations are instead selected based upon ease of access, safety of travel, available infrastructure, lack of language barrier and networking between mutual acquaintances, friends and organizations. Obvious exceptions to this exist with well-established organizations such as *Doctors without*

Borders (MSF) and the *International Federation of Red Cross and Red Crescent Societies*, however, no specific data exists on the selection method for location of most elective surgical missions. While it is certain that political climates will dictate annual decisions about surgical missions, visiting surgeons and donor organizations should maintain a multi-year plan that enables selection based on regional stability, influx of new resources and increased need. This allows broad sharing of valuable material, and human resources without duplication of efforts.

Concerns over donated surgical supplies and equipment that is taken to resource-poor nations during surgical missions, can be controversial. Many surgical missions have used expired medications, hardware and/or equipment even though it is strongly discouraged by the United States Food and Drug Administration and the World Health Organization. Although certain expiration dates may be less significant than others, there is clearly an ethical dilemma when regulations set for patient safety in high-income countries are ignored. Furthermore, ethical dilemmas arise when high-tech equipment is donated without any means to ensure that repairs are possible, thus contributing to overload of equipment that has been abandoned. Progress is being made as institutions formalize the process of surplus equipment donations, implementation and education.

Expectations during international surgical missions can be unfair from many perspectives. Case selection and the availability of critical equipment are all concerns that can change the expectation of the outcomes of the mission or research. Avoiding situations where the foreign team falls into the *white knight syndrome* is important to promotion of viable healthcare in the region when the mission is completed.

The final and most important issue of resource allocation for global surgical missions is of team selection and surgeon allocation of their time and expertise between patients at home and patients in other regions. For instance, the number of attending surgeons versus the need for including more support personnel (anesthetists, nurses, or residents) should be considered. Mechanisms for continuity of care in the patients served by a visiting team or those involved in a research protocol need to be accounted. Selecting a contextually sensitive multidisciplinary team that can simultaneously promote cultural exchange and bilateral benefits for clinical, training, and research exchange ensures continuity through durable collaborations and knowledge exchange.

Public vs. Private Sector Funding

Funding for any surgical care or research requires investment of financial capital from public, private or personal sources. University and international policy-maker engagement in global surgery is gaining momentum with pathways and policies being put forth that would allow for appropriate resource allocation and sustainability. However, although funds have started to flow via such institutional and governmental support, corporate donations and sponsors are frequently still needed. Numerous ethical issues of resource allocation arise when corporate business

policies mix with philanthropic goals. However, despite these issues, private sector assistance is increasing and is a critical source of funding for aspects of surgical care in resource-limited locations. In an era of social responsibility, the role of donations from businesses and wealthy donors, must undergo critical evaluation and debate to minimize disparagements. Although criticisms and potential conflicts of interest will persist, such discussion must ultimately promote and support the growth of both exceptional public *and* private sector efforts from those demonstrating lasting and positive global health commitments.

Sustainability

A key ethical concept for any successful clinical, educational or research mission is that the enterprise can be sustained once the visiting team leaves the region. In the fall of 2015, the United Nations will adopt the post 2015 Sustainable Development Goals, SDGs. These 17 goals and 169 targets arose from their predecessor, the Millennium Development Goals, MDGs, and recognize the ethical responsibility of funding agencies, state governments and global health workers to create programs that are sustainable beyond the period of funding, build in-country capacity and are cost-effective and accessible. Evidence exists that programs which do not accomplish these goals are likely to be unsuccessful and may even reduce the quality of medical care in the region. In the most current edition of Disease Control Priorities, DCP3-Essential Surgery, the authors describe several surgical care platforms and conclude that short-term surgical undertakings seem beneficial only if no other option is available. Unless performed as a component of a broader existing program, these efforts are characterized by suboptimal outcomes, unfavorable cost-effectiveness and lack of sustainability. Self-contained mobile platforms such as mobile surgical units or hospital shipments offer improved outcomes but there are no data regarding their cost-effectiveness or ability to build local capacity. Specialized hospitals, including those providing surgery for cataract and obstetric fistula, seem to be among the most cost effective of the competing options for specialized platforms.

Based on current information it appears that the most sustainable programs develop strong links with local practitioners to promote training and ensure appropriate post-intervention care. By involving local health workers in the pre-surgical (patient selection) phase, there is buy-in and ownership by local professionals, leading to better quality postoperative surgical care. Similarly, the elective (non-urgent) nature of this approach allows flexibility in patient scheduling. This is important in order to achieve high volumes, contain costs, and improve technical quality. The resultant building of technical, and managerial capacity, strengthens the health system and provides a foundation for sustainability of global surgical programs.

Other aspects of the sustainability of a global surgical program, include cost-effectiveness and access. These components require a close and strong working relationship with the local health system including the Ministry of Health. At the

very minimum, the local Ministry of Health ought to be aware of any global surgical activity in the region. However, we strongly recommend telephone, email or electronic conversations that occur several times prior to arrival in the LMIC. This interaction is invaluable in understanding local needs, obtaining appropriate regulatory documents and obtaining local resources are available for the surgical activity. As such, we believe that partnering with the local Ministry of Health is a prerequisite for any global surgery program.

Cost-Effectiveness

Although not a traditionally recognized ethical concept, in so far as it affects sustainability, global surgical programs also need to be cost-effective. As LMIC economies develop, allocation of resources to health has increased significantly. For example in April 2001, the heads of state of African Union countries, pledged to increase government funding for the health sector to at least 15 % of their annual budget. Although, only one African country has reached that target, 26 countries did increase their health expenditure during this period. Similarly, donor spending towards LMIC health has increased. In particular, programs, such as the President's Emergency Plan for AIDS Relief (PEPFAR), have significantly augmented the available funding resources in many developing countries. This translates into better resources for global surgery. However, justifying allocation of these resources to surgery will require convincing governments and funding agencies that global surgery programs are cost effective. Data is increasingly available demonstrating cost-effectiveness. Chief among these efforts are the Essential Surgery package proposed by the World Health Organization. In 2013, Jamison and colleagues estimated that it would cost just over \$3 billion annually to deliver the component of the essential surgery package that is applicable to first-level hospitals, universally. This development would have a benefit–cost ratio of 10:1. These findings while encouraging, need to be contextualized for each global surgery program. As such, data collection and analysis should be an integral aspect of every ethically-conducted global surgery program. In addition to patient outcome and quality data, addition of cost-effectiveness data analysis will encourage ownership by in-country decision makers and greatly increase the likelihood of success and sustainability for every long-term global surgery activity.

Accessibility

Access to essential surgical care is increasingly thought of as a critical public health concept and therein should be thought of as a basic right of LMIC populations. Although accessibility may seem to be the realm of local health officials and workers, the global surgeon shares this moral responsibility because of his or her role in

delivering surgical care to the most disadvantaged populations. Geographical accessibility is perhaps the most obvious concept related to access to surgical care in LMICs. However, other barriers to access include cost (described above), language and culture. This is a great opportunity for the global surgeon to provide leadership in suggesting programmatic solutions to such barriers. Examples of successful interventions to improve access include providing patient education with high-quality information, nurse help lines, translated patient educational material to local languages and dialects, or other culturally-appropriate methods of patient education and creation of disease discussion groups. Other issues of accessibility include shortages of appropriate health facilities or health providers, or excessive regulatory or approval processes. The global surgeon has another opportunity to advise local health sector leaders in this area, based on their experience in a more established healthcare delivery system. Examples include promotion of community health workers, aiding in development of mobile technology-based healthcare adjuncts, providing advice on possible location of new health facilities, aiding in recruitment of staff, and staff training and resource allocation. By better understanding and working within the framework of existing Ministry of Health programs, the global surgeon becomes a much more effective catalyst for sustainability of global surgery programs.

Non-maleficence

Nowhere is the medical aphorism *Primum non nocere* more appropriate than in the field of global health and global surgery. Global surgeons are by default routinely asked to deliver high level surgical care in challenging and under-resourced environments. As such the risk of surgical mishaps is extremely high. Many examples already exist for the causation of harm within non-sustainable (medical) global health programs. For instance, delivering locally unavailable expensive anti-hypertensive drugs, during short-term missions is likely to cause complications when the patient exhausts their drug supply. Surgery is particularly prone to such harm because of its invasive nature. According to the World Health Organization, crude mortality after surgery is about 5 % and mortality from general anesthesia may be as high as 1 in 150 in parts of sub-Saharan Africa. Surgical complications occur in 25 % of all patients and many are preventable. Furthermore such complications typically require additional care which may not be present or available in the local environment where many short term missions occur. Hence surgeons who participate in clinical missions ought to consider the effect of their surgical activities on the community in general. Suggestions for such consideration include the answers to such questions such as:

1. Are the available facilities safe for the proposed procedures?
2. What are the minimum preoperative evaluation requirements to accomplish a safe procedure for the surgical patient in that environment?

3. Is there adequate postoperative follow up (knowledge, skill and people) for the surgical patient?
4. Has the local staff been trained to recognize common complications?
5. What is the chain of information/command in the event of a complication?
6. Is there an accessible safety net system to provide care for the patient with complications?
7. What mechanisms are in place to ensure continuing communication with the global surgeon after they leave the resource-poor location?

At its best, failure to plan accordingly is likely to harm individual patients. At its worst, the fallout can quickly terminate the entire global surgical program, destroy long-standing relationships between stakeholders, and deny the local population of any future benefit of continuing a proper program. As is typical with such issues, a small number of poor outcomes have a much stronger effect than large numbers of excellent outcomes. Therefore the ethical responsibility resides with the global surgeon to create an environment that greatly reduces the risk of harm to the surgical patient.

The global surgeon often finds themselves caught in the tension between delivering surgical care to patients who may never have the opportunity to have life or limb saving procedures, and the desire to cause no harm. While this may cause a great deal of anxiety, we believe that the only way to deliver surgical care in global surgery is to deliver it safely. In this regard, the work of groups such as the Alliance for Surgery and Anesthesia Presence, ASAP (www.asaptoday.org) has provided skills and knowledge to global surgeons to improve patient outcomes in developing countries. One such example is the use of Perioperative Mortality Rate (POMR). This is defined as all-cause mortality within 24 hours of a surgical procedure and is an indicator that allows patient outcome comparison among different global surgery programs. This should be included as part of benchmarking for all global surgery activities and can reveal surgical outcome disparities and encourage safe surgery and anesthesia practice throughout. Similarly, the World Health Organization Safe Surgery group continues to provide tools to make surgery and anesthesia safe in developing countries by providing the WHO Safe Surgery checklist and working with partners to provide low-cost pulse oximeters for use in surgical patients. These tools should be incorporated in global surgery programs.

Informed Consent

Prior to performing surgery or research on any patient, informed consent must be obtained with honesty and no misrepresentation. The process of obtaining consent is based on an informed decision process. Patients should be told the benefits and risks of the surgery or research involvement as well as those associated with no intervention. Additionally, language and cultural barriers such as medical paternalism or family hierarchies can affect the process of informed consent and should be

considered. Insight from local colleagues is important in this regard and is critical towards protection of patient autonomy while still allowing the visiting surgeons to appropriately perform the planned operation or protocol. Open communication between the visiting and local surgeons should outline expectations for the duration of the mission or project, facilitate short-term achievement of goals and assure long-term patient monitoring.

Conclusion

The combination of an increasing global burden of surgical disease and a still low rate of surgical procedures in LMICs, presents an opportunity for global surgeons to develop innovative solutions to deliver more, high-quality, surgical care in LMICs despite scarce resources. In order to ensure ethical practice, these solutions will require collection and analysis of good quality data, and testing of customized interventions for each global surgery program. Academic global surgeons are ideally suited for this work and need embrace its inherent ethical dilemmas while studying and testing potential solutions for each of their programs.

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Part II

Career

Chapter 4

Preparing and Sustaining Your Career in Academic Global Surgery

Sanjay Krishnaswami and Mamta Swaroop

Introduction

Academic Global Surgery (AGS) comes with a set of unique challenges for those wishing to enter it. As a person coming into this new field, it is up to you to view these challenges as opportunities rather than barriers (Box 4.1). The most important factor in achieving a positive perspective is to figure out what truly ignites your thoughts and emotions. What research project makes you want to stay up all night writing a grant? What clinical or educational idea has you teleconferencing at all hours with colleagues around the globe? When you struggle with the slow pace of progress, when your boss does not understand your path or perhaps most importantly when you are successful in AGS, the answer to these questions will help you remember why you chose to pursue this career.

This chapter provides practical advice for a career in AGS, including questions and external influences to consider when getting started, finding and giving mentorship, applying global surgery toward academic promotion, and sustaining your career. Although these issues may seem mundane or even self-serving given the populations we aim to benefit with this field, the only way to effect sustainability of surgical care in resource-poor areas around the world is to first sustain yourself.

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Box 4.1. Challenges to a Career in Academic Global Surgery (Created by D. Ozgediz and E. Ameh)

1. Persistent perception by surgical community that global surgery is purely voluntarism
2. Persistent perception by public health community that surgery and surgical care is luxury activity and not of priority compared to other areas health care, in resource poor settings
3. Uncertainty of the existence of an academic pathway for this work, which creates anxiety and concerns about career progression and self-fulfillment
4. Academic work has a focus on scholarly activity and publications, but questions persist on whether Global Surgery work can have impact
5. Funding (i.e. justification of support for this activity) as a university-based surgeon may be a challenge
6. Inherently complicated logistics for work and partnerships between distant institutions and countries

Getting Started: Ask Yourself the Following Questions

1. What ignites you?
2. What are your personal strengths and limitations?
3. What has already been done? How can you be prepared?
 - (a) Study the field and read the relevant literature. Know the results of the Lancet Commission on Global Surgery, the Disease Control Priorities 3rd edition Volume 1 and relevant articles in the World Journal of Surgery, Journal of Surgical Research, international surgical specialty journals, and public health journals.
 - (b) Consider obtaining a Master of Public Health/Masters in Global Health/ Masters in Education and improving your contextual language skills.
4. Who does what you want to do? Do you have someone who can mentor you in this field?
5. How can you expand your network?
 - (a) Establish contact with a couple of international institutions in your region or area of interest.
 - (b) Cultivate longitudinal relationships with a few international surgeons.
6. How will you communicate your interests well?
 - (a) Develop an *elevator speech*.
 - (b) Communicate your interests often.
7. What can you start *writing up*?
 - (a) Brainstorm ideas with colleagues.
 - (b) Positive or negative...if it's not written it wasn't done.

Next, define the path you want to take. If it is primarily clinical work that you are interested in you must decide if you are more suited to short-term humanitarian missions and disaster relief or longer-term, recurring clinical work. Be it through *Doctors Without Borders*, faith-based missions, or others, these opportunities are abundant and the impact and gratification is tangible and direct. However, although some surgeons contractually negotiate a period of dedicated clinical international volunteer work per year, it is typically performed in your spare or vacation time. An alternative pathway to Global Surgery is through academics.

Like in other academic surgical specialties, global surgical research, education and advocacy may at first appear removed from clinical medicine because less direct medical care is provided. However, the impact of academic surgery in this realm can actually be broad, affecting the overall clinical system in resource-poor areas. Furthermore, surgeons have increasing opportunities to weave Global Surgery into their academic career paths. This is particularly notable because through academics, the Global Surgeon can successfully contribute and stay involved even without being *there* all the time.

The four cardinal areas for Academic Global Surgery are the same as for all other academic surgical fields and include:

1. Education (training foreign or domestic surgeons)
2. Research (contributing to clinical, education or basic science)
3. Advocacy (championing international surgical care through policy change, promoting activities of global surgeons within academia or other methods)
4. Development (establishing clinical programs, surgical systems or career pathways in the field)

An individual surgeon in this era of newfound appreciation for AGS may follow a clinical or academic pathway in AGS. Although people generally choose one over the other, these areas are not mutually exclusive, and significant crossover between pathways is possible. For example, those who lean toward clinical work can incorporate an element of academics by studying patient outcomes or helping to build lasting infrastructure between international surgical trips. Similarly, those following an academic pathway should engage in *some* degree of clinical work in the collaborating region to keep academic pursuits relevant to the conditions on the ground.

Considering External Factors

Ultimately, your involvement in the AGS is likely to be significantly influenced by a number of factors external to yourself:

1. What is the time commitment that you are able or willing to devote? Is it a few weeks or months or are you interested in working in these environments full-time? Opportunities exist in all of these scenarios.
2. What are your financial limitations? Do you have debt or other financial obligations that make one path more viable for the foreseeable future?

3. What about your significant other or children? Would you bring them along? Are they interested and at an age to tolerate prolonged or recurring absences?
4. What is your risk aversion with respect to either personal safety or job security abroad or back home?

Some surgeons worry that focusing on Global Surgery too early in one's career will result in missed opportunities for clinical skill growth. While this might be true during the period of formal training in residency, incorporating AGS early in your faculty career is equivalent to dedicating your early career to launching a basic science lab and should not be seen as a negative. Ultimately, your options or ability to pursue a career in AGS may be restricted by the position of your partners and your ability to gain acceptance and support for this pursuit. Considering all of the foregoing factors early on will allow you to adjust for them and achieve your goal of pursuing a career in AGS.

Mentoring in AGS: How to Find It and How to Give It

To turn an interest in AGS into a career, you must connect with other individuals and institutions in the field. Finding mentors is key to knowing the current landscape, understanding the market for AGS and developing solid projects, among many other things. Numerous professional societies now actively promote Global Surgery, and membership in those societies necessarily provides a ready opportunity for establishing mentorships. For example, surgeons may establish mentor networks through groups such as *Health Volunteers Overseas*, *the Pan African Academy of Christian Surgeons*, *Surgeons OverSeas*, *the Association of Academic Surgery* and *the Society of University Surgeons* and specialty organizations such as the *Global Pediatric Surgery Network*. Armed with the insight of others and individual passion, you can develop a career plan that explicitly states your interests and how you plan to achieve your goals.

Be persistent. As with any field, the successful, coveted mentor is incredibly busy. Additionally, in AGS, there are a limited number of mentors to choose from. Despite good intentions, clinical work, personal life responsibilities and other academic requirements may make it difficult for them to respond in a timely fashion or regularly. As a result, it is imperative to learn and adapt to how your mentor works. What is their typical schedule? What is their preferred method of communication? If a mentor fails to return emails or texts because of a heavy clinical load, propose a weekly standing meeting. While both individuals are responsible for a successful relationship, the burden of the relationship always falls on the mentee as the person with more at stake in the relationship.

Be aggressive with your pursuit of the good mentor, but know when to broaden your search for additional mentors. No single mentor can provide everything you need for a successful academic career.

Once you have achieved a certain point in your career, and earlier than you think, you will undoubtedly be approached by medical students, residents and other

faculty who share similar interests and need guidance. You may feel unqualified to provide this mentorship, but you aren't. You likely know more than the person asking for your advice, which is why they are coming to you. However, know your limits. If you can't help the person, point them instead toward colleagues who can assist them. Finally, keep a list of the people in your network, and always look for opportunities to introduce and connect people. Your success is in the success of your mentees; if they go on to achieve more than you have, you are successful in your role.

Academic Promotion in Global Surgery

The metrics for AGS are the same as those for other academic surgery fields. The three pillars of academic promotion are patient care, research and teaching (Box 4.2). These are traditionally heavily dependent on the number of successful grants and publications, but more recently have significant weighting for the service and educational components within most universities.

Box 4.2. The Three Pillars of Academic Promotion

Research

- Ability to create new knowledge.
- Continued publication.
- Funding by external agencies.

Service

- Extensive participation in patient care.
- Recognition as a consultant.
- Provision of unusual/innovative types of care.
- Productivity.
- Clinical trials.

