

Surgical Training and Global Health

Initial Results of a 5-Year Partnership With a Surgical Training Program in a Low-Income Country

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Hypothesis: Surgical trainees in the United States have a growing interest in both clinical experiences and structured training opportunities in global health. Global health training and exposure can be integrated into a surgical residency program.

Design: The global health activities of surgical residents and faculty in 1 department were evaluated from January 1, 1998, to June 1, 2008, using a survey and personal interviews.

Results: From January 1, 1998, to December 31, 2002, 4 faculty members made more than 20 overseas volunteer medical expeditions, but only 1 resident participated in global health activities. In 2003, a relationship with a surgical training program in a developing country was established. Ten residents and 12 faculty members have made overseas trips during the last 5 years, and 1 international surgeon has visited the United States. During their research block, 4 residents completed 1- to 3-month clinical rotations and contributed to mentored

research projects. Three residents completed a university-based Global Health Clinical Scholars Program, and 3 obtained master's degrees in public health. A joint conference in injury-trauma research was also conducted. A faculty member is based overseas with clinical and research responsibilities, and another is completing a master's degree in public health.

Conclusions: Global health training and exposure for residents can be effectively integrated into an academic surgical residency program through relationships with training programs in low-income countries. Legitimate academic experiences improve the success of these programs. Reciprocity with collaborative partners must be ensured, and sustained commitment and funding remain a great challenge to such programs. The long-term effect on the development of global health careers is yet to be determined.

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I NTEREST IN THE ROLE OF GLOBAL health in undergraduate and postgraduate medical training is increasing.¹⁻⁶ Such experience can have a profound effect on trainees at all levels, some of whom choose careers on the basis of their interest in global health.⁷ Traditionally, however, international surgery has been a voluntary experience not formally linked with surgical training programs. It is unknown whether global health experiences should be incorporated into surgical residency training and how this could be done.⁸⁻¹⁰

Meanwhile, US surgeons in training have reported increasing global health interest, but the discussions of global health in residency have focused solely on clinical experience.¹¹⁻¹³ To support international clinical work by US surgeons, the American College of Surgeons developed Operation Giving Back, a database of opportunities to

promote global voluntarism. The American College of Surgeons is also conducting an online survey to further define resident interest in global health.¹⁴ In addition, recognition of the importance of surgical research in global health is increasing. With several studies documenting the substantial burden of surgical conditions and favorable cost-effectiveness of basic surgical care in low-income countries, the global public health community is paying more attention to surgery.^{15,16}

The University of California, San Francisco (UCSF) previously reported a pilot collaboration with Makerere University (MU) in Kampala, Uganda, primarily emphasizing the educational benefits of clinical opportunities in low-income countries.^{17,18} The educational value of these clinical experiences has been outlined by senior UCSF faculty by considering the 6 competencies of the Accreditation Coun-

cil for Graduate Medical Education.¹⁹ In addition, at UCSF, there has been a general trend in trainees who not only are interested in isolated clinical experiences abroad but also have a greater career interest in global public health.

We hypothesize that global health can be more effectively incorporated into general surgery resident training with clinical electives as well as structured didactics and research. This can be facilitated through a mutually beneficial relationship with a postgraduate surgical training program in a low-income country (Uganda) while supporting the needs of the collaborating institution. In this article, we report the results of this approach and present a critical discussion of benefits and challenges of the program.

METHODS

A UCSF departmental program was established with the postgraduate surgical training program at MU in 2003. This was facilitated by an institutional affiliation agreement between UCSF and MU and by preexisting collaborations. Senior general surgical faculty at both institutions developed goals and specific objectives of a mutually beneficial program. These focused on training, research, and sharing of educational resources. The global health-related activities of UCSF surgical residents and faculty before and after the establishment of this program were tracked using surveys and personal interviews. The global health program evaluation was undertaken as part of the residency education review and was exempt from oversight by the institutional review board.

At UCSF, resident interest in global health has generally taken 1 of 2 pathways: (1) interest in clinical experience or (2) greater career interest in global health, with significant research and training focused on public health. The program has attempted to accommodate both of these pathways.

