

Addressing Malawi's surgical workforce crisis: A sustainable paradigm for training and collaboration in Africa

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Background. The exodus of health professionals including surgeons from sub-Saharan Africa has been well documented, but few effective, long-term solutions have been described. There is an increasing burden of surgical diseases in Africa attributable to trauma (road traffic injuries), burns, and other noncommunicable diseases such as cancer, increasing the need for surgeons.

Methods. We conducted a Descriptive analysis of surgical academic partnership between Kamuzu Central Hospital (KCH) Malawi, the University of Malawi-College of Medicine, the University of North Carolina in the United States, and Haukeland University Hospital, Norway, to locally train Malawian surgical residents in a College of Surgeons of East, Central and Southern Africa (COSECSA) approved program.

Results. The KCH Surgery Residency program began in 2009 with 3 residents, adding 3 general surgery and 2 orthopedic residents in 2010. The intention is to enroll ≥ 3 residents per year to fill the 5-year program and the training has been fully accredited by COSECSA. International partners have provided near-continuous presence of attending surgeons for direct training and support of the local staff surgeons, while providing monetary support in addition to the Malawi Ministry of Health salary.

Conclusion. This collaborative, academic model of local surgery training is designed to limit brain drain by keeping future surgeons in their country of origin as they establish themselves professionally and personally, with ongoing collaboration with international colleagues. (*Surgery* 2013;153:272-81.)

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THE END OF THE 20TH CENTURY brought increased high-income nation investment in the healthcare delivery of low- and middle-income countries (LMIC). These efforts were driven by recognition of worsening health parameters such as life expectancy, under 5 mortality, and maternal mortality in poverty stricken nations facing the AIDS epidemic.¹ These international efforts matured into

the United Nations' Millennium Development Goals (MDGs) as a basis for coordinated collaboration between the global north and south addressing not a single disease process, but various factors critical to improving health. However, sustaining dynamic health systems was impossible without an adequate healthcare workforce. Accelerating labor migration and chronic underinvestment in human resources had decimated the healthcare workforce in LMIC.¹ Sub-Saharan African nations have been particularly affected. Malawi is among the hardest hit, with only 2 physicians and 59 nurses per 100,000 population compared with 244 physicians and 867 nurses per 100,000 population in the United States.^{2,3} This dearth of health professionals is particularly bleak for surgeons in sub-Saharan Africa, an environment

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with a burgeoning burden of surgical disease; for example the annual need for inguinal hernia repair is at a minimum 205 per 100,000 population, with the unmet need estimated at 175 per 100,000.⁴ Despite significant unmet surgical needs worldwide, surgical care was not directly addressed in the MDGs.

Malawi is a relatively small nation in southeastern Africa (Fig 1). In the face of the healthcare workforce shortage, Malawi's healthcare system has adapted by task shifting clinical care to non-physician clinicians, known as clinical officers (COs). Malawian surgeons have invested in regional surgical education, and collaborated with international partners to improve clinical care. In the capital of Malawi, Lilongwe, a multilateral effort between partners from the Norway, the United States, and Malawi has focused on establishing a surgical residency program at Kamuzu Central Hospital (KCH) that is accredited by the College of Surgeons of East, Central and Southern Africa (COSECSA). The collaboration undertaken to develop this residency program is a coordinated effort of the stakeholders toward the goal set by the local partner, KCH. Herein we have analyzed the rationale for in-country training of Malawian surgeons and share our experience regarding the concomitant enhancement of the healthcare delivery infrastructure, not only at KCH, but also in Malawi as a whole.