Education

- Teaching and scholarly activities.
- Recognition of excellence.
- Courses and study to increase expertise.
- Publications.

You must demonstrate that efforts in AGS are indeed a scholarly activity and not solely volunteer work. Similar to an education or education-research basis for promotion, the nuances of AGS research will frequently need explanation for due recognition during promotion. Time spent building collaborations with ministries of

health and specific programmatic development in low- and middle-income countries (LMICs) are paramount to sustainability of AGS projects, but their significance will need to be explained to the non-global surgeon. Furthermore, like basic science publications, one paper may take years to publish, so while you need to be patient, you need to involve yourself in more than one project at a time. The laboratory of the Global Scientist is not across the street. It is more often halfway around the globe, and you are often dependent on the local champions in those regions who *run your lab*. Therefore it goes without saying that those individuals must get due rewards (grants, appropriate authorship, etc.) for their efforts to help legitimize your career.

Although the pillars for promotion detailed above do not need significant alterations for AGS, their interpretation may need to be expanded upon. For example, although the funding currently available to faculty in AGS is limited, students and residents are much more likely to obtain project funding in this area. Of course students and residents could not qualify for funding without faculty, who should be credited for their close mentorship and study development when seeking promotion. Similarly, although not as prestigious as U.S. governmental funding, intramural support should be viewed as a step toward independent funding when considering faculty for promotion. Finally, LMIC surgeon-researchers may seek out counterparts in high-income countries and include them in their own governmental funding or grants. Even if for a small role, this shows a country's commitment to the researcher and, in turn, the researcher's contributions to the country and should be noted as such when considering academic advancement.

Practicalities of Employment

If you do not plan to pursue Global Surgery while on vacation or to be located abroad full-time, but instead expect to practice in North America with partial protected time reserved for AGS pursuits, it is imperative that you communicate your interests early and clearly to your employer for several reasons. First, you are most likely to be successful if your practice partners are on board with your plan. Second, you need to determine if the time engaged in these pursuits will be paid and at what rate. Finally, any agreement must be memorialized in your contract. In other words, you are going to have to explain the relevance of this work, and you will have to convince your practice, hospital or institution of the deliverables.

If possible, demonstrating the local relevance of your international work is highly advantageous. At first this may seem unnecessary. Involvement in patient care, research, mentoring and teaching should seemingly transcend geographic location when discussing advancement criteria. However, it's best to be clear that you value your primary location as much as or more than the ostensibly exotic places where you will do your AGS work. Therein, you may find it helpful to slightly modify your scholarly activities to fit within the model of your home institution.

Institutions frequently want to know how your AGS work aligns with the institutional mission. In other words, "*What's in it for us?*" With regard to hospitals,

articulate how your activities enhance their reputation and working processes. For example, most hospital institutions want to demonstrate a desire to care for the underserved in their area, thereby enhancing the community's trust. Endorsing a surgeon who both works hard for the local community and has interests in LMIC regions demonstrates a commitment to accessible, cost-effective, high quality services that are balanced with available resources. Many places that have begun to effectively recognize surgeons for AGS work say it has become a point of publicity for the hospital or health system. With regard to academic institutions, you may need to define the critical role of surgery in global health for your department and possibly your affiliated school of public health. You may also need to address misconceptions about the scope and academic potential of Global Surgery. Specifically, you may need to advocate for promotion in the traditional academic path with a Global Surgery focus.

Sustainability

So you have started down the AGS path, but how do you stay on it? Besides time, money is an obvious necessity for sustainability. Martyrdom is never a lasting path to success. Instead, seek out the newer avenues for funding of non-communicable disease care and research, under which surgery falls. These include intramural, local or regional sources, and governmental sources, such as the National Cancer Institute under the auspices of the National Institutes of Health and even non-governmental organizations such as the Gates Foundation. The May 2015 passage of the World Health Assembly resolution on the importance of essential surgical and anesthetic care in universal healthcare and a few other recent cardinal events, should lead to an increase in funding for surgical work and research by the US and international governments and foundations.

Possibly most important to sustaining a career in AGS, you should leave an identifiable trail of your accomplishments through the development of longitudinal relationships. This is done clinically by repeatedly working with and returning to the same places to foster clinical programs. Similarly, educational relationships are established through lasting, bilateral training opportunities. Finally, maintain research-based relationships by promoting joint scholarly work and creating a literal paper trail of publications.

Miscellaneous Advice

1. Focus your attention on one or two primary areas or regions.
2. Learn to say no. However, maintain a strong relationship with those individuals or institutions by relaying a plan to ensure their work will get done, even without your involvement.

3. Stay organized. Keep lists of funding opportunities, submission opportunities, problems encountered during program development or implementation, and country contacts (Ministries of Health, Professors, Leaders in country).
4. Whatever you do, however you do it, write and present it.
 - (a) OpED
 - (b) Journal Articles
 - (c) Review Articles, Systematic Reviews
 - (d) Editorials
 - (e) Blogs
 - (f) Twitter

Conclusion

Despite challenges, a career in Academic Global Surgery is viable and rewarding if you first find what ignites you and then set out with intention on your career path. In this still emerging field, it is critical to know the cardinal literature, seek further education as needed, and network early on in order to connect with potential mentors. Furthermore, you must communicate your interests and accomplishments succinctly to potential donors and employers and leave a paper trail of your work to ensure that your efforts will be viewed as a legitimate academic pursuit. Ultimately, academic advancement as a Global Surgeon should be viewed as a means to an end, not the goal itself. Instead, a career in Academic Global Surgery should be driven by the desire for advancement of practice and knowledge across geographic and economic divides, the creation of the next generation of leaders in the field, and most importantly the delivery of cost-effective, quality, equitable surgical care across the globe.

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Chapter 5

Balancing Global Surgery with Traditional Career and Life Demands

Susan L. Orloff and Kathleen M. Casey

Introduction

Over the past 10 years, global surgery has taken off like wild fire as a field of endeavor, and even a career focus, for many surgery residents and faculty. There is an ever-growing need to address all facets of surgical disease and treatment in low and middle income countries (LMICs), and academic surgeons in the US have developed an important role in ameliorating this problem. Reflective of this, the literature continues to grow on key issues in global surgery, such as healthcare delivery and management in LMICs, surgical workforce deficits and solutions, training and education, and economics. However, there remains a dearth of literature on how to develop and navigate a career in global surgery itself, especially within the traditional environment of academic surgery, and furthermore, how to best balance career goals in this unique and emerging field with other life demands and priorities. Accordingly, this chapter outlines the verities in pursuing a global surgery career through a series of interviews with nine established leaders, experts, and emerging trailblazers in the field who are based in the United States:

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 Robert Riviello, MD, MPH, FACS (RR)

How Does One Achieve Work-Life Balance?

It's a lovely goal, but is it realistic? Interestingly, not one of these leaders felt they had achieved balance...

I am not a great role model for balance – one of my weaknesses. (DLF)
 I do not believe I have ever had a balanced life. (HTD)
 Don't think there's such a thing. (RR)
 I wouldn't know. Not sure it's possible! (CRdV)
 Aren't we all just muddling along? (RRP)

The scholar, David Whyte, in his recent book, The Three Marriages. Reimagining Work, Self and Relationship notes, "The current understanding of work-life balance is too simplistic. People find it hard to balance work with family, family with self, because it might not be a question of balance. Some other dynamic is in play, something to do with a very human attempt at happiness that does not quantify different parts of life and then set them against each other. We can call these three separate commitments marriages, because at their core they are usually lifelong commitments and . . . involve vows made either consciously or unconsciously. To neglect any one of the three marriages is to impoverish them all, because they are not actually separate commitments but different expressions of the way in which each individual belongs to the world."

This perspective was shared by several of our interviewees –

A balanced life is 'holistic'. You can't compartmentalize professional, family and altruistic goals; they overlap and complement each other. (RR)

To me, a balanced life means being able to do all of the things that you love. Sometimes that means taking risks, and stepping off the usual path. (DLF)

You can't look at whether it works day to day; but rather whether it works out over time. (CRdV)

Pursuit of excellence focusing on the critical issues of life, first and foremost is family and friends and trying to do Tikkum olam – "repairing the world (WPS).

With this perspective in mind, and because the concept of "balance" is not well defined, nor is it tangible, we chose instead to focus on the idea of "integrating" global surgical pursuits into the rest of life for an academic surgeon.

The Questions

For each global surgery leader, a set of core questions was posed, supplemented by one or two more specific questions based on each person's areas of expertise/renown. The core questions were:

- What does a balanced life mean to you?
- How have you achieved integration of personal + professional priorities?
- What is the greatest challenge to achieving integration of personal + professional priorities?
- Who are the critical people in your life necessary to support your professional goals?
- How did you attempt (and succeed) in achieving legitimacy to your global surgical pursuits in an academic environment?

Several themes emerged:

1. Family First and the Juggling Act
2. Learning to Say No
3. Academic Challenges
4. Support Systems
5. Legitimacy
6. Making the Case for Surgery in Public Health Terms
7. General Advice
8. Future of Global Surgery

Family First and the Juggling Act

With regard to establishing priorities among competing demands, the first theme that emerged was family first.

First order relatives have priority over everything else, except in life and death situations. Between the happiness of the spouse and children vs. career advancement or patient care, I chose the former, with the exception of life and death situations. This may have negatively impacted my career. (WPS)

If I had to do it all over again I would not work 16 hours nearly 7 days a week. I would go home to dinner and spend weekends and holidays with my family. Many in my generation sacrificed family time, hobbies, and social life for work. Now that I am retired, I sincerely regret this. I am happy to see the new generation is much smarter and appreciates the need to live a balanced life in which work does not consume the time that should be set aside for their family, their hobby, and friends. (HTD)

The key is achieving the things that you think are important – for me family life is most important. If I don't have the balance with family, the rest does not mean much. It is incredibly important to make time for your kids. It is impossible to spend the needed time with your family if you accept too many obligations. One has to constantly make choices about what you value most. (SWB)

Recognizing this, many described taking family along when possible to conferences or medical missions (participating as a general assistant) and then extending those trips to spend time and create shared experiences with family. Another benefit was the fact that taking them along allowed those family members greater insight and appreciation into the work that frequently takes them away from home.

Beyond family, the metaphor of *juggling* was commonly invoked – with the most urgent need becoming the *glass ball* that cannot be dropped without breaking. All

recognized that what is being juggled changes over time, depending on the stage of your career, where you are working, who your colleagues are, whether you are married or have children, and the age of those children. In addition to work and family, some described church or other obligations outside their academic institute as another priority to be juggled. And several cited the importance of taking care of oneself, including leisure, health/exercise, and personal interests.

For the average surgeon, you have to take care of patients and family, so global work ends up third. At any one time you may be able to handle 2 out of 3 of these – but they all think they deserve your full attention. At least 1 or 2 entities will be resenting you at any one time! (CRdV)

There are different “seasons” in a life – and the priorities will change in each. (JLT – referencing Osler)

It’s important to balance the needs of self and others. Particularly with so many conflicting messages: ‘The patient always comes first’; work hour restrictions; respect for family. (MJT)

Sometimes balance is not in your control. (MJT)

Most of it is out of our control. (CRdV)

Working in low resource areas provides even greater challenges to “balance”. There is severe understaffing and you are always on call. There is constant high stress and limited resources. Even when you try to take time to tend to self, more work piles up and is waiting for you. The only way to get a break was to leave campus, but there was double the work on return.” It is so important to find “partners” – someone to run things by and decompress with – even if they are hours away... (JLT)

Without question, time management was the biggest challenge.

There are too many good things to do. And in global surgery, there are endless needs, endless requests . . . (RRP)

There are not enough hours in the day. Given that limitation, the challenge becomes establishing priorities and making choices. (DLF)

It’s important to use time ‘well’ – maximizing any travel time for writing, editing, reviewing – papers, grant proposals, etc. (RR)

Prioritize and recognize what you can realistically accomplish, and what things you can let go – it is impossible to do everything. There is nothing wrong with choosing and limiting what you take on – if you are spending your time doing things that are not important – you will never have enough time to do the things that are important. Choosing is key! (SWB)

Learning to Say No

Hand in hand with the challenge of limited time is the need to learn to say ‘No!’

And especially learning to say no to some very good things. (RRP)

I think it is important to be able to say “No” and accept requests, speaking invitations, and committee assignments very selectively. (HTD)

It's part of the surgical personality to say 'Yes.' (MJT)

You need a clear vision of your priorities. Once you decide this it is easy. If it is family, go to less meetings; if it is research, then operate less. One needs to ask the question – 'What is the most important thing that you want to achieve in your career? What am I not doing that I really want to do?' (SWB)

Academic Challenges

At the heart of the matter, incorporating global surgery into one's career has inherent challenges, including prolonged time away from patients and family, and out of pocket expenses.

In academic medicine, there are traditionally three criteria that are rewarded – all with fairly quantifiable outputs: clinical productivity, publications, and teaching.

Global surgery work can seem at odds with these. The work is less clearly quantifiable and it can be challenging for the home institution to perceive benefits.

In the recent past, work done outside one's academic institution, particularly in another country, was generally considered 'extra-curricular' – i.e., a personal choice pursued on one's own time.

In my early years, I was completely in the closet with my global health activities; I only did them during travel on vacation times, and did not put any of my work on my CV. At that time, it was perceived as a detractor from serious academic achievement. This was late '90's. (DLF)

The commitment to this work was so strong among those interviewed that all described profound sacrifices that they'd made in order to be involved in global surgery. Economic sacrifices were nearly ubiquitous. Many worked part time, accepting initial contracts for 0.5 or 0.75 FTE salaries, in order to be able to engage in their global work. And then, all of the global work was entirely self-funded.

If you want to do global surgery, you have to be aware of likelihood of accepting lower pay. (RR)

I make sacrifices in the amount of money that I earn – so that I can still pursue my global research interests, and it is worth it... I choose to do what I do in global surgery with less remuneration – but I would not have it any other way. I am incredibly happy with my life and feel incredibly fortunate the way my career has unfolded. (SWB)

Time away is time not generating RVUs. (JLT)

The primary challenge is money – it is all about money. For those people willing to work half time and accept a half time salary, it is easy to spend part of a year in another country. This is true whether you are in private practice or academic surgery. (DLF)

If I required payment for doing this work, none of it would have happened. The value lies in creating opportunities for others to have a career in global surgery. (RRP)

There can be significant disparities in salaries as compared to peers. It's important to understand: "*What currency do you want to be paid with?*" (MJT)

It is naïve to expect to be paid to do charitable work. So just like any other academic pursuit, you either have to have a grant funded question that involves a global problem or be willing to potentially work part time. (DLF)

Other disparities exist as well. With regard to start up costs:

For conventional Academic Surgery, lab space, staff, and start up funds are all provided until grant money starts to come in (for basic science or even translational research). With Academic Global Surgery, you're on your own. (CRdV)

Another financial aspect relevant to involvement in global surgical work is how one lives, including housing, the car you drive, and other lifestyle choices:

I cannot stress the importance of keeping lifestyle aspirations as conservative as possible; learning to be financially sensible. It's important to realize, and start to practice as a medical student, if global health is an interest. (MJT)

It's equally important to make sure your spouse buys into these compromises. (JLT)

Support Systems

In order to achieve what they have in their global surgery career, our interviewees described reliance on a range of people:

1. Spouse/life partner (several experts included their spouse in the interview)
2. Family
3. Surgical Chief
 - Critical that they are supportive – or at least neutral. (CRdV)
4. Colleagues/Partners
5. Office staff
6. Mentees/Students
7. Friends
8. Church community

You have to 'be equally yoked' with your spouse/partner – though that shouldn't be confused for 50 % – 50 %. Someone's always leading, someone's always following. (JLT)

I think it is extremely important not to make the mistake of assuming that your professional colleagues are your friends. (WPS)

Your partners have to have your back. (CRdV)

It takes a village. (DLF)

Professional Legitimacy

Despite great personal sacrifice and profound commitment, professional legitimacy for this work has not been easy to achieve:

I wonder if Academic Global Surgery is an oxymoron – or an emerging reality? (JLT)

Advancement used to be based on “publish or perish” – now it’s based on impact factors and grant funding. Both are problematic for global surgeons. It was the ‘grey’ literature – non-peer reviewed journals, that historically published global work, BUT – there were no (or very few) peers! (CRdV)

Few in the Public Health community considered that surgeons could play a serious role in anything other than expensive interventions that target the individual and not the community. Dr. Jeffrey Koplan, former CDC Director and Founder of Emory Global Health, was one of the few clear voices to say that, in his experience, “Surgeons were some of the most effective public health professionals.” My own approach was to first help show that surgery should form a critical element of global health and that without the provision of accessible, affordable essential services that the lofty goals of the UN or Lancet Commission cannot be achieved. The time was right because of the unprecedented interest and passion of students and young faculty in global health, and later, in global surgery. At my own institution I made a high priority of speaking to students and residents about the importance of global surgery. The movement within the students, residents, and young faculty, and the growing evidence that the availability of global health experience was an important determinant for students to choose residency programs, brought a reluctant Department of Surgery to come around and finally invest in a Center for Global Surgery. (HTD)

Global surgery as a specialty within surgery is quite vulnerable in an academic setting, and still very dependent on individuals. The speciality not yet entrenched institutionally, so individuals are vulnerable to the whims of changing leadership. (CRdV)

As for legitimacy within the profession, it is a marketing problem and a huge obstacle to overcome. The average surgeon still has no idea what we’re talking about. (RRP)

Some strategies for gaining greater credibility at home and abroad include:

The key to legitimacy is publishing your work. I never much thought about how people at my home institution viewed by work. I have never missed a promotion, probably because I was fairly successful at publishing articles and did a good job of taking care of my patients. Legitimacy comes from achieving personal goals. Academic promotion should not be a goal in itself. By contrast, self-satisfaction, and doing something impactful is more important. It is unreasonable to expect validation from institutions that don’t value global surgery. One has to figure out what you want to do for yourself, for your career and for the world, and if you believe in it, then you should do it! (SWB)

- Set up a new paradigm.
- Demonstrate the academic components of the work.
- Differentiate the work from that of an NGO.
- Pose questions – figure out ways to study the problems, investigate, write about it, and report on it.
- Establish Interest Groups.
- Engage residents in opportunities to publish and present at national and international meetings.

- Hold cross-disciplinary courses together with School of Public Health, Business, Engineering, etc. You may then be able to demonstrate to your Chair authentic projects on affordability; also provides opportunities to get ideas patented.
- Write a textbook. (RRP)

Consider living and working in-country. The potential importance is dual natured – you foster relationships, establish trust, build friendships, and truly understand the challenges faced plus it helps achieve legitimacy in the academic center. (RR)

Say No to anything that doesn't advance your career during the 7–8 year period while trying to get tenure. (MJT)

I can say that I never really tried to achieve legitimacy; I just went about doing my work. There are certain rules if you want to play the academic game. Rule #1: you must write 2–3 papers per year; #2: you must be an enthusiastic teacher; #3: if you are a surgeon, you must arrive in the OR on time, keep your complication rate down to a minimum, and participate in the committees that you are assigned to. There is also an expectation of community service in academic institutions and that is where global surgery can achieve legitimacy. (WPS)

On what we need to do as a field to gain greater legitimacy:

It may be necessary to 'redefine' academic work that could be counted towards tenure: including teaching; setting up academic programs in other countries; and establishing opportunities for US students. (CRdV)

Of critical importance is that schools and departments must give the same academic weight to the work faculty and residents perform overseas, and to their global surgery publications. I have advocated for a National Consortium for Global Surgery to be created as a collaboration between academic surgery and our national surgical organizations and associations. Such a Consortium would illuminate the importance of global surgery, and this in turn, would help bring legitimacy and acceptance of a career track in departments of surgery. We need to push this as a national, professional surgical agenda. (HTD)

Making the Case for Surgery in Public Health Terms

Clearly, this field is evolving. Today, global surgery programs have been established at dozens of academic medical centers. The number of publications devoted to the topic has grown exponentially over the past decade, helping establish the significance of this research topic and clinical work. Academic surgical societies such as the Association for Academic Surgery, ACS, the Society of University Surgeons, SAGES, and the Americas Hepato-Pancreato-Biliary Association have built platforms that foster interest in and encourage presenting academic global surgery research at their annual scientific meetings. Although many professional groups support global surgery work, there remains much variability in opportunities to pursue global surgery as a part of academic training or practice

Several references to examples from the global public health field were cited as important for promoting the successful evolution of academic global surgery.

