

Pretraining Experience and Structure of Surgical Training at a Sub-Saharan African University

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Abstract

Background The common goal of surgical training is to provide effective, well-rounded surgeons who are capable of providing a safe and competent service that is relevant to the society within which they work. In recent years, the surgical workforce crisis has gained greater attention as a component of the global human resources in health problems in low- and middle-income countries. The purpose of this study was to: (1) describe the models for specialist surgical training in Uganda; (2) evaluate the pretraining experience of surgical trainees; (3) explore training models in the United States and Canada and areas of possible further inquiry and intervention for capacity-building efforts in surgery and perioperative care.

Methods This was a cross-sectional descriptive study conducted at Makerere University, College of Health Sciences during 2011–2012. Participants were current and recently graduated surgical residents. Data were collected using a pretested structured questionnaire and were entered and analyzed using an excel Microsoft spread sheet. The Makerere University, College of Health Sciences Institutional Review Board approved the study.

Results Of the 35 potential participants, 23 returned the questionnaires (65 %). Mean age of participants was

29 years with a male/female ratio of 3:1. All worked predominantly in general district hospitals. Pretraining procedures performed numbered 2,125 per participant, which is twice that done by their US and Canadian counterparts during their entire 5-year training period.

Conclusions A rich pretraining experience exists in East Africa. This should be taken advantage of to enhance surgical specialist training at the institution and regional level.

Introduction

The common goal of surgical training is to provide effective well-rounded surgeons who are capable of providing a safe, competent service that is relevant to the society within which they work [1]. In recent years, the surgical work force crisis has gained greater attention as a component of the global human resources in health problem in low- and middle-income countries. Recent needs assessments, facility, and work force surveys have highlighted the many challenges facing recruiting, training, and retention of surgeons in Uganda as well as the status of hospitals providing surgical services [2–4]. Similar problems have been highlighted in other low-income Africa regions [5–7].

The purpose of this study was to (1) describe the models for specialist surgical training in Uganda; (2) evaluate the pretraining experience of surgical trainees; and (3) explore training models in North America and areas of possible further inquiry and intervention for capacity-building efforts in surgery and perioperative care. It was thought that this information would be useful to organizations and individuals regionally and globally who are focused on

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capacity-building efforts in surgery and perioperative care in Uganda and the East African region.

Current postgraduate programs

There are two mechanisms for specialist postgraduate surgical training in the East, Central, and Southern Africa region. The Makerere University College of Health Sciences (MakCHS) offers a Masters degree in Medicine in Surgery that includes course work and a dissertation. It is presently a 3-year course in which the first year focuses on biomedical science course units, which functions as a foundation for the next 2 years of clinical surgical experience. During the clinical years, trainees rotate through a number of subspecialties to gain a vast experience of surgical exposure and develop a broad skill set for managing of the wide variety of surgical conditions they are expected to encounter upon graduation. The trainees are continuously assessed as they go through their rotations. Summative assessments are done at the end of each semester via written and oral/clinical examinations. Mbarara University of Science and Technology and Nkozi University—the other universities in Uganda—also offer full-time academic postgraduate surgical training akin to that of MakCHS. A prerequisite for the Master of Medicine (MMed) program is a preceding period of service as a medical officer. Generally, this is done in rural areas, and postgraduate students enter the program with significant surgical experience, although it has not been quantified or characterized.

The College of Surgeons of East Central and Southern Africa (COSECSA), on the other hand, offers a uniquely different program. Training is undertaken in designated training institutions in the region. To increase the number of trained professionals that the region requires, COSECSA operates a “college without walls” that utilizes all health care resources for training, including regional, missionary, and district hospitals. COSECSA currently has two programs.

- *Membership* a certificate of competence in surgery at general medical officer grade (2 years training)
- *Fellowship* a specialist qualification in general surgery, orthopedics, urology, pediatric surgery, otorhinolaryngology, plastic surgery (each requires 5 years of training) or neurosurgery (6 years of training)

Admission to the College is open to all registered medical practitioners who comply with the professional requirements. The significant difference between the COSECSA program and the more academic programs already described is the facility-based training by designated mentors/supervisors. Thus, these facilities do not

“lose” their doctors to the universities for training. Ongoing assessment is done on site by the trainers following a recommended curriculum. No quotas exist for the various recommended procedures. There is a formal final written and clinical examination, the passing of which leads to the award of membership or fellowship in the College [8]. Some but not all surgical trainees complete both training programs. The COSECSA qualification also has the advantage of being automatically valid in all countries in the region.

