The Effect of a New Surgery Residency Program on Case Volume and Case Complexity in a Sub-Saharan African Hospital

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BACKGROUND: Improved access to surgical care could prevent a significant burden of disease and disability-adjusted life years, and workforce shortages are the biggest obstacle to surgical care. To address this shortage, a 5-year surgical residency program was established at Kamuzu Central Hospital (KCH) in July 2009. As the residency enters its fourth year, we hypothesized that the initiation of a general surgical residency program would result in an increase in the overall case volume and complexity at KCH.

METHODS: We conducted a retrospective analysis of operated cases at KCH during the 3 years before and the third year after the implementation of the KCH surgical residency program, from July 2006 to July 2009 and the calendar year 2012, respectively.

RESULTS: During the 3 years before the initiation of the surgical residency, an average of 2317 operations were performed per year, whereas in 2012, 2773 operations were performed, representing a 20% increase. Before residency, an average of 1191 major operations per year were performed, and in 2012, 1501 major operations were performed, representing a 26% increase.

CONCLUSION: Our study demonstrates that operative case volume and complexity increase following the initiation of a surgical residency program in a sub-Saharan tertiary hospital. We believe that by building on established partnerships and emphasizing education, research, and clinical care, we can start to tackle the issues of surgical access and care. (J Surg 72:e94-e99. © 2015 Association of Program Directors in Surgery. Published by Elsevier Inc. All rights reserved.)

KEY WORDS: Global Health, Global Surgery, Surgical Education in Sub Saharan Africa, Surgical Workforce

COMPETENCIES: Patient Care, Medical Knowledge, Practice-Based Learning and Improvement, Systems-Based Practice and Professionalism

INTRODUCTION

The burden of infectious diseases in Africa has long been recognized, but only recently has the surgical disease burden been appreciated in low- and middle-income countries (LMIC). Of surgical procedures performed worldwide, 26% occur in LMIC, an area representing 70% of the world's population.[1] Other estimates show that only 4% of the world's 234 million annual surgical procedures occur in low–health care expenditure countries, where 35% of the world's population resides.[2] The burden of disease and disability-adjusted life years that could be prevented with improved access to surgical care is similar to estimates of disease prevention from vaccination programs.[3] Injury is the greatest driver of the increased burden of surgical diseases and is a disease amenable to surgical intervention, but malignancy, congenital disease, obstetric disease, and cataracts are also important targets.

There are considerable obstacles to providing quality surgical care in LMIC. There is a dearth of health care infrastructure to support surgical care, but more importantly, there is a staggering shortage of health care personnel

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(nurses, anesthesiologists, and others). Nearly half of 132 surgical facilities in LMIC reported never having access to oxygen or anesthesia machines. Only 36% of the facilities had stable and continuous electricity and half had access to water.[4] Although these shortages are stark, the lack of trained health care providers has been shown to be the most significant challenge to developing health care programs internationally.[5]

The number of surgeons per capita in many African countries is low.[6] Migrations of health care providers to the private sector, nongovernmental organizations, or overseas, particularly to the United States and the United Kingdom, place a strain on the ability of a country to provide essential surgical services. The economic loss of a doctor migrating from Africa to another continent is estimated at US $184,000,[7] and the number of physicians leaving Africa is huge. For example, 68% of Ghanaian-trained medical graduates left the country between 1993 and 2000.[8] In Malawi, a 2003 report revealed that of the 17 surgeons registered with the Medical Council of Malawi, only 4 were Malawian,[9] and a 2002 report showed that most Malawian medical graduates pursuing surgical training were studying abroad.[10] Now a decade later, the number of general surgeons registered with the Malawi Medical Council has increased to 31; however, only 6 are Malawian.[11]

To address this shortage, the Department of Surgery at Kamuzu Central Hospital (KCH), Lilongwe, Malawi, Haukeland University, Norway, and the University of North Carolina established a 5-year, College of Surgeons for East, Central and Southern Africa –accredited surgical residency program at KCH in July 2009. The residency program aims to train residents to not only provide surgical care but also be leaders in health care in Malawi through education, clinical care, and research.[12] Although several short-term assessments of surgical training partnerships between institutions in high-income countries and LMIC have been described,[13-16] few have assessed the long-term effect of surgical residency programs on case volume and complexity at a LMIC hospital.

As the KCH residency enters its fourth year, we hypothesized that the initiation of a general surgical residency program in an environment of poor capacity and access would result in an increase in the overall case volume and complexity at KCH, thereby building capacity while increasing surgical access.

METHODS

We conducted a retrospective analysis of operated cases at KCH during the 3 years before and the third year after the implementation of the KCH surgical residency program, from July 2006 to July 2009 and the calendar year 2012, respectively. We chose the calendar year 2012 for the postresidency implementation analysis because we hypothesized that the critical mass of resident complement (10 residents) necessary to affect workflow in the program was achieved in 2012.

Study Setting and Population

We used the existing handwritten operating theater registry of operated cases at KCH, a 750-bed tertiary care hospital in Lilongwe, Malawi, with a catchment population of more than 5 million people in the central region of the country. There were 4 full-time (greater than a 6-month commitment) general surgeons, 2 full-time orthopedic surgeons, and 6 clinical officers for the entire study period, and in 2012, there was also a 10-resident general surgery residency training program. The same cohort of attending general surgeons was present during both periods, and there was no increase in expatriate surgical faculty visit in 2012. There were 2 attending urologists from 2006 to 2009, and in 2012, there was 1 attending urologist. Plain and contrast radiography, abdominal ultrasound, and echocardiography were consistently available, whereas computed tomography and magnetic resonance imaging were not available.

Study Design

Patient demographics (sex and age), indication for operative procedure, procedure performed, and operative acuity (elective vs emergent) were recorded. Operative procedures were categorized as general, trauma, skin and soft tissue, oncology, burn, urology, orthopedics, or pediatrics. Pediatric surgical procedures were further subdivided into general, trauma, skin and soft tissue, oncology, burn, urology, neurosurgery, orthopedics, and foreign body extraction as summarized in Table 1. Case complexity was determined by categorizing the operative procedure into major and minor surgery.

Minor surgery was defined as any operative procedure in which only the skin or mucus membrane and the connective tissue is resected. Cases such as incision and drainage of an abscess, skin surgery, and resection of soft tissue tumor were generally considered minor. This category also included biopsy, which is an invasive operative procedure for procurement of tissue samples or body fluids using a needle or trocar.

Major surgery was characterized as an invasive operative procedure in which a more extensive resection is performed, a body cavity is entered, organs are removed, or normal anatomy is altered. In general, if a mesenchymal barrier was opened (pleural cavity, peritoneum, or meninges), the surgery was considered major. For surgical procedures that did not clearly fall in the aforementioned categories, the chance for significant inadvertent microbial contamination was a primary consideration, and the chance for significant blood loss was a secondary consideration.