Public Health has an academic model where time for travel is built in. Where ER doctors work in shifts, public health operates more like semesters with a focus on longitudinal research rather than 1:1 patient interactions. (CRdV)

Regarding publication of global surgery research, it was noted:

Global surgery research is generally not hypothesis driven, and therefore doesn't nicely fit the model for 'academic' research. Materials and Methods are often hard to define. It's difficult to get grant funding without a hypothesis. Public health journals follow a different format – assessing trends and successful models, rather than hypothesis testing. Anthropologists would say – you can't get a hypothesis without first observing. (CRdV)

General Advice

The author David Whyte observed, “We may not have an arranged ceremony at the altar to ritualize our dedication to work, but many of us can remember a specific moment when we realized we were made for a certain work, a certain career or a certain future: a moment when we held our hand in a fist and made unspoken vows to what we had just glimpsed.” If you see yourself as made for global surgery and look to creating a future that includes this work, our cohort of global surgery leaders have shared some general advice.

For Medical Students

Find the discipline you love. Learn the basic principles. Become the best surgeon you can be. It doesn't matter where you train – this can be done anywhere. Sometimes academic medical centers are not the best places to learn for this. Train as if you were not going into global work. If you can operate on a pulmonary hilum, you can take out a uterus! You can always spend a week or two later on learning specifics of particular procedures (i.e. orthopedics, C-section). (JLT)

For Residents

You need to be sensible and sensitive. As for being sensible – you are at greater risk in these environments! Don't ride motorcycles; don't go out at night. Being sensitive means being culturally aware and exercising your 'EQ'. (MJT)

For Junior Faculty

When looking for a job in where you can still be involved in global surgery:

You get what you negotiate. (MJT)

If institutions want “in” with Global Health badly enough, they'll have to negotiate. It's important to negotiate up front, at the beginning of your contract. (JLT)

What specialty you're in matters – if you're needed badly enough by the home institution, you can use it for leverage. (JLT)

Set your goals high; be passionate and determined about your work, and most importantly, never give up on what YOU think is important. (SWB)

If a department wants a Global Health presence, there's a need to value the people involved and their work. So...sell yourself as the person who will be the "go-to-person" for the huge demand for global surgery experiences; Unburden the Chief. Increase the brand. Demonstrate that value. Build the niche. Be a knowledge generator and thought leader. (RR)

Will I have protected time? I always wondered where this concept of protected time came from because my experience is that it is a myth – one has to accomplish things by multitasking... protected time is a fallacy. Even though I have an NIH grant, the clinical work is still there. Protected time maybe happens in medical fields, but certainly does not in surgery. I also wonder what kind of surgeon I would be if I only worked 1 clinical month per year as many medical specialists do.. (SWB)

Be your own advocate – let leadership know when you've done something of note. (MJT)

Some additional words of caution...

Don't get caught up in receiving praise and accolades. (RRP)

Unfortunately, human beings are human beings, and when working in human organizations, there is jealousy, rivalry, competition, ambition, etc., which can sometimes rise to the level of pathology. And that is true of every human endeavor. As long as everyone understands the rules of the game it's OK, because that is life. If you don't like the rules, you can try to change them; which is a strategy that you are highly unlikely to succeed in, better, you play a different game. (WPS)

For Academic Surgeons as a Whole

The advantages of an academic environment are that you have the resources of a full university to leverage for your work, and some of the infrastructure to do clinical trials and statistical analysis, plus all of the other resources that can be used to support scholarly work. (DLF)

However, remember why we do this....

I was asked to go overseas to set up a rotation for UCSF residents, but the moment I got to Africa, I realized that this was not about the American residents at all, but about patients dying of preventable diseases, and the doctors were overworked, and they could benefit from the type of surgical education that my colleagues and I could provide. And of course, the residents get a tremendous secondary benefit. The primary goal of this African venture is to educate the next generation of Tanzanian surgeons. I think that we have a responsibility to address inequity in access to surgical care wherever it exists, both at home and abroad. (WPS)

Avoid the "Ivory Tower" mentality. Academic global surgery needs to see the value of both the NGO/missionary component as well as the professional society in order to sustain surgery longitudinally. All the work now considered 'academic' has been possible because of

the work of the NGO and missionary surgeons and the pre-existing relationships they forged which laid the groundwork for academic enterprises.

NGOs are really valuable for their tremendous flexibility, adaptability, broader financing base and minimal hierarchies. Professional societies contribute strong networks, certification and credibility. There is overlapping importance of Academia, Professional societies and NGOs and strong presence in each has led to a lot of synergies. (CRdV)

1. Put aside pride.
2. Try to bring people into the tent.
3. Prepare to be rejected over and over.
4. It's not just about personal academic achievement – there needs to be a larger institutional meaning. (CRdV)

For me, teaching and mentoring others has been how I spend most of my time in global surgery. One of the reasons I decided to become a Chair of Surgery is that I would have more control and influence over program development (fewer people to ask permission from), and you can control more of the resources. (DLF)

For Being Involved in Academic Global Surgery in a Private Practice

In bridging the (many) divides between academia and private practice, challenges include getting the private hospital to recognize value of teaching; getting the academic hospital to recognize the value of private practice; and intellectual property issues – who owns the output when you bridge two institutions? Find a practice where people are supportive and flexible. Realize that Global Surgery takes time away from your primary work. You have to be OK with a significant loss of income. And have to not care who gets the credit. (RRP)

Some Geographic Considerations

Live near a hub airport. Find a nice place to live for the family. Settle on the right clinical mix.

If You Plan to Work Primarily in Another Country

Ideal staffing in these situations is three surgeons, so one person can always rotate out and the remaining 2 can support each other. (JLT)

The Future

Be aware and realistic about of how long things can take. The Center for Global Surgery at the University of Utah took 10 years of lobbying to achieve. (CRdV)

Chairs of Departments and CEOs of companies need to better study the benefits of global surgery to the home institution(s). What are the economic benefits? Health benefits? Do we produce better surgeons? (RRP)

The field has grown organically and in an uncoordinated way. The unprecedented enthusiasm among our students, residents and faculty, and the emerging recognition that surgery is a critical element of any global health system, make this an opportune time for serious discussion about the future development of global surgery (HTD)

Global surgery is not a fad. It is an important field in global health and is an indispensable component of the structure of any health system. As an academic field, it is to some degree uncharted territory, and its success, growth and quality will depend on the surgical leadership in today's academic medical centers, and the institutional investment, both financially and conceptually, in achieving excellence in global surgery education, research, and clinical programs.

Haile Debas shared his vision for the future success of the field of global surgery as involving four domains: governance and organization, education and training, research, and access to essential surgical services in low-resource settings. Within each, frameworks must be established to ensure appropriate structure, quality, strategic planning, funding opportunities, collaborations, and access to essential surgical services.

To make optimal contributions to global health, global surgery requires an organizational framework and leadership that should be provided by the major surgical organizations, associations, and training programs. In this way, the enthusiasm and commitment of students, residents, and faculty can be harnessed effectively, and American Surgery can make significant contributions to training the global surgical workforce and to helping increase access to high quality, affordable essential, surgical services in low-resource settings at home and in LMICs.

We would like to thank the expert leaders whom we have had the opportunity and privilege to interview. Because of them and others alike them, we have achieved considerable progress in the recognition of Global Surgery as an academic endeavor. While there is much still to do to establish a true career path in Global Surgery, they have blazed the trail and continue to show us the way forward. And for that we are in their debt.

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Part III
Clinical

Chapter 6

Guidelines and Parameters for Ideal Short-Term Interactions: Disaster Relief

Adam L. Kushner and David H. Rothstein

How can we help in a disaster situation? The need and desire for immediate deployment to render aid must be balanced with the need for a measured response that takes into account both local needs and an honest self-assessment of one's own skills set. What type of health system was in place prior to the disaster? What injury and illness patterns exist? Who is responding to the disaster and how? What is the current political situation in the affected area? Providing care in austere environments is not for everyone, and even the ablest of health care providers can stumble when they are unprepared to understand and do *what is needed*. Close coordination and integration of care by volunteers can avoid some of the common mistakes that have plagued disaster responses over the years. Importantly, although disaster relief can seem far removed from academia, properly performed relief takes into account basic academic principles, most notably in the increasing movement to measure outcomes through disease surveillance and quality improvement of these efforts. In this chapter, we outline general principles for participation in disaster relief as well as the evaluation of efforts therein.

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Do No Harm

If a natural or man-made disaster has just occurred and you have no experience working as a surgeon in a low resource setting but have been asked to join a team and are reading this chapter for insight, stop – now is not the time to gain experience and understanding. Being part of a disaster mission is nothing to take lightly, and requires planning and preparation to do well. Remember, *primum non nocere*, first do no harm. This concept is often ignored during disaster responses when ill trained and inexperienced volunteers rush to help. The rationale, *something is better than nothing*, is rarely true and often times *do gooders* without the proper support and experience do not actually help and can even make things worse.

Before heading into a disaster zone on a relief mission – be it natural or man-made – unless you are physically present on the site where this occurred, do not rush in. It is especially important to not rush in alone. Think about your family, your work and your reputation; rushing to help and ending up as a hindrance can lead to multiple problems for the people you were trying to help and for yourself.

Also consider the ethics of what you are doing and why. Most likely the people you will be trying to help have suffered. There will likely be a lack of water, food, shelter, fuel and health care. Make sure that you will be a net positive for the situation and not become a burden on those you are trying to assist.

As international disaster response has become increasingly common and advanced, several themes have emerged as critical to success:

- *Coordination of care* is paramount, particularly as ease of international travel allows more and more aid groups to reach areas of disasters quickly.
- *Involvement of local resources* is not only ethically necessary, but prudent, as local health care providers can supply invaluable information about local needs, disease patterns and medical care abilities.
- Responders must *plan for changing patient demographics*; quite often the initial wave of injured is followed soon after by a surge of the chronically ill whose access to usual healthcare has been disrupted by a disaster. Disaster relief is often principally concerned with the reestablishment of baseline surgical/medical capacities rather than pure trauma care.
- Even as providers focus on immediate needs, *planning for transition and after-care* must begin almost as soon as one arrives on ground. Disaster relief often has a short memory and leaving without making plans for transition of care is to be condemned.
- Although difficult in disaster situations, *disease surveillance and quality assurance/improvement* are vital to proper performance of relief efforts. Adjustments need to be made in response to what is always a ‘moving target’ of needs and resources.

Prepare

As stated above, preparation is the key. Do not just run to a disaster zone because the opportunity presents itself. Make sure that you are adequately prepared and that there is some logistical backing or organizational structure to support you. There will certainly be a first time for everyone, but before volunteering for a relief mission, it is almost imperative that you have prior experience working in a low-resource setting environment. It is not appropriate that the first time you operate without electrocautery, suction or lights be during a disaster. Even though such skills are not difficult for most surgeons to gain, they still need to be learned and practiced. Volunteering in a stable, low-resource setting can begin to provide the background and understanding of what possible conditions will be like during a disaster relief mission. Further, depending on the stable low-resource setting and the organization that helps arrange the mission to the disaster, the circumstances in the disaster may be relatively better than the experience gained in the stable environment.

Additionally, it is important to go with a group that has prior experience not only in disaster relief missions, but also in similar locations so that they better understand governmental and cultural nuances. There are a number of well-respected organizations such as Médecins Sans Frontières (MSF), International Medical Corp, and the U.S. Government International Disaster Management Teams that have the technical experience and logistical framework to support volunteer surgeons on a relief mission. It is the logistics on the ground that will ultimately determine if your mission and the treatment your patients receive is successful. Other useful U.S.-based resources include the American College of Surgeon's Operation Giving Back program (<http://www.operationgivingback.facs.org>) and the Global Paediatric Surgery Network (<http://globalpaediatricsurgery.org>), both of which serve as clearinghouses for short- and intermediate-term surgical work in low- and middle-income country settings.

When assisting in a disaster situation, having some knowledge or special connection with the location is helpful. This can include a sociopolitical understanding of the affected region, cultural issues specific thereto, competence in a local language, and so on.

Prior to signing up for a relief mission, it is also useful to get some specialized training. Some groups such as MSF hold courses for new volunteers; other options include humanitarian surgery courses run by Stanford University or the American College of Surgeons. Many of the cases encountered in the field will likely include infected wounds, open fractures and maternal health care needs; therefore, some familiarity and comfort with trauma, orthopedics and obstetrics is mandatory. Other subspecialty skills that can be useful include: pediatric surgery, plastic surgery, neurosurgery and urology. Experience in these subspecialties can be gained by working with other colleagues at your home institution. Another option, which requires a significant time commitment, is a rural surgery fellowship. As of this writing, ten such fellowships are offered in the United

States (see <http://www.facs.org/residencysearch/specialties/rural.html>, accessed September 12, 2015). In addition, there are multiple online and in-print resources that address trauma and non-trauma surgery in austere settings, including the two-volume Primary Surgery text edited by Maurice King and the International Committee of the Red Cross' War Surgery Manuals (see suggested readings).

Prior to volunteering it is also imperative that your family and work colleagues be aware of your interest and that they, like you, understand the commitment. Often they will be supportive, but this might not always be the case. It is better to let them know before you actually deploy.

It should go without saying that you must be in good physical condition, and if you have medical issues that you are able to take along enough medication. Be aware that if you have a problem in the field there may be limited assistance. Adequate treatment, stabilization and evacuation may not happen in a timely fashion. In addition, if you have a problem, scarce resources that were intended for the affected population might have to be diverted to you.

If Asked to Go

Assuming you have the proper experience and necessary preparation, if and when you are asked to participate in a relief mission, you should ask yourself of the following questions:

1. Do I have the proper experience and skills?

There is no guarantee what types of cases or conditions that will arise on a disaster relief mission. It is best to be prepared for possibly being the only surgical care provider for a population in need. This means being able to provide all manner of surgical care, including trauma, orthopedics, pediatric, plastic, neurosurgical and obstetrics. Unless you already have some experience in a low-resource setting it may be difficult to adapt quickly to the conditions for providing appropriate care. Additionally, flexibility and creativity is needed as specific equipment and supplies (*e.g.*, specialty sutures, premade Plaster of Paris, abundant gauze) frequently will not be available. Further, depending on where the disaster occurred, an understanding of tropical medicine and conditions (*ascaris*, *schistosomiasis*, *malaria*, *tuberculosis*, *hydatid disease*, *etc.*) is useful. Good fundamental examination skills are a must, as often there will be little in terms of diagnostic modalities. While portable ultrasounds are more frequently being used in such settings, CT scanners and x-rays will usually not be available. In addition, routine blood tests might also be lacking.

2. Does the organization asking me to volunteer for a disaster relief mission have the experience to provide proper logistical support, security and, if needed, evacuation?

When evaluating an organization with which you will volunteer for a relief mission, make sure that they have the experience and breadth of capacity for

providing logistical support, security and an evacuation plan. There is little sense in your going to help and then requiring resources to care for you.

3. Would sending a cash donation to an organization be a better option?

If you do not have the proper skills or experience and cannot go with an experienced organization, a cash donation to an organization such as the Red Cross or MSF may help the most. Individually collecting and sending equipment and supplies is not recommended, as many professional relief organizations will try to get supplies to the disaster zone and there could be a backlog or delays at the transport hubs which might also have been damaged.

4. Am I healthy enough?

Just having the desire to go is not enough. Are your vaccinations up to date? Do you have a yellow-fever vaccine and a valid yellow card if going to an endemic area? Will you need anti-malarial prophylaxis, and can you tolerate the various medications? Can you work for many hours straight in possibly very hot or cold or wet conditions with limited air conditioning or heating? Do you have any medical conditions that would limit your ability to work or tolerate extreme conditions?

5. What about issues back home (family, co-workers)?

Are your affairs in order back home? Have you made adequate arrangements to cover patient care and call duties? Do you have designated emergency contacts and a beneficiary in case of an emergency or untimely death? Does someone have your social media accounts and passwords?

What to Bring?

Depending on the situation you might not be able to bring much with you. One school of thought is to just take enough personal items so that you only have carry on luggage. This facilitates your movements and reduces the risk of losing bags on flights. It is also easier to pack in the event an evacuation is needed.

For personal effects, aside from comfortable clothing and toiletries, we suggest taking a small portable headlight and a microfiber towel. Any personal medications and a small personal first aid kit can be useful. Some organizations provide volunteers with cell phones and a local SIM card. If a cellphone is not provided, it might be prudent to bring an unlocked GSM cellphone so that a local SIM card can be purchased.

In terms of medical supplies, it is sometimes possible to bring materials with you depending on the logistical capability of the organization with which you volunteer. Access to supplies may be limited and you might have a personal preference that will not be available locally. Be aware that often times there is a great need and that a few bags of supplies will probably be insufficient, though the items will certainly be useful. In addition, for some organizations it might be prudent to bring a few pairs of scrubs and personal operating room shoes.

Another important issue is whether to bring items for personal entertainment. On some missions it will be very busy and there will be little or no down time; however, on others there will be a lot of waiting. “Hurry up and wait” is quite a common phenomenon. During such waiting times and during periods without high patient volume, books, e-readers, music, playing cards and videos will be a nice diversion. One thing to remember is that there may be limited electricity to recharge batteries and you will need to know the local pin adapters or have converters for recharging items.

What to Expect on the Ground

Living conditions on a relief mission can vary widely. Ultimately it is unwise to plan for an intervention without adequate shelter. Ideally a small team would have done an assessment of the situation and found appropriate shelter for a larger team. Remember that there may not be a constant water or electricity supply. Care must also be made for security of the team and the safety of staff and patients.

Further, it is important to try to avoid getting sick yourself. Water must be filtered, boiled, chlorinated or purchased in bottles. Food must be either packaged or well-cooked. Anti-malarial prophylaxis is essential if you will be working in an endemic location.

When working with patients, universal precautions must always be followed. This includes eye protection and double gloving, if possible. Carrying medication in case of exposure is also recommended.

Depending on the baseline conditions and the type of disaster, the operative caseload can vary widely, but it will certainly be different from back home. Sometimes hospitals and health facilities are completely destroyed and field hospitals need to be set up and used. When possible, it is best to work along with local health officials to support existing structures instead of creating a parallel system. Problems occur by undermining confidence in local providers and creating issues with follow-up and patients who visit various facilities. It is also important that the organization you volunteer with works within the UN cluster system so that there will be some coordination of health care delivery. The role of expatriate health care providers is to *augment and support* local health care resources, not replace them.

As stated above, there may or may not be running water or a constant supply of electricity. There may or may not be a dedicated operating room, sufficient supplies, functioning equipment or post-operative facilities. There may be no nurses or aides to assist with pre- and post-operative care or even in the operating room. Depending on the baseline situation and the cause of the disaster there may be many trauma patients and/or maternal or pediatric cases. Sometimes the situation will be dangerous or unstable and patients may not be able to get to the health facilities and things will be slower than anticipated. During these times it is important to work with the

staff but not overwork them. Occasionally it is appropriate to do some elective procedures but this should possibly be avoided as a large influx of patients can happen without warning and it is important to have fresh teams and sufficient supplies.