Through the program, UCSF surgery residents are selected to complete a 1- to 3-month clinical elective in general surgery at Mulago Hospital, Kampala, Uganda, during their designated research years. This elective is offered for general surgery residents who have completed their third clinical year and are pursuing research projects. Interested residents complete the clinical elective during their research years and are self-funded. Resident salaries are maintained through their research funding source, and UCSF infrastructure overseas offsets some expenses such as local housing and evacuation insurance. The elective is available to general surgery residents, although formal participation by anesthesia and surgical subspecialty faculty and trainees is being developed. Residents are required to read a manual updated by previous visitors to Uganda that presents logistics, personal safety, and clinical preparation for the experience. Clinical preparation includes a list of educational resources, such as *Primary Surgery*, which is particularly relevant to surgery in a resource-constrained environment.²⁰ On their return, residents are required to complete an evaluation and give a presentation about their experience. In addition to UCSF faculty oversight and trainee evaluations, ongoing communication with MU faculty ensures that residents are effectively integrated into the care of patients. Faculty from MU and, whenever possible, visiting faculty from UCSF complete evaluations of UCSF surgical residents rotating in Uganda. On a case-by-case basis, selected medical students have also participated in the clinical electives and research projects.

Residents from UCSF with a greater career interest in global health were encouraged to pursue a master's degree in public health (MPH) or a campus-based Global Health Clinical Scholars Program (GHCSF). Surgical specialist UCSF faculty members were recruited for voluntary trips to Uganda as visiting scholars. During these visits, collaborative research projects with

Table 1. UCSF Surgery Global Health-Related Activities, January 1, 1998, to June 1, 2008

Variable	1998-2002	2003-2008
Residents		
Clinical electives	0	4 (all to Uganda)
Global health scholars	0	3
MPH	1	3
Faculty		
Visiting scholar	4	12 (9 to Uganda)
MPH	0	1

Abbreviations: MPH, master's degree in public health; UCSF, University of California, San Francisco.

Ugandan faculty counterparts were promoted. In addition, intramural and extramural funds were sought to support a Ugandan surgeon to visit UCSF.

RESULTS

All global health-related activities from January 1, 1998, to June 1, 2008, undertaken by UCSF surgery residents and faculty are given in **Table 1**. In the last 5 years since the establishment of the program, most overseas work has focused on Uganda. Four surgery residents completed 1- to 3-month clinical rotations in Uganda. There, residents participated in approximately 10 to 15 operations per week and reported exposure to novel pathologic conditions in clinics, on the wards, and in the operating room. These included surgical infectious diseases such as extrapulmonary tuberculosis, Buruli ulcer, cystitis secondary to schistosomiasis, ileal perforation secondary to typhoid fever and tetanus; malignant neoplasms such as Burkitt lymphoma and non-HIV-associated Kaposi sarcoma; and generally, an advanced disease state at presentation such as with advanced intra-abdominal malignancies of unknown origin and peritonitis of unknown cause.

A sample operative experience from a resident participating in both clinical and research activities during 1 month is given in **Table 2**. No laparoscopic procedures were completed. From residents' trip reports, it could be summarized that patients generally had advanced disease, especially surgical infectious disease and malignant lesions. Intraoperative monitoring was limited to intermittent manual blood pressure and pulse checks, and most operations were completed without staplers, basic instruments, self-retaining retractors, or reliable cautery or suction. Visiting residents also assisted in bedside teaching and supervision of medical students and interns. Overall, clinical experiences in a resource-constrained environment fulfill the 6 Accreditation Council for Graduate Medical Education competencies (**Table 3**).

Three residents completed the GHCSF; 1 completed a clinical rotation as well as a research project in Uganda in the use of focused abdominal sonography for trauma; and 3 other residents earned an MPH degree at US and international institutions. These residents were self-funded, had partial departmental support, or were supported by grants such as the US Fulbright Scholar Program. All residents had a research focus on surgical care in low-income countries.

**Table 2. Sample Resident Operative Case Log:
2½ Weeks of Clinical Time During 1-Month Rotation**

Procedure	No.
Repair of complex facial lacerations	3
Laparotomy because of trauma	1
Laparotomy to repair a perforated ulcer	1
Partial mastectomy	3
Excision of ganglion cyst	2
Excision of neck mass	1
Drainage of psoas abscess	1
Forequarter amputation	1
Appendectomy, open	2
Subtotal thyroidectomy	1
Thyroid lobectomy	5
Parotid gland cyst excision	1
Split-thickness skin grafting	1
Soft-tissue mass incisional biopsy	2
Total	25

**Table 3. How a Clinical Experience in a
Resource-Constrained Environment Fits
the Competencies Outlined by the ACGME**

ACGME Competency	Global Health Application
Medical knowledge	Exposure to new clinical features of surgical diseases
Patient care	Shift back to focus on importance of history taking and physical examination
Professionalism	Coping with the difficulties of providing care in an austere environment to an underserved population; advocating for patients and the professionals who work daily in such settings
Interpersonal and communication skills	Cross-cultural communication and development of an understanding of the perception of medicine and surgery in a new cultural context
Practice-based learning and improvement	Application of medical knowledge to practice in a different setting and sharing past experiences with new colleagues; new sources of information and learning
Systems practice	Exposure to a vastly different practice environment and an understanding of cost-conscious care

Abbreviation: ACGME, Accreditation Council for Graduate Medical Education.

