

Strategies to increase access to surgical services in resource-constrained settings in sub-Saharan Africa

Bellagio Essential Surgery group

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Strategies to increase surgical workforce

Model Proposal for Training Clinical Officers in Surgery

The Malawi Case Study

Objectives: To address the shortage of surgical specialists in general surgery, gynecology and orthopedics in Malawi by establishing a standardized Bachelors Degree program to train Clinical Officers in surgical care.

Role of the Bachelor-degree trained CO in surgery will be to:

1. Mainly to conduct clinical work in the District/Mission/Central Hospitals, specifically in surgery, gynecology, orthopaedics and trauma.
2. Lead the Operating Theater team, where the members will consist of the Bachelor-trained CO, theater nurse, anesthetic and orthopedic COs.
3. Lead the Trauma team, where the members may consist of a clinical nurse and orthopedic officer.
4. Supervise other COs who work with these departments as the most-senior CO on staff. Train and mentor other COs.
5. Hospital management will not be a part of the role of the CO although he/she will be expected to manage individual departments where they are the most senior CO staff. This cadre will not be used to cover shortages in hospital administration staffing.

Outline of the Training Program:

A. Pre-Course (prerequisite):

1. Candidates will be clinical officers who have completed a prerequisite of 2 years of "on-the-job" clinical experience at the District Hospital level.
2. Two candidates will be posted to each District Hospital as a part of this program. Malawi has 3 Central Hospitals and 1 University Hospital. The Central hospitals are associated with a total 11 District Hospitals so a maximum of 22 candidate Cos can be in the program at any given time.
3. Candidates will take a midterm exam after completing two years of clinical experience. A "Pass" will lead to a Senior CO title and the best COs will be selected for part two.

B. Bachelor program:

1. Involves 2 years of ADVANCED training for selected COs who have performed well clinically and on the midterm exam.

Structure of Training Program:

A. Pre-Course:

Aim: At the end of this component, the COs should be able to do treat the most common surgical/gynecological abnormalities. (See Addendum 1)

Education Component of Pre-Course:

1. This is a 2 year “on the job training” component at one Central Hospital and the 3-4 District Hospitals associated with it. The pre-course will be evaluated by the Malawi Medical Council for credit towards Continued Professional Development which is a new requirement for Doctors and COs. A minimum of 40 CPD points needs to be accumulated to remain registered with the Med Council.
2. Two candidates will be selected for this component based on:
 - a. A minimum of 2-3 years clinical experience in Mission/District/ Central Hospitals.
 - b. An interest in surgery.
 - c. Leadership qualities.
3. The 2 candidates will be supervised by visiting surgical specialists from the Central Hospital for 2 days every 4 weeks for the course of the two years.
4. The structure of the training is based on the current experiences of the “On the job teaching program from the CO training” in Malawi and includes the following responsibilities for the visiting surgeon and the COs:
 - a. Making Ward rounds
 - b. Seeing Outpatients
 - c. Doing operations
 - d. Teaching surgical topics by power point presentation to all medical staff of the hospital (Cont. Medical Education for all). Power point presentations are available on most of the Topics of the surgical textbooks of Dr King: Primary surgery and could be used by other countries. PPP from the WHO will also be used.
 - e. To discuss the outcome of the visit with the District Health Officer or Hospital Director every three months so that the progress of the COs can be monitored and the results of the visiting surgeon's evaluation of the ongoing care, drugs and supplies at the District Hospital can be reviewed for potential improvements.
 - f. Attachments meetings for the involved COs will be provided at the Central Hospital and will include special training which can not be provided by the visiting surgeon at the hospital visit. It is for training skills in skills labs and for teaching by other specialists: This is on: surgery (bowel suturing on goat bowels, intercostals drains, knot tying, gynecology, anaesthesia like Primary Trauma course , EarNT, dermatology and pathology).
5. The curriculum for this component is outlined in Addendum 1. All surgeons will teach the same program according the schedule.
6. Surgeon-trainers work at the Central Hospitals. Some of them are UN specialists.
7. Every 2 years a new set of COs will be posted to this Central Hospital to replace the COs who are selected for Part two of the training program. We anticipate that due to HR shortages in the country, COs who are not selected to advance to Bachelor training will not have a problem finding jobs in the health system.