BRAIN DRAIN

The term "brain drain" was first coined in the 1960s to describe the loss of British intelligentsia to the United States.⁵ Currently, the term refers to the loss of trained professionals from the global south to the north. This transnational migration has been particularly acute in healthcare workers, as doctors and nurses possess skills that are easily transferrable to other countries. High-income nations have an increasing need for professionals owing to low health profession school graduation rates compared with the demand of expanding health systems, as well as increased healthcare needs in an aging population. Low-income nations lose health professionals owing to unsatisfactory working conditions, such as low salaries, shortage of supplies, and work overload.^{1,5} In Africa, not only is the migration between global south and north, but professional migration also occurs within the global south, with physicians from Malawi and other poor countries of sub-Saharan Africa migrating to wealthier ones, such as South Africa, to fill the void of those who have departed to the global north. Recent data from the

Organization for Economic Co-operation and Development highlights the health professional brain drain, with 23% of sub-Saharan African physicians working in Organization for Economic Co-operation and Development nations, including the United States, the United Kingdom, and Australia.² To overcome this dearth of in situ healthcare workers, sub-Saharan Africa needs to nearly triple the size of its health workforce by adding approximately 1 million workers.¹ In addressing certain health conditions, such as infectious diseases, this dearth has been addressed by the use of community workers. However, surgical diseases require a technically skilled workforce with a prolonged duration of training and prohibitive cost⁶; therefore, the provision of surgical care has been neglected in global health efforts.⁷

SURGERY AND GLOBAL PUBLIC HEALTH

Although communicable diseases remain the major cause of mortality in sub-Saharan Africa, it has been estimated that 11% of the global burden of disease is owing to surgically treated conditions such as injuries, malignancies, congenital anomalies, hernias, complications of childbirth, and cataracts.⁸ In people aged 10–24 years, injuries account for >40% of annual deaths globally, with a majority of these deaths in LMIC.⁹ There is no accurate assessment of the burden of surgical disease in the developing world, although recent reviews have cited that "2 to 3 billion people (approximately one third to one half of the world's population) have no access to basic surgical care."¹⁰ In sub-Saharan Africa, the estimated incidence of nonfatal injury is $\geq 1,690$ per 100,000 population/year, with an annual mortality of 53–92 per 100,000.⁴ In 2010, the burden of nonfatal injury in the United States was 10,227 in 100,000; however, the 2009 burden of fatal injury was 56 in 100,000 when adjusted for age.¹¹ In light of the high burden of fatalities, this difference most likely represents underreporting of nonfatal injury in sub-Saharan Africa. In addition, some nations (including Malawi) are facing a double burden: A rise in noncommunicable diseases with a continued high incidence of infectious diseases. With this epidemiologic transition, there is greater recognition of the interface between surgical disease and public health, and the need for surgeons to participate in developing sustainable health systems.⁷ Although surgery is not specifically referred to in the MDGs, there are strong arguments that surgery has an important role in achieving the MDGs.¹² Because of the prevalence of surgically treated conditions, and global disparity in access to surgery, the