Nine UCSF faculty members have visited Uganda for 1 to 3 weeks for research, clinical, and didactic activities in trauma and in breast, pediatric, and cardiothoracic surgery. Most of these trips were self-funded; others were funded by research grants. Visiting faculty from UCSF reported challenges in adapting to the local context and resources for care. In turn, a faculty surgeon from Uganda visited UCSF for 2 months to conduct research in trauma systems development. The UCSF faculty paid for the Ugandan surgeon's travel and housing expenses in the United States. A UCSF faculty member with clinical and research responsibilities is based in Uganda and is supported in part by the UCSF Departments of Surgery and Global Health Sciences. The 3 faculty members who were involved with global health work in the earlier period (before 2003) have con-

tinued their work in the countries in which they had previously established relationships, and 1 other faculty member has since turned attention to work in Uganda (Table 1). Another faculty member is pursuing an MPH degree.

In 2005, a joint injury-trauma conference was conducted in Uganda, funded by the UCSF Global Health Sciences program, drawing faculty and trainees from MU and UCSF. The meeting generated research and training priorities in injury and trauma care in Uganda. The UCSF Global Health Sciences program subsequently funded a pilot project on the use of ultrasonography in injured patients, and 2 UCSF surgery faculty members led a 5-day training course using machines loaned by SonoSite (Bothell, Washington). The American College of Surgeons-certified instructors in focused abdominal sonography for trauma taught 19 participants including trainees and senior surgeons. After the course, images were uploaded to a Web-based server in Uganda and evaluated at UCSF to provide feedback to trainees. Data from this project are still being analyzed. Another project under way will evaluate a prehospital trauma training program for lay first responders that has improved trauma care at low cost in other countries with no prehospital system.²¹

In the 5 years before the MU-UCSF program, despite 4 faculty members making more than 20 volunteer expeditions, only 1 resident participated in global health activities. This was done independently as a Fulbright Scholar at the London School of Hygiene and Tropical Medicine. Primary challenges identified by faculty and residents include limited funding to support global health activities and research, lack of a clear faculty advancement pathway, and lack of Residency Review Committee approval for resident clinical activities overseas. The UCSF School of Medicine is exploring ways to reward faculty involvement in global health programs.

COMMENT

The importance and benefits of global health programs in surgical residency can be considered from varied perspectives of residents and faculty. In addition, it is important to understand the benefits and challenges to partner institutions presented by such a program.

BENEFITS TO RESIDENTS

Clinical Experience

Educational benefits to US trainees working in resource-constrained environments of low-income countries have been well documented and include exposure to varied conditions, greater reliance on medical history and physical examination, and cost-conscious care.^{1,12,13,17} Reports by our trainees after 1- to 3-month clinical rotations have confirmed benefits in these areas and have consistently described that their experiences abroad rekindle their fundamental motivations for pursuing a career in medicine. This may be especially important because there is evidence that motivation to work with vulnerable populations, in particular, decreases as the duration of training increases.²² Resident evaluations also

support the assertion that these clinical experiences fulfill the 6 Accreditation Council for Graduate Medical Education competencies.¹⁹

Despite these benefits, residents have not been permitted to log operations for credit in this pilot phase. Given the increasing concern about adequate resident case volume owing to work-hour limitations, increased subspecialization, and more laparoscopic and less open-surgery experience, the potential benefits of overseas clinical work are readily apparent. Nationally, the Residency Review Committee might consider criteria by which these clinical activities could be credited, as has been previously suggested.¹²

These benefits must be carefully balanced with benefits to collaborating institutions. Some believe strongly that international clinical experiences should be reserved only for fully qualified surgeons, and other national residency associations have formal guidelines limiting activities only to senior trainees.^{5,8} Faculty oversight, trainee evaluations, and feedback from our partner institution have ensured that visiting trainees effectively integrate into the context of the host training program and perform work appropriate to their level of training.

Structured Training and Research in Surgery and Global Health

Some residents have also demonstrated academic interest in public health beyond clinical experiences overseas. Although it has been difficult to find an appropriate training structure to accommodate these residents, their interests provide a valuable opportunity to broaden the traditional Halstedian model of the laboratory-based surgeon-scientist to the surgeon-scientist leader with expertise in public health.

