

Ethics in Global Surgery

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Abstract Global surgery, while historically a small niche, is becoming a larger part of the global health enterprise. This article discusses the burden of global surgery, emphasizing the importance of addressing surgical needs in low- and middle-income countries. It describes the barriers to surgical care in the developing world, the ethical challenges that these barriers create, and strategies to overcome these barriers. It emphasizes the crucial role of preparation for global surgical interventions as a way to maximize benefits as well as minimize harms and ethical challenges. It ends with the cautionary statement that preparation does not eliminate ethical problems, so surgical volunteers must be prepared not only for the technical challenges of global surgery but also for the ethical challenges.

Introduction

Two notions that have historically taken root in global health are that surgery can only address a small piece of the global burden of disease and that surgical care is too expensive to implement in low- and middle-income countries (LMICs) when competing with other types of interventions to improve health [1]. This perception of surgery has marginalized its role in the larger enterprise of global health. In 2008, Paul Farmer and Jim Kim described surgery as the “neglected stepchild of global health [2].” This article asserts that surgical conditions are a significant contributor to the global burden of disease, and are

especially prevalent in LMICs. Furthermore, it argues that basic surgical interventions should not be seen as specialized tertiary care but rather as primary care. Given that global surgery should take on a larger role in global health, it goes on to describe the barriers to surgical care in LMICs and the ethical challenges that these barriers create. It suggests ways in which to improve global surgical interventions so as to address the ethical problems that arise in this setting.

Background

Before discussing the state of global surgery, it is important to define a couple of terms. Surgical conditions are ‘any disease state requiring the expertise of a surgically trained provider’ and needing anesthesia for incision, excision, and suture [3]. Examples of surgical conditions include injuries, burns, obstetric complications, and congenital deformities. The burden of surgical disease is “the total disability and premature deaths that would occur in a population should there be no surgical care [3].” The global burden of surgical disease has been estimated at 11 %, with the majority of this burden affecting LMICs [4, 5]. Of the over 200 million operations performed worldwide on a yearly basis, the richest one-third of the world undergo 73.6 % and the poorest one-third undergo only 3.5 % [6]. It is unlikely that there is a significantly lower rate of surgical disease in LMICs, but rather that there is a largely unmet need for surgical intervention. To put the burden of surgical disease into perspective, the figure of 11 % is greater than the global burden of HIV, tuberculosis, and malaria combined [4]. Moreover, studies of specific populations suggest that the global burden of disease may be significantly underestimated. Groen et al. [7]

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performed a survey of Sierra Leone households and found that 25 % of respondents had a condition possibly needing surgical intervention, defined as wound care, suturing, incision, excision, or other manipulation of tissue, and that 25 % of deaths in the previous year may have been averted with surgical intervention. As public health interventions in LMICs decrease the incidence of infectious disease, surgical disease is poised to become an even larger contributor to the global burden of disease.

An important consideration with respect to the global burden of surgical disease is the morbidity related to the lack of access to surgical interventions. In Sub-Saharan Africa, the burden of disability-adjusted life-years (DALYs) has been estimated at 38 lost per 1,000 people due to lack of access to surgical interventions [8]. The most common conditions contributing to DALY loss are injuries, obstetric complications, perinatal conditions, congenital anomalies, malignancies, cataracts, and glaucoma [8]. Children in Africa lose six times more productive years from burns with subsequent contractures than from war [9]. As Curci [10] comments, “inadequate access to timely surgical care not only leads to unnecessary death, but inhibits the ability of survivors to lead productive lives.”

What Does it Mean to Address the Global Burden of Surgical Disease?

Addressing surgical disease in LMICs has the potential not only to prevent morbidity and mortality, but also to improve the productivity of young people disabled by congenital and acquired surgical conditions. Injuries, obstetric complications, and congenital abnormalities such as cleft lip and palate and club foot are some of the most common surgical diseases in developing countries [8]. These conditions also disproportionately affect young, productive individuals. Without access to safe, effective surgical interventions, these members of LMICs are often doomed to lifelong disability. However, with proper intervention, many of these individuals can return to productive lives. The economic benefit of global surgery is undeniable. Restoring young people to productive lives positively impacts patients, their families, and their societies.