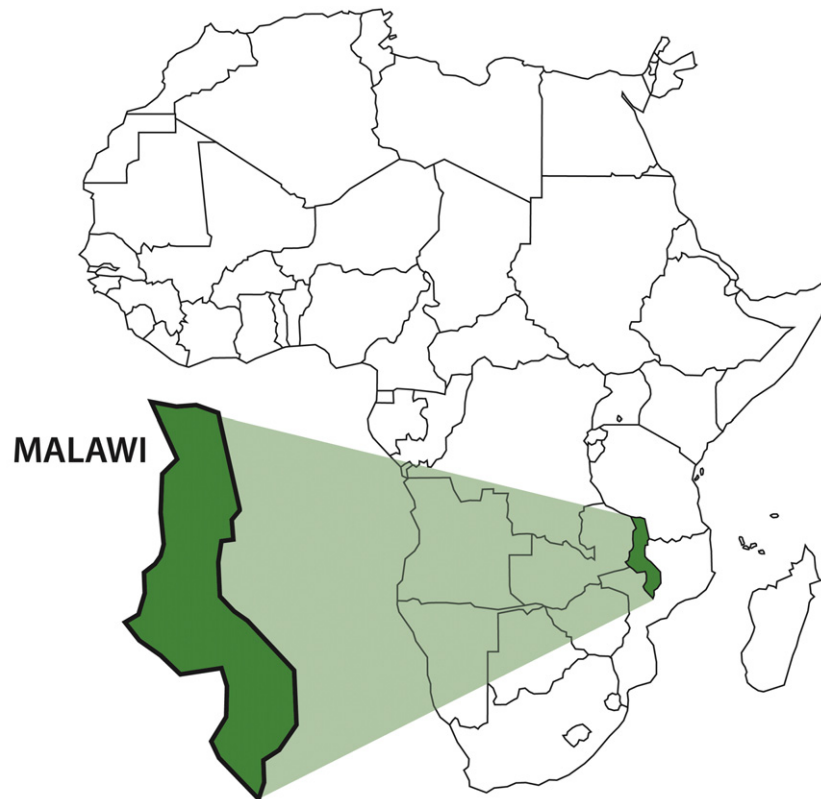


Fig 1. Map of Malawi. (Color version of figure is available online.)

provision of surgical services can help to improve the overall healthcare infrastructure.¹²

SURGERY IN MALAWI

Malawi is a small, landlocked nation in sub-Saharan Africa with a population of almost 14 million in a land area of 119,149 km², making it among the most densely populated countries in Africa. It is ranked among the poorest and least developed nations in the world at number 171 on the United Nations Development index of 187 nations, with 55% of Malawians living on <\$US1 per day.¹³ Its economy is affected by the HIV/AIDS epidemic with a seropositive prevalence of 10.6% in 2011 and life expectancy of 51.7 years in 2011.¹⁴ Its governmental health system is composed of 21 district hospitals and 4 central hospitals in urban areas.¹⁵ Clinical care at district hospitals is provided by a District Health Officer, typically a medical graduate of the Malawi College of Medicine, who has completed an internship, and COs. Clinical supervision at district hospitals is provided by District Medical Officers,^{15,16} although district hospitals remain understaffed. Sixty percent of the medical care is provided by governmental district and central government hospitals and 40% is provided

by a combination of mission and private hospitals. A 2007 survey by Lavy et al¹⁵ reviewed the volume and types of surgery occurring at district hospitals and highlighted the lack of surgeons in Malawi. There were then 14 indigenous Malawian surgeons in the country, 1 surgeon per 1 million people; in the United States, there are 8 surgeons per 100,000 population.¹⁷ Therefore, many basic operative procedures were performed by COs without surgeon backup. The COs interviewed by Lavy et al reported discomfort performing many general surgery procedures, because they did not feel adequately trained to deal with unexpected or unusual pathology. The extreme lack of surgical personnel is also present at central hospitals in Malawi. KCH, where the described training program is situated, has a catchment population of approximately 5.5 million people. Presently, KCH has only 4 general surgeons and 1 urologist. Four of these 5 surgeons are expatriates.

EXPATRIATE SUPPORT AND TASK SHIFTING

Like many African nations, expatriate surgeons in various clinical specialties support Malawi's surgical capacity. Within the last decade, various public and private hospitals in Malawi have been

staffed by British, German, Dutch, American, Norwegian, Italian, Ukrainian, Cuban, Korean, Swedish, and Chinese surgeons, among many others. Some of these providers come to Malawi as volunteers through international organizations such as the United Nations, whereas others are part of a larger development effort by their respective governments; others come as individuals. These surgeons' clinical care is essential to the Malawian healthcare system, but does not contribute to overall health system development because most surgeons leave after a few years without replacements and without having trained any Malawians.

In Malawi, COs are the primary source of clinical care in most settings, including surgery.¹⁵ Many sub-Saharan African nations have increased training of COs and general practitioners to address the lack of surgical care in district hospitals and rural areas. Because obstetric procedures are the most common, Malawi, Mozambique, and Tanzania initially trained COs in emergency obstetric care.¹⁸ In 2010, an article by van Amelsfoort et al¹⁹ cited the extended surgical training COs as a solution to the lack of surgeons in Malawi, particularly at district hospitals. This encouraged the Malawian government to create a 2-year surgical training program for COs, so that they can be the primary surgical providers at district hospitals. Malawi, like other sub-Saharan African nations, has encouraged CO training because their credentialing is not transferrable out of country, thereby preventing COs from joining the brain drain.¹ However, task-shifting surgical care to nonphysician providers does not obviate the need for fully trained physician–surgeons.