8. This plan will ensure a steady source of COs to staff each Central Hospital and its associated District Hospitals and facilitate a constant cycle of teaching and supervision for COs.
9. COs with a wide experience in surgery may be considered for direct admission to the Bachelor course without formal participation in this Pre-Course. We expect approximately 6 COs who have had lengthy experience and are very skilled will be interested in entering the Bachelor course directly every two years.

Potential Training Sites for the Pre-course:

1. In the Northern Region:
 Training Unit: Mzuzu CH and 4 District Hospitals
 Examples of District Hospitals: Karonga, Rumphi, Mzimba & Nkhata Bay
 Example Mission H: Ekwendeni
 (*Mzuzu CH is on the waiting list as there are no specialists at the moment*)
2. In the Central Region
 Training Unit: Kamuzu CH in Lilongwe and 4 District Hospitals
 Examples of District Hospitals: Kasungu, Salima, Nkotakota, Dedza
 Examples Mission H: Nkhoma H
3. In the Southern Region
 Training Unit: Zomba CH and 3 District Hospitals
 Examples of District Hospitals: Balaka, Liwonde, Mangochi
4. Trainings unit: QECH Blantyre and 4 District Hospitals
 Examples of District Hospitals: Thyolo, Chiradzulu, Mulanje, Chikwawa
 Examples Mission Hospitals: Mlambe H, Holy family Phalombe, Mulanje Mission
5. CHAM Mission Hospitals may be part of these to be selected 4 hospitals.
 The Mission Hospitals need to have enough surgical patients to be able to participate. The selected CHAM CO's will have to work for the surgical departments only. This might create problems as the CO's working in Mission Hospitals do usually rotate to different, also non surgical departments every 3-4 months

Expected numbers of COs completing the pre-course every 2 years:

The Maximum capacity of taking in CO's for the pre-course will be:

2 CO's in each of the 4 DH in the NR	8
2 CO's in each of the 4 DH in the CR	8
2 CO's in each of the 3 DH in the SR (Zomba)	6
2 CO's in each of the 4 DH in the SR (QECH)	8
Total COs:	30

However, the NR is not yet ready to start making hospital visits, which means 22 COs would complete the training until Mzuzu CH could take over from QECH when the new surgeons of this hospital are ready for making surgical visits in the District Hospitals and to train COs in the

Central Hospital. The Department of Surgery OS of the QECH has indicated to be able to support the on the job training as well as the Central training for 4 years more years only at which time they will focus on the training of medical students and registrars. Therefore it is realistic to focus on 3 Central Hospitals looking after 11 District Hospitals which means that every 2 years a maximum of 22 COs could be selected for the pre- course.

Evaluation Component of Pre-Course:

1. A Midterm Exam will be conducted at the end of the 2 years Pre-Course.
2. The rationale behind the midterm exam is two-fold:
 - a. Ensure that only the best COs will be selected to proceed to the Bachelor Course.
We anticipate that of the 22 COs who will in training at any time, 80% will pass the midterm exam which means 17-18 COs will advance to the Bachelor course.
 - b. It will bring motivation and competition to stimulate all COs to do their very best to be selected. This will improve the general quality of care provided in the hospitals and will ensure that patients benefit directly from this program.
3. The COs who have scored a PASS but not selected for the bachelor degree training will have to be upgraded (suggestion: Senior Clinical Officer) and again we anticipate they will not have difficulties finding continued employment in the health system.