Given the growing burden of surgical disease, coupled with the lack of available surgical care in LMICs, it is not surprising that the international surgical community is taking a more active role in global health. The drive to participate in global surgical interventions is particularly strong among US surgical residents. A national survey found that 92 % of 724 US surgical residents were interested in participating in an international surgical elective [2]. Residency programs are responding to this desire by

offering international rotations that are an accredited part of surgical training [11]. As the surgical community increases its global presence, it is essential that surgical volunteers and their organizations understand the barriers to surgical care in LMICs, identify the ways in which these barriers create and contribute to ethical challenges in this setting, and design interventions that address the barriers to surgical care so as to increase capacity for safe, effective surgical intervention in LMICs.

What are the Barriers to Surgical Care in Developing Countries?

While there is clearly a need for increased and improved surgical care in LMICs, there are also many barriers to providing safe and effective surgical interventions in this setting. These barriers are not unique to global surgery, but are often more pronounced in this context. Barriers to surgical care in LMICs stem from the underlying context of providing medical care in this setting, which is dominated by limitations and differences [12]. The capacity to provide surgical care depends on resources, infrastructure, and personnel. Without these, patient safety and outcomes may be compromised. Population factors such as poverty, limited access to healthcare, and cultural beliefs and practices that negatively impact health also create challenges to providing surgical care in LMICs. Finally, when visiting volunteers provide surgical care, there are many additional challenges including time constraints, cultural and language barriers, and incongruent expectations. The following sections discuss each of the aforementioned barriers to surgical care, the ethical issues that occur as a result of these barriers, and the steps that surgical volunteers can take to address them.

Limitations in Surgical Capacity

The lack of resources in LMICs is often profound, and is visible in all areas of surgical care from preoperative workup to postoperative management. For example, in a case series from Tanzania, of 118 patients treated with exploratory laparotomy for tuberculosis intestinal obstruction, none underwent preoperative colonoscopy or computed tomography (CT) scan because of resource limitations [13]. Resources specific to operative interventions, such as suture, mesh, and antibiotics, are often in short supply [14]. While volunteers can provide some of these resources if deficiencies are recognized prior to the beginning of a surgical mission, needs identified while providing surgical care in LMICs may require creative solutions. For example, Tustin and Hodges [15] describe

fashioning wound vacs from mattress foam and cling film for plastic surgery patients. Gil et al. [14] describe using sterilized polyester or nylon mosquito netting for hernia repair in LMICs. Resources for postoperative care may also be limited. For example, dressings for wound care and antibiotics for treating surgical site infections may be in short supply. Moreover, ward beds, intensive care unit (ICU) capacity and staff available to care for patients after operations may be limited. Looking even further into the future, facilities need to have the capacity to provide interventions for postoperative complications (e.g., incision and drainage of postoperative abscesses, exploratory laparotomy for bowel obstruction) and to provide follow-up care for postoperative patients. When short-term volunteers provide surgical care, they will not be available to manage complications or follow-up, so this responsibility falls to local providers.

Along with limited resources, inadequate infrastructure can be a significant barrier to surgical care in LMICs. Operating rooms are often ill equipped compared with US standards. For example, Gil et al. [14] describe a series of hernia repair operations in Africa and Spain in which only 70 % of African operations were performed with coagulation because of a lack of this equipment in operating rooms. Howe et al. [16] discuss the unfair expectations that volunteers perform operations in less optimal conditions than they are accustomed to, such as using inadequate operating microscopes for neurosurgical procedures. Bernstein [17] puts inadequate infrastructure into perspective: “Another situation that caused me medical and moral unease almost daily was performing surgery with equipment and assistance so inferior to that back at my Toronto hospital that it simply felt “wrong” to do it, knowing that I would very likely perform an operation inferior to what I knew I was capable of.”

Another important barrier to surgical care in LMICs is a lack of trained personnel available to provide surgical interventions. In fact, a survey of Zambian hospitals found that lack of surgical skill was the primary limitation to providing pediatric surgical care [4]. Volunteer surgeons are able to provide the surgical skills that are lacking in so many areas of the developing world through their personal presence. However, this is only a temporary fix as surgical skills will leave with volunteers unless education interventions are part of the mission.