WHY TRAIN MEDICAL GRADUATES AS SURGEONS?

All the authors have been practicing surgery in Malawi, some of them for decades. Although expatriate surgical support and task shifting have improved the volume of surgical care in Malawi, the authors realized that these solutions are limited and will not provide a self-sustaining surgical care delivery system. COs can provide adequate care in routine cases, but lack the training and skill to deal with nonroutine cases or complications. Without timely, experienced support and an appropriate referral base, COs routinely face life-threatening disease that they are not trained to diagnose or treat. Safe, effective surgical care in Malawi and other African nations requires adequate numbers of fully trained surgeons who will be present long term in the Central Hospitals,

providing support for COs, DHOs, and District Medical Officers in the district hospitals.

The Malawi Ministry of Health has sent many Malawian medical school graduates out of the country for surgical training, but very few come back to Malawi to practice. Previous studies have shown that the most important factor for medical graduates remaining in country is the presence of a training program.²⁰ Malawian-trained surgeons who stay in Malawi will become leaders in their health system and train future local surgeons and surgical COs. They will have insight into the national healthcare system's needs with recognition of the required policy changes from direct experience. Graduates of the Malawi surgery residency programs have their credentials recognized by COSECESA, which affords them the platform to nurture specific regional interests and concerns.²¹

WHY TRAIN IN COUNTRY?

Malawi already has an established medical school. The University of Malawi College of Medicine was established in 1991, and matriculates 60 medical students annually. Until 2007, the only Malawian clinical postgraduate surgical training programs were the COSECESA-approved general surgery, orthopedics, and ophthalmology programs at Queen Elizabeth Central Hospital in Blantyre, Southern Region. These programs have graduated 1 general surgeon, 3 orthopedic surgeons, and 2 ophthalmologists since inception. Our approach was to focus on KCH to improve the health system in Central Region. Furthermore, both the University of North Carolina (UNC) in Chapel Hill in the United States, and Haukeland University Hospital (HUH) had preexisting clinical and structural assets in Lilongwe. Concentrating efforts in a single location resulted in a sustainable supply of trainers from abroad and prevented the duplication of efforts and assets by both stakeholders in another geographic setting. The addition of Malawian residents at KCH has improved working conditions and produced a critical mass of providers who have started to articulate the need for healthcare system reform. Not only do the surgery residents drastically increase the clinical capacity of their training hospital, their camaraderie builds relationships that support future collaboration. The years after medical school are formative in young surgeons' lives. There is a good chance they will also put down roots and maintain existing family ties where they train, making it more plausible for them to remain in Malawi after training.

In addition, like many other nations in sub-Saharan Africa, Malawi's surgeons face regionally specific pathologies such as typhoid perforation, sigmoid volvulus, abdominal tuberculosis, and esophageal cancer that are rare and managed differently in high-income countries.²² This does not prohibit the development of technologies such as laparoscopy in Malawi, but emphasizes the need for local surgeons to use their available resources to treat locally common diseases. In addition, the cost of training a medical graduate in country is significantly lower than out-of-country training. It is estimated that the MMOH spends \$US125,000 for 5 years of surgical training in South Africa, whereas the KCH surgery residency is estimated to cost \$US75,000 for the 5 years of training.