Remember that many of the wounds will be neglected and will need good debridement. Infected wounds should not be closed and patients should be given a tetanus vaccine and immunoglobulin, if appropriate. Try also to conserve supplies, especially suture, gauze, bandages and tape. There will be difficulty getting new shipments and so each case must be accomplished as efficiently as possible.

If there are local colleagues, it is imperative to have a respectful and collaborative working relationship with them. There may be many baseline issues which are not necessarily at a standard of care of your home institution, however, it is important to try to give the best care possible. Also remember that local colleagues are under enormous stress as their families and communities are affected by the disaster.

If there are a large number of local providers, it may be best to take a bit of a backseat and work more as a mentor and advisor. Often times the local surgeons will want to take care of the patients and be primarily in charge. Let them and work with them; offer to assist and try to keep things as safe as possible. You do not want to get into conflict with local providers in a disaster zone where security may already be an issue.

One issue, which may arise, is the interaction with other volunteer staff. Often volunteers want to help, but they may not have the proper skills and experience. This is another reason to work with an experienced organization but it is no guarantee of success. Try to maintain a flexible attitude and be supportive. However, in the case that someone is not providing good care or is negatively affecting the team either because of a lack of skills or difficulty with the situation, it is important to speak with those in charge.

Another issue concerns photography. While this is permissible and even encouraged, respect and privacy of the patient needs to be maintained. All patients should be asked for their permission and there should be care taken when sharing the photos, especially on social media.

Quality Control and Metrics

Often lost in the conversation on surgical humanitarian relief work is a discussion of the need for quality assurance. This is where the academic surgeon may be especially qualified to contribute. Reviews of procedures and outcomes – be it a weekly sit-down conference or a 15 min huddle under a tent – are critical and no less important in emergency settings than in academic halls. They provide a method for introspection and a way to avoid repetitive errors. When properly done, these reviews set an example of inclusivity that can serve to benefit both patients and care providers

at all levels. Remember to include all members of the team to the greatest degree possible, welcoming local and expatriate staff, nurses, aides and physicians. Remember also that this culture of case review may be foreign to the local staff and visiting surgeons are wise to not to assign undue blame for those poor outcomes that are inevitable in any emergency setting no less than “back home.”

When Leaving

Ideally, when you leave a relief mission there is a plan in place to care for your patients so that they get appropriate post-operative care and a mechanism exists to take care of any complications and for follow-up. Ideally this is arranged before a project is started; however, there is often a rapid desire by clinicians to jump in to start helping, and there needs to be some way to care for the patients after the initial procedure. How will they be fed and provided for? Will they become more of a burden on their families and communities afterwards? These are difficult questions and involve cultural and ethical considerations. Again this necessitates a strong organizational environment and close collaboration with local health providers and community leaders.

Finally, if there is left over equipment and supplies from a mission, ideally these can be given to local health care providers. They should not be wasted.

On Return

Returning home after a mission can be stressful. It is important to have a debriefing and it is further ideal to have supportive family, friends and colleagues with whom to discuss the experience. It is important to discuss what happened, both the good and the bad. Usually there will have been significant issues that affected the care of patients and might not have been a proper standard of care, however, one needs to keep in mind the limitations and the difficulties of working in a disaster zone. It is important to understand what was done, identify any problems and understand what could have been done differently.

Documenting the experience is an imperative part of the re-assimilation process and can take the form of an end of mission report for the organization and a personal journal. Additionally, if appropriate, the experience should be shared with colleagues who are interested in similar experiences. The mission can be documented for a medical journal or shared on social media, although many international humanitarian relief organizations have strict rules regarding the use of social media (check first). Though not a priority on a relief mission, research can sometimes be undertaken, often comprising descriptive studies using routinely collected data. However, if research is to be done, ethical oversight and collaboration with local colleagues are a must.

Conclusions

Opportunities for academic surgeons to participate in disaster relief missions for natural and man-made disasters are increasing. Although there is a tremendous need for assistance and a great desire on the part of volunteers to help, in order to provide quality care and do the most for the population in need, a volunteer should have prior experience working in low-resources settings. In addition, specialized skills and flexibility are essential. Foreign language skills can be tremendously useful. The importance of working with an experienced and established organization cannot be stressed enough.

Volunteers must also try to assist local colleagues who are experts in the local infrastructure and with local disease conditions. Safety and security for the volunteers, patients and local community must be on the forefront. Reflection on one's work and patient outcomes, both in real time and *post hoc*, are a critical way to bring an academic flavor to relief work to the greatest degree possible. Subsequent dissemination of results obtained and lessons learned – whether through formal peer-reviewed publication or through prose or other forms of communication – will contribute significantly to the body of knowledge slowly accumulating on how to relieve suffering and bring high levels of surgical care to disaster victims.

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Chapter 7

How to Set Up for an Ideal Long Term Clinical Interaction

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Introduction

Over the last several years there has been a heightened interest in the surgical community in participating in international surgery. Several explanations for this increased interest have been proffered – including an enhanced awareness of the world at large via print and electronic media, the proliferation of social media interactions and a deeper sense of social responsibility. With regard to trainees, a recent survey indicated that at least a fifth of graduating US medical students had participated in international activities related to global health. Another survey among American College of Surgeons Resident Members demonstrated a majority of responders were interested in international rotations and had plans to incorporate some form of international volunteerism into their future practice. Surgical Residency program directors in a recent poll were found to be largely supportive of such international rotations, and over half of US programs already had some form

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of an *informal* rotation. It is clear that interest in global health, especially in younger surgeons, is growing.

Regardless of the reasons for the increased focus on global surgery, it is recognized that formulating a productive clinical international surgical experience is shouldered on the adequate development and long-term sustenance of an effective model for optimal clinical interaction. Naturally, unique challenges arise with the creation of such processes. Fortunately, there are a number of existing models, as well as others being developed that have enjoyed varying degrees of success. These can serve as repositories of information for programs attempting to forge new relationships. Many of these programs are currently in countries in Sub-Saharan Africa, Asia and South America.

In this chapter, we discuss some of the important considerations for setting up ongoing clinical interactions. Potential pitfalls and barriers to success will be also briefly mentioned.

Basic Considerations

Pre-deployment Preparation

Some basic preparations can go a long way in making global health experiences worthwhile. A prime consideration is a structured pre-departure training course. Such courses provide a comprehensive overview of the necessary planning required to participate in global surgery experiences. These should cover issues such as visa requirements, travel safety, cultural sensitivity training, and health advice – including immunizations, personal protective equipment, how to access post-exposure prophylaxis and access to medical care when needed. Most curricula also provide strategies to deal with ethically challenging situations and link the participant with a global health mentor who can serve as an advisor during the initial trip. These courses, available in many US and Canadian medical schools, are typically open to all medical professionals. In lieu of such a course, several online modules are available for participants to learn about global health endeavors prior to their departure.

It is crucial to start planning global health experiences early, at a minimum of 6 months ahead of the planned date of departure. This includes obtaining necessary visas, finding adequate accommodation, getting the necessary permissions to join clinical rotations, purchasing airline tickets, identifying a potential local mentor and taking care of health and immunization issues.

Needs Assessment

Prior to initiating a trip to a new destination, a needs assessment must take place. This can be as simple as knowledge borne through a prior trip by organizers to the proposed destination but can be formalized easily in a more structured survey.

Additionally, meeting with local leaders, both medical and non-medical, can help one understand the local needs. Just showing up and planning to work can be offensive locally and inefficient for participants volunteering their time. It is especially important to learn how this trip will be perceived in the local community. If there is not acceptance with “local buy-in,” the trip is doomed to fail. It is particularly critical from the outset to outline the care plan for patients in an emergent situation and for dealing with complications that develop after returning home.

A careful evaluation of the medical system while there and an ongoing assessment of needs can also be done over months. Depending on the goals of the relationship, this might involve an extended time period, with evaluations of the population, available material and human resources including other available volunteer organizations in the area, and interviews with community medical and non-medical leaders. A critical bilateral trust in the partnership is developed through these meetings, and from asking the community what their primary interests are from the ongoing relationship. This process can be lengthy, but gives a foundation for a long-lasting and successful interaction. This often leads to a formalized relationship, such as a Memorandum of Understanding (MOU) between institutions, Universities or Ministries of Health.

The initial trip to perform surgery in an LMIC might be less productive than organizers hope. This should be clearly understood. Initial trips are always a time of tremendous learning with uncovering of unforeseen barriers. Participants on the initial trip need to be prepared for this ahead of time or well-intended volunteers may become frustrated and detract from the opportunity. Finally, the initial trip needs a careful debriefing at the end to plan for future interactions and to how to optimize this new experience. This might even mean finding that the particular setting is not acceptable for ongoing interactions.

Clear Goals of the Experience

Defining the objectives of a planned international clinical experience is an essential key to success. Programs that have clearly defined goals and a reasonable plan for implementation will be more successful. For some, this may be an opportunity to experience surgery in a low-resource setting, but often it can also involve initiating a long-term partnership between programs and institutions centering on local capacity building, educational exchanges and research. Experiences with a long-term vision are often more fruitful for both the participant and the host.

Another key step is to identify a local contact that can serve as a partner and mentor. Such individuals will offer crucial advice and help navigate what is often a very different system. Furthermore, if there is an opportunity to start a project or perform research, these individuals can serve as stakeholders and become the main contacts for the participant.

On the initial trip, the focus of any clinical experience should be on gaining an understanding and appreciation of health care delivery in a novel organizational

setting, and should not be simply focused on performing as many procedures as possible. One area of concern includes the diversity of practice. In the global setting surgeons are often tempted to perform procedures they do not perform at their home institution simply due to the scarcity of resources (*If I do not do it no one will*). As a general rule of thumb, when a chance to perform a procedure arises, it is important to ask the following question: *Am I credentialed to perform this procedure back home?* The answer to this question should be a guide towards the correct answer.

It is also important to remember your role as a guest at your host institution. Your role, especially in the first few experiences is primarily to observe and learn. Beyond their potential educational value, such experiences are a unique opportunity to make new friends amongst clinical colleagues and teachers, to learn about a new health delivery system, and also to have fun. Often such experiences are excellent opportunities to reflect on important differences between the health care system you are used to and the one of your hosts. Due to limited resources, local solutions to clinical problems are often more efficient and less wasteful. Keeping a diary of observations and experiences can help keep track of the new lessons learned. It will also serve as a good starting point for debriefing once you return from the experience.

A valuable addition to any program is to incorporate a focus on a simple research project which can be done collaboratively. Some practical tips regarding these are as follows:

- Aim for simple questions whose answers will provide solutions or insight to problems faced by the local health care practitioners. In surgery the themes are often related to improved educational experiences, local capacity building by providing new technologies or research techniques, and building training opportunities.
- Identify possible projects together with the local leadership with whom you are working.
- Work on securing grant money early and ensure there is local buy-in and co-administration from your host partners and stakeholders.

Ultimately the degree of planning, local involvement, partnership building, and collective decision-making that goes into any global health partnership is directly proportional to its chances of success and of having a positive impact.

Building Sustainable Rotations: Role of Medical Students and Surgical Residents

General Considerations

Rotations for residents and fellows can be incredibly rewarding and educationally invaluable and importantly can often form the nidus of a true bilateral institutional collaboration. As mentioned above, there is a growing interest in residencies and fellowships that offer this experience. Applicants for these programs often arrive having previous positive experiences in this work and search for programs to

provide similar opportunities. International rotations can be a draw for programs in a competitive environment to attract top applicants.

A simple means to this end is for the trainee to use vacation time to do an international rotation. This eliminates the requirements of the Residency Review Committee and the American Board of Surgery. These experiences are thus shorter and perhaps less formalized, but provide exposure to international work. In spite of the obvious drawbacks and limitations, this is a reasonable option for an initial experience in global surgery.

Sustainable rotations are best developed within the context of institutional commitments between programs in the United States/Canada and foreign nations. This provides a context to ensure the consistent quality of the educational experience for residents and fellows. Institutional commitments often involve universities affiliated with hospitals or universities in developing countries. This extends the commitment beyond relationships between individual physicians. Often this enhances funding and resource allocation.

RRC and American Board of Surgery (ABS) Requirements

The RRC and the ABS have increasingly been supportive of these rotations. Approval allows for programs and trainees to count their cases- a recent change for the RRC. This recently formalized process, with clear instructions and criteria, can be found on websites of both entities. A letter of request must be sent to both the American Board of Surgery as well as the Executive Director of the Residency Review Committee for Surgery (RRC). Approval must be obtained from both organizations for the rotation. Once approved, cases can count in general surgery towards board certification. The process is generally the same for fellowships, although the RRC reserves the right to individualize how they treat each application. Currently, the application and approval process is on a case-by-case basis for individual residents/fellows for specific International Rotation. Approval is not sustained ad-indefinitum for future residents in a program.

In order to successfully obtain approval from the RRC/ABS, certain elements are required. First, the rotation must be elective so trainees are not 'forced' to make these trips. The residency program must have a current status of Continued Accreditation with no significant citations at the time of the application. There must be ABS-certified faculty to supervise the resident. The faculty member is also charged with ensuring the safety and wellbeing of the resident/fellow. The application must include a center's operative volume as well as an exposure to an outpatient experience. Funding must be verified, including travel, health insurance and housing. There must be a signed Program Letter of Agreement between the institutions. These criteria formalize the experience in order to ensure that the level of the educational opportunity on an International Rotation is equivalent to time spent at the home program in the United States. The permitted duration for these rotations has not been determined and is not firmly outlined on the websites of the regulatory agencies. Some have suggested rotations of up to 6 months of general surgical training.

Potential Pitfalls and Barriers to Success

Developing a long-term clinical program is expectedly fraught with ‘minefields’ that could threaten long-term viability. The following are a few such barriers.

Funding and Continuity

International air travel has become increasingly expensive. Accommodation and in-country transport are other associated costs. As alluded to above, a well thought out creative plan for financial support should be in place. The backing of the home institution is imperative for sustainability. Smaller surgical programs often do not have the resources that universities or institutions within major health care systems do. For this reason, smaller programs will often form collaborations and alliances with well-established global programs to assist them with development of their experiences.

Commercial vendors/industry sponsors often have money allocated for philanthropic purposes. Solicitation by busy surgeons in developed countries can lead to ongoing financial support for global health programs. Also, certain products (e.g. mesh for hernia repairs) may offer opportunities for sponsorships, as this may be viewed from the vendor’s perspective as potential for new market opportunities. For these reasons, it is sometimes easier to obtain equipment than find funding for travel/housing.

Cultural Issues

The respect of local culture and norms in the health care context is imperative. Inappropriate activities can fracture relationships that took years to build. Candid discussion with participants prior to departure centering on professionalism and respect for the laws and customs of the host country are critical. Adapting appropriately to the local environment will not only help in enhancing sustainable healthy relationships, but also give credence to any positive suggestions for systems or health care delivery improvements that may be made.

Faith-Based Considerations

Often, healthcare facilities in Low and Middle Income Countries have faith-based affiliations. There may be code of conduct and lifestyle restrictions that could create potential conflicts if not adhered to. These issues must be addressed prior to a long-term commitment. The program seeking collaboration must recognize these ahead of time and decide if they can abide with such restrictions. Institutions with established global surgery programs have generally worked well with these issues – and generally have avoided any problems in this area.

Logistic Support

Basic requirements such as local medical licensing, vaccinations, visas and flight arrangements should be handled by a knowledgeable logistics individual or Travel Office. Inexperienced participants may omit necessary steps of the process and create unnecessary problems.

Lack of Clear Goals and Objectives

As in any organization, each international trip must have clear goals, objectives and expectations. The absence of these will prevent both the establishment of clear metrics by which the short and long term success of the venture can be measured, and the potential identification of opportunities for improvement. Clear goals will also prevent abuses such as a training trip being used as an opportunity to take an extended vacation in lieu of the expected clinical experience.

The Absence of Local ‘Buy-In’

The importance of having a local champion cannot be overemphasized. In addition to having this imperative resource, the host international institution must be fully *on board* with the vision, goals and objectives of the trip. The entire partnership should be a process that fosters a mutual benefit – a good experience for participants and tangible benefits for the host institution. The *benefits* to the hosts can come in various manners – reciprocal observational experiences, education, research opportunities, financial support or simply a reduction in case backlog. The presence of such valued reciprocity will help maintain the long-term sustainability of the experience.

Conclusion

Clinical global surgery programs based on single individuals often last only as long as the individual’s presence and commitment. In contrast, academic institutions, hospital organizations and faith-based institutions are often ideal entities to foster long-term commitments. Ideal interactions require deliberate planning, resourcefulness and commitment from all involved parties in order to be sustained successfully. These experiences can often center around international rotations for medical students, residents and fellows, and provide tremendous training opportunities for those involved.

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Part IV

Research

Chapter 8

Academic Global Surgery: Current Research Needs and Priorities

Stephen W. Bickler, Doruk Ozgediz, and Dan Poenaru

The body of literature addressing surgical care in LMICs is growing rapidly, but remains limited by comparison with other clinical and educational areas within surgery. There are currently multiple areas where research is needed, and therein is an important opportunity for academic surgeons to fill these gaps in knowledge. The Essential Surgery volume of the Disease Control Priorities Project 3rd Edition (DCP3), published in early 2015 and launched at the Academic Surgical Congress, emphasized the importance of surgical research in global public health. Some of the key areas within global surgical research noted within DCP3 are expanded upon below.

Improved Methodology for Assessing the Public Health Impact of Surgical Care

The disability-adjusted life year (DALY) has traditionally been the commonly accepted burden of disease (BoD) measure, and has been widely utilized for surgical disease as well. It is calculated as the sum of the Years of Life Lost (YLL) due to premature mortality in the population and the Years Lost due to Disability (YLD)

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for people living with a particular disease or its consequences. However, as noted by the Disease Control Priorities (DCP) group and others, the DALY may not be the ideal metric in the surgical domain. Surgeons and policy-makers involved in global health need simple and easily interpretable measures which take into account less-than-ideal surgical outcomes, quality of care actually provided, and the burden of living with a surgical condition both before and after intervention. Research on alternative BoD metrics in surgery is still in its infancy.

Cost-effectiveness analysis (CEA) has demonstrated efficacy of operative management compared to other medical interventions, but needs to be expanded to a variety of further specialties and intervention types. Econometric approaches such as the Value of a Statistical Life (VSL) represent a worthwhile expansion of CEA offering a significant advocacy potential, but currently there are only a handful of studies using this method in surgery. Even rudimentary studies to evaluate the economic impact on families such as ability of families to pay for care, expenditure for transport and during hospital stay, assets sold, income foregone, and associated impact on household poverty may go a long way to improve the knowledge base for advocacy, and to estimate the impact of surgical disease on poverty.

Interest in global health disparities and the associated moral imperative to address them and improve global health equity have gained greater attention in recent years. However, measurement of these disparities in both low- and high-income countries has made only modest progress, and requires intentional research efforts.

Better Estimates of Avertable and non-Avertable Burden of Surgically Treatable Conditions in LMICs

Most BoD studies within surgery are based on hospital data, which are often a poor proxy for community needs, though they can be a good starting point. While some population-based studies from low- and middle-income countries (LMICs) have recently been published, their data are too granular to effectively inform surgical providers on the ground. Thus, research efforts aiming at merging population- and hospital-based data are needed. Moreover, burden studies at all levels have been fraught with significant methodological assumptions, and need validation across institutional types, regions, and resource levels. Similarly, multiple tools have been developed for measuring surgical capacity, typically involving some composite index of human resources and skills, as well as infrastructure and supplies. While these efforts have been useful in identifying gaps, future efforts are needed to link surgical capacity to health outcomes and to develop proposals for increasing capacity at the margin by adding incremental resources.