Addressing Limitations in Surgical Capacity

Limited capacity in the form of resources, infrastructure, and personnel is a significant barrier to surgical care in LMICs. The first step in addressing deficiencies in surgical capacity is identifying them. Hughes and Jandial [18] argue

that site evaluation prior to mission engagement is paramount to establishing a successful mission. Luckily, there are already resources available for assessing surgical capacity. Surgeons Overseas has created a survey for assessing surgical capacity in resource-constrained health facilities [19]. This survey takes into account 105 items in five sections: personnel, infrastructure, procedures, equipment, and supplies (PIPES). The advantage of this tool is that it can identify deficiencies in capacity in advance of a mission so that plans can be made to address these deficiencies. For example, if suture is not available, this resource can be provided by the visiting team. Furthermore, this survey can identify critical deficiencies that must be remedied prior to providing operative care (e.g., electricity, running water). Using this tool, organizations have the opportunity to recognize deficiencies in capacity for surgical care and address them before embarking on mission so as to set themselves, their hosts, and most importantly, their patients, up for success.

If deficiencies in capacity are such that they have the potential to compromise patient care and safety, then organizations may need to refrain from pursuing surgical missions until capacity is improved. It is essential for volunteers and their organizations to be in a position to provide safe and effective surgical care in locations with the capacity to manage postoperative care, complications, and follow-up. While capacity does not necessarily have to reach the level of facilities in the developed world, it does have to be acceptable in order for surgical missions to maximize benefits and minimize harms to patients.

The PIPES tool includes an assessment of personnel availability, including general surgeons, anesthesiologists, medical doctors who perform surgical interventions, and nurse anesthetists. Knowing what personnel currently provide surgical care is helpful in tailoring education interventions to develop human capacity and work toward sustainable solutions for surgical disease in LMICs. Because many essential surgical procedures, such as skin grafting, incision and drainage of abscesses, endoscopy for foreign body removal, and contracture release, do not necessarily require a trained surgeon, educational initiatives by surgical volunteers may be best directed at available non-surgical personnel.

Training non-surgeons to provide surgical care in LMICs has been termed task-shifting. There is some controversy surrounding this practice, of which volunteers should be aware. Those against task-shifting believe that the best use of educational time is to train a small group of local surgeons and have this group conduct internal outreach programs [20]. Their primary concern is that shifting tasks to less skilled providers could result in poorer outcomes [20]. Those for task shifting argue that this practice allows more providers to be trained more quickly than

surgeons to provide low complexity care [20]. They argue that having more providers with basic surgical skills can decrease delays in care and prevent improper care of surgical conditions [4]. Community needs and personnel availability should be investigated prior to the start of surgical missions so that educational interventions can be targeted to the individuals most likely to provide surgical care after the mission is over. Having a strategy for education interventions should be seen as an essential element of surgical missions, as this helps hosts move toward local, sustainable surgical capacity.

Identifying deficiencies in surgical capacity through PIPES allows organizations to prepare for surgical missions. Ideally, this preparation should be a collaborative effort between the host community and the visiting organizations. It is essential that missions aim to meet the surgical needs of the host community as defined by the community. It is important to keep in mind that capacity assessment and planning for deficiencies will not eliminate resource limitations in LMICs, so volunteers must be prepared to face these limitations and make decisions about what surgical care to provide. Resource limitations that compromise patient safety may make going forward with interventions too risky (e.g., general anesthesia without pulse oximetry). When elective operations are being offered, it is essential that surgical volunteers remember that they have the option to not operate. While this may be a difficult decision to make, unsafe surgical interventions can have devastating consequences and leave patients worse off than they would have been without interventions.