Role of COSECSA. One factor critical to the development of a surgical residency program in a resource-limited nation like Malawi is the presence of a regional accreditation body for surgeons. COSECSA was established in 1999 to parallel the efforts of the older West African College of Surgeons, which was established in 1962.⁶ COSECSA operates in 9 countries in sub-Saharan Africa: Ethiopia, Kenya, Malawi, Mozambique, Rwanda, Tanzania, Uganda, Zambia and Zimbabwe (Fig 2). Although its accreditation of training programs is based on the criteria used by the Royal Colleges of Surgeons in Ireland and Edinburgh, COSECSA has adapted its requirements to the needs of the region as well as allowed for greater flexibility because of its member countries' resource constraints.²³ COSECSA trainees are trained in hospitals accredited by the College, which are not necessarily affiliated with universities, and sit exams for membership qualification after 2 years and fellowship qualification after ≥ 5 years. With the presence of sophisticated hospital systems in the region, such as Kenya and South Africa, trainees have the opportunity to expand their skills regionally. In addition, COSECSA has provided coordination between surgeons, facilitated harmonization of surgical training in the region, and addressed issues that contribute to brain drain such as the knowledge differential between the global north and south.¹ COSECSA surgeons have collaborated with international organizations such as the University of Toronto and the Royal College of Surgeons of Ireland to provide educational resources to African trainees. For example, the Ptolemy project in collaboration with the University of Toronto provides access to peer-reviewed journals to COSECSA trainees, and the Royal College of Surgeons of Ireland provides case-based learning to trainees via their web site. In the setting

of these preexisting educational resources, establishing a residency program depended on coordinated collaboration rather than starting de novo.

The KCH framework. The collaboration to bring an accredited surgical residency program to Lilongwe, the second in Malawi, is the story of personal relationships growing into institutional partnerships that have evolved into multilateral efforts in various areas of the Malawian health system. Of the authors, Drs Borgstein, Mulwafu, and Mkandawire are Malawian surgeons who are faculty members of the College of Medicine in Blantyre and work to increase surgical capacity with CO training and COSECSA-accredited programs in general and orthopedic surgery. Dr Muyco has a 27-year presence at KCH and his leadership has built the stable relationships that have evolved into institutional partnerships with KCH. His personal efforts drove the establishment of the KCH Surgery Residency program (Fig 3). HUH in Bergen, Norway, was first attracted to KCH in 2006 via the work of an individual obstetrician that developed into a continual presence in the obstetrics/gynecology department. This initial contact led to the development of HUH infrastructure in Lilongwe, and a subsequent visit by KCH administrators to Bergen, at which time 2 of the authors (Drs Young and Viste) became involved and decided to spend extensive periods of time at KCH providing clinical care in orthopedic and general surgery respectively (Fig 4). A memorandum of understanding was signed in 2007 between HUH and KCH for institutional cooperation between the 2 hospitals and, per Dr Muyco's request, the focus was always on preparing the local situation for training of Malawian surgeons at KCH. When funding was obtained from the Norwegian government in 2008, the cooperation was further expanded to include 2 other Norwegian University Hospitals, Oslo University Hospital and The University Hospital of Northern Norway.

UNC has been present at KCH as part of ongoing infectious disease efforts at the UNC Project since the 1990s, with a surgical presence developing in 2006 with Drs Shores and Charles that has been previously described.¹⁶ Similar to the situation with HUH, the established UNC infrastructure in Lilongwe encouraged surgical involvement. The presence of multiple surgeons from academic backgrounds allowed for cross-talk, and an understanding that their efforts would be more effective via a joint effort to support the surgical training program at KCH. Without a training program, the expatriate and Malawian surgeons would not be able transfer their knowledge and

