Global Health in General Surgery Residency: A National Survey

Sudha P Jayaraman, MD, MSc, Alexander L Ayzengart, MD, Laura H Goetz, MD, FACS, Doruk Ozgediz, MD, MSc, Diana L Farmer, MD, FACS

BACKGROUND: Interest in global health during postgraduate training is increasing across disciplines. There are limited data from surgery residency programs on their attitudes and scope of activities in this area. This study aims to understand how global health education fits into postgraduate surgical training in the US.

STUDY DESIGN: In 2007 to 2008, we conducted a nationwide survey of program directors at all 253 US general surgery residencies using a Web-based questionnaire modified from a previously published survey. The goals of global health activities, type of activity (ie, clinical versus research), and challenges to establishing these programs were analyzed.

RESULTS: Seventy-three programs responded to the survey (29%). Of the respondents, 23 (33%) offered educational activities in global health and 86% (n = 18) of these offered clinical rotations abroad. The primary goals of these activities were to prepare residents for a career in global health and to improve resident recruitment. The greatest barriers to establishing these activities were time constraints for faculty and residents, lack of approval from the Accreditation Council for Graduate Medical Education and Residency Review Committee, and funding concerns. Lack of interest at the institution level was listed by only 5% of program directors. Of the 47 programs not offering such activities, 57% (n = 27) were interested in establishing them.

CONCLUSIONS: Few general surgery residency programs currently offer clinical or other educational opportunities in global health. Most residencies that responded to our survey are interested in such activities but face many barriers, including time constraints, Residency Review Committee restrictions, and funding. (J Am Coll Surg 2009;208:426–433. © 2009 by the American College of Surgeons)

International clinical electives in resource-constrained settings for residents interested in global health have been well-established in many internal medicine and other primary care residency programs.[1,2] Trainees participating in these electives report many educational benefits, including improved clinical acumen, less reliance on diagnostic tests, exposure to a broad spectrum of illnesses, and increased cultural sensitivity.[3,4] Potential reciprocal benefits to host institutions include a temporary increase in trained medical personnel in regions with a limited health workforce and opportunities for international collaboration. Comparable opportunities have been slow to evolve in surgical residency programs.

Surveys of members of the American College of Surgeons (ACS) have confirmed growing interest in voluntarism and, in response, the ACS has established a database of volunteer opportunities through Operation Giving Back. Meanwhile, an ongoing national survey of surgery residents by the ACS is evaluating this interest.[5] Several recent reports from individual institutions document the growing interest and availability of structured global health electives in surgical residency.[6-8]

Three institutions, Mt Sinai, Brown University, and the University of California, San Francisco (UCSF), have published their global health experiences in detail. The surgical programs at Mt Sinai and Brown University offer formal clinical experiences overseas. The Mt Sinai program offers a 1-month clinical rotation for senior residents at a 250-bed public hospital in the Dominican Republic. Residents perform 50 to 90 cases under the supervision of local surgeons and offer lectures to medical students and health personnel. Trainees report increased appreciation for

Disclosure Information: Nothing to Disclose.

Received October 21, 2008; Revised November 15, 2008; Accepted November 20, 2008.
From the Department of Surgery, University of California, San Francisco, CA (Jayaraman, Ayzengart, Farmer); Department of Surgery, Kaiser Permanente, Oakland, CA (Goetz); and Department of Pediatric Surgery, Hospital for Sick Children, University of Toronto, ON, Canada (Ozgediz).
Correspondence address: Doruk Ozgediz, MD, MSc, Division of General Surgery, Hospital for Sick Children, 555 University Ave, Toronto, ON M5G IX8, Canada. email: dozgediz@hotmail.com

© 2009 by the American College of Surgeons
Published by Elsevier Inc.

ISSN 1072-7515/09/$36.00
doi:10.1016/j.jamcollsurg.2008.11.014

Abbreviations and Acronyms

ACGME = Accreditation Council for Graduate Medical Education
ACS = American College of Surgeons
RRC = Residency Review Committee
UCSF = University of California, San Francisco