Outcomes: A Step Beyond Capacity Assessment

While screening for surgical capacity is important in planning surgical missions, measuring outcomes is key to identifying areas in which care can be improved. Historically, volunteer organizations have measured mission success with what Dupuis [21] terms the “body count mentality.” This is literally the number of patients treated during the mission. It does not capture the number of patients who have successful outcomes versus those who suffer adverse events. Barriers to monitoring outcomes in LMICs include losing patients to follow-up, staff turnover, and limited systems for tracking outcomes [22]. However, if efforts are not made to put outcomes monitoring in place, then there is no opportunity to identify areas in which surgical care can be improved. In order to make progress in surgical care in developing countries, outcomes must be measured so that quality improvement can be initiated. Surgical missions should not be able to claim success if they cannot provide data regarding the outcomes of their surgical interventions.

Population Factors Affecting Surgical Care

Poverty is rampant in developing countries and is the most important contributor to delay in patient presentation for surgical conditions [23]. In a study of patients with breast cancer, the common denominator for patients who presented more than 12 weeks after the onset of symptoms was poverty [23]. In many developing countries, patients must pay for care prior to intervention, which deters many individuals from seeking or obtaining medical care [24]. Bernstein [17] describes a heartbreaking situation in which a teenage girl who became comatose after a motorcycle accident. Her presentation was typical of an epidural hematoma but her family could not pay for CT imaging. The patient died within a few hours. Bernstein recalls his moral dilemma as follows: “I was tempted to offer to pay for the CT imaging, but realized that doing this a few times during my stay wouldn’t change the big picture and would undermine the local neurosurgeons. The system had to be forced to change, to become more humane so that hospitals would absorb the costs of treating such patients.”

Poverty limits patients’ ability to obtain adequate medical and surgical care. It is tempting for medical volunteers to try to work around the barriers of poverty in order to provide necessary interventions for patients. However, paying for interventions for a few patients does nothing to change healthcare systems [16]. It may in fact undermine change in the sense that the community comes to expect volunteers to pay for necessary interventions rather than pushing for sustainable change in which the hospital or government absorbs the costs of medical care for patients who cannot pay. In order to prepare for situations such as the one described by Bernstein, it is essential that volunteers understand the payment structure of the facility where they are working and the capacity of that facility for charity care. Volunteers should set expectations among themselves and with local personnel regarding payment for patients who need essential interventions but cannot pay for them.

Particular cultural beliefs and practices can also directly affect medical care. For example, many patients in developing countries get their first-line medical care from traditional healers. Traditional healers may provide interventions that are ineffective or even harmful. For example, Clem and Green [25] describe a traditional healing practice in Papua New Guinea, called a bush thoracotomy, in which traditional healers stuff leaves, mud, and pig dung into the chest cavity to treat chest complaints. This often results in an empyema, requiring operative drainage and long-term empyema tube management. This practice is clearly harmful but may not be something that surgical volunteers are able to address because of the strong relationship between the community and traditional healers and the limited time that volunteers have with the

community. Even when traditional healing practices do not harm patients, they can delay patient presentations, which can make surgical care more difficult.

Beyond treating complications of traditional healing practices, surgical volunteers may be asked to participate in or provide supplies for cultural rituals that they see as harmful (e.g., amputations for Sharia law, female genital mutilation). Being placed in this type of situation can be very challenging for volunteers who want to maintain a positive relationship with the community but do not want to be involved in practices to which they are morally opposed. Learning about cultural tradition and practices that may affect patient health prior to embarking on surgical missions is a key element in preparation. This does not eliminate the tensions that can arise with cultural differences but it does prepare volunteers to identify and address these tensions. In addition to familiarizing themselves with cultural beliefs and practices, volunteers should engage patients' beliefs regarding medical problems. Kleinman and Benson [26] propose a seven-question mini ethnography that can be used in the clinic to explore patients' beliefs about their medical problems. Using this tool, volunteers can gain a better understanding of their patients' beliefs, goals, and fears regarding medical intervention.

Barriers Created by Volunteer Missions

The most common model for surgical intervention in LMICs is that of the short-term surgical mission. In this type of intervention, a small group of providers from a developed country travel to a developing country and provide as many surgical interventions as they are able. These types of missions provide much needed surgical interventions but, as discussed earlier, they cannot provide access to postoperative care, provide follow-up, or manage postoperative complications due to time constraints. Moreover, these missions place the burden of providing surgical care on foreign volunteers, who are often unfamiliar with local culture, language, and medical problems.

