

# Surgical education at Weill Bugando Medical Centre: supplementing surgical training and investing in local health care providers

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Global surgery initiatives increasingly are focused on strengthening education and local health care systems to build surgical capacity. The goal of this education project was to support local health care providers in augmenting the surgical curriculum at a new medical school, thus promoting long-term local goals and involvement. Working with local surgeons, residents, and medical and assistant medical officer students, we identified the most common surgical conditions presenting to Weill Bugando Medical Centre in Mwanza, Tanzania, and the areas of greatest need in surgical education. We developed an 8-week teaching schedule for undergraduate students and an electronic database of clinical surgery topics. In addition, we started teaching basic surgical skills in the operating theatre, bridging to an official and recurring workshop through a supporting international surgery organization. The medical and assistant medical officer students reported increased satisfaction with their clinical surgery rotations and mastery of key educational subjects. The initiation of an Essential Surgical Skills workshop through the Canadian Network for International Surgery showed students had improved comfort with basic surgical techniques. Short-term surgical missions may appear to fill a void in the shortage of health care in the developing world. However, we conclude that global health resources are more appropriately used through projects giving ownership to local providers and promoting education as a foundation of development. This results in better coordination among local and visiting providers and greater impact on education and long-term growth of health care capacity.

Les initiatives internationales en ce qui concerne la chirurgie sont de plus en plus axées sur le renforcement des programmes de formation et des systèmes de soins de santé locaux pour consolider les capacités dans ce domaine. L'objectif de ce projet éducatif était d'aider les professionnels de la santé locaux à enrichir le programme de chirurgie d'une nouvelle faculté de médecine et de favoriser ainsi l'atteinte des objectifs et une meilleure participation à long terme à l'échelle locale. En travaillant avec des chirurgiens, des résidents, des étudiants en médecine et de futurs aides-médecins locaux, nous avons recensé les chirurgies les plus fréquentes au Centre médical Weill Bugando à Mwanza à la Tanzanie, et les domaines de la chirurgie où les besoins de formation sont les plus grands. Nous avons mis sur pied un calendrier d'enseignement échelonné sur 8 semaines pour les étudiants et une base de données électronique sur les différents types de chirurgie clinique. Nous avons également commencé à enseigner les techniques chirurgicales de base au bloc opératoire, en parallèle avec un atelier officiel récurrent, grâce au soutien d'une association internationale de chirurgie. Les étudiants en médecine et les futurs aides-médecins se sont dits plus satisfaits de leur stage de chirurgie clinique et de leur maîtrise des principaux enjeux didactiques. Le lancement d'un atelier sur les compétences chirurgicales de base, rendu possible grâce au Réseau canadien pour la chirurgie internationale, a montré que les étudiants se sentent plus à l'aise avec les techniques chirurgicales de base. Les missions chirurgicales de courte durée peuvent sembler combler une lacune dans les pays en développement où les soins de santé sont insuffisants. Toutefois, nous concluons que les ressources en santé internationale sont utilisées de manière plus appropriée dans le cadre de projets qui responsabilisent les fournisseurs de soins locaux et favorisent leur formation comme base du développement. Cela donne lieu à une meilleure coordination entre les professionnels locaux et les coopérants et exerce un impact plus grand sur la formation et la croissance des capacités en matière de soins de santé à long terme.

International volunteerism has a long-standing history among surgeons, particularly those with academic affiliations and relationships with departments of global health. With growing recognition of World Health Organization (WHO) projections that surgical diseases will represent a substantial

global health burden by 2030,<sup>1</sup> and with current data showing that 90% of deaths from injuries occur in developing countries,<sup>2</sup> this interest in surgical volunteerism has increased steadily in recent years.<sup>3</sup>

Many attempts to ameliorate the disparities in worldwide surgical care have been focused on short-term medical missions. However, these missions arguably undermine the local health care systems and disrupt relationships among physicians and their patients.<sup>4</sup> This mode of service delivery is unsustainable, perpetuating a cycle of externally imposed and often uncoordinated “solutions” that fail to offer systematic education and infrastructural development based on local goals.