A growing number of residents are completing an MPH or the GHCSF. The GHCSF is being developed into a national program through an academic consortium including The Johns Hopkins University, the University of Pennsylvania, and the University of Washington. The participation of surgical residents has been particularly important in the GHCSF at UCSF to diversify the discussion beyond communicable diseases by including surgical topics such as the global burden of injury.²³

As these training pathways have evolved, compelling synergies between local and global health disparities research have become apparent. Surgical trainees drawn to disparities research are often motivated to work with underserved populations, whether in the United States or abroad. Previous research also confirms that participants in global health programs are more likely to care for underserved local populations.¹ Vulnerable communities facing the health challenges of poverty both in the United States and abroad have limited access to care and often present for medical attention at an advanced stage of disease. Several residents in our program have pursued or are planning further training in domestic health policy and health disparities research.

While the international role of surgeons has generally been limited to the clinical arena, the expansive surgical research agenda in global health should be defined and addressed by surgeons. The Bellagio Essential Surgery Group, led by UCSF and partner institutions, ana-

lyzed issues of increasing access to surgical care in Africa.²⁴ A follow-up meeting is planned in Uganda in 2008.

BENEFITS TO COLLABORATING INSTITUTIONS AND RECIPROCITY

Surgical associations in high-income countries have a responsibility to address global surgical training needs. This requires looking beyond interests of US trainees to consider needs of training institutions in low-income countries. According to the leaders of the MU surgery department, highest priority needs include research training and collaboration, visiting faculty from UCSF, and relevant training opportunities in the United States. The basic context, structure, and challenges of surgical training and care in Uganda have been previously described and are representative of sub-Saharan Africa.²⁵ The postgraduate training program in surgery at MU struggles to recruit surgical trainees because local students are drawn instead to careers in infectious diseases.²⁶ There is an extreme surgeon and anesthetist workforce shortage in Uganda, as in all of sub-Saharan Africa.²⁷ A primary goal of the collaboration is to attract more surgical trainees in Uganda through opportunities to interact with visiting faculty and to participate in collaborative research.

RESEARCH

As enumerated previously, several collaborative research projects are under way or completed, funded through UCSF Global Health Sciences and related programs. As in most low-income countries, trauma takes a substantial health toll in Uganda, and research projects have predominantly focused on this area.²⁸ While data from the study of focused abdominal sonography for trauma are still being accrued, a subsequent challenge will be the integration of this modality into the local trauma care protocol.

There are several important lessons of this collaborative research. First, projects must be locally relevant and a priority to clinicians in the host country. Second, responsibility for the key portions of the project should be shared. Third, in areas where training is necessary, it is important for the university with available resources to share them. Fourth, projects must be adaptable to an environment with limited research infrastructure.

FACULTY

Visits from UCSF faculty have led to collaborative research and sharing of educational resources. Faculty evaluations have stressed that the local context and resources must be carefully anticipated to ensure success of short missions. Faculty members generally have volunteered for these experiences during vacation or nonclinical academic time. To achieve greater sustainability, the ongoing presence of a UCSF faculty member in Uganda is currently being piloted with partial UCSF departmental support.

Previous reports have emphasized that trips made by clinicians from resource-constrained environments to high-income countries must be carefully designed to maximize the acquisition of relevant skills and to avoid external migration or "brain drain."²⁹ In the United States, these

experiences are further constrained by licensure requirements for foreign medical graduates that limit clinical interactions. The objective of a faculty surgeon from Uganda visiting UCSF was to evaluate the local trauma system by meeting with key personnel from the emergency medical services system and observing prehospital and hospital care in San Francisco. The faculty member also attended a regional trauma course and several other courses, and the visit allowed for development of a plan for first-tier (lay first responders) and second-tier (ambulance) systems of care in Uganda. Several changes in the trauma care at Mulago Hospital in Uganda were subsequently implemented in the design of a new emergency department and the organization of disaster preparedness courses.

CHALLENGES

Most of the activities described herein were self-funded or supported by targeted research or training grants. Overseas travel is costly, and most surgery residency programs do not have the resources to support these activities, especially inasmuch as resident clinical activities overseas are not credited by the Residency Review Committee. Resident involvement during the research block limits participation to a small group with supportive research mentors. The relative success of the Uganda program can be attributed to sustained volunteer faculty commitment and partnership with existing institutional infrastructure and resources. For faculty, salary support while abroad and department compensation for lost faculty revenue during such time are also challenges. A mechanism for faculty promotion based on research, mentorship, and service in global health is necessary. A meaningful collaboration that equitably balances the needs of collaborating institutions is difficult to maintain without a sustained presence abroad. To learn more about interest and barriers to global health programs nationally, a Web-based survey of program directors is being conducted. The long-term effect on surgical training and care globally will only be apparent with time.