Patients in developing countries often suffer from conditions that are not common in the developed world. Unfamiliarity with these conditions can create a challenge for surgical volunteers. For example, a common obstetric problem in developing countries is vesico-vaginal fistulae caused by prolonged obstructed labor [27]. Fistulae form secondary to avascular necrosis from the fetal head pushing against the uterus for a prolonged time period. This situation results in urinary incontinence, and women with vesico-vaginal fistulae are often ostracized from their communities. While US surgeons are familiar with vesico-vaginal fistulae, the most common etiology in the

developed world is a post-hysterectomy complication. These fistulae are more straightforward to fix as they do not have as much scar tissue as obstetric vesico-vaginal fistulae. Therefore, while familiar with fixing vesico-vaginal fistulae in the developed world, surgical volunteers may not be well equipped to fix the more complex obstetric fistulae common in developing countries. Other examples of different pathologies include bowel obstruction secondary to tuberculosis, hernias that are significantly larger than those typically encountered in the developed world, and hernias that contain parasites in the hernia sac [14, 24].

The dilemma that arises when volunteers encounter unfamiliar surgical problems is the question of whether the pathology is so different from the usual practice in the developed world that surgical interventions may not translate. Just as capacity assessment is a key element of surgical missions, volunteers should also learn about common surgical problems, pathologies, and current practices for intervening on these conditions. This will help volunteers prepare to address the surgical needs of the host community. Moreover, volunteers may recognize that their skills are not congruent with community needs and seek alternative opportunities to participate in missions in which they can positively contribute to patient care.

Language barriers can also be extremely challenging in developing countries. In a survey of Sierra Leone households regarding the burden of surgical disease, Groen et al. [7] noted that 14 official languages exist in this country. Finding adequate translators for each of these languages is a formidable task. Even with just one language to translate, there can be challenges. Incorrect translation can result in an inadequate patient history and subsequently an incorrect diagnosis. This is particularly important as limited resources mean that imaging and blood testing may not be readily available to confirm diagnoses. Moreover, volunteers do not generally have the luxury of time to observe patients when history is unclear because of the time constraints of mission trips. Language barriers can be addressed by ensuring that trained interpreters will be available not only during operations but also to assist with patient interactions. Any surgeon who has used an interpreter for patient communication, even in the developing world, can appreciate the difficulty of this practice. While interpreters are immensely helpful, communicating through them is difficult and conversations are often less smooth than when providers and patients are able to communicate through a common language.

Beyond the challenge that language barriers present for patient care, they also create a more subtle personal challenge, as it is hard to connect with patients when providers cannot have a normal conversation with them. It can be an isolating experience to not be able to communicate freely with patients, even when volunteers can meet their surgical needs.

Incongruent Expectations

One common complaint of surgical volunteers is misrepresentation of their expertise to patients. Sometimes this misrepresentation comes in the form of the volunteer being introduced as an expert in an area in which he or she is not an expert [17]. Other false advertising can occur when host personnel promise patients that volunteer surgeons will be performing operations when they will actually be teaching local surgeons [16]. Moreover, visiting surgeons can misrepresent themselves. Physicians who have limited training in particular operations, such as cleft lip and palate repair, may gain experience through working in developing countries. Rather than being experts in these interventions, they are practicing on vulnerable patients [17]. Misrepresentation and misguided expectations are further complicated when residents are part of the visiting team. It is essential that residents are not put into situations in which they are expected to provide interventions that they are not qualified to perform [11].

Beyond different expectations regarding representation, there are often different expectations regarding the process of obtaining informed consent for surgical procedures. As discussed above, surgical volunteers are often at a disadvantage in communicating with patients because of language barriers. There may also be cultural beliefs about informed consent that are very different from those in developed countries. Rose [28] describes one such belief as follows: “The culture in which I was practicing medicine, like many (I have come to learn), equated skill with wisdom, wisdom with conviction, and masculine conviction with action. In the pre surgical setting of heightened fear and expectation, informed consent was interpreted as a lack of professional confidence or ‘faith’.” Hughes and Jandial [18] described how their group did not participate in obtaining informed consent from patients, but made this the responsibility of hosts. While this mitigates issues with the language barrier, it prevents surgical volunteers from ensuring that the process of informed consent is adequate according to their home standards. Expectations regarding informed consent for surgical procedures should be set with the host facility prior to the mission.