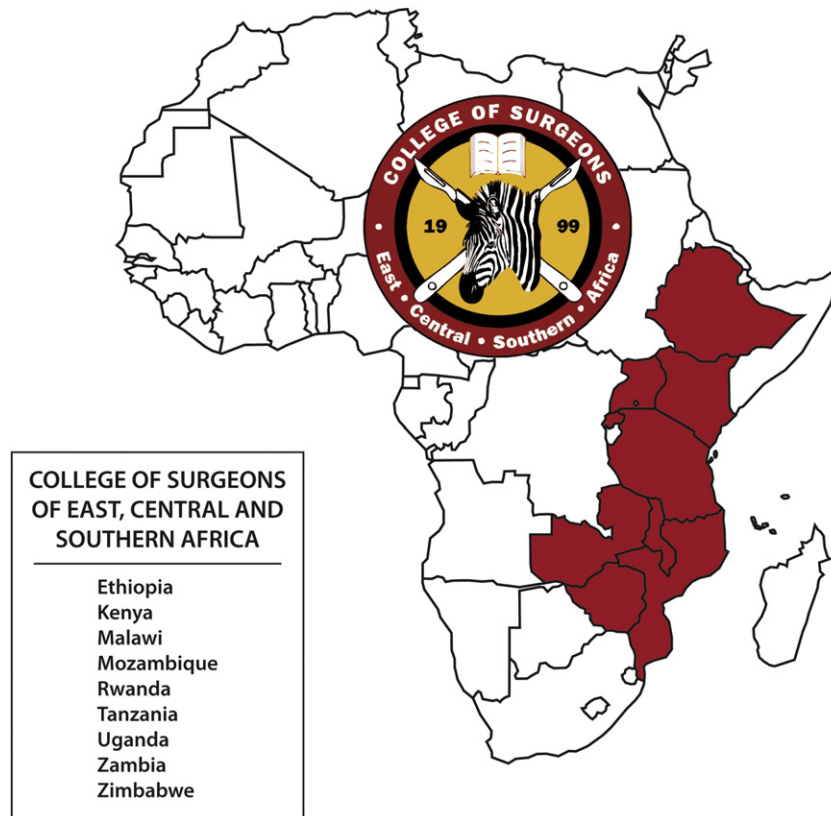


Fig 2. College of Surgeons of East, Central and Southern Africa (COSECSA) member nations. (Color version of figure is available online.)



Fig 3. Dr Arturo Muyco discussing patients with Kumbukani Manda (KCH surgery resident), Boston Munthali (KCH surgery resident) and Stephen Mjuweni (KCH clinical officer); counterclockwise. (Color version of figure is available online.)

skill set to practitioners who could replace them. Thus, the focus became to train the future trainers.

Connecting resources and addressing hurdles. Each partner (KCH, the College of Medicine, HUH, and UNC) brings a unique set of resources to the

table, which are enabling as well as limiting, because each individual institution could not have established this residency program independently. The framework of this effort has been founded on clear communication and discussion of each partner's needs and responsibilities. The presence of Dr Muyco at KCH provides strong, on-the-ground leadership and local initiative. Although initial supplemental funding has been via the international partners, the Malawi Ministry of Health provides salaries to the residents and the aim is for transition of complete funding to the MMOH. Understanding the medical landscape in Malawi has been important to this initiative, and allowed for integrating the new program with pre-existing systems such as the College of Medicine, COSECSA, and the Malawi Medical Council.

We recognize the pressures trainees will face to migrate abroad with their skill set; therefore, incentives were built into the system to support trainees' growth and make staying in country more attractive. We have focused on 3 areas: Bringing career-enhancing opportunities to residents, improving the overall hospital system, and providing an academic environment. The efforts made to enhance the educational and training



Fig 4. Dr Sven Young operating with Dr Boston Munthali (KCH orthopedic surgery resident). (Color version of figure is available online.)

opportunities of the Malawian surgical residents have led to creation and improvement of a surgical library with Internet access, and support and training of operating theatre staff to improve the quality and quantity of operative procedures. In addition, international partners have donated surgical equipment based on needs as well as made efforts to improve ancillary facilities such as pathology and radiology services. The UNC Project worked closely with KCH and the MMOH to open the KCH Pathology laboratory in July 2011 and HUH has provided an experienced Norwegian pathology technician to work in the laboratory for 1 year to help expand and consolidate protocols and techniques.