Another yet unexplored area of surgical research is the estimation of BoD suffered by patients due to delayed surgical care, a metric which would be relevant in both high- and limited-resource settings. This is especially applicable to delayed care that leads to increased disability or non-fatal health outcomes. This requires greater

sensitivity to the direct consequences to families of delayed or absent care - to which we bear witness as clinical surgeons at the bedside. Furthermore, it requires the development of new tools or the optimal use of qualitative research to raise the visibility of this burden to the public and to the international philanthropic community.

Finally, standardization of data collection methods is needed for data integration and meaningful comparisons across disciplines. Fractured approaches with multiple similar metrics supported by different groups may actually hinder the global surgery movement rather than move it forward.

Strategies to Address the Non-avertable Surgical Burden

Non-avertable burden refers to the fraction of the surgical burden that is not currently addressable by surgical care. As DCP3 demonstrated, the majority of the surgical burden worldwide is currently non-avertable. Yet, this does not necessarily imply a *non-addressable* problem, as this burden can be potentially reduced by non-surgical means such as injury prevention, improved delivery of care, and surgical innovation. Research priorities should therefore include a careful examination of the non-avertable burden, prevention strategies suited for use in resource-limited settings, and the role of surgical innovation (particularly reverse innovation) in decreasing the non-avertable burden.

Tools for Measuring Surgical Care in Primary Health Care Systems

Monitoring and evaluating the delivery of health care is essential and fully accepted in many health development programs, but has yet to be systematically applied to surgical care in LMICs. Holistic, comprehensive measures of surgical care delivery, which interrogate the multitude of process and outcome factors inherent to surgical care, are needed. Unlike uni- or bi-dimensional measures like mortality data or the DALYs, appropriate comprehensive tools would need to include data on access to care, effective surgical coverage, human and facility resources, surgical outcomes, cost of care, and overall quality of care.

One such example may be the WHO Monitoring the Building Blocks of Health Systems Monitoring and Evaluation (MBBHS M&E) matrix to surgical care (Fig. 8.1). Adapting such tools to global surgery may serve the dual purpose of facilitating the integration of surgery within national or regional health systems and of providing a mechanism for measuring and comparing the performance. An important aspect of this includes the identification, stabilization, and referral of patients with surgical conditions from the most basic levels of the health system to higher levels.

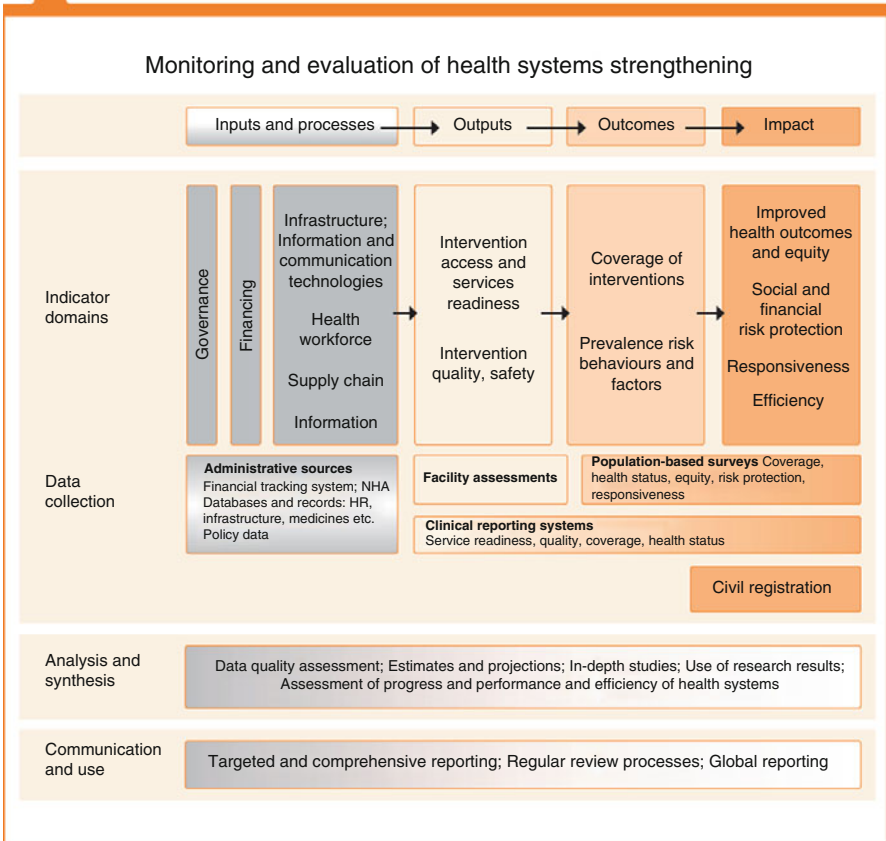


Fig. 8.1 WHO Monitoring the Building Blocks of Health Systems monitoring and evaluation matrix (With permission from WHO)

Models of Surgical Care Implementation in LMICs

An essential priority within global surgical research is exploring and identifying how emergency and essential surgical care can best be implemented in LMICs, where the needs are greatest and health systems are often the least developed. Published examples of well-functioning surgical services in LMICs are rare, and there is little information on the specific factors that make them successful. The process of progressive improvement in global surgical care is widely multi-factorial, and includes considerations of infrastructure, equipment, personnel, as well as education and training.

Research priorities in this area include designing and delivering a basic surgical package that is flexible enough to be adaptable to local needs, benchmarks for

assessing requirements for delivering emergency and essential surgical care at first-level hospitals, strategies for measuring the impact of any improvements, and cost estimates for various interventions. Specific interventions may include the creation of new health care facilities and inpatient units, the addition of personnel such as surgical or anaesthesia providers, or the delivery of various types of equipment and supplies. Previous work has emphasized that such improvements may be best measured within comprehensive packages.

While significant resources have been allocated by academic and non-academic groups to measure burden and capacity in countries and regions, there has been very limited research on the design and implementation of solutions to these problems. Some of these solutions will of necessity entail the development of low-cost essential surgical equipment such as anaesthesia machines, consumables such as sutures, power sources, and/or orthopaedic implants.

In recent years, several global initiatives have been aimed at measuring and improving the quality of surgical care delivery. Examples include the WHO surgical checklist, the global pulse oximetry initiative, and a recent emphasis on post-operative mortality rate (Fig. 8.2). While a focus on quality of care is essential, there is limited consensus on *which* quality indicators are most meaningful, contextually appropriate, and likely to be embraced by providers and policy-makers in resource-poor settings. Some of this work has been a direct extension of surgical quality improvement initiatives in the United States, where quality improvement discussions often start with the large number of patients unintentionally harmed by hospitals and through medical errors and follow strategies adapted from the aviation and the automobile industries.

It is uncertain what priorities these strategies may have in resource-poor settings, where many patients with surgical conditions may not interact at all with the health care system and/or may present late with advanced disease. Most quality indicators to date have focused on the outcomes of the patients who *actually* reach surgical facilities and are operated upon; unfortunately this group represents the minority in many settings. Furthermore, while quality improvement initiatives have gained momentum in North America and this focus has extended to surgical care in the resource-poor environment, it is important to remember that these initiatives are most successful through established long-term relationships rather than short-term initiatives.

A significant component of the surgical burden is caused by multiple barriers to access for patients and families, such as poverty, transport costs, poor understanding of disease, low expectations of the health system, fear, cultural and spiritual factors, and other factors that influence health-seeking behaviour. For example, in many communities it is more common to initially pursue care from a traditional healer than from a medical professional. While some of these factors have been elucidated and addressed in other medical fields, very limited work has been done regarding surgical conditions. This may limit our knowledge base for designing interventions that have the potential to improve access to surgical care.

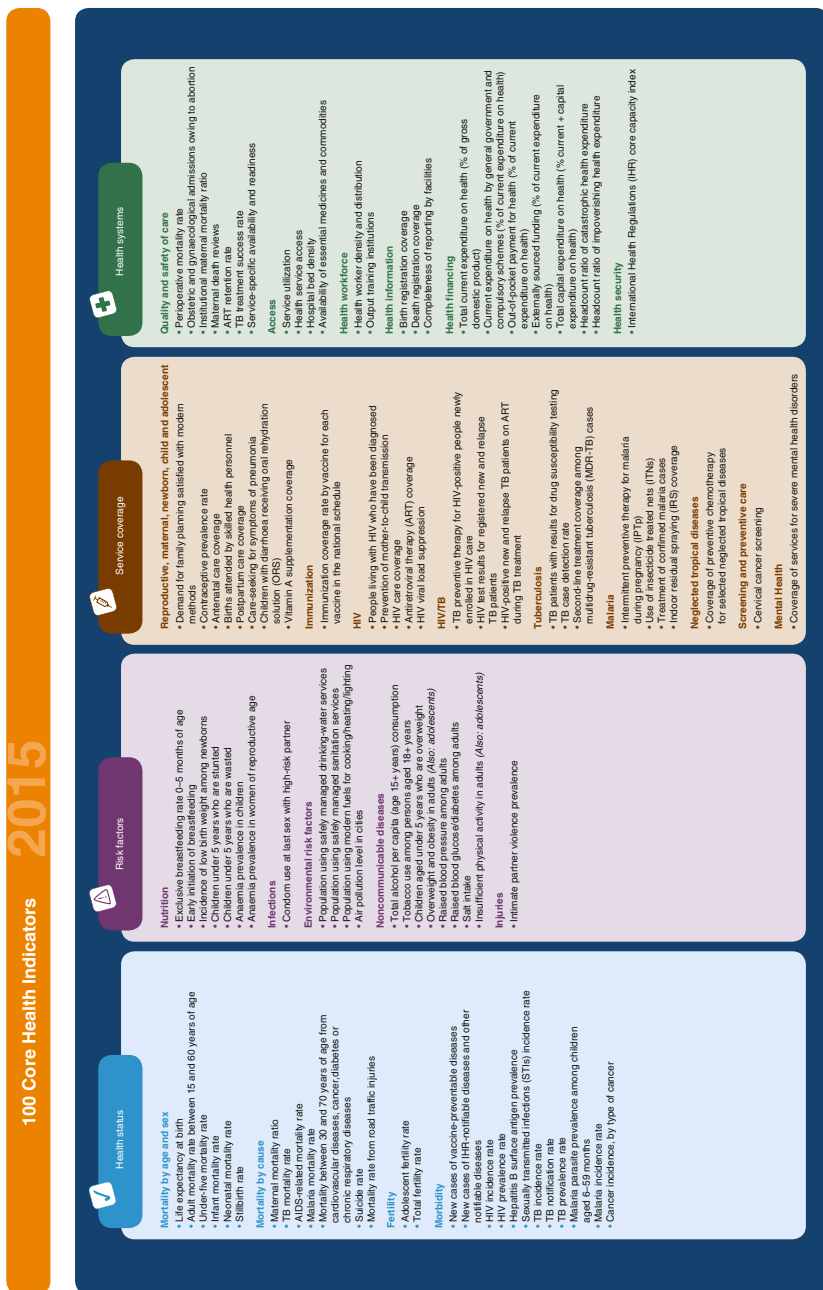


Fig. 8.2 WHO 100 Core Health Indicators, including surgical indicators: perioperative mortality rate, health worker density and health worker density (With Permission from WHO)

Estimating the Surgical Workforce Needs in LMICs

An essential limiting factor in scaling up the provision of surgical care in LMICs is the severe deficiency in the workforce, which is primarily comprised of the training, retention, and distribution of surgical and perioperative care providers. Surgical training is both lengthy and costly, and market forces work against newly trained surgeons being retained by the district-level hospitals where they are most needed. Surgical training in LMICs has traditionally been university-based, with sub-specialty expertise often gained through observerships in high-income countries (HICs). Newer models are based on cross-national professional colleges and academies (such as the West African College of Surgeons, the College of Surgeons of East, Central, and Southern Africa, and the Pan-African Academy of Christian Surgeons). Studies are needed to evaluate the quality and impact of such distributed training approaches and the best educational methods for surgical training in LMICs. This includes reviewing the essential components of curricula and identifying region-appropriate case volume and distribution to ensure proficiency. Courses and training tools geared towards high-income settings generally require significant modifications to contextualize to limited-resource settings.

Issues of migration of health professionals from low to high-income countries (the so-called ‘brain drain’) are not limited to surgical providers. Nonetheless, very little work has been done to quantify the extent and impact of this migration on surgical service delivery, nor to evaluate various approaches to addressing this issue. Similarly, the maldistribution of specialist medical providers, who typically aggregate in large cities at the expense of rural areas, has not been sufficiently studied. Research is needed to design and implement strategies for increasing the rural surgical workforce. These strategies might include policies such as increased salaries and benefits, continuing education opportunities, housing and educational benefits for children of providers, etc.

Estimates of the shortages of surgical providers are based on limited data from national or regional college registries, which may be fairly inaccurate in capturing the number of practitioners *actually* providing clinical service. The ideal provider number and distribution for surgical sub-specialties and anaesthesia is also not known. Without such data, the significance of the surgical backlog may be difficult to quantify, and this can limit planning to meet population workforce needs.

‘Stop-gap’ national task-shifting programs have been instituted in several LMICs, with occasional successful examples of non-surgeon physicians, physician assistants, clinical officers, and nurses used to complement the surgical workforce. Longitudinal studies are needed to evaluate such programs and their long-term impact not only on health care but also on national workforce. While such programs have been studied for short-term outcomes, they often lack other critical metrics, such as cost, to inform their potential implementation in other settings.

Aligning Surgical Care with Other Global Health Movements

Surgical care has been aptly identified as a key primary care intervention and contributes to major challenge areas within global health, such as infectious disease and child and maternal health. Thus, surgery constitutes an important factor in the global success of meeting the 2015 UN Millennium Development Goals and later in the post-MDG era. There are, however, no studies defining the role of surgical care in meeting these global initiatives. As these initiatives link health improvement to economic growth, integrating surgical care into these important movements could represent an important strategy for encouraging investment in surgical care in LMICs. Potential examples of such integration, where surgical care plays a key role, include maternal mortality and child health initiatives, the growing focus on non-communicable diseases (NCDs) such as cancer, diabetes, and cardiovascular diseases, and infectious diseases such as HIV-associated conditions. Engaging major global initiatives to propose surgical public health targets that may use metrics such as mortality from specific surgical conditions or access to care are a critical research priority. A critical step towards appropriate attention to these issues was made in May 2015 when the World Health Assembly passed a resolution on the importance of essential surgical and anaesthesia care within universal health coverage.

Dissemination, Marketing, and Advocacy

Research generally involves identification of knowledge gaps and subsequent knowledge generation to fill these gaps. This alone, however, is not sufficient. Within the global surgery community, there is a critical need to translate generated knowledge into policies or into fundable initiatives for improving surgical care in LMICs. For example, while existing economic evidence for surgical interventions is compelling, this fact is still not fully recognized within the public health community or by surgical providers. *Packaging* critical research findings into actionable implementation plans is crucial. What, for instance, is the impact of building new facilities, new wards, adding surgical or perioperative care providers, or upgrading equipment on an existing infrastructure? One inherent challenge is *how* to package surgical interventions when surgery plays a key role in so many disease processes, across age groups and across levels of urgency.

Also lacking is better use of social media, global communication networks, and documentation of the impact of delayed or absent surgical care on families and communities. This type of work has been critical to the success of other major movements in public health such as HIV-AIDS/TB/Malaria and the NCDs. This requires marketing skills that are generally outside the realm of surgical (and even public health) training. Moreover, mobilization of patient groups to advocate for the basic right to surgical care is also required. Such activist patient groups who fueled

measures to control the HIV/AIDS epidemic are lacking in surgery. Part of the challenge is that the public lacks high expectations from the health care system and thus often accepts as *status quo* poor outcomes from conditions that would be easily treatable with improved resources. This is especially true in the lowest-income countries. Existing data supports the tremendous burden of trauma, especially from road traffic injuries, and of high maternal mortality due to limited emergency obstetric care. Although there are individual examples of some of one of these issues being taken up by policy makers (for example by the Rwandan Ministry of Health in the case of trauma) overall few groups have mobilized to support these causes.

A significant disadvantage of academic research is the time required to acquire knowledge through high-quality studies, the challenges (and time-delay) to publish in peer-review journals, the need to publish for academics who are evaluated through such metrics, and the relative inaccessibility of this knowledge to the people who need it most (hospital administrators, policymakers, philanthropic foundation representatives). Academic global surgeons must navigate these challenges to augment the impact of their scholarly activity beyond publications and surgical conferences and to engage wider audiences while remaining sensitive to the LMIC in which the research is being done. One example of an attempt to address this issue is the G4 alliance (Global Alliance for Surgical, Obstetric, Trauma and Anesthesia Care), which was launched in May 2015 as a consortium of 45 professional organizations, non-governmental organizations (NGOs) and academic centers to provide a collective voice for advocacy in global surgical issues.

Critical Evaluation of Surgical Humanitarian Efforts

For various reasons, the most common form of global health involvement for surgical providers from HICs remains the short-term surgical mission, either in the setting of disaster and conflict or with voluntary organizations which deliver care for elective surgical conditions. Despite a greater focus on capacity building in recent years, as long as the massive backlog of untreated patients with elective conditions in LMICs remains coupled with a limited local surgical workforce, short-term surgical missions are likely to continue to thrive. While voluntary organizations have various missions and models of funding and care delivery, transparent evaluation of outcomes is often not available. In addition, for initiatives focusing on education or skills transfer through educational interventions, more data is needed both on contextually appropriate designs for the resource-limited environment and on metrics to evaluate successful skills transfer. Ideally this may occur through evaluation of patient outcomes, volume of cases, or other metrics, either at the institutional or population level. As stated earlier the ideal would be a combination of both.

Within subspecialist surgery, numerous groups have established hospitals or units delivering targeted care for specific conditions (i.e. neurosurgery, orthopaedic surgery, craniofacial and reconstructive surgery). More rigorous evaluation of appropriate metrics (cost effectiveness, volume, training) from such institutions

may aid planning of humanitarian efforts. In addition, the challenges of integrating these training and delivery models with existing local/national service providers has not been well studied.

While many short-term education courses and workshops have been developed to contribute to surgical education in resource-limited settings, evaluation of these interventions has generally been limited to confidence and satisfaction levels of participants and pre- and post-course fund-of-knowledge evaluations. A further and necessary step would include longer-term evaluations of course participants' skill proficiency and, ideally, patient outcomes. Courses developed in HICs may not be a good fit for resource-limited settings, and the development of contextualized educational interventions represents another useful area of research.

Generators and Users of Research

Another priority for research in global surgery relates to the process through which research priorities are developed and knowledge is disseminated. One particular challenge in global health research, particularly in disciplines such as communicable diseases, has been that universities and funding organizations from resource-rich areas have defined the research priorities without due attention to priorities identified by local clinical providers or policymakers. This subtle form of paternalism and neo-colonialism can be avoided through long-term relationships with the local surgical providers who are most vested in the dissemination and utilization of new knowledge and solutions to their most pressing local challenges. The academic global surgical movement may have much to learn from the challenges faced by prior long-standing global health initiatives, and studies of successful north-south (HIC/LMIC) and south-south (LMIC/LMIC) partnerships could go a long way towards guiding effective collaborative research with improved outcomes. A few examples of successful HIC/LMIC partnerships are the Fogarty International Research Program that has contributed to direct research capacity-building, and the University of Michigan – Ghana partnership in creating a local residency program in obstetrics and gynecology, as both programs have led to high levels of in-country retention of trainees. Examples of LMIC/LMIC partnerships in surgery are fewer, and perhaps best exemplified by the adaptation of successful strategies such as curricula and models for task shifting, and approaches to scaling up pre-hospital trauma care with the use of lay first-responders.