Organizations and individuals can take steps to ensure that they are not misrepresented or asked to perform duties outside of their comfort level. First, they can set goals for the mission that are in line with the expertise of the surgical volunteers (e.g., if the mission is set to provide cleft lip and palate operations, the surgeons should have adequate training in this type of operation). Furthermore, establishing expectations regarding the role of surgical volunteers (e.g., assisting with operative interventions, teaching operative interventions, helping catch up on case backlog) with the host institution prior to arrival can also help

prevent misrepresentation. Expectations regarding consent should also be negotiated prior to the start of missions.

Moving Forward with Global Surgery: Cooperation, Capacity, and Sustainability

Hopefully this article demonstrates the complexity of providing surgical care in LMICs. The myriad barriers to surgical care range from resource limitations to language differences to time constraints. While they create difficult challenges, these barriers are not insurmountable. However, they should not be taken lightly. Because barriers to surgical care in developing countries are well described, it is paramount that surgical missions prepare to address these barriers. Successful surgical interventions rely on thoughtful preparation, which includes identifying capacity restraints, learning about common medical problems and cultural practices, ensuring translation services, and negotiating expectations. Preparation should be a collaborative effort between mission organizations and host communities so that surgical interventions can be designed to meet the needs of the community as defined by the community. The ultimate goal of global surgery should be to develop local capacity for sustainable surgical care. Designing missions that build capacity through resources, infrastructure, and personnel is a step in that direction.

Addressing Ethical Issues on the Ground

While preparation for global surgical missions helps mitigate some ethical problems, it in no way eliminates ethical challenges in this work. Poverty, limited resources, and inadequate medical facilities plague LMICs. Patients often have complex surgical problems that are worsened by delayed presentation secondary to limited access to healthcare. Furthermore, surgical volunteers come from different cultures and medical traditions and speak different languages than their patients. All of these factors create a complex situation, bound to have ethical challenges. Just as volunteers should prepare for the technical challenges of global surgery, they should also prepare to address the ethical challenges.

Specific methodologies for addressing clinical ethical problems are especially helpful in preparing for international missions because volunteers do not generally have the luxury of contacting ethics consultants or committees when they are on the ground. I have proposed a systematic approach to ethical problems in global health elsewhere [29], which identifies important stakeholders; their perceptions of the medical facts; their goals and values; important legal, ethical, and bioethical norms; and the

limitations to options. Using this approach, volunteers have the ability to identify, analyze, and ultimately resolve the ethical problems that they do encounter during medical missions.