The UNC has on-going research interests in Malawi through the UNC Project and we have previously written about how the presence of a senior US surgical resident provides continuity between the multiple UNC specialists providing care and teaching at KCH.¹⁶ Drs Shores and Charles have initiated cancer and trauma databases, respectively, and related research projects with diverse funding.²⁴⁻²⁶ The databases provide a platform for current and future research projects, and attract international research trainees. To promote an exchange of knowledge and experiences, international surgical residents and medical students are paired with Malawian residents on research projects aiming to establish life-long research collaborations to support a vibrant academic environment in the KCH Department of Surgery. These projects have been sustained through diverse funding including, but not limited to, the Doris Duke Fellowship, the Fogarty International grant, the UNC Lineberger Comprehensive Cancer Center, and the North Carolina Jaycee Burn Center. In addition, senior US surgical residents on year-long rotations in Malawi share



Fig 5. Drs Enock Ludzu (KCH surgery resident), Judith Mkwaila (KCH surgery resident), Tiya Chilunjika (KCH surgery resident), Jared Tomlinson (Fogarty International Research Fellow), Boston Munthali (KCH surgery resident), Gift Mulima (KCH surgery resident), Kumbukani Manda (KCH surgery resident), Carol Shores (UNC Otolaryngology/Head & Neck Surgery), Rahim Ibrahim (KCH surgery resident), Anthony Charles (UNC Trauma & Critical Care); left to right. (Color version of figure is available online.)

clinical responsibilities and work together with Malawian residents in patient care (Fig 5). HUH also has ongoing research at KCH that includes residents and COs. The research opportunities and training for our residents in Malawi has exposed them to the possibilities of building successful academic careers in the future.

The KCH surgical residency program is dependent on collaboration, and the understanding has always been in place that the ownership for the program is Malawian. Although international donors provided financial support for equipment and training, the program is self-governed and locally run. The KCH education program uses preexisting resources such as UN volunteers and surgeons visiting via their individual universities or governments. Trainees are supported with a scholarship based on participation in the program and meeting training expectations, as well as coverage of travel costs to required regional training opportunities such as COSECSA courses and research meetings. All running expenses of the program are expected to transfer to the MMOH in the future, but the long-term commitment from all partners is necessary for the program to reach a level of self-sustainability.

EVIDENCE OF PROGRESS

In 2009, the KCH surgical residency was accredited to provide 2 years of basic surgical training to medical graduates by COSECSA on the basis of its

Table. KCH general surgery operations, 2007–2010

General surgery case type	2007	2008	2009	2010
Total major operations	1,070	1,378	1,513	1,573
Laparotomies	799	991	1,115	1,068
Head and neck surgery	205	260	260	269
Breast and chest surgery	40	47	63	73
Other major operations	26	80	75	163
Total minor operations	427	351	715	860

trainer and facility resources. Residents completing these 2 years of training are eligible to sit for exams for Membership in the College of Surgeons [MCS (ECSA)] and can competently perform basic surgical procedures such as chest tube insertion, herni-orrhaphy, appendectomy, tracheostomy, and skin grafting. The first 3 surgical residents began training in August 2009, and over the next 2 years have been joined by 6 more residents. In August 2011, the KCH surgical residency was accredited to provide the full 5 years of surgical training leading to eligibility for COSECSA Fellowship exams [FCS (ECSA)] in general surgery. The first 3 trainees sat their COSECSA Membership written exams in September 2011. Only 1 of the 3 passed this exam and the other 2 will retake the exam in 2012. Subsequently, programmatic changes have been made to the education curricula.

The first 2 years of the program have seen a gradual improvement in the KCH department of surgery. Patients are seen more often in the wards as the number of physician staff has increased. Monthly morbidity and mortality meetings are held, and the residents hold lectures on rotation weekly to present current relevant literature. The number of operative cases performed has markedly increased from 1,070 major operations in 2006 to 1,573 in 2010 (Table; Fig 6). Although we have limited capture of data at present on mortality and morbidity reduction at KCH, we have noted a trend toward more complex operations being done at the hospital, indicating a higher skill level in the surgical teams.