Arguments for conducting Pre-Course Component:

1. Ensures that this training program does not deplete the number of medical personnel in hospitals.
2. Facilitates training more Clinical Officers than would be possible if the single University Hospital had to train all the COs.
3. Improve conditions in the District/Mission hospitals involved in the pre-course through monthly quality assurance visits by the surgeons from the Central Hospital. (the wards, theatre, OPD).
4. Allows for the monitoring of general quality of surgical care in the hospitals because it will facilitate the introduction of quality assurance monitoring tools such as complication forms, and audit meetings at each District Hospital.
5. Allows Continuing Medical education for medical staff working in District Hospitals through mentorship from visiting surgical specialists.
6. On the job or hands-on learning is a growing trend in teaching institutions throughout the world. The combination of work and learning allows for immediate opportunities to reinforce the information that is learnt in a didactic setting.
7. Ensures that Candidates are comfortable working in a District Hospital setting and have seen the most common surgical cases that they will encounter on starting a career as a Bachelor-trained CO.

Conditions to facilitate successful implementation of Pre-Course:

1. Appropriate District Hospitals will have to be selected based on staffing, equipment and supply criteria.
2. Interest and cooperation of the hospital staff (MOs, COs, nurses, etc) to participating in this program.

3. Presence of a Medical Doctor at each District Hospital will be needed for daily supervision of the COs.
4. Existence of adequate visiting surgical specialists at the Central Hospitals who can participate in this program.
5. Adequate supervision of COs from visiting surgical specialists.

B. Bachelor (Advanced) Course:

Aim: at the end of the advanced training the CO will be able:

1. To perform the surgical procedures as produced by the WHO and Bellagio Essential Surgery group. **(See Addendum 2)**
2. To manage the surgical departments in a District Hospital

Education Component:

1. This will be a two-year course and provide advanced training in surgical skills at a Central Hospital with close daily mentorship by surgical specialists.
2. Most of the training will be done at Central Hospital level. The CO will learn to treat the acute and more complicated surgical/ orthopaedic /gynecological cases which can not be learned at the on the job visits during the pre-course.
3. We anticipate that 17-18 Candidates will enter this component from the pre-course and approximately 6 will enter directly due to previous work experience. This fits with the ideas of the MOH who have indicated to allow 20 COs in specializing surgery. Immediate candidates for the bachelor degree course are also those COs who have successfully completed the CHAM's CO training in the SR and in the NR. (15 CO have completed their study in the SR and 15 COs in the NR are likely to finish by April 2009, but not all of them as suitable candidates).
4. The curriculum will include rotations as follows:
 - a. 8 months in general surgery.
 - i. This includes training in paediatric surgery, intensive and local/regional anaesthesia.
 - b. 8 months in obstetrics/gynecology.
 - i. This includes: ultrasound course
 - c. 8 months in orthopedics/trauma.
 - d. CO Exchange or visiting rotations can be considered for further advanced surgical training with other African countries that have similar training models, such as Mozambique.
5. Teaching of Basic Medical Sciences will be incorporated into the curriculum as appropriate to the rotation with emphasis on anatomy, physiology, pathology
6. Learning materials and equipment to pursue self-directed learning using electronically available curricula will be encouraged.
7. Extra training in leadership and ward management will be provided over the course of the two years by the faculty at the University.

Potential Central Hospital sites for the Bachelor course:

1. **General surgery** at: Lilongwe CH, Zomba CH and later on Mzuzu CH

- a. The Surgical Department of QECH offered training for 4-5 years.
 - b. Afterwards the Department will be busy training surgical registrars and medical students
2. **Gynecology** at: QECH, Lilongwe CH, Zomba CH
 3. **Orthopaedics and Trauma** at QECH
 - a. Surgeons and gynecologists of Lilongwe, Zomba and QECH have agreed to be willing to participate in the specialized CO training. For orthopaedics we are still waiting for a reply from QECH.

Evaluation Component of Bachelor Course:

1. Continuous Assessments: The students will have a logbook in which completed rotations, skills and other achievements are recorded and signed by the (visiting) surgeon. The Logbook will be based on the detailed curriculum and will include a record of operations assisted, performed under supervision and performed independently.
2. By exams at the end of the course: This is very important but is not easy as not much is found in literature on this. Exams could potentially include vivas or other hands-on evaluations. Suggestions and ideas from other countries need to be explored to develop an adequate assessment program for this curriculum.