global health disparities and improved cultural sensitivity.[5] Residents from Brown University volunteer for 1 month in a rural 330-bed teaching hospital in Kenya. They perform 75 to 100 cases and 40 to 50 endoscopic procedures under the direct supervision of board-certified US general surgeons, one of whom has a faculty appointment at Brown Medical School. These residents also report greater cost-conscious care and improved clinical skills as a result of this experience.[7] The UCSF program offers structured training, research opportunities, and host-country capacity-building.[9] UCSF has established a 1- to 2-month clinical elective at Mulago Hospital, the national referral and main teaching hospital in Kampala, as part of a broader collaboration with Makerere University in Kampala, Uganda. Residents in their research years work alongside their Ugandan counterparts and participate in 40 to 60 operations per month, supervised by Ugandan or visiting UCSF faculty. Residents also participate in medical student education and contribute to ongoing research projects. UCSF faculty members have also completed short and longer-term visits for focused clinical activities and research. Capacity-building activities, such as trauma training for lay first-responders, an advanced trauma course for interns and house officers, collaborative mentored clinical research, and close partnership with anesthesia colleagues are also key elements of this program.[8,9]

Although these single-institution experiences are models for other programs to consider, many concerns have been raised. Programs must ensure adequate resident supervision while abroad, and this can be a challenge, depending on the setting and the arrangement with host institutions.[10,11] Others have suggested that these clinical activities do not add to current training and do not meet Accreditation Council for Graduate Medical Education (ACGME) and Residency Review Committee (RRC) requirements; they should be independent voluntary activities outside the scope of surgical training. In addition, there have been increasing concerns that programs often do not consider reciprocal benefits to host institutions when engaging in overseas collaborations. These issues notwithstanding, residents and programs report great interest in such opportunities and promote the role of academic surgical programs in global health.[12,13]

Despite these reports and related controversies, the attitudes of surgery residency programs toward global health education and their integration into training programs are unknown. In addition, challenges to establishing such programs have not been well-defined. To address this lack of data, we conducted a nationwide survey of general surgery residency program directors to understand how global health clinical electives and related activities currently fit into postgraduate surgical training in the US.

METHODS

A cross-sectional survey of all 253 general surgery residency programs in the US was conducted using a Web-based questionnaire. The survey had 20 questions (Table 1) and was modified from a previously published and validated survey.[14] Several questions covered basic descriptive data (eg, geographic location, community versus academic focus) on each program. Other questions targeted the surgical audience and included issues raised in previous reports, such as level of interest in global health opportunities for residents, presence and nature of these current activities, number and training level of participating residents, type of partner institutions, perceived benefits to host institutions abroad, and challenges to establishing these electives.[6-8] For each question, opportunities for comments were also available so that qualitative data on programs' experiences could be collected. The questionnaire was reviewed by a core group of UCSF faculty and revised based on this feedback.

Institutional Review Board approval was obtained from UCSF before the survey was distributed. Electronic invitations were sent to program directors and associate program directors to complete this survey online. Responses were tabulated and confidentiality of respondents was maintained in the analysis. The Survey Monkey program was used for survey distribution and analysis.[15]

RESULTS

Of the 253 general surgery residency programs in the US, 73 responded to the survey (29%). Of these 73 responses, 11% were from academic programs (n = 8) that require residents to participate in research, 36% (n = 25) were from community programs that do not require residents to participate in research, and 53% (n = 37) were from hybrid programs where research is optional but encouraged. Four percent (n = 3) of institutions did not report their program type. Most survey respondents (36%, n = 25) were from the East Coast of the US.

Table 1. Questions Addressed by the Survey of US General Surgery Residency Programs

1. Program name
2. Were educational activities in global health offered?
3. Was there interest in establishing global health activities at programs that did not offer activities currently?
4. What types of global health activities are offered?
5. What types of overseas partners were involved: academic institutions, public or private hospitals, NGOs?
6. For how many years has each US program offered these activities?
7. Who established the activities: resident, faculty, overseas partner?
8. What goals do US programs have for offering global health activities?
9. How many faculty have participated in global health activities from each US program in the last 5 years?
10. How many residents have participated in global health activities from each US program in the last 5 years?
11. At what level of training do residents engage in global health activities?
12. What is the nature of overseas activities: clinical, research, both, other?
13. What funding assistance do US programs provide for residents?
14. What defined reciprocal benefits does each US program offer to partner institutions?
15. Have any faculty/residents from overseas institutions visited the US partner program in last 5 years?
16. How many foreign faculty/residents have visited each US program?
17. What is generally the focus of each visit by foreign faculty/residents: clinical, research, both, other?
18. What barriers do US programs face in establishing successful overseas collaboration: at US institution? At overseas institution?
19. Of the barriers highlighted previously, which have been the greatest challenges?
20. Additional comments

NGO, nongovernmental organization.