In the United States and Canada surgical training is by way of a residency program in general surgery or a variety of other surgical specialties. Upon completion of medical school the newly qualified doctors undergo a series of examinations, interviews, and other qualification procedures before they can be “matched” to a residency program at one of the academic and nonacademic institutions that offer such programs [9, 10]. With this system there is no period of medical practice equivalent to the medical officer or general doctor level seen in many sub-Saharan countries. The trainees, known as residents, undergo at least 5 years (the first of which is for internship) of rigorous supervised training in general surgery with rotations in other surgical disciplines [11]. Training assessment is according to the Accreditation Council for Graduate Medical Education (ACGME) core competencies [12, 13]. After successfully fulfilling a minimum set of requirements and passing examinations, certification in surgery is awarded by the American Board of Surgery (United States) and the Royal College of Physicians and Surgeons of Canada. Some of the requirements for board certification [14] are the following.

- A minimum of 5 years of progressive residency education in a general surgery program accredited by the ACGME or the Royal College of Physicians and Surgeons of Canada
- No fewer than 48 weeks of full-time experience during each residency year
- At least 54 months of clinical surgical experience with increasing levels of responsibility over the 5 years
- Completing the Advanced Cardiovascular Life Support (ACLS), Advanced Trauma Life Support® (ATLS®), and Fundamentals of Laparoscopic Surgery (FLS) programs
- A minimum of 750 operative procedures during 5 years as an operating surgeon, including at least 150 operative procedures during the chief resident year
- A minimum of 25 cases in surgical critical care

The general hospital working context is that commonly performed procedures in the East African region include cesarean section, laparotomy, uterine evacuation, incision and drainage, surgical toilet and suture [4, 5].

Methods

This cross-sectional descriptive study was undertaken at Makerere College of Health Sciences, a graduate and postgraduate training College in Uganda, East Africa. Study participants included postgraduate students (or residents) and recently qualified surgeons. A survey tool was developed to assess the pretraining surgical experience of these participants. It was administered to all students in their second (clinical) year and to recently qualified surgeons.

Data that were collected included the age and sex of the participants, the category of the hospital where they had worked, duration of their post-internship work, number of weeks worked per year (minus leave), number of procedures performed per week, number of procedures performed per year, and total number of hours spent performing surgery. The data were entered and analyzed using an excel Microsoft spread sheet.

The institutional review board of Makerere College of Health Sciences approved this study.

Results

The survey questionnaire was given in person to the 15 recently graduated surgical residents (qualified surgeons), and 4 completed the survey (20 %). Recently qualified surgeons were defined as having completed the MMed program within the last 5 years. The survey was also given to all 19 of the first- and second-year postgraduate students (surgical residents), all of whom completed it (100 %). The number of years and hours worked and procedures performed prior to training were calculated from the questionnaires.

The pretraining experience for trainees and recently qualified surgeons is displayed in Table 1. The pretraining experience ranged from 1 to 10 years (average 3 years). Graduates enrolling for specialist training are likely to spend some time at a district hospital before they “qualify” for a training post. Commonly performed procedures during this period, include but are not limited to: laparotomies, surgical toilet and suture (trauma wound care), hernia repairs, cesarean sections, and uterine evacuations (Table 2).

The average pretraining experience for our participants was 3 years, 2,125 procedures were performed, and 2,798 h of hands-on operating time were accumulated per trainee. Trainees came not only from Uganda but also from South Sudan, Democratic Republic of Congo, Tanzania, and Kenya.

Table 1 Pretraining experience for newly enrolled surgical trainees and recently qualified surgeons at the time of the Makerere 2012 study

Variable	Data
Age (years), mean and range	29 (28–37)
Sex (M:F)	3:1
General hospitals (no.)	21
Bed capacity (no.)	100–150
Nationalities of participants: Ugandan, Kenyan, Tanzanian, Congolese, Southern Sudanese	<i>n</i> = 5
Trainee participants (no.)	19
Qualified surgeons participating (no.)	4
Post-internship duration (years), mean and range	3 (1–10)

Table 2 Estimated hands-on pretraining experience and supervision

Parameter	Data
Weeks worked per trainee per year	45
Procedures done per trainee per week	14 (3–25)
Procedures per trainee per year	720 (300–1,440)
Procedures per trainee (total)	2,125 (360–7,056)
Operating practice time per candidate (hours) ^a	2,798
Trainees who worked on their own without supervision	14/23 (60 %)

Results are average numbers. Ranges are shown in parentheses

^a The average operating time estimated per procedure was 1 to 2 hours, with the commonest procedures being cesarean section, hernia repair, laparotomy, and uterine evacuation. This average is for the cumulative number of hours for all trainees over the cumulative duration for all trainees

Discussion

Specialist surgical training in Uganda occurs through the MMed pathway [15] or the COSECESA pathway [8]. Their advantages and disadvantages have not been studied although it is accepted that specialist surgical trainees in Uganda and the region have significant pretraining experience during their service as medical officers, often in rural areas, this experience has not been quantified or characterized.