In an effort to develop a sustainable global surgery relationship that will provide long-term support and engender self-reliance among local surgeons, Weill Cornell Medical College has established a relationship with the newly founded Weill Bugando University College of Health Sciences (Weill BUCHS) in Mwanza, Tanzania. Working with both Weill BUCHS and the existing Bugando Medical Centre (BMC), the project involves assisting with improving and organizing the existing surgical curriculum for undergraduate medical students, emphasizing scheduled bedside teaching, and providing training in basic surgical procedures and surgical subspecialty techniques for residents and attending surgeons in neurosurgery. It also includes the addition of the Canadian Network for International Surgery (CNIS) Essential Surgical Skills (ESS) workshop for all final-year medical students, which aims to improve student skills on a defined set of basic surgical procedures.

Unlike other missions or surgical electives in which Western surgeons travel for brief periods of time to developing countries with the purpose of performing large volumes of surgical cases, the emphasis of involvement with Weill BUCHS is to assist in the training and education of physicians to create independent and sustainable medical care. Weill Cornell has worked with Weill BUCHS surgeons to provide instruction on didactic topics and basic surgical skills and to schedule recurring visits by Weill Cornell surgical faculty and residents for teaching purposes.

This development of Weill BUCHS grew from recognition that Tanzania suffers from a dearth of physicians, with only 0.1 physicians per 10 000 population — one of the lowest physician:patient ratios in the world.<sup>5</sup> In addition, the health work force in Tanzania is unevenly distributed, with only one-third of doctors practising in the rural areas where three-quarters of the population resides.

### THE WEILL CORNELL–BUGANDO RELATIONSHIP

The surgical education project at Weill BUCHS is part of a larger relationship with Weill Cornell Medical College and the BMC (Fig. 1). The BMC is a 900-bed tertiary referral hospital that serves as the medical epicentre of the region (total population about 13 million) and employs

950 local people. It was founded by the Catholic Church in 1971, was run by the Tanzanian government from 1971 to 1985, and was subsequently returned to the control of the Tanzania Episcopal Conference of the Catholic Bishops.

Given the growing need for physicians, particularly in Western Tanzania, the Episcopal Conference opened the BUCHS at the BMC site in 2003. In 2007, it was renamed Weill BUCHS, in honour of benefactors Sandy and Joan Weill. In 2008–2009, Weill BUCHS graduated its first 35 medical doctors and its first 10 residents in internal medicine, surgery, obstetrics and gynecology, and pediatrics; all graduates were retained in Tanzania. Currently, 400 students are enrolled in the medical school and an additional 400 are enrolled in the allied health sciences (assistant medical officers, nursing, laboratory technicians and radiology).

### DEPARTMENTAL STRUCTURE AND PATIENT CARE

The surgery department employs 11 surgeons, all of whom have completed a general surgery residency at a Tanzanian or Ugandan university. In addition, many have travelled abroad to participate in short-term specialty training programs, such as orthopedics and otorhinolaryngology. There are about 5 medical officers per year assigned to these surgeons and 2–3 residents per year in each of the 3 years of general surgery residency education at Weill BUCHS. There are 250 inpatient surgical beds and 13 intensive care unit (ICU) beds.

Locally trained nurse anesthetists and anesthetic assistants provide most of the clinical anesthesia care at the BMC. One physician–anesthesiologist has regional oversight and interacts with the clinical providers daily via a morning report and education session. There is a continued emphasis in anesthesia regarding the improvement of the use of monitoring in the operating theatre, recovery room and ICU.



Fig. 1. Bugando Medical Centre, Tanzania.

In 2009, there were 59 906 patients seen in surgical clinics and 66 404 admissions to the inpatient wards; 3423 general, 1896 orthopedic and 1213 obstetrics and gynecologic surgeries were performed. Neurosurgical procedures currently are not recorded separately from general surgery procedures, but a Tanzanian attending surgeon at the BMC is now developing a collection system to track neurosurgical data specifically.