Funding Research in Global Surgery

Compared to other traditional pursuits in academic surgery, global surgery has not been perceived to have as many potential funding sources. Junior basic scientists and clinical researchers have generally pursued initial departmental support followed by attempts at independent funding through mentored scientist awards by groups such

as the National Institutes of Health (NIH). The funding pathways to research in global surgery are less clear. Nonetheless, the NIH Fogarty Center, the Medical Education Partnership Initiative, and increasingly more surgical professional organizations, have dedicated pilot grants to global surgery research projects.

One fundamental challenge is that a primary goal for many academic surgical partnerships is *capacity-building*, while most traditional funding sources for academic research are focused on hypothesis-based research, which may not have a direct impact on capacity-building. This gap may explain why many non-profit, NGOs and independent groups focused on global surgery have grown to pursue philanthropic sources of funding for capacity-building activities in recent years. Such activities may also be pursued through an academic base, but this remains a less traditional form of obtaining funding.

Conclusion

The rapidly growing global surgical arena has engendered multiple research opportunities. These opportunities are highly relevant, urgently needed, and hold significant potential for advocacy for equitable resource allocation to surgery in LMICs. The globally minded surgeon who has so far committed personal time and resources to improve surgical care delivery across the globe has therefore the added prospect to advance this cause through meaningful and impactful research. The authors' wish and hope is that many will take up this challenge.

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Chapter 9

Research Methods Appropriate and Applicable to Global Surgery

Robert Riviello and Samuel R.G. Finlayson

Introduction

The research possibilities for global surgery are vast, perhaps indefinably broad. The agenda and prioritization of research for our field has been more thoroughly elucidated in Chap. 8; including who should set the agenda. As the field is so open, there are perhaps innumerable methodologies for generating and disseminating knowledge. In this chapter we begin with a discussion of special considerations for the conduct of research in resource-poor settings. Following that, we will provide an overview of several domains of academic inquiry that figure prominently in global surgery research, and provide some specific examples from these domains. This overview is not meant to be either an exhaustive list, or a deep dive into any research approach. Rather, we hope to inspire our readers to think broadly and collaboratively as they embark on a global surgery research career.

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Special Considerations for Global Surgery Research

Patient/Provider Experience

Global surgery has as one of its foundations the interacting of diverse cultures and contexts with the goal of improving care for destitute sick and injured patients. Thus, it is inherent to the nature of the field that patients and providers will move across contextual settings, or at least encounter other individuals or systems previously foreign to themselves. How individuals respond to new experiences and stressors is critical to the outcome for both parties. Narrative inquiry, a qualitative research methodology developed in the early 20th century, recognizes that story telling is ubiquitous in the human experience. Utilizing the near universality of narrative, the methodology entails active interrogation and listening by the researcher of the participants. The structured analysis of the stories told can then bring insights into the complexity of relational experiences that make up people's lives. Insofar as partnership-based collaborations start with building relationships, narrative inquiry holds promise as a field of research that could greatly improve the quality of work that global surgery produces in the future.

Partnerships

Partnerships, be they South-South or North-South, bilateral or multilateral, are a critical mechanism for the delivery of global surgical care, education and research. Understanding the partnerships themselves poses several challenges. There is a need to identify methods to report on and study the success and failure of these collaborations with the goal to create best practice guidelines for partnership implementation. In this domain, we may be best advised to take our cues from business and policy schools. At these higher education institutions, structured, facilitated discussions based on teaching cases of programs, projects, and leadership allow students and professors to analyze the complexity of organizations and their management. Case writers effectively act as investigative reporters, interviewing a broad range of actors relevant to the program narrative in question. Combining aspects of finance, economics, management, leadership, policy and politics, teaching cases are written from the perspective of a protagonist decision-maker. When the cases are taught in the classroom setting, students are engaged in active discussion, based on the data presented in the case (this may be budgetary information, process measures, or quotes from stakeholders), to identify lessons learned and principles elucidated in management and leadership. While this mode of inquiry is relatively new to surgery as a field, it lends itself well to the complex nature of the multi-institutional context of much of global surgery. As such, we expect that there will be increasing partnership with schools of business and management to expand the role of such teaching cases in our scholarship.

Ethics

Chapter 3 of this textbook has laid out an ethical framework for clinical and scholarly collaborations in global surgery. Thus here we wish to express only a few important points that we believe deserve special emphasis.

First, a comment is warranted regarding the words in the title of this chapter – *appropriate*, *applicable*, and *global*. Webster’s Dictionary defines appropriate as “right or suited for some purpose or situation.” When asking ourselves if a research methodology, or a clinical intervention for that matter, is *appropriate* for a setting where there is poverty, we must first ask who gets to define what is *right or suited* for the situation. The term *appropriate* seems to have entered our global surgery lexicon from the global public health discourse of the 1990s with the term ‘appropriate technology’. Unfortunately, this term tends to tacitly imply ‘appropriate for poor people,’ but not for others. We would argue, from a perspective of global health equity, that the term *appropriate* should refer to the researchers in question – that we comport ourselves ethically in the pursuit of scientific inquiry. And we also argue that determining who defines *right and suited* is complex, but ultimately this must be based on the good of the poor patients and their caregivers in the setting of poverty.

The word *applicable* is another term that can be hijacked by conscious or unconscious paternalism. Investigators in global surgery, as in many other fields of global health, certainly face great challenges because the human resources and infrastructure for research are few and weak in settings of poverty. Thus, it must be understood that to perform rigorous research in these settings will necessarily require much greater effort and patience than in settings of developed research capacity. We thus prefer to describe certain methodologies as *more challenging to implement* rather than *not applicable*.

The word *global*, simply put, means on the globe. Thus the research we are discussing is not merely about Northerners doing research in another country. Rather, the research is focused on improving the plight of all destitute sick and injured people who are, or may someday be, surgical patients. They can live in any country. Researchers from rich countries can also learn from researchers in poorer countries, and apply the lessons learned in the richer countries.

We believe that global surgery researchers are ethically obligated to strengthen the local clinical and research enterprises of the settings in which they work. In view of this obligation, a number of additional points should be kept in mind:

- Data: settings of poverty, almost universally, suffer from relative lack of data on health care topics, and those that exist are likely to be of poor quality. Thus researchers need to commit to strengthening data collection capacity and infrastructure.
- Local-regional relevance: global surgery researchers should ensure that the output of their work is meaningful to the population studied.
- Local engagement and ownership: *nothing about us without us* is a guiding principle in the conduct of research. Research partnerships in global surgery should

be just that – genuine collaborative teams with participation by local experts and foreign guest researchers.

- Authorship: research partners should seek to achieve equity in credit for publication. A metric for this could be parity among local and foreign contributors in the first-author and last-author positions. This must of course be paired with adherence to international standards of authorship contribution and credit.
- Local capacity building: often, there is limited local experience and capacity in research. Thus to achieve the authorship goals above, research skills and experience in the partners from low- and middle-income countries requires development. Research teams must recognize that research output will come slower when there are team members with less research knowledge and experience.
- Dissemination plans: from the beginning of the research plan, there should be a clear commitment to report the research findings to the studied community and its health system (be that a health center, a district hospital or a Ministry of Health more broadly). Once this has been achieved, then findings should also be disseminated to the broader scientific community through traditional means of conference presentation and publication.

Domains of Research

Epidemiology/Burden of Disease

Understanding the distribution of diseases and conditions in a population, and the relative impact that these have on health and well-being – i.e. epidemiology and burden of disease – are paramount both for prioritizing health care investments, and for generating hypotheses for further and deeper research. Ideally, investigators will perform due diligence in ensuring that the sources of data collection are as broad and inclusive as possible, to provide the best representation of true incidence and prevalence of surgically treatable conditions.

One example is estimations of injury mortality for a given geographical location. These have been performed in Kampala, Uganda and in Kigali, Rwanda. Understanding the vital statistics of these cities, and hence the proportion of deaths caused by injury, included surveys of the death logs of all the major hospitals, the accident reports of the police and the statistics of all mortuaries in the city. Understanding details such as mechanism, timing, and demographics of injury required further collaboration with pre-hospital response/ambulance systems to build searchable databases aimed at quality improvement.

In the past few years community-based household surveys have been undertaken in many countries to understand the overall burden attributable to diseases and conditions which may be treated or averted by surgical care. It is clear that broad-based

household surveys are likely the best way to capture the *surgical burden of disease* that both presents and does not present to the health care system. This research is also fairly labor intensive to perform well. Researchers need to ensure appropriate sampling methodologies (e.g. two-stage cluster sampling design), buy-in from the leadership of each community to be sampled, local transport and well-trained local interviewers and data collectors. Perhaps one of the greatest challenges is creating a survey instrument that generates reliable data. To date there has not been a published data collection tool for assessing a community's surgical burden that has been validated against a gold standard (e.g. physician exam and diagnosis). Thus, while survey results are being reported, it is unclear if the figures generated represent true epidemiology.

Determinants of Disease and Barriers to Care

There is a pressing need to understand the etiology and risk factors associated with surgical conditions and complications in settings of poverty. These may vary greatly across different contexts. The study of determinants and barriers will also range across a great number of disciplines (sociology, geography, demography, genetics, environmental and occupational health) thus research methodologies will include basic sciences, social sciences and clinical research.

For example, researchers may seek to understand delays in patients deciding to seek care, delays in reaching care and delays in patients receiving adequate health care – the Three Delays Model. One approach to this is to develop and support databases based at district hospitals, the first level of referral for most surgical cases. These databases must capture information on diagnoses, onset of symptoms, time of decision to seek care, time to first presentation, time of first clinician evaluation, time of recommendation for referral (for those requiring it) and time of transfer. With these, the research team can determine the length of different phases of delay. Further assessments could look qualitatively into the causes for each of these delays for various conditions or various population subsets.

Another example methodology in this domain utilizes geographical analysis. Global Positioning System (GPS) mapping of place of residence or site of injury can give insight into the distribution of disease and injury. These data can be collected by linking government-provided coordinates, if they exist, to the village or neighborhood captured in the previously described database. Urban ambulances, or household surveyors, can be equipped with tablets or smartphones that capture GPS coordinates at the site of patient interaction. Once collected, skilled researchers can perform 'smart mapping' of how patients might travel from their homes to health care facilities taking into account the local geography, to understand one aspect in delays to care. Or the researchers may perform analyses of injury types to identify clustering, seeking to understand local trauma etiology.

Cost and Financing

Early costing research in global surgery focused on demonstrating the cost-effectiveness of essential surgical interventions at the district hospital. These were efforts to demonstrate that the ‘bang per buck’ of providing surgery was on par with interventions such as vaccinations and malaria and tuberculosis treatment, and thus a ‘good buy’ for those allocating public health funds. Researchers seeking to understand the total cost of providing surgical care need to define early the scope of perspective of inquiry. As surgery is an indispensable and indivisible component of health care delivery, seeking to estimate its costs must take a broad view. If from the health system perspective, fixed and operating costs of care delivery need to be assessed. Researchers need to include the costs of all involved staff (surgical, anesthesia, nursing, allied health professionals, and auxiliary workers), depreciated costs of spaces (theater, recovery rooms, etc), supplies, utilities and maintenance. If the researchers are seeking to understand costs from the patient perspective, then they need to further understand the costs of transport, food, payments, navigating the health system and opportunity costs for family members losing work time to care for the patient while in hospital.

More recently, efforts are underway to understand the financing of surgical care in global economies. This is a challenging endeavor as few Ministries of Health have budgets specific to surgical care and hence, surgical financing is rarely reported. One recent approach has been to define the inclusion of surgical care in the current Universal Health Coverage movement by performing a systematic review of the literature to identify articles referencing surgery and financing in the global literature. With the passing of the World Health Assembly resolution A68/15 on Strengthening Emergency and Essential Surgical Care and Anaesthesia as a Component of Universal Health Coverage, Ministries of Health may find budgeting favorable for surgical care.

Quality and Safety

Maximizing quality and safety of surgical care must clearly go hand-in-hand with expansion of capacity and access to care. Capturing quality metrics in low-resource settings remains a challenge for researchers and quality improvement teams alike. A first question to ask is what outcome to measure – mortality, surgical site infections (SSI), unplanned re-operations, functional status, quality of life and/or long-term survival? Most investigators have found it impractical, or very difficult, to capture outcomes outside of the hospital setting. Thus many have utilized operating logs and inpatient registries to collect data – either retrospectively or prospectively. Certainly it is far preferable for these logs and registries to be entered prospectively on simple electronic platforms (e.g. Microsoft Excel or REDCap Database). At the teaching hospital we partner with in East Africa this was achieved by enlisting the

surgical residents to log all their cases and complications on the centralized database, and incentivizing them by providing them with monthly, personalized case logs (necessary for residency graduation).

One notable innovation for tracking longer-term outcome (e.g. 30-day SSI, or 1-year survivorship) was recently piloted in Haiti. Surgical community health workers (sCWH) were trained to follow post-operative patients in their communities. Supported by a mobile health application on smartphones, these sCWH were able to report outcomes and relay wound photographs to the operating surgeons as a method of tracking 30-day SSI rates in the community.

In regards to safety, the WHO Safe Surgery Checklist certainly has the potential to make substantial impact in surgical care delivery. A challenge remains in scaling this simple, beneficial intervention across a hospital or a health system. Implementation science efforts are currently underway to decrease the *know-do gap*: the gap between recognizing the value of an intervention and reliably performing the intervention.

Clinical Effectiveness Research

Clinical research is perhaps the most natural and intuitive research for surgeons to engage in, even if it is not usually considered in the range of global health research methodologies. It is our strong belief that global surgical care delivery, education and research should be integrally tied together. Thus, surgical research in this domain begins with simple observation of patterns at the bedside beginning with questions such as, *Why does there seem to be a high prevalence of esophageal cancer in the patients presenting to our hospital? Can we speed the care of open fractures by creating a procedure room in the emergency department for initial washout and fracture stabilization?*

Two opportunities for collaborative research present themselves in this domain. In many university-teaching programs across economic strata, post-graduate trainees in the surgical disciplines (anesthesia, obstetrics/gynecology, and the surgical specialties) are either encouraged or required to conduct original research, for instance for the completion of Masters in Medicine (MMEd) requirements. These projects are often based within the physical confines of the teaching hospitals. Supporting these young researchers throughout the process of research (problem recognition, hypothesis generation, methodology determination, ethical and scientific review and approval, data collection and analysis, write-up and dissemination) has the potential to create a rich trove of locally-generated and contextually-relevant new surgical knowledge and research experience.

Secondly, a great number of surgical researchers in American and other high-income country (HIC) institutions are clinical researchers – as opposed to basic scientists, social scientist or public health researchers. Thus identifying partners with methodological expertise for these collaborations does not require the research team to reach across to other disciplines. While multi-disciplinary research is to be

encouraged and lauded, it also adds another layer of complexity in logistics and relationship building that may create challenges for junior investigators.

Care Delivery Innovations

This category is particularly broad, and in great need of development. Innovations research in global surgery can include the development and testing of high-quality, low-cost technologies for treatment or diagnosis, or novel strategies for the improvement of supply-chain management, procurement of surgical equipment or increasing access to care. Countless examples exist.

One technology example is the development of simplified negative pressure wound therapy (sNPWT). It is a frequent observation that wound management is perhaps the most common use of surgical beds in hospitals in settings of poverty. Thus there is a strong demand for improved wound care technologies in LMICs. Negative pressure wound therapy (NPWT) has been demonstrated to be tremendously useful in HICs to speed wound healing and to shift wound care out of the hospital arena to home-based care. Surgical researchers partnered with engineering innovators to design sNPWT – an inexpensive, mechanical bellows pump with a novel skin interface to seal over the wound. In its first iteration, the research team performed biomechanical and safety testing of the prototype at a large public hospital in Rwanda. The first round of research required onsite presence of the engineer to allow iterative changes to the device design, as directed by needs identified by the clinicians. After nearly a dozen iterations, the final product of the device is ready for large-scale manufacturing and further clinical trials.

An example of an innovative access intervention is the elaboration of patient navigation in surgical patients. First described for surgical patients in Harlem, New York to assist poor women to access breast cancer care, patient navigators are often community members who guide patients through complex and fragmented health systems. A pilot program in rural Haiti recently trained community members to help poor, disenfranchised patients to overcome the barriers to care caused by illiteracy, stigma and poor social agency through a process of accompaniment. The implementation of this support system was associated with a quadrupled rate of elective surgery for the target population, for as long as patient navigation was supported. Beyond the efforts to implement, studying the impact of the novel program required identifying a vulnerable and definable target population (in this case, the extremely poor mountainous area near one charitable hospital), accessing census data for the area, and measuring the volume of elective surgery for the target and control populations.

A third example of innovation research could be defined as the technical domain. Classically, this is characterized by the *How I Do It* genre of surgical scholarship. Certainly in Sub-Saharan Africa, as in many LMICs, there is a disproportionate burden of surgically treatable disease coupled with disproportionate death of

surgical and anesthesia providers, supplies, infrastructure and systems. While this situation makes for clinically overwhelming conditions, it also creates the opportunity for the development of high-volume centers of excellence. Selective non-operating management of penetrating trauma and endoscopic third ventriculostomy for hydrocephalus were approaches perfected in such centers in Africa – these approaches are now being adopted in wealthy medical centers in the Northern countries. One could imagine similar opportunities in the palliation of foregut malignancies, the management of sigmoid volvulus, and novel approaches to chronic osteomyelitis in children.

Education/Training

Chapter 12 of this textbook is devoted to the role of educational research in global settings, thus we will not delve deeply into this topic here. We will pause only briefly to raise an example of a new field in surgical education, which has introduced a novel set of research methodologies for the surgeon. Non-technical skills (NTS) have been identified as critical to high-quality surgical performance in HICs. A study team sought to understand the NTS utilized by surgeons in a low-income country. To do so, the investigators employed qualitative methods to deepen understanding of the field. Expert surgeons, anesthesia providers and theater nurses underwent critical-incident interviews by researchers to replay a challenging operation. These interviews were recorded and the analyzed using line-by-line coding and field notes, seeking thematic saturation across the different interviews. This led to the identification of specific NTS and the contextual factors that influence them. The research team now seeks to develop and test an NTS assessment tool to support surgeons operating in LMIC environments.

Conclusion

While the methods of global surgery research resemble closely the methods employed in research in more highly resourced settings such as the US, global surgery researchers must attend to several special considerations. These include the interactions of culture and society in healthcare, the critical role of partnerships and important ethical obligations that researchers from HICs need to observe. The methodologies applicable and pertinent are as diverse as the great array of challenges that are present in this new field. Each new method brings great opportunities for learning and development for the individual investigator, for cross-contextual and cross-disciplinary collaboration for the team, and for knowledge generation that is marshaled for the benefit of poor patients affected by surgical conditions.

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Chapter 10

Funding for Global Surgical Programs

Megan Frost, T. Peter Kingham, Paula Ferrada, and Stephen W. Bickler

Introduction

Compared to other areas of global health, funding opportunities for surgery projects have been limited. With an increasing number of surgical faculty attempting to build academic careers in this area, lack of funding has been a source of great frustration. While it is likely that global surgery funding will increase in the future, it is still possible to obtain funding in the current environment provided that projects are designed well, have goals that align closely with donor's priorities, and if one is persistent.

A good starting point is to first determine what resources will be needed to successfully complete the project. Some research and development programs require limited resources and it may be easier to self-fund the project. Self-funding projects saves the time and effort involved in preparing applications that all too frequently yield only a small amount of financial support. Self-funding from a pre-tax account

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is one strategy that can make money last longer. Most surgeons who have been involved with global surgery programs have self-funded projects. Most will also emphasize that getting a project started is the most important factor in eventually receiving funding. Further, that some of their most important projects would have never gotten off the ground without personal investment of both time and money.