CONCLUSIONS

A comprehensive global health program that includes both clinical experiences and structured training in public health can be successfully established in a residency training program and results in greater resident involvement than ad hoc "medical missionary" programs.³ Residency programs can address global surgical training needs through partnerships with training programs in low-income countries. This has the potential to reduce surgical disparities in global health. The American College of Surgeons and other national surgical associations could offer more opportunities for US and international surgeons to train in public health. More practical metrics of success must be developed for such programs. Pathways devoted to global and public health from undergraduate to postgraduate medical education also hold great promise. The sustainability of meaningful and vigorous global health programs requires a viable, long-term financial model. Funding for such programs and valida-

tion of their academic merit remain a substantial challenge and must be innovatively approached.

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DISCUSSION

Steve Bickler, MD, San Diego, California: The Department of Surgery at UCSF is to be congratulated for their efforts over the past 10 years to establish a surgical education and research partnership with MU in Uganda. Beginning with surgical faculty visits in 1998, this program has evolved into formal links with the postgraduate surgical training program at Mulago Hospital. It is clear that this program has succeeded because of a dedicated group of surgical faculty from UCSF who have been willing to spend their time and money to travel to Uganda. The importance of having surgical leadership that recognizes the value of global health cannot be underestimated.

The UCSF-MU program has correctly focused on training, research, and sharing of educational resources. This collaboration has been beneficial to both institutions. With respect to the educational experiences of UCSF surgical residents traveling to Uganda, the article makes a strong case for such activities by analyzing their value in terms of the 6 competencies outlined by the ACCGME. I see no reason why the Residency Review Committee should not credit these valuable clinical experiences, provided there is close faculty oversight and training is done in a collaborative environment.

The UCSF-MU collaboration comes at an exciting time in international surgery. Initiatives within the past 5 years, such as the World Health Organization's Emergency and Essential Surgical Care Project, the Bellagio Essential Surgery Group spearheaded by UCSF, and the upcoming Global Burden of Surgical Disease Study, offer a real possibility to bring surgical care into the mainstream of global health.

Critical to all of these efforts is the great need for surgical research in low- and middle-income countries. Data are needed on the epidemiology of common surgical conditions, best practices, and the cost-effectiveness of surgical care. The UCSF and MU have strategically positioned themselves to play an important role in this research and upcoming public policy debates. The great surgical laboratories of global health are not in the developed world but are the district hospitals and overcrowded government referral hospitals in the capital cities of Africa. Departments of surgery with an interest in global health should take note of the UCSF program because it serves as an excellent model for surgical collaborations. I have 1 question. How should these joint educational and training research programs in developing countries be financed?

Dr Farmer: Frankly, prior to the development of this as a formal program in our university, interest in global health activities was really a closeted activity. It was okay for someone in internal medicine or infectious disease to be interested in global health, but those of us in surgery with this interest kept it pretty quiet. In fact, I remember being advised as a medical student that if I wanted to go overseas, I should think about a different field because I would never get into a surgery program.

We have come a long way in the last 20 years, but clearly the issue of funding is critical to the long-term success of these programs. As always, the solution will be multifactorial. One solution will clearly develop as a natural outgrowth of the greater awareness of the effect of the burden of surgical disease on the world as a whole. The vernacular, or the language, that is used to discuss this in the global health parlance is DALYs, the Disability-Adjusted Life Years, and really speaks to the effect of disease on a community. Imagine the breadwinner of the family who has a broken leg that cannot be properly set, who then goes from being a productive member of society to a burden on that same community, in fact, a handicapped individual in an environment that does not support handicapped individuals very well. That is the Disability-Adjusted Life Years measurement. Imagine again the increase in productivity that accrues to a community when an individual has a cataract removed and can now see and become productive again. Thus, surgery has an important role to play in the global health world despite the fact that at the present time, most of the funding is focused on AIDS, malaria, and tuberculosis. Not that those things are not important, but data are becoming available that demonstrate how surgical disease can be positively effective. I think with that information more funding will come that will help support programs like this. In the meantime, programs that are developing will develop much like ours has, with funds scrounged from various sources and donors, faculty members giving their own time, and departments doing what they can to support this activity. I believe the philanthropic opportunities and the grant opportunities are just being identified and will be the way we bridge this funding gap until the larger institutions, such as the World Health Organization, come to bear fruition. Another challenge that is important to understand and is just being recognized by our schools of medicine is that of finding ways to promote faculty with an interest in global health and to see this as a legitimate career pathway, both through mentoring and research activities.

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