Global health activities and goals

Thirty-three percent (n = 23) of 70 responding program directors reported that their programs offered global health activities for their residents, and 67% (n = 47) of programs did not. Three programs declined to answer this question. Of the 47 programs that did not offer global health activities, 57% (n = 27) expressed interest in developing such programs for their trainees. Twenty-one respondents reported offering at least one type of global-health activity, including international experiences (76%, n = 16), didactic sessions (43%, n = 9) and experience with domestic underserved communities (14%, n = 3) (Table 2). Nineteen programs reported on the setting for their international experiences. Nine (47%) programs worked with public or private hospitals or travel/field clinics, five (26%) sent staff to nongovernmental or faith-based organizations, and three (16%) had collaborations with academic institutions. Of the 21 respondents reporting the duration of their programs, most (33%, n = 7) had developed their programs in the last 2 to 5 years. Three programs (14%) had global health activities in existence for 5 to 10 years and 29% (n = 6) had such collaborations in place for >10 years. Overall, 19 of 21 programs (91%) reported that these activities were initially organized by individual residents or faculty. Assuming that all nonresponding programs had no active program in global health, a minimum of 9% of US programs (23 of 253) offer some global health opportunities.

The leading goals for pursuing global health activities, as reported by 21 residency programs, included trainee preparation for a career in global health (67%, n = 14), resident recruitment (43%, n = 9), motivation to serve vulnerable local communities (33%, n = 7), and acquisition of skills that are no longer emphasized in current training (33%, n = 7) (Table 2). One program director commented that offering such activities "would add a level of interest for some of the candidates we are hoping to recruit. It would lend strength of character for some residents." But because

Table 2. Key Findings of Global Health Survey

	Reporting	
	%	n
Types of global health activities currently offered by programs (n = 21)		
Experiential learning in international setting	76	16
Didactic sessions	43	9
Experiential learning in domestic setting	14	3
Other	19	4
Types of overseas partners involved (n = 19)		
Public/private hospitals, travel/field clinics	47	9
NGOs, faith-based organizations	26	5
Established surgery program at an overseas academic institution	16	3
Other	21	4
Reported goals of global health activities (n = 21)		
Preparing physicians for a career in global health care or practicing abroad	67	14
Recruiting potential residents	43	9
Preparing physicians for practice in underserved communities in US	33	7
Teaching residents the skills no longer emphasized in current training	33	7
Recruiting potential faculty	5	1
Other	29	6

NGO, nongovernmental organization.

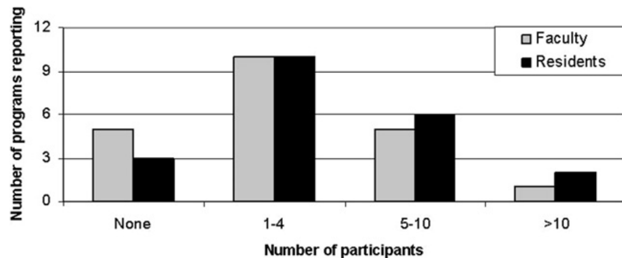

Figure 1. Surgery resident and faculty participation in global health activities in the last 5 years as reported by survey respondents (n = 21).

not every resident wants a global health career, another program director indicated that a global health experience "could be valuable as an elective or optional part of the curriculum."

Resident and faculty experiences in global health

Residents had predominantly clinical experiences in global health in 18 of 21 responding programs (86%), and both research and clinical activities in three programs (14%). In the last 5 years, 48% (n = 10), had one to four residents participate in global health electives and 29% (n = 6) had between 5 and 10 residents doing global health-related work (Fig. 1). Programs allowed residents to participate in such activities at various levels of training, most commonly, the senior years of residency (40%, n = 8), junior years (35%, n = 7), or while in research (22%, n = 6), as reported by 20 programs. Nine of 21 (43%) responding programs were able to assist residents with obtaining funding for their experience abroad. In terms of faculty participation, 48%, or 10 of 21, programs reported that one to four faculty members did global health-related work during the previous 5 years and 24% (n = 5) reported having no faculty involvement in such activities (Fig. 1).