The top surgical admissions reported by the hospital statistics department include fractures, miscellaneous otolaryngology and urology, abdominal cancer, hernias, bowel obstruction, miscellaneous ophthalmology, portal hypertension, muscular tumour, ruptured spleen, cholelithiasis, obstructive jaundice, peritonitis and chest trauma.

There are 5 operating rooms (ORs), which run both elective and emergency procedures 24 hours a day, 7 days a week. Since the installation of new industrial-size driers for linens, no procedures have been cancelled owing to lack of gowns or drapes, which are all reusable cloth rather than disposable. Instruments are sterilized with autoclave machines or bleach.

Patients who are regularly employed have medical fees covered under the Tanzanian national health insurance fund. Other patients must raise cash through their own funds or assistance from family members to pay for the services they receive. Although medication and radiographic imaging, such as computed tomography scans, are available, patients must be able to pay for these before receiving them. Surgeons are salaried by the hospital, but receive additional compensation for private patients who pay additional fees for “VIP service.”

## EXPERIENCE

To help teach and train local students, residents and physicians, multiple surgical and anesthesia providers from Weill Cornell have spent time, ranging from 1 week to several months, at Weill BUCHS. These rotating visitors have included 1 neurosurgical faculty member, 1 anesthesia faculty member, 4 surgical residents, 1 neurosurgical resident and 2 nurses. The plan is to build upon this foundation of initial involvement and send future visitors so that a continuous, uninterrupted cycle of assistance with education is in place.

Through this involvement, Weill Cornell has worked with Weill BUCHS surgeons to identify local development goals and areas of greatest need for undergraduate education. This has included discussions about more formal teaching — both didactic and on technical surgical skills in the OR — ultimately bridging to the ESS workshop.

Prior to the initiation of the lecture schedule, specialists taught students short topics in an informal bedside setting. To formalize this process and ensure that students received instruction on all major surgical diseases, the most common surgical conditions presenting to the BMC were identified from a ward log review of admitting diagnoses. From

this, a formalized teaching schedule for the undergraduate students was created. It mandates 2 lectures per week augmented by 2 additional postgraduate presentations and a journal club on a topic pertinent to resource-limited settings. Lectures include history and physical exam of the surgical patient, trauma, abdominal pathology, head and neck, oncology, and skin and soft tissue (Fig. 2). Sixty medical students per year now rotate through surgery and receive organized teaching according to this schedule.

In addition to the 8-week lecture curriculum that corresponds to the medical student rotations, students present patients at biweekly bedside ward rounds and in surgical outpatient clinics. Emphasis is placed on physical examination, clinical findings and deductive reasoning that does not rely on expensive diagnostic procedures. Through coordination with the development officer and medical library of Weill BUCHS, access to electronic resources, including UptoDate and Hinari (PubMed), has been established. Students are encouraged to use these resources for

**FIRM II: General surgery routine activities for undergraduate students**

Time	Monday	Tuesday	Wednesday	Thursday	Friday
0745–0815	----- Morning report -----				
0815–0900	Lecture	Postgrad presentation	Lecture	Journal club	Postgrad presentation
0900–1500	Theatre & surgical skills	Ward rounds and bedside teaching	Clinic	Ward rounds and bedside teaching	Theatre & surgical skills

**Undergraduate teaching schedule, June–July 2010**

Date	Topic	Facilitator
June 7	History taking & general physical examination	
June 9	Trauma primary & secondary	
June 10	Examination of swelling	
June 14	Acute abdomen	
June 15	Examination of an ulcer, sinuses and fistulae	
June 16	Goitre	
June 17	Examination of thyroid gland	
June 21	Breast cancer	
June 22	Examination of breast	
June 23	Head injuries	
June 24	Examination of head injuries	
June 28	Burn	
June 29	Evaluation of burn patient	
June 30	Intestinal obstruction	
July 1	Appendicitis	
July 5	Hernia	
July 6	Evaluation of inguinal-scrotal swelling	
July 8	Gastric outlet obstruction	
July 12	Cancer of esophagus	
July 13	Examination of a case of dysphagia	
July 14	Obstructive jaundice	
July 15	Gastric cancer	
July 19	Pediatric congenital anorectal malformation	
July 20	Examination of an anorectal case	
July 21	Anorectal conditions	
July 22	Peripheral arterial diseases/diabetic foot	