The current analysis shows that before specialist training the trainees had been working, on average, 3 years in the community and had each performed more than 2,000 surgical procedures. Surgical residents in the United States have no such exposure before starting their residencies. In a survey among general surgery residents graduating in 2005, nine out of ten of the most commonly performed procedures were reported to equal or exceed the mean of total ten procedures (reported experience) over a 5-year

training period [16]: cholecystectomy with a mean frequency of 87.8 %, colectomy (46.1 %), open femoral hernia repair (45.9 %), endoscopic colonoscopy (35.5 %), upper gastrointestinal endoscopy (20.2 %), laparoscopic appendectomy (20.4 %), thyroidectomy (17.8 %), arteriovenous fistula for dialysis (13.0 %), laparoscopic femoral hernia repair (12.7 %).

A surgical resident in the United States completes a minimum of 750 major cases during a five-year program. Describing the scope of exposure of Ugandan trainees during the 3-year specialist training period and how it compares with the US experience was not the objective of the study and therefore not included here.

The findings in this study emphasize the volume of surgical experience of Ugandan trainees prior to specialist training and the contribution of medical officers to diminishing the surgical disease burden in rural areas. It raises the question whether improved supervision of surgical procedures in the medical officer post (through outreach or more regular support and supervision from specialist surgeons) could offer an equivalent level of clinical expertise and perhaps greater public health benefits, as most medical officers leave their rural posts to come to the capital for specialist surgical training.

Perhaps this is the potential strength of the COSECSA program, where medical officers undergo training at their primary hospitals. With proper planning and resource allocation, this immense pretraining experience is fertile ground for increasing the number of surgeons trained while maintaining and developing an interested surgical work force in rural Uganda.

Category-based minimum quotas exist in the US and Canadian systems for licensing surgeons. This system does not exist in either of the two local training curricula in Uganda. Both COSECSA and the MMed surgery program in Uganda have developed areas of the curriculum but not quotas in the areas. It remains unknown whether minimum category-based case requirements would be practical or effective in the Ugandan context. Even in the US and Canadian context, quotas are based on consensus from senior surgeons more than evidence-based data [10]. This could be explored further through review of training logbooks and correlation with competence and performance after graduation. In a similar setting, in Botswana the Surgical Council on Resident Education (SCORE) curriculum has been adapted to the local African context, and this system also could be considered [17] in future discussions about surgical training innovations and improvement in East Africa. SCORE is a consortium that was formed in 2006 by principal organizations involved in US surgical education. Its mission is to improve the education of general surgery residents through development of a national curriculum [18].

Competencies (e.g., ACGME competencies, CanMEDS roles) have also evolved for postgraduate training in US, Canadian, and UK training programs, but similar competencies have not been developed for “resource-constrained” environments [12, 13, 19, 20]. Although it is assumed that specialist surgeons require a broader scope of practice in the African context because of the surgeon shortage and unmet surgical needs, specific competencies have not been discussed as an aspect of training. They may differ considerably from those required in the United States and Canada, and directed discussion by training program directors in the region may be worthwhile to assess whether they would be of value.

An understanding of the regional training curricula and training needs are also important for international partnerships to be successful in building local capacity for surgery. The prolonged prespecialist training practice period seen in Uganda clearly serves the purpose of providing a service for the community that needs it. What is not clear is whether this rich pretraining experience guarantees trainees better outcomes: patient care outcomes (morbidity and mortality) and academic outcomes (grades). Perhaps an in-depth exploration of outcome differences for long versus short exposure is justified.

Study limitations

The numbers of procedures performed was determined by recall. To reduce recall bias, the respondents were guided in the estimates by recalling the weekly elective operating days. Based on that figure, the participants went on to approximate the average number of elective and emergency procedures per day and the number of weeks worked (minus official leave, sick leaves, compassionate leave, and leave for workshops and conferences). Estimates would have been more accurate if we had looked at the individual operation logs, but not all of the respondents had such records readily available, which would have required visiting the individual hospitals at which they worked.

Conclusions

There is extensive pretraining experience among the surgical trainees in the East African context. This may be a rich area that could be exploited to improve the numbers and quality of the surgical work force. Also, the various differences between the Ugandan and US and Canadian surgical training programs highlight areas for potential improvement.

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Conflict of interest The authors declare no competing interests.

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