Barriers to global health activities

Barriers to establishing such experiences for trainees, as reported by 18 programs, were primarily time constraints for faculty and residents (33%, n = 6), concerns about certification by the ACGME/RRC (28%, n = 5), and lack

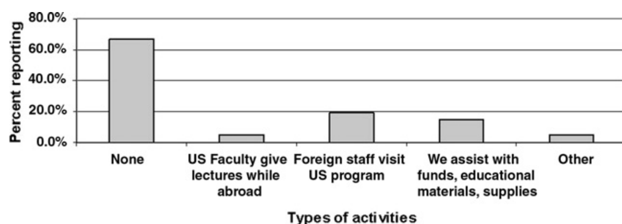

Figure 3. The reciprocal benefits offered to overseas partners as reported by survey respondents (n = 21).

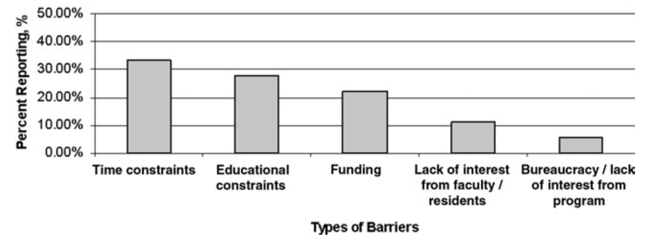

Figure 2. Greatest barriers facing US programs in developing and supporting global health activities (n = 18).

of funding (22%, n = 4) (Fig. 2). Qualitatively, program directors commented that:

> It is not that we do not want to; it is that financial and service issues are prohibitive.
>
> We have secured funding, locations, proctors but have not been able to fit it into the rotation yet.
>
> Need to work on ACGME and ABS so if residents do this especially with a staff that those cases/experience count. At this time it is my understanding they do not. This restricts how we can involve residents in this sort of activity.
>
> Not exactly sure where to start and what the actual strict definition of Global health is.

Reciprocity to overseas institutions

When asked if they provided their overseas partners with any benefits as part of their global health activities beyond temporarily increasing the local workforce, program directors described these benefits as visits from US faculty with specific educational goals for local partners, opportunities for foreign faculty or residents to visit US programs, or assistance with accessing finances, educational materials or medical/surgical supplies. Sixty-seven percent of 21 responding programs reported (n = 14) no active reciprocal relationship with their partner institutions. Eight programs reported providing one of the benefits listed here (Fig. 3).

DISCUSSION

The role of global health in medical education is growing rapidly, with many academic medical centers developing global health programs and nearly 25% of medical graduates acquiring international experiences before starting postgraduate training.[3,16,17] Clinical global health opportunities in postgraduate training have typically been offered in nonsurgical disciplines, partly because of the traditional focus of public health on infectious diseases and maternal and child health.[1,4,14,18,19] Recently, the substantial burden of surgical conditions in low-income countries has

prompted leading figures in public health to refer to surgery as the "neglected stepchild of global health," and others to promote the crucial role of surgical care in meeting the United Nations' Millennium Development Goals.[20,21] The public health importance of surgery in low-income countries is acknowledged by the world's leading economists, who have ranked essential surgical care as one of the highest-priority investments to improve the well-being of the world's poorest populations.[22]

In parallel with this increased awareness of surgery's role in global health, department-level surveys of surgery residents have shown high interest in international electives. Approximately 98% of surgery residents at New York University and >90% at UCSF were interested in participating in international electives.[12,23] Reports from surgical training programs in other countries also confirm global interest in these activities.[24-26] Nevertheless, the attitudes of surgery residency programs toward global health education and whether such activities can be integrated into surgical training programs are unknown. In addition, the challenges to establishing such activities have not been well-defined. Results of our nationwide survey show that few general surgery residency programs currently offer clinical electives or other educational opportunities in global health, and that most residency programs are interested in such activities, but cited time constraints, funding, and RRC restrictions as the primary barriers to creating them. Thirty-three percent of programs responding to the survey offered some global health-related activity; or a minimum of 9% of programs nationwide, assuming that programs not responding to the survey do not offer such opportunities. Even with great interest from surgical trainees and medical graduates, very few surgery residency programs nationwide have such programs.