Larger global surgery projects require funding to cover salaries with benefits, transportation and supplies. Again, it is important to have a clear understanding what resources are needed to complete the project. The ultimate goal of the academic surgeon is to have funding that covers salary. Salary support provides the independence, and more importantly the time that is required to successfully complete research and other projects. Bear in mind that external salary support is never equivalent to most surgeon's salaries and consequently there is almost always a financial penalty. Nonetheless, there is no substitute for having control of one's time, having the freedom to pursue interesting research and the feeling that one is pushing the field forward in a meaningful way.

Basics of Global Health Funding

Health care in low-and middle-income countries (LMIC) comes from two major sources: (1) government financing, and (2) developmental assistance. In general, government financing on health care is much greater than that which comes from developmental assistance. Typically, governments spend 20 times more of their own resources on health than they receive in assistance. This is extremely important as the distribution of the majority of health care dollars within a country is set by local priorities.

The amount of developmental assistance for health, although much smaller than government financing, is still substantial. In 2013, donors disbursed a total of \$31.3 billion to improve health in low- and middle-income countries. This amount is more than five times larger than the developmental assistance for health provided in 1990. However, it is still less than 1 % of what developed countries spend on improving and maintaining the health of their own countries. Mothers and children—two of the most vulnerable groups—fair slightly better compared to other groups. Assistance for maternal, newborn, and child health reached \$6.1 billion in 2011, increasing more than any other areas of funding area between 2009 and 2011. However, maternal, newborn, and child health spending per live birth continues to be extremely low at just \$51. Of note, is that non-governmental organizations (NGO) contributions to improve health in LMICs have grown 11 % annually since 1990, at points outpacing total development assistance for health. NGO contributions span all areas of global health. NGOs also spend more annually than any one of the major multilateral agencies.

Why Global Surgical Funding is Difficult to Obtain

Although the importance of surgery in primary health care was first recognized by the World Health organization in the early 1980s, it was not until the last ten years

that there has been convincing data demonstrating surgical conditions are an important public health problem in LMICs and that surgical care can be as cost-effective as many other public health interventions (e.g., immunizations, Vitamin A supplementation). As these and other research findings eventually influence public policy it is reasonable to expect that funding opportunities for global surgery research and development program will increase.

2015 was a pivotal year for global surgery. The 2015 *Disease Control Priorities 3rd edition (DCP3)* was the first time an entire volume of this seminal work was devoted to Surgery (<http://dcp-3.org/surgery>), and it provided the strongest evidence to date for the favorable economics of surgical vs. many other public health interventions. In April 2015, the *Lancet Commission on Global Surgery* published its findings. The commission developed collaborations with individuals in over 100 countries to more broadly and accurately demonstrate the burden of surgical disease and the resources needed to bridge the current gap in care (<http://www.globalsurgery.info/>). In its policy brief on *Actions and Opportunities for the International Community*, it specifically referred to the utmost importance of “supporting epidemiological, clinical, and health systems research for better global surgical and anaesthesia care”. Both of these efforts no doubt critically influenced the World Health Assembly in its passage of the first-ever resolution on the importance of surgery within universal health coverage in May 2015. Collectively, these initiatives are likely to create an expansion of funding for global surgical research and development programs.

Tips for Obtaining Global Surgery Funding

Despite the current scarcity of funding for global surgery research and program development there are a number of steps that can be taken to improve one’s chances of receiving funding.

- ***Align the goals and objectives of your project with global health problems that are already recognized as important.*** A project is more likely to be funded if it fits into a larger thematic interest. Examples include surgical projects that relate to the 2015 Millennium Development goals and health system strengthening. Other areas where surgical care has a prominent role is in the treatment of non-communicable diseases and injuries. Non-communicable diseases (NCD), such as cardiac disease, cancer, and diabetes, are now recognized as a significant problem contributing almost 50 % of the global disease burden. Vascular and cardiac bypasses, diabetic wound care, and cancers all fall within this realm. Additionally, injuries are a significant cause of morbidity and mortality worldwide. Many, including the World Health Organization, have acknowledged that the prevention and treatment of traumatic injuries should be added to the global health agenda. The Fogarty International Center has recently expanded their funding for injury and non-communicable disease research and training.
- ***Ensure that your project fits within the scope of the funding agencies priorities.*** Most, if not all granting agencies have strict rules about what they can and

cannot fund. It is therefore, well worth the time to investigate the type of projects that have been funded in the past. Prior to choosing a project, or early in its development, review the mission statements and rules for grant seekers. All of these information can be found on the donor's website. A good starting point is to visit the websites of The Bill and Melinda Gates Foundation, The Rockefeller Foundation, The Fogarty International Center, The Fulbright Scholars Program, The Carnegie Corporation, The Wellcome Trust, and National Cancer Institute Center for Global Health. Remember, flexibility is key when attempting to find funding for projects. It is easy to become too devoted to your project—unwillingness to change can be a pivotal mistake. It is rare that a project is carried out to its end exactly the way it was initially designed. Many times, it is essential to create multiple variations of a single project to fulfill the objectives of several different potential funders.

- ***Always include a sustainability plan in your proposal.*** Most funding agencies are interested in seeing lasting effects of their investment and proposed projects are almost always reviewed for sustainability. Short term 'mission trips' to perform operations on a limited number of patients have been an all too frequent approach in global surgery and unless designed as a training mechanism have little long-term impact. Proposals should include distinct outcome measures and have a plan for how the project will be sustained after completion.
- ***Build a track record for global surgery research or program development.*** Donors are much more likely to fund projects when the principle investigator has been productive in the past. A track record includes oral presentations, abstracts and published manuscripts on the topic. Publications are also a key to academic promotion. Perhaps more important is that publications demonstrate to Department Chairs that global surgery is a serious academic endeavor. We frequently remind our research fellows that research not published is research not done.
- ***Submit high quality, well written proposals that have clear goals and objective with measurable outcomes.*** Writing a project proposal or anything else of high quality is hard work and takes time. A poorly written proposal reflects poorly on the individual, the individual's institution and on surgeons in general. One of the most difficult, yet key things to learn when developing an academic surgical career is to take ownership of projects. Set high standards for yourself and never rely on others to complete or do the final editing on a project proposal. The best way to learn how to write a quality proposal is to obtain previously successful applications. Examples of successful project proposal can often be found on the internet.
- ***Never give up.*** No one ever received a grant without submitting an application. Always seek feedback on a rejected proposal, or better yet discuss the failed application with the program officer. Having a conversation with the program officer is often an important opportunity to familiarize them with the importance of surgical care. Always seek a critique on your proposal. While often painful to read, critiques can provide important insight into how future proposals can be improved. Remember, that even the best ideas are sometimes not funded. Put aside the idea that everything you do will be successful. A reasonable success rate for global surgery grants currently is about 10 %.

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Part V
Education

Chapter 11

Developing Educational Opportunities for Trainees on Both Sides

Philip M. Mshelbwala, Georges R. Azzie, and Benedict C. Nwomeh

Ideally, the development of educational opportunities in global surgery addresses learning objectives for participants from both High Income Countries (HIC) and Low-Middle Income Countries (LMIC). Historically speaking, HIC have offered some undergraduate and postgraduate training opportunities to individuals from LMIC. However, in the context of “medical missions”, trainees from HIC typically gain easier access to LMIC, with little reciprocal benefit for trainees from their host countries. Also, given that many doctors from LMIC have not returned home after training in HIC, the overall benefits of training has been heavily weighted in favor of participants from HIC.

Trainees from LMIC often face a highly regulated set of conditions when visiting HIC. These regulations tend to focus on patient safety and liability protection for the HIC host institution. Consequently, the participation of visiting trainees from LMIC is usually limited to observation only, with few opportunities for practical experience. Therefore, when planning visits for participants from LMIC, consideration should be given to optimizing their experience. While the environment may not allow full participation in clinical activities, other valuable educational opportunities can be planned and instituted.

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In designing new educational partnerships between HIC and LMIC, there exists the risk to perpetuate the inequity and imbalance in medical workforce that underlies many existing arrangements. While complete equity may not be possible at this juncture, there is a growing movement to shift the paradigm, and seek greater transparency, clearer objectives, and ultimately, programs that address educational wants and needs for interested parties from both resource rich and resource restricted environments.

While we strongly advocate truly bilateral exchange visits in which trainees from both sides participate fully in clinical activities, such arrangements are limited at present. Rigid licensing requirements, accreditation agencies, and medico-legal norms in HIC effectively check the activities of visiting LMIC trainees. However, such protections are not always available to the vulnerable patients and local trainees from LMIC when they receive trainees from HIC. The following discussion assumes that the visiting trainee is from a HIC while the host site is in a LMIC, and focuses on how such visits can provide meaningful benefits to both sides.

Educational Opportunities for Trainees from HIC

(i) Learning surgery in an environment with a different teaching system, training pattern and ethical considerations

The participants from HIC will experience the host country's models for teaching and training. They look to focus on and learn what they perceive as most important: acquisition of traditional cognitive knowledge and psychomotor skills. They may recognize that these differ from those in their home country, but are most apt to concentrate on what they feel will transfer to their resource rich context. This acquisition of traditional knowledge and skill may occur in clinical conferences and meetings, on the wards, in the operating theatre or in a multitude of clinical settings. However, not least important is the learning which reflects the local culture and ethical values. These insights into systems-based issues and differences in practice are perhaps the most important lessons learned during such experiences.

Depending on the environment, the emphasis may be more on ensuring patient survival than on improving the quality of life. This reality in certain resource restricted environments needs to be highlighted. The local trainers who serve as mentors to the trainees will provide insight based on the same body of knowledge available to colleagues in HIC, but tempered by personal experiences and preferences in the management of surgical conditions in their resource restricted environment. The trainee will also have peer learning opportunities while interacting with the local residents at various clinical/academic forums.

Complementary formal teaching sessions could further improve the overall capacity of the visiting trainee to understand the processes from a new perspective of limited manpower and limited resources. Many stakeholders from HIC recognize that well established bedside teaching methods that are utilized in LMIC are

becoming extinct in resource rich environments. Formal efforts are being made to re-establish traditional bedside teaching rounds in many resource rich environments, largely based on experience from time spent in a LMIC. Another change in behavior by the trainee from HIC may be a shift in attitude towards greater resource efficiency. This is often the result of experiencing the constraints imposed by limited resources in LMIC, and may impact their practice upon return to their home country.

There is a growing awareness that while formal learning objectives may focus on the previously mentioned traditional criteria based on knowledge and skill, some of the most valuable lessons are learned in realms of communication, collaboration, professionalism, health advocacy and systems-based practice. Recognition of this concept as a whole, and the focus on tailored preparation will assist in appropriately sensitizing and preparing the trainee for the new context in which they will find themselves, and will help focus and maximize the learning experience.

Point of Caution

An overseas rotation may not be ideal for every resident. Residents from both HIC and LMIC are more likely to thrive in a foreign setting if they exhibit the cultural sensitivity and situational awareness necessary to facilitate a smooth transition from one environment to another. Therefore, in selecting residents for these rotations, especially early on, program directors should prioritize those with these qualities. A formalized preparation should be considered prior to arrival at the host site.

(ii) Opportunity to exchange knowledge and skills with trainees in the host country

The expectation is that the trainee from a HIC will integrate fully into the training structure of the host institution and therefore will readily provide information about perspectives in their own country. The presumption here is that the visiting trainees from HIC will be sufficiently advanced in training to participate more effectively in clinical care at the host site. The acceptable level of training is a matter to be carefully considered during the planning stages. In some situations, visiting trainees will encounter host LMIC peers with superior knowledge and skills. It is not unusual to find trainees from LMIC who have unique insights into local diseases, honed through reliance on clinical skills and adaptation to the scarcity of modern technology. For instance, trainees from HIC, accustomed to minimally invasive procedures, could have much to learn from their LMIC counterparts who may have more advanced open surgical skills. In many situations, both the visiting and host trainees and faculty can scrub together and learn from each other. These opportunities to exchange knowledge and skills with local trainees may also bring to the fore previously undeveloped leadership skills of the visitor, and help foster a spirit of collaboration and understanding. A sense of both humility and camaraderie on both sides can foster a positive learning environment for all. The exchange of knowledge can take place in the operating theatre as above, or through planned presentations made during formal clinical meetings and rounds, or even during informal bedside teaching. Careful planning, adequate supervision and close

monitoring from a dedicated local stakeholder and a thoughtful HIC organizer are therefore imperative.

Of particular importance, learning opportunities for trainees in the host LMIC must never be compromised by the visiting trainee. Rather, a plan should be made long in advance as to how the visitor can benefit the people (patients and trainees), and the environment. A clear understanding regarding the level of training and competence required of the visiting trainee will offset potential problems. Adequate preparation, with clear goals and objectives from the outset, will lend greater transparency to the collaboration. This preparation may also include an orientation regarding the role of the visiting trainee, focusing on interactions with patients, local trainees and faculty.

Point of Caution

It is not acceptable for visiting trainees to be placed in positions of responsibility for vulnerable patients that exceed their cognitive or technical abilities. It is therefore expected that these trainees will provide patient care under adequate supervision. Many HIC residency programs do not have the resources to provide visiting faculty for on-site supervision of their residents for the duration of the trip. A collaborative model in which local faculty are integral to the process and where multiple visiting HIC institutions agree to share faculty to spread out coverage could ensure the on-site presence of at least one HIC and LIC supervising faculty surgeon at all times.

(iii) Acquisition of knowledge in the management of surgical conditions prevalent in the host country

The HIC trainee, in the course of his/her visit, will come across a number of surgical conditions (e.g. surgical complications of infectious diseases) that are unique to the host country, or are uncommonly encountered in their home country. This will provide first hand in-depth information on the natural history and pathophysiological processes of such diseases and may also serve as an avenue to improve on their clinical skills. Patients presenting with advanced stages of surgical diseases will afford the visiting trainee opportunities to acquire more knowledge and foster greater understanding of disease and health care implications outside their home environment.

(iv) Establishment of networks that could translate to future research collaborations

During the time spent at the host institution, the trainee may observe diseases, conditions, patterns of care, or other local practices that may inspire research ideas. The relationships and network established during the visit could create a framework for future research collaboration. Such research opportunities can commence while the visiting trainee is still at the host country or form part of future collaborations, and even partnerships, after returning to their home country.

Point of Emphasis

It is important that any research projects to be undertaken are locally relevant and mutually beneficial, in the spirit of true collaboration, with shared responsibility and authorship.

(v) Development of an interest in Global Surgery as a career path

The HIC trainee visiting a LMIC institution has the opportunity to appreciate the value of surgery as a public health tool. An understanding of the cultural, social and economic determinants of surgical diseases will foster informed diagnostic and therapeutic decision-making, based on local resources. Daily struggles with poor infrastructure, limited supplies, and inefficient allocation of resources will likely be encountered by the trainee. Also, trainees from HICs who have become accustomed to limited work hour rules will discover that their counterparts in the host countries still work much longer hours for significantly less salary. The approach to ethical and medico-legal issues in the host country may contrast with practices in their home HIC, and create an awareness regarding the differences in systems-based practice. All these experiences may serve as a spring board that will propel the trainee towards developing an interest in global surgery as a future career path.

Educational Opportunities for Trainees from LMIC**(i) Exposure to different modules and methods of teaching and practice**

The host-country trainees, while interacting with the visiting HIC trainee, may notice differences of opinion and of approaches to surgical practice such as the routine use of management protocols, standard operative procedures and the reliance on checklists to ensure safety. Discussions on different investigative and treatment methods such as the multidisciplinary approach to patient care and the ever expanding role of minimally invasive surgery may result in the integration of these methods into the local surgical practice as deemed appropriate. Such exchange of ideas may lead to a modification of LMIC training modules to adopt the highest quality and most contextually appropriate practices.

Point of Caution Sensitivity to the local environment is paramount here: terminology such as “best practice” may be used, so long as we recognize that what may be best in one environment, may not be practical in another. A thoughtful process involving dialogue and exchange of ideas/information will allow local stakeholders to decide what is appropriate, and what is not.

(ii) Development of goals or benchmarks for training

The host trainees may receive a morale booster when they discover the many similarities between their training and that of the visiting trainee, especially in the realm of knowledge base and clinical acumen. Discussions on training requirements and career progression with the visiting HIC trainee may create a desire to re-assess the structure of their local training. This could entail more formally defined goals and benchmarks which will serve to determine progression and promotion.

The more formalized concept of mentorship and the problem solving approach to patient care in the HIC may be contextualized and eventually incorporated into the training structure of the host country. These may well already exist in a locally

contextualized format, but due to resource and manpower constraints, are not as ubiquitous as they are in resource rich environments.

Point of Emphasis

This is a process that requires a dialogue with local stakeholders: otherwise, the risk is that well-meaning visitors may establish programs that are not contextually relevant.

(iii) Fostering of professional relationships for further training and research

Personal and professional relationships will invariably develop between trainees of the host institution and the visiting trainee. This may take the form of joint research opportunities or lead to the establishment of collaboration between both institutions, perhaps in the form of simultaneous web based conferences or seminars. An offshoot of these activities could serve as a basis for the development of an exchange program between the host country and the HIC institution of the visiting trainee. These will surely improve the quality of both the host institution and the HIC hospital. An example is the International Association of Student Surgical Societies (IASSS). This began as a group to support medical students who had an interest in surgical specialties at the University of Cape Town, South Africa. It was recognized that such a grass roots movement may help provide the answer to the surgical manpower needs in other LMIC. With the assistance of strong local mentors, and external mentors from HIC, the program expanded across the entire southern African region. Stakeholders from HIC have since joined, with the understanding that the program is owned and operated by the LMIC stakeholders. Collaborative efforts in research and education are in progress.

Regulatory Aspects of HIC Global Elective Rotations

Both the American Board of Surgery (ABS) and the Surgery Residency Review Committee (RRC) of the Accreditation Council for Graduate Medical Education (ACGME) have approved a mechanism for overseas rotation to count towards the requirements of general surgery residency training in the US. The stipulated requirements are to ensure that global elective rotations are based on a defined educational rationale with competency-based objectives. A major barrier for most institutions is the requirement that they provide salary, travel expenses, health insurance, and evacuation insurance for their residents who participate in global rotation. A Program Letter of agreement (PLA) is required that clearly defines the responsibilities of both the home and host institutions. A key tenet of the rules is that on-site supervision of residents will be performed by American Board of Medical Specialties (ABMS)-certified faculty, and allows for residents to be supervised by faculty from other institutions through a collaborative arrangement. Programs must provide verification that residents will participate in outpatient clinics and continuity of care related to any operative experience (pre-, peri-, and post-operative care). Approval

of these rotations also requires demonstration that the host institution has a level of infrastructure and ancillary services that will support an optimal educational experience, including housing, transportation, communication, safety, and language.

Developing Education Curriculum for LMIC Setting

Curriculum development is a continuous process in which mutual trust and joint decision-making regarding what constitutes priorities must be had. In the context of Global Surgery, there are two main curricula to be addressed. The more formal curricula are those established for LMIC trainees in their respective environments. The less formal curricula are those established for visiting or elective trainees rotating from HIC to LMIC. In both cases, the stakeholders from LMIC must ensure local ownership with a view to establishing a relevant curriculum. This is self-evident when discussing the formal curriculum in the local environment. However, it should also be the case in establishing a curriculum for trainees visiting from HIC, and should span all spheres of surgical education, from cognitive and technical expertise, to systems-based practice and professionalism. The key is *contextual* relevance. Regardless of which of these curricula we are addressing, a thoughtful collaboration between stakeholders can help foster a mutually beneficial relationship with the ultimate goal to establish the most appropriate curriculum possible.