Before the residency program, this department like many others in the region was dependent on COs for staffing. Surgery residents have integrated within the system, supplementing and in some cases replacing the responsibilities of the COs. The goal is for surgeons to take leadership roles in caring for surgical patients at KCH. The CO role is evolving into staffing specialty areas, such as the Burn Unit, Surgical Intensive Care Unit, and the Casualty Area and providing routine care with surgeon backup. We have made clear that the

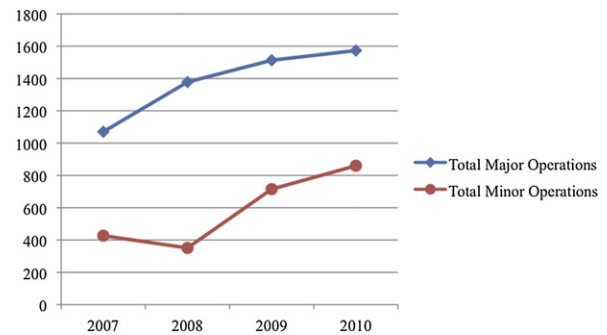


Fig 6. KCH General Surgery Operations, 2007–2010. (Color version of figure is available online.)



Fig 7. Vascular suturing workshop in May 2011 with Dr Joseph Fulton (UNC Vascular Surgery) with Dr Muyco looking on. (Color version of figure is available online.)

presence of surgical residents is not meant to replace COs within the hospital or health system, and have encouraged the efforts for CO training as detailed by van Amelsfoort et al.¹⁹ The integration of residents in the KCH Department of Surgery has precluded the need for hiring more Cos; therefore, new CO graduates are posted to other departments or local health centers or district hospitals. Thus, the trickle-down effect is to increase the number of providers available at various levels within the health system. However, as other papers have stated, we believe that fully trained general and specialist surgeons should be the cornerstone of surgical care in Africa, supported by Cos.^{6,23}

The training program is structured according to COSECSA guidelines. There is a resident council with a representative chief resident who is also responsible for administrative coordination of the residents, while also keeping the Head of Department (Dr Muyco) and the Director of Postgraduate Training (Dr Banza) aware of any concerns. The program director is responsible for the educational

activities of the program, as well as providing residents with an alternate avenue for support. It was seen as a great advantage by all the involved stakeholders that the director is a COSECSA-trained surgeon. The current educational system is based on weekly resident-led conferences attended by the entire department, and biweekly morbidity and mortality conferences. The curriculum outlined by COSECSA is followed and is supplemented by local skills workshops when specialty surgeons are present, for example, a vascular suturing workshop (Fig 7) and a casting workshop. As the needs and resources of the department continue to evolve, the education program will continue to adapt.

In conclusion, as academic departments of surgery from high-income countries partner with surgery programs in LMIC to narrow the global health inequality gap, it is imperative to both address the current healthcare needs, and to provide long-term solutions to brain drain. Our residency program tries to address these needs by providing local and internationally supported in-country training within an academic environment.

Many African nations face a shortage of surgeons. Like Malawi, many other African countries also have surgical leaders within the local healthcare system and a local medical school, providing the initial environment for a local surgical training program. Starting a new surgical training program in a resource-limited setting is challenging. We have outlined our rationale for this effort, and analyzed the resources and obstacles for this process. Other programs have also increased the number of fully trained surgeons in sub-Saharan Africa and are laudable for their successes in a difficult endeavor.^{18,27,28} However, we believe our experience involving a partnership between local initiatives and international institutions is instructive. There remain challenges in ensuring the sustainability and measuring the success of the KCH surgery residency program. The complete transfer of financial support to the MMOH has been hampered by economic instability in the nation as a whole. We also need to graduate a full complement of residents and, in the future, report post-training in-country retention.

In an environment where all academic departments face increasing financial strains, social justice efforts such as this can only be sustained through collaboration. The relationship of surgical professionals from global north and south provides an example of mutually beneficial cooperation for our surgical trainees. Our goal is not only to train future surgeons for the region, but also future trainers and leaders in surgical

healthcare. With an increasing cohort of locally trained surgeons in the future, the opportunity to bring attention and seek interventions to the huge surgical health inequalities of their populace is inevitable, particularly access to quality surgical care.

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