Goals of global health activities

The residency programs that offered some global health-related activity indicated that the primary goals were to prepare residents for a career in global health, improve resident recruitment, and motivate residents to serve local vulnerable communities. These reasons for engaging in global health-related activities might reflect the increasing influence of globalization on health care and greater associated awareness of global health disparities. Programs can also be responding to the growing role of global health curricula in undergraduate medical education. Medical students with an interest in global health might be increasingly drawn to surgery if they envision opportunities to create a viable career path in this area. Another goal of programs offering global health opportunities was to prepare physicians for practice in underserved communities in the US. Because domestic health disparities are gaining greater recognition, research and advocacy skills learned overseas can translate into similar activities locally, because earlier studies have shown that international health volunteers are more likely to also be engaged in local voluntary service.[27,28] This interest in voluntarism has been shown to decrease during the length of training.[3,29] Promotion of global health activities during residency can encourage career-long voluntarism.

Resident and faculty participation

Survey respondents were evenly divided on when to allow resident participation in global health activities, with equal numbers of programs reporting junior or senior resident involvement. Some earlier reports argue that only more mature senior residents should be permitted to participate in clinical activities because of the challenges of caring for patients with advanced disease in a resource-constrained environment and because of the patient's right to receive the highest possible standard of care.[10,18] Others have countered that the standard of care might be context- and resource-dependent.[11] Some believe that this experience should be reserved for board-certified surgeons only, and that even they might have difficulty adapting to an austere medical environment.[10,30] Many ethical issues arise from sending trainees to work in developing health systems, especially if local supervision has not been formalized. These concerns need close evaluation and level-appropriate international experiences might need to be provided for residents, much like the structured curricula provided in US surgery residencies.

Focus of global health activities

Most programs responding to this survey (86%) reported that the majority of their global health activities were clinically focused, without a research component. There is a growing surgical research agenda in global surgery promoted by the World Health Organization, the World Bank, and other prominent international organizations.[31-33] Collaborative surgical research projects with overseas institutions could allow programs and trainees to contribute to health care systems worldwide. The ACS and other surgical associations can play an important role in encouraging such work by providing opportunities such as research support for surgery residents, similar to support provided for basic science or clinical research, especially because many surgical residency programs do not have the resources to establish extensive research collaborations.

Barriers to offering global health activities

According to our survey, 57% of the programs that do not offer global health opportunities have an interest in creat-

ing such opportunities for their trainees. The most frequently cited barriers to establishing global health programs are time constraints for residents and faculty, lack of RRC approval, and funding concerns. As the number of US surgical residents involved in global health activities continues to grow, the RRC might need to consider how clinical activities abroad can be approved for credit so that the reported time constraints to do global health work can be addressed. Earlier reports have suggested that global health experiences have the potential to meet all six core competencies of the ACGME.[8] If the RRC engaged in developing guidelines for level of training and supervision, it could ensure that programs provide residents with the appropriate support to conduct global health activities. Additionally, if board-certified US surgeons could participate with residents overseas, the ACGME competencies could be met through close supervision. Time constraints for faculty can limit this possibility. Support from the ACS for such activities could implicitly address the time pressures facing faculty and allow their participation overseas.

The third most frequently reported barrier to conducting global health work was funding. Before this survey, we expected this to be a more critical issue for most programs. Surprisingly, it was ranked third. Perhaps this could be explained by the limited number of participants who are involved in such activities at this time. Programs simply might not have encountered the funding problem yet, because too few trainees participate. Program cost can become an increasingly important barrier to participation as global health activities develop and broaden in scope. One potential solution to address the costs of creating global health opportunities at small surgery programs might be to engage in partnerships with US institutions that have more established global health programs. In addition, a few core overseas sites could be identified, perhaps by the ACS, for collaboration so that staff and resources across US institutions can be pooled for maximum effect.

Study limitations

Although this survey highlights key attitudes and barriers to global health work by surgery residencies, it has several limitations. First, the 29% response rate is within the accepted range for similar surveys, but is not ideal and could represent selection bias because residency programs with ongoing programs or interest in this area might have been more likely to respond. This response rate limits the conclusions that can be drawn from this study. A more thorough survey through the ACS or the Association of Program Directors in Surgery could be more informative. Second, and perhaps more importantly, this survey did not evaluate the impact of these programs on host institutions abroad. Understanding the needs and perspectives of our collaborating institutions can inform the design of effective and mutually beneficial global health partnerships. Surveys of surgical programs, faculty, and trainees from low-income countries, such as one recently completed in Uganda, can provide a local perspective on how these activities can improve surgical training and delivery.[34] Only 33% of respondents reported that their program was able to offer reciprocity beyond increased short-term staffing for host institutions in the form of visiting faculty, exchanges, or sharing of other resources, such as surgical equipment and supplies.