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References

- Bae JY, Groen RS, Kushner AL (2011) Surgery as a public health intervention: common misconceptions versus the truth. *Bull World Health Organ* 89(6):394
- Koplan JP, Merson MH, Reddy KS et al (2009) Towards a common definition of global health. *Lancet* 373:533–536
- Tollefson TT, Larrabee WF (2012) Global surgical initiatives to reduce the surgical burden of disease. *JAMA* 307(7):667–668
- Bowman KG, Jovic G, Rangel S et al (2013) Pediatric emergency and essential surgical care in Zambian hospitals: a nationwide study. *J Pediatr Surg* 48:1363–1370
- Choo S, Papandria D, Goldstein SD et al (2013) Quality improvement activities for surgical services at district hospitals in developing countries and perceived barriers to quality improvement: findings from Ghana and the scientific literature. *World J Surg* 37:2512–2519. doi:10.1007/s00268-013-2169-4
- Banu T, Chowdhury TK, Kabir M et al (2013) Bringing surgery to rural children: Chittagong, Bangladesh experience. *World J Surg* 37:730–736. doi:10.1007/s00268-013-1916-x
- Groen RS, Kamara TB, Dixon-Cole R et al (2012) A tool and index to assess surgical capacity in low income countries: an initial implementation in Sierra Leone. *World J Surg* 36:1970–1977. doi:10.1007/s00268-012-1591-3
- Cometto G, Belgrano E, Bonis U et al (2012) Primary surgery in rural areas of southern Sudan. *World J Surg* 36:556–564. doi:10.1007/s00268-011-1403-1
- Henry JA, Windapo O, Kushner AL et al (2012) A survey of surgical capacity in rural southern Nigeria: opportunities for change. *World J Surg* 36:2811–2818. doi:10.1007/s00268-012-1764-0
- Curci M (2012) Task shifting overcomes the limitations of volunteerism in developing nations. *Bull Am Coll Surg* 97(10):9–14
- Axt J, Nthumba PM, Mwanzia K et al (2013) Commentary: the role of global surgery electives during residency training: relevance, realities, and regulations. *Surgery* 153:327–332
- Wall A (2011) The context of ethical problems in medical volunteer work. *HEC Forum* 23:79–90
- Chalya PL, Mchembe MD, Mshana SE et al (2013) Tuberculous bowel obstruction at a university teaching hospital in North-western Tanzania: a surgical experience with 118 cases. *World J Emerg Surg* 8:12
- Gil J, Rodríguez JM, Hernández Q et al (2012) Do hernia operations in African international cooperation programmes provide good quality? *World J Surg* 36:2795–2801. doi:10.1007/s00268-012-1768-9
- Tustin H, Hodges AM (2012) Innovations in plastic surgery using cheap readily available materials in a resource poor environment: from CoRSU Uganda. *Br J Plast Surg* 65:e136–e137
- Howe KL, Malomo AO, Bernstein MA (2013) Ethical challenges in international surgical education, for visitors and hosts. *World Neurosurg* 80(6):751–758
- Bernstein MA (2004) Ethical dilemmas encountered while operating and teaching in a developing country. *Can J Surg* 47:170–172
- Hughes SA, Jandial R (2012) Ethical considerations in targeted paediatric neurosurgery missions. *J Med Ethics* 39:51–54
- Surgeons Overseas. PIPES surgical assessment [online]. http://www.adamkushnermd.com/files/PIPES_tool_103111.pdf. Accessed 1 Dec 2013
- Aliu O, Pannucci CJ, Chung KC (2012) Qualitative analysis of the perspectives of volunteer reconstructive surgeons on participation in task-shifting programs for surgical-capacity building in low-resource countries. *World J Surg* 37:481–487. doi:10.1007/s00268-012-1885-5
- Dupuis CC (2004) Humanitarian missions in the third world: a polite dissent. *Plast Reconstr Surg* 113:433–435
- Wall AE (2012) Benchmarks for international surgery. *Arch Surg* 147:796–797
- Sharma K, Costas A, Shulman LN, Meara JG (2012) A systematic review of barriers to breast cancer care in developing countries resulting in delayed patient presentation. *J Oncol* 2012:121873
- Ayoade BA, Thanni LO, Shonoiki-Oladipupo O (2012) Mortality pattern in surgical wards of a university teaching hospital in southwest Nigeria: a review. *World J Surg* 37:504–509. doi:10.1007/s00268-012-1877-5
- Clem KJ, Green SM (1996) Emergency medicine expeditions to the developing world: the Loma Linda University experience in Papua New Guinea. *Acad Emerg Med* 3:624–633
- Kleinman A, Benson P (2006) Anthropology in the clinic: the problem of cultural competency and how to fix it. *PLoS Med* 3:e294
- Wall LL, Arrowsmith SD, Hancock BD (2008) Ethical aspects of urinary diversion for women with irreparable obstetric fistulas in developing countries. *Int Urogynecol J Pelvic Floor Dysfunct* 19(7):1027–1030
- Rose AD (2011) Questioning the universality of medical ethics: dilemmas raised performing surgery around the globe. *The Hastings Center Report* 41(5):18–21
- Wall AE (2012) Ethics for international medicine: a practical guide for aid workers in developing countries. University Press of New England, Hanover