**Fig. 2.** Lecture and teaching schedules.

more in-depth reading on lecture and journal club topics.

Through the CNIS, the ESS workshop was introduced to all final-year medical students graduating in 2011. An instructor's workshop was first conducted to certify local specialists and residents to teach the course, followed by a week-long course for students. The initial 2 courses trained 18 instructors and 60 students. At the conclusion of this course that taught skills ranging from knot-tying to colostomy formation, students reported marked improvement in their technical confidence (Tables 1 and 2).

Finally, local surgeons have been introduced to laparoscopy, endoscopy and other general surgical techniques, such as using mesh to perform hernia repairs. Visiting neurosurgeons have instructed Weill BUCHS surgeons on craniotomies and spinal fusion cases for trauma and infection.<sup>6</sup> These cases were coordinated so that a visiting neurosurgeon from a different American institution worked with a local Tanzanian surgeon on emergency sur-

gical decompression; the subsequent visiting neurosurgeon from Weill Cornell assisted in completion of the definitive stabilization with instruction on use of instrumentation.

Since this time, Tanzanian surgeons subsequently have performed these surgeries independently and successfully. Continued communication and consultation about complicated neurosurgical cases via email has been established and is ongoing.

### FUTURE GOALS

Based on initial experiences at Weill BUCHS, Weill Cornell visitors and local providers established goals for sustainable surgical education and health care at Weill BUCHS. Priorities included

- selecting a Tanzanian surgeon to act as a coordinator for visiting educators at Weill BUCHS and emphasize bi-directional exchange with the western world;

**Table 1. Essential Surgical Skills preworkshop survey results**

Procedure	How confident are you that you could perform these procedures without supervision? No. (%) responses					Rating average	Response count
	Not confident	Not confident in most situations	Confident in some situations	Confident in many situations	Confident in all situations		
Tie a surgical knot	16 (26.7)	14 (23.3)	15 (25.0)	11 (18.3)	4 (6.7)	2.55	60
Suture a simple wound	11 (18.3)	8 (13.3)	15 (25.0)	16 (26.7)	10 (16.7)	3.10	60
Drain a subcutaneous abscess	8 (13.6)	9 (15.3)	23 (39.0)	8 (13.6)	11 (18.6)	3.08	59
Apply a POP for a simple fracture of the forearm	6 (10.2)	10 (16.9)	18 (30.5)	12 (20.3)	13 (22.0)	3.27	59
Insert a Steinmann pin	32 (53.3)	15 (25.0)	4 (6.7)	3 (5.0)	6 (10.0)	1.93	60
Perform a normal delivery	3 (5.0)	6 (10.0)	10 (16.7)	23 (38.3)	18 (30.0)	3.78	60
Insert a spinal needle for a spinal anesthetic	8 (13.1)	15 (24.6)	18 (29.5)	17 (27.9)	3 (4.9)	2.87	61
Endotracheal intubation	18 (29.5)	16 (26.2)	18 (29.5)	8 (13.1)	1 (1.6)	2.31	61
Chest tube insertion	36 (59.0)	14 (23.0)	7 (11.5)	3 (4.9)	1 (1.6)	1.67	61
Close surgical incision after laparotomy	19 (31.1)	18 (29.5)	18 (29.5)	3 (4.9)	3 (4.9)	2.23	61
Answered questions							61
Skipped questions							0

POP = plaster of Paris.