Future opportunities

"Twinning programs" or partnerships have been identified by the World Health Organization as a key strategy to address the crisis in human resources for health.[35] A recent report in *The Lancet* suggests that 75% of the world's surgical output is in high-income countries,[36,37] although Africa alone manages 25% of the global burden of disease, with only 2% of the world's health care resources.[38] Mutually beneficial collaborations between surgical associations and academic training programs have the potential to reduce global disparities in surgical care. Surgical training programs can have a greater impact by focusing not only on overseas clinical activities, but also on longer-term partnerships that develop surgical capacity.[39]

Many key areas for future research remain. Many low-income countries are trying to address critical shortages in their surgical workforce and are eager to develop curricula and novel training programs, such as training of nonphysicians to perform "essential surgery."[40] Research in this area could have a lasting impact on global surgical education. Surgery is also a team effort and engaging in multidisciplinary projects, with anesthesia and nursing colleagues, could greatly improve surgical care in resource-constrained settings.[41] Ethical controversies related to global health disparities and surgical delivery, such as universal standards of care and sustainability of programs, also merit additional analysis.

Interest in global health opportunities is on the rise among medical students and surgical trainees, but only a minority of American surgery residencies offer these opportunities for their trainees. Programs that do not offer these opportunities have a strong interest in global health training. The most difficult barriers to establishing and maintaining such programs are time and staffing constraints, lack of RRC approval, and limited funding. These efforts could be more formally supported by national and international surgical associations. Global health opportunities for surgical trainees include primarily clinical roles, although trainees can also be educators, research collaborators, and advocates to increase resources available for sur-

gical care in low-income countries and to reduce disparities in surgical care. The impact of these roles will continue to grow as more formalized global health electives in general surgery develop. By building on the traditional service-based model of international surgery to develop sustainable longterm academic collaborations, US surgeons have a valuable opportunity to contribute to the development of global surgical capacity.

Author Contributions

Study conception and design: Ozgediz, Farmer
Acquisition of data: Jayaraman*, Ayzengart*, Goetz, Ozgediz
Analysis and interpretation of data: Jayaraman, Ayzengart, Goetz, Ozgediz
Drafting of manuscript: Jayaraman, Ayzengart, Goetz, Ozgediz
Critical revision: Jayaraman, Ozgediz, Farmer
*Jayaraman and Azyzengart contributed equally to the manuscript.

Acknowledgment: We are grateful for editorial support from Ms Pamela Derish, Scientific Publications Manager at the UCSF Department of Surgery.