When discussing the curriculum for HIC trainees on elective in LMIC, a collaboration between stakeholders from resource rich and restricted environments is paramount. Because these trainees are subject to demands of the home program but need to be accountable in the programs they visit, the task is very complex. Consideration towards incorporation of academic principles into clinical rotations, as outlined previously, and methods for HIC residents to monitor their outcomes should be made. Additionally, as trainees from HIC stand to learn a great deal from the cultural, religious and environmental factors that shape differing senses of value, these concepts should be incorporated into their learning. In designing these curricula, there are no substitutes for thoughtful mentors from both their home and host environments.

When discussing the curriculum of the host LMIC, training needs should be identified. Emphasis will be placed on tried and tested training and teaching methodology that is deemed appropriate to the environment. While the introduction of novel ideas and techniques may be discussed, local stakeholders must decide what is appropriate. Non-technical aspects of training such as professionalism, safe surgery and ethics need to be included as these may be overlooked in the curriculum of some LMIC. Having said this, there are many lessons to be learned regarding the evolution of the ethics and decision making in the host country environment. There is an emerging body of literature on the Eurocentric concept of ethics and decision making, and its relationship with other cultures. We must recognize that these concepts and values are not singular, and may not even be the most appropriate in a given context. The guiding principle and overarching goal must remain the interests

of the local trainees and their patients; these should be the driving forces in the development of such a curriculum.

Structuring the education for LMIC trainees into modules with clear, achievable goals, and timelines, may improve its quality. Benchmarks by which the progress and quality of training in host institutions can be measured such as number of cases performed, research, and academic output should all be considered and incorporated as indicated into the curriculum. Involvement of local and regional professional training and regulatory bodies (e.g. the West African College of Surgeons-WACS, and the College of Surgeons of East, Central & Southern Africa-COSECESA for sub-saharan Africa) and other regional surgical societies may also help to domesticate the curriculum and improve the chances of being adopted by regional training institutions. Some governments and training bodies in LMIC are considering the introduction of a 1 year training abroad for all postgraduate doctors; this policy can be expanded to include the regular exchange visits by HIC trainees to their respective LMIC which could further ensure continuity of an international collaborative program.

Monitoring and Evaluation of the Program

To ensure maximal benefits and continuity of a viable global surgery initiative, mechanisms of monitoring and evaluation should be put in place from the outset. This involves those at the level of institutions that send and receive trainees, and also at the higher level of professional bodies, and associations which serve as auditing bodies. As discussed earlier and repeated here for re-emphasis, pre-departure preparation with clearly established rules and objectives should be drawn up and formally discussed. Assigned mentors on both sides should help ensure that goals are worked towards and achieved. The establishment of global surgery organizations that appropriately represent stakeholders from both the resource restricted and resource rich environments could assist in initiating, maintaining and evaluating the program. These international organizations such as the Association for Academic Surgery (AAS) present a common platform from which institutions and individuals from both HIC and LMIC can interact and establish collaborative projects. Periodic assessment of stated goals and of the progress of the program must take place.

Conclusions

The development of educational opportunities, regardless of the context or level of training, requires a thoughtful process at the best of times. This is all the more complex in the global setting because we are adding a relationship between parties with different cultures and resources; and the differences do not stop there! No two programs need look the same; rather, they should be tailored to the LMIC and HIC

stakeholders involved, and to the operative context. We should not shy away from the time and effort required to establish worthwhile opportunities for trainees “on both sides”, with the goal to create a common front. Ultimately, we should strive for a setting where all the involved parties capitalize on shared strengths, learn from past mistakes, and strive for programs based on honesty, integrity and transparency.

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Chapter 12

The Role of Educational Research in the Global Setting

Jonathan A. Laryea and Chandrakanth Are

Introduction

Given that most global surgery efforts have focused on *service* rather than education, there is very little written about educational research in the global surgery setting. As the focus of global surgery rotations shift from a purely volunteerism-driven effort to an educational experience for surgical trainees as well as providers in host institutions, there is a need to evaluate different ways education initiatives can be tailored and adapted to meet the needs of both sides. Academic institutions can partner with institutions in resource-limited countries to facilitate bridging the gap in surgical workforce, as well as help with training needs of these countries. It is in this educational environment that educational research can flourish.

Educational research may be defined as a systematic way of using basic and applied research methodology to study the different aspects of education including teaching methods, learning styles, curriculum development, training environments, teacher training and the interactions between the teacher and learner.

The shortage of specialized surgical workforce in Africa led to the development of the concept of *Surgical Task Shifting*, in which essential and emergency surgical services are provided by less specialized healthcare workers including non-surgeons physicians and non-physician healthcare workers. There is widespread use of non-physician clinicians and other mid-level healthcare providers in Africa. In Mozambique, *técnicos de cirurgia* (non-physician surgeons) have been trained

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since 1984. In Malawi, Tanzania and Mozambique, a recent survey showed the majority of cesarean sections, obstetric hysterectomies and ectopic pregnancy operations are being performed at the district hospital level by surgical clinical officers. The training of these providers is cheaper and shorter in duration than the traditional surgery training. The impact of this system has been studied. Multiple analyses have showed that these providers have similar outcomes and comparable quality of care and decision-making compared to formally trained surgeons. The applicability of this model to other non-African low- and middle-income countries (LMICs) can be explored through research and pilot studies. The expansion of training of these non-surgeon clinicians to other essential subspecialty procedures needs to be considered and evaluated through educational research methods.

The use of Minimal Access Surgery is very widespread in the developed world. The transfer of the technology and associated technical skills to the developing world is often hampered by the cost of the equipment, disposables and lack of supplies as well as reliable electricity and carbon dioxide. There is a need to develop sustainable technologies in developing countries to provide alternatives to these expensive technologies. Education research can support the dissemination and help determine the most effective and innovative ways to develop and deploy such technologies and technical skills.

The key to providing timely, safe and quality surgical care to any populace in the world is dependent on the availability of an adequate surgical workforce. This rests on the availability of systems and resources to sustain a surgical workforce, not only for today but also to maintain a pipeline of surgeons for the future. This is where education plays a paramount role by providing training and guidance to support an adequate surgical workforce capacity. Although the long-term benefits of this are usually shadowed by other short-term needs and a lack of fiscal latitude, education is without any doubt the most important tool to address global surgical workforce needs in a sustainable fashion.

Education is not static. The field is indeed very dynamic, even more so in the recent times. The rapid pace of changes witnessed in education parallels the similarly rapid pace of changes seen in clinical care due to a multitude of factors emanating from the central focus point of advancing technology. Just as what is considered the standard of clinical care today may be obsolete tomorrow; what is considered to be the standard of educational content today may also be obsolete in the near future. To maintain up to date clinical care, we need to maintain up to date educational content. This is where educational research plays a key role. Traditionally, print textbooks and journals have been the main means of providing content for education. However, in more recent times, most textbooks and journals have online content, opening another avenue for dissemination of knowledge. The availability of online libraries has opened a new mechanism for acquisition of information and knowledge. The use of these avenues for surgical education in the global setting can be studied through qualitative and quantitative methods. Additionally, the widespread use of social media in LMICs for the dissemination of surgical knowledge and learning offers a relatively untapped potential and needs to be studied. The telecommunication platform also provides another innovative avenue for education and research, through tele-teaching, tele-conferencing, tele-consulting,

tele-surgery, tele-radiology, tele-pathology, tele-mentoring and tele-simulation. These also lead to potential areas of research to determine effectiveness in the global setting. This chapter will particularly address the role, need, opportunities and limitations of educational research in a global setting.

Role and Need for Educational Research

- (a) *Identifying gaps and needs in providing evidence-based care:* Research in education on the global stage is essential for several reasons. One of which is to be able to identify gaps and needs in the educational system of the region with particular reference to aspects such as content and delivery. Unlike in the past where any surgical care was acceptable, the promise of delivering surgical care anywhere in the world today is based on the premise that it will adhere to the most current-evidence based guidelines. This can only be accomplished by conducting research into the educational curriculum of the particular region. In this way, any identified gaps can be addressed in a proactive fashion to enable delivery of evidence-based care. Additionally, evidence-based guidelines may not be transferrable to different environments since they may have peculiar circumstances. The applicability of evidence-based care to resource-limited environments can be studied. New guidelines can then be developed based on proven techniques that work in the particular environment given their resource challenges. This will make the adoption of any new guidelines easy and sustainable.
- (b) *Identifying the appropriate teaching forum/method:* There is not one ideal method to impart education. Similarly learners come in different forms and capabilities. This is further compounded by the innumerable languages spoken across the world and the diverse cultures which value, structure and deliver educational content with disparate regional preferences that date back centuries. A method of teaching considered appropriate for the Organization of Economic Cooperation and Development (OECD) countries may not be effective for LMICs and vice versa. The effectiveness of one type of teaching method in one region does not guarantee its efficacy across the world. This can only be determined by conducting research into the educational practices of that particular region and by involving local educators. It is only through this rigorous approach that the educational method ideally suited for the particular region can be determined.
- (c) *Testing adequacy of knowledge acquisition:* One of the important aspects of our educational efforts is to ensure that the learner has acquired a sound grasp of the required knowledge. It is well known that methods for testing knowledge-based competencies vary vastly across the world. While most of the OECD and high income countries (HIC) rely on electronic and standardized tests, many of the LMIC countries continue to rely on hand-written or non-standardized tests. This is another area that is ripe for educational research. The results of such research may be of benefit not only to the LMIC' but also to the HIC's.

- (d) *Implementation in practice*: The next step from acquisition of knowledge is its implementation in practice. Numerous barriers exist for implementation of evidence-based clinical care and these barriers vary depending on the region of the world. Conducting research to understand the nature and scope of these barriers to implementation of surgical knowledge will be essential to improve the delivery of evidence-based clinical care.
- (e) *Adapting educational material to various regions of the world*: A larger volume of educational material/guidelines originates from the OECD countries. Some or most of these material/guidelines are not applicable to other parts of the world, particularly the LMIC's, due to various factors such as inadequate resources. Research into these material/guidelines can be helpful in selecting portions that are actually applicable to LMIC's. Countries in the tropical regions of the world have different types of diseases that they frequently encounter and the educational materials from developed countries may not address any of these diseases. The lessons learned from such research can be used to help develop region-specific materials.
- (f) *Develop distribution channels for dissemination of information to other health care providers*: Surgical education involves not only surgeons but also other health care providers that constitute a part of the care team. These professionals also need to be educated in the various aspects of surgical care as it pertains to their domain of expertise. Their learning preferences and testing methods could be entirely different from those of practicing surgeons. Research into the educational methods and practices of these health care professionals will be beneficial to sustaining an adequate workforce.
- (g) *Develop distribution channels for dissemination of information to the general public*: A large part of maintaining a healthy society relies on actually involving its members in determining and controlling their own health care needs. This is becoming even more important in an era where health care information is readily available in electronic and mobile platforms. At the same time many parts of the world are yet to catch up with the advancements in information technology. This is compounded by the discrepancies in levels of education and literacy, as well as the use of diverse languages with an equally varied number of dialects. Educational research into the various aspects of content development appropriate for general public and its delivery through appropriate channels is essential.

Types of Educational Research

Some of the various avenues to conduct educational research include:

- (a) Assessment to determine educational needs
- (b) Assessment to determine gaps in the current educational systems

- (c) Content development appropriate for the region of the world to address the gaps and needs
- (d) Educational research pertaining to the field of surgery include areas of:
 - (i) Acquisition and maintenance of surgical skills: includes development of low cost and effective cadaver or simulation-based models
 - (ii) Acquisition and maintenance of surgical knowledge: through both electronic and non-electronic formats
 - (iii) Keeping up to date with the latest evidence and the respective guidelines
- (e) Research to determine the most effective teaching methods
- (f) Research to determine the most effective testing methods
- (g) Research to analyze the perceptions of surgeons, other surgical care workers and general public towards the current educational methods available.

Tools Needed for Educational Research

- (a) Appropriate personnel with a passion for improving education and thereby influencing surgical care across the world
- (b) An understanding of the basics of conducting research, particularly educational research
- (c) An understanding of the local educational environment and dynamics to tailor research accordingly
- (d) An ability to identify the highest areas of need where educational research will lead to benefits
- (e) An understanding of the basic research methodology and statistics
- (f) The presence of basic educational material to conduct research

Limitations

- (a) Lack of Resources: including human resource capital and capacity, financial resources, physical resources and material resources.
- (b) Cultural Barriers
- (c) Political Barriers
- (d) Leadership Barriers
- (e) Research Capacity
- (f) Language Barriers
- (g) Lack of reciprocity with U.S. institutions

Conclusions

To meet the challenges of the global surgical workforce shortage in resource-limited parts of the world, there is the need to train surgeons and surgical practitioners who can perform essential lifesaving surgeries for the populations they serve. Therein exists the demand to develop innovative ways to rapidly and cost-effectively train local providers to meet the need within current confines. Educational research methods can help to identify areas of need, assist in curriculum development, develop channels of dissemination, and assess the effectiveness of methods of education. As importantly, such research will also help to identify methods that are *not* effective and will guide changes in educational methods.

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Part VI

Resources

Chapter 13

Tools Useful for the Academic Global Surgeon

Mamta Swaroop, Wolfgang Stehr, and Sanjay Krishnaswami

General

WHO Global Initiative for Emergency and Essential Surgical Care: <http://who.int/surgery/globalinitiative/en/>

Disease Control Priorities 3rd edition- Surgical Volume: <http://dcp-3.org/surgery>

Lancet Commission on Global Surgery: <http://www.thelancet.com/commissions/global-surgery>

Overseas Development Institute (ODI): <http://www.odi.org/>

USAID: <http://www.usaid.gov/>

Organizations

International Federation for Medical Students Association: <http://www.ifmsa.org/>

International Surgical Society: <http://www.iss-sic.com/index.php?id=3>

International College of Surgeons: <https://www.icsglobal.org/>

Global Partners in Anesthesia and Surgery: <http://www.globalsurgery.org/volunteer/>

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Consortium of Universities for Global Health: <http://www.cugh.org/>
 Canadian Network for International Surgery: <http://www.cnis.ca/>
 Office of Global Surgery and Health: <http://globalsurgeryandhealth.com/>
 Surgeons OverSeas (SOS) – <https://www.surgeonoverseas.org/>
 Alliance for Surgery and Anesthesia Presence: <http://asaptoday.org/>
 Pacific Coast Surgical Association: <http://pcsaonline.org/>
 G4 Alliance: <http://www.theg4alliance.org/>
 Global Surgery Pediatric Network (GPSN): www.globalpaediatricsurgerynetwork.com
 Society of American Gastrointestinal and Endoscopic Surgeons: <http://www.sages.org/>
 Association for Academic Surgery (AAS): <http://www.aasurg.org/>
 Society of University Surgeons (SUS): <http://www.susweb.org/>

International Volunteering Opportunities

GSPN: <http://globalpaediatricsurgery.org/>
 Operation Giving Back: <http://www.operationgivingback.facs.org/>
 CureKids – <https://cure.org/go/>
 International Medical Relief (IMR) – <http://www.internationalmedicalrelief.org/about-imr/what-imr-does/>
 Medecins Sans Frontiers – <http://www.msf.org/work-msf/working-in-the-field>
 Resurge – http://www.resurge.org/ways_to_help/story_medical_volunteers.cfm
 Mercy Ships – <https://www.mercyships.org.uk/get-involved/volunteer/>
 Society for Pediatric Anesthesia's Committee on International Education and Service – <http://spacies.pedsanesthesia.org/>
 International Committee of the Red Cross (ICRC): <http://www.icrc.org/eng>
 International Federation of Red Cross and Red Crescent Societies (IFRC): <http://www.ifrc.org/>
 Operation SMILE: <http://www.operationsmile.org/surgery/global-need>

Educational Initiatives Online

AAS International Research Courses: <http://www.aasurg.org/meetings/international.php>
 Lancet teaching Cases: <http://www.globalsurgery.info/teaching-cases/>

Centers for Global Surgery

University of Utah: <http://medicine.utah.edu/globalsurgery/>
 Duke University: <http://surgery.duke.edu/about-department/divisions-and-programs/duke-global-surgery>

Northwestern University: <http://globalhealth.northwestern.edu/>
 Oregon Health and Science University: <http://www.ohsu.edu/xd/education/continuing-education/global-health-center/collaboration/ohsu-gh-programs.cfm>
 Harvard University: <http://ghsm.hms.harvard.edu/programs/surgery>
 University of California, Los Angeles: <http://worldhealth.med.ucla.edu/index.php/serve/global-surgery-initiative/>
 University of California, San Francisco: <http://global.surgery.ucsf.edu/>
 University of Virginia: <http://www.medicine.virginia.edu/clinical/departments/surgery/global-surgery-initiative/global-surgery-initiative.html>
 Emory University: http://www.surgery.emory.edu/training/general-surgery-residency/global_surgery_program.html
 Brigham and Women's Hospital: <http://www.brighamandwomens.org/research/labs/CenterforSurgeryandPublicHealth/AGSFMMeetingDatesandTopics.aspx>
 University of Washington: <http://depts.washington.edu/uwsurgap/ght.html>
 Global Health Fellowships: <http://www.globalhealthfellowships.org/database.html>
 Branch for International Surgery, UBC: <http://internationalsurgery.med.ubc.ca/>

Funding Opportunities

EGrants initiative: <http://www.grants.gov/>
 AAS: http://www.aasurg.org/awards/fellowship_award_global.php
 SUS: <http://www.susweb.org/global-academic-surgery-committee>
 Fogarty Center: <http://ww.fic.nih.gov/Pages/Default.aspx>
 Harvard Traveling Fellowships (Sinclair Kennedy, Frank Knox, Frederick Sheldon): <http://www.scholarship.harvard.edu/dissertation.html>
 Harvard Global Health Graduate Fellowship Awards (through the Harvard Global Health Institute)
 ACS Scholarships: <http://www.facs.org/memberservices/research.html> and <http://www.facs.org/memberservices/acresident.html>
 Fulbright Fellowship: <http://us.fulbrightonline.org/#&panel1-2> = General Site
 SAGES Career Development Award: <http://www.sages.org/projects/sages-career-development-award>
 SAGES Research Award: <http://www.sages.org/projects/research-grants/>
 Rotary Global Grants Scholarships: <https://www.rotary.org/myrotary/en/take-action/apply-grants/global-grants>

Blogs

<http://blogs.plos.org/speakingofmedicine/2013/09/13/advocating-for-global-access-to-surgical-care-a-student-working-group-on-global-surgery/>
<http://www.aasurg.org/blog/>

<http://blogs.bmj.com/>
<http://www.essentialssurgery.com/blog/>
<http://www.safeglobalsurgery.org/blog/>

OnLine Discussion

Global Health Delivery: <http://www.ghdonline.org/surgery/>
GSPN: <http://www.globalpaediatricsurgery.org/community/social-networking>

Books

Essential Clinical Global Health, Nelson, Brett D.
Global Surgery and Anesthesia Manual: Providing Care in Resource-limited Settings, Meara, John G.
Global Surgery and Public Health: A New Paradigm, Catherine R. deVries, Raymond R. Price
Operation Health, Kushner, Adam
Top Knife: Art and Craft in Trauma Surgery, Hirshberg Asher
Mountains Beyond Mountains: The Quest of Dr. Paul Farmer, a Man Who Would Cure the World, Kidder, Tracy
Where There Is No Doctor: A Village Health Care Handbook, David Werner, Carol Thuman, Jane Maxwell
The Checklist Manifesto: How to Get Things Right, Atul Gawande

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