**Table 2. Essential Surgical Skills postworkshop survey results**

Procedure	My current level of comfort with performing these tasks without supervision, no. (%)				Rating average	Response count
	Very uncomfortable	Uncomfortable	Comfortable	Very comfortable		
Scrubbing, gloving and gowning for the operating theatre	0 (0)	0 (0)	4 (13.8)	25 (86.2)	3.86	29
Knot tying	0 (0)	0 (0)	15 (51.7)	14 (48.3)	3.48	29
Venous cutdown	0 (0)	0 (0)	13 (44.8)	16 (55.2)	3.55	29
Laceration repair	0 (0)	0 (0)	12 (42.9)	16 (57.1)	3.57	28
Cardiopulmonary resuscitation	0 (0)	0 (0)	9 (31.0)	20 (69.0)	3.69	29
Adult intubation	0 (0)	0 (0)	11 (37.9)	18 (62.1)	3.62	29
Chest tube insertion	0 (0)	0 (0)	17 (58.6)	12 (41.4)	3.41	29
Ketamine anesthesia	0 (0)	7 (25.0)	16 (57.1)	5 (17.9)	2.93	28
Laparotomy	0 (0)	0 (0)	20 (69.0)	9 (31.0)	3.31	29
Bowel anastomosis	0 (0)	5 (17.2)	13 (44.8)	11 (37.9)	3.21	29
Nasogastric tube	0 (0)	0 (0)	6 (20.7)	23 (79.3)	3.79	29
Normal vaginal delivery	0 (0)	0 (0)	9 (31.0)	20 (69.0)	3.69	29
Shoulder dystocia	0 (0)	1 (3.4)	17 (58.6)	11 (37.9)	3.34	29
Vacuum extraction	0 (0)	1 (3.4)	15 (51.7)	13 (44.8)	3.41	29

- developing a living database to document educational activities in the department and emphasize teaching of conditions, such as gastrointestinal bleeding, that represent a significant burden of surgical disease in the local setting;
- providing a forum for communication among visiting surgeons and surgeons in Tanzania;
- encouraging a specific biomedical engineer to be stationed in the operating theatre; and
- establishing a regular operating theatre committee with an appointed surgeon, anesthesiologist and nurse to discuss problems related to equipment, follow infection rates and promote educational activities.

Notes from this committee would help facilitate care among local providers and visitors; email communication and consultation for complicated problems would be encouraged. There will be continued encouragement of systematic teaching, communication and coordination in a multidisciplinary approach — including pre-, peri- and postoperative care. There is emphasis on using resources that local providers are familiar with and supplying and providing education about new resources.

Overall, Cornell surgery and anesthesia involvement in the medical school at Weill BUCHS rests on the principle that providing appropriate and comprehensive surgical education benefits both health care providers and the patients whom they serve. Such training arguably is an investment in preventative health care: a physician properly educated on life-saving surgical techniques, such as those needed in trauma, not only prevents morbidity, mortality and suffering among high-risk populations, but also

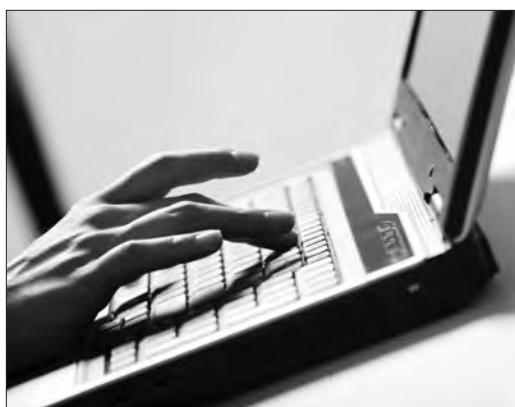
averts a burden to the health care system of caring for patients with long-term complications. This model of local, sustainable health care with multidisciplinary support from all surgical providers — generalists, subspecialists, anesthesiologists and nurses — will provide long-term educational and infrastructural development in Tanzania rather than offer potentially detrimental short-term solutions.

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