REFERENCES

1. Gupta AR, Wells CK, Horwitz RI, et al. The International Health Program: the fifteen-year experience with Yale University's Internal Medicine Residency Program. Am J Tropic Med Hygiene 1999;61:1019–1023.
2. Miller WC, Corey GR, Lallinger GJ, Durack DT. International health and internal medicine residency training: the Duke University experience. Am J Med 1995;99:291–297.
3. Drain P, Primack A, Hunt D, et al. Global health in medical education: a call for more training and opportunities. Acad Med 2007;82:226–230.
4. Grudzen CR, Legome E. Loss of international medical experiences: knowledge, attitudes and skills at risk. BMC Med Educ 2007;7:47.
5. Casey KM. The global impact of surgical volunteerism. Surg Clin North Am 2007;87:949–960, ix.
6. Silverberg D, Wellner R, Arora S, et al. Establishing an international training program for surgical residents. J Surg Educ 2007; 64:143–149.
7. Klaristenfeld DD, Chupp M, Cioffi WG, White RE. An international volunteer program for general surgery residents at Brown Medical School: the Tenwek Hospital Africa experience. J Am Coll Surg 2008;207:125–128.
8. Ozgediz D, Wang J, Jayaraman S, et al. Surgical training and global health: initial results of a 5-year partnership with a surgical training program in a low-income country. Arch Surg 2008; 143:860–865; discussion 865.
9. Global Partners in Anesthesia and Surgery Homepage. [cited 2008 July 5]. Available at: www.globalpas.org. Accessed December 21, 2008.
10. Ramsey KM. International surgical electives: reflections in ethics. Arch Surg 2008;143:10–11.
11. Schein M. Ethics of surgical training in developing countries. World J Surg 2007;31:2070–2071.
12. Powell AC, Mueller C, Kingham P, et al. International experience, electives, and volunteerism in surgical training: a survey of resident interest. J Am Coll Surg 2007;205:162–168.
13. Hayanga A. Voluntarism in surgical residency: fostering sustainable global academic partnerships. Arch Surg 2007;142:577–579.
14. Evert J, Bazemore A, Hixon A, Withy K. Going global: considerations for introducing global health into family medicine training programs. Family Med 2007;39:659–665.
15. Survey Monkey. Available at: http://surveymonkey.com/. Accessed December 21, 2008.
16. Kanter S. Global health is more important in a smaller world. Acad Med 2008;83:115–116.
17. Panosian C, Coates TJ. The new medical "missionaries"—grooming the next generation of global health workers. N Engl J Med 2006;354:1771–1773.
18. Kamat D, Armstrong R. Global child health: an essential component of residency training. J Pediatr 2006;149:735–736.
19. Nelson BD, Lee AC, Newby PK, et al. Global health training in pediatric residency programs. Pediatrics 2008;122:28–33.
20. Farmer P, Kim J. Surgery and global health: a view from beyond the OR. World J Surg 2008;32:533–536.
21. A crucial role for surgery in reaching the UN Millennium Development Goals. PLoS Med 2008;5:1165–1167.
22. Copenhagen Consensus 2008. [cited 2008 July 5]. Available at: http://www.copenhagenconsensus.com/Default.aspx?ID=788. Accessed July 5, 2008.
23. Ozgediz D, Roayaie K, Debas H, et al. Surgery in developing countries: essential training in residency. Arch Surg 2005;140: 795–800.
24. Ghani KR, Cotton MH, Paterson-Brown S. Surgical training in the developing world. BMJ 2003;326:S1.
25. Hill AG, Woodfield JC. Training outside of the box. ANZ J Surg 2003;73:881–883.
26. Barton A, Williams D, Beveridge M. A survey of Canadian general surgery residents' interest in international surgery. Can J Surg 2008;51:125–129.
27. Rogers SO Jr. Disparities in surgery: access to outcomes. World J Surg 2008;32:505–508.
28. Ayanian JZ. Determinants of racial and ethnic disparities in surgical care. World J Surg 2008;32:509–515.
29. Woloschuk W, Harasym P, Temple W. Attitude change during medical school: a cohort study. Med Educ 2004;38:522–534.
30. Bernstein M. Ethical dilemmas encountered while operating and teaching in a developing country. Can J Sur 2004;47:170–172.
31. Bickler S, Spiegel D. Global surgery—defining a research agenda. Lancet 2008;372(9633):90–92.
32. Debas H, Gosselin R, McCord C, Thind A. Surgery. In: Jamison D, ed. Disease control priorities in developing countries. 2nd ed. New York and Oxford: Oxford University Press; 2006:1245–1259.
33. Ozgediz D, Jamison D, Cherian M, McQueen K. The burden of surgical conditions and access to surgical care in low- and middle-income countries. Bull World Health Org 2008;86: 646–647.
34. Galukande M, Kijjambu S, Luboga S. Improving recruitment of

surgical trainees and training of surgeons in Uganda. East Central African J Surg 2006;11:17–24.
35. Crisp N, Gawanas B, Sharp I. Training the health workforce: scaling up, saving lives. Lancet 2008;371:689–691.
36. Laxminarayan R, Mills AJ, Breman JG, et al. Advancement of global health: key messages from the Disease Control Priorities Project. Lancet 2006;367:1193–1208.
37. Weiser TG, Regenbogen S, Thompson K, et al. An estimation of the global volume of surgery: a modelling strategy based on available data. Lancet 2008;372(9633):139–144.
38. World Health Organisation. Health Workers for All and All for Health Workers. The Kampala Declaration and Agenda for Global Action. [cited 2008 March 12]; Available at: http://www.who.int/workforcealliance/forum/2_declaration_final.pdf. Accessed March 12, 2008.
39. Ajayi OO. The responsibility of established colleges to the developing world. Aust N Z J Surg 1994;64:4–6.
40. Chilopora G, Pereira C, Kamwendo F, et al. Postoperative outcome of caesarean sections and other major emergency obstetric surgery by clinical officers and medical officers in Malawi. Hum Resour Health 2007;5:17.
41. Hodges SC, Mijumbi C, Okello M, et al. Anesthesia services in developing countries: defining the problems. Anesthesia 2007;62:4–11.

Abstracts and Tables of Contents delivered to your PDA.

JACS, and more than 100 other journals and clinics.

Go to: www.pocketconsult.com