Arguments for conducting Bachelor Course Component:

1. Allows a rapid scale-up of COs who are rigorously trained in specific surgical care.
2. Is a viable cost-effective option for addressing the surgical health care workforce shortage in Malawi based on time and costs of training. As demonstrated by the study performed in Mozambique, the 30-year discounted costs of training and deployment, but not including start-up, are \$71,914.8 and \$167,057.7 for técnicos de cirurgia and physicians, respectively. Técnicos de cirurgia perform 1850 surgeries, while physicians perform 1159 surgeries (discounted) in the same timeframe largely because of their longer period of training. The resulting cost per surgery for Técnicos de cirurgia is \$38.87 versus \$144.1 for physicians. Today técnicos de cirurgia earn less than operating room scrub nurses in Mozambique (Mozambique Ministry of Health, unpublished). If their salaries were to double, their cost per major surgery would still be less than half that of physicians (...). Conclusion: Técnicos de cirurgia retain a substantial cost advantage in all of the scenarios. (Kruk et al. 2007: 1256/7)
3. Ensures that high quality surgical care will be provided by trained and licensed COs. Which means that for the individual patients, the improved quality of care for surgical treatment that will be available at DH level through this program means that they will not have to be referred to a far away hospital for common conditions, they can stay in the area and have better access to social support structures, they do not have to travel long distances, they can be treated faster and will sustain less medical costs which is critical in a setting of very limited financial resources.
4. Improves the referral system to get complex cases to the Central Hospital because staff will have closer professional ties.
5. Acts as a vehicle to improve communications between District, Central and University Hospitals.

6. Allows the Central Hospitals to focus on the treatment of the more complicated diseases and on teaching the medical students.
7. Allows currently overloaded medical doctors at the DHs to be supported by trained COs.
8. Tests a model that can be applicable to other countries that are facing the health care worker shortage.

Conditions to facilitate successful implementation of Bachelor Course:

1. A surgeon working in the CH will be the **head** of the Training Unit and responsible for the trainees in the Bachelor program.
2. Other members of the surgical staff will be also involved in the 8 month rotations (other surgeons, experienced Doctor and experienced COs).

Training Program Costs:

This will depend on the need identified by Department of Human Resources and the Ministry of Health. How many COs with a bachelor degree in surgery are needed in Malawi? To start one Bachelor-trained CO in each District Hospital may be a reasonable target.

1. Administration costs of the supervising University.
 - a. Costs for exams
2. Teaching:
 - a. Text books for Pre-course and Bachelor course like Textbooks of Dr King: Primary surgery and the WHO book: Surgery at the District Hospital, others
 - b. Log books
3. Skills lab:
 - a. Each Central Hospital should have the equipment for a skills lab.
4. E-learning
 - a. Computer and internet access for COs in Bachelor course
 - b. Online and CD-based learning tools such as the Surgery at the District Hospital, Primary Trauma Course and others
5. Salaries or stipends:
 - a. Program managers University
 - b. Candidate COs in Pre-Course
 - c. COs in the Bachelor Course.
 - d. Visiting Surgical specialists - As teaching is a normal part of the surgeons job, no allowances are needed to be paid to the visiting specialists. Some additions to his salary might be of importance to facilitate the training like telephone allowance or when the surgeon is involved in extra teaching at the attachment weeks.
 - e. Faculty/Surgeons who teach in the Bachelor Course at Central Hospitals and at the University
 - f. Medical Doctor at the District Hospital for daily supervision of COs.
6. Travel and accommodation costs
 - a. For Surgical specialists to travel from Central to District Hospitals for monthly 2 days supervision/teaching of Pre-Course COs.
 - b. For COs to attend attachment meetings at Central Hospitals.

- c. For program managers of the University who will supervise the course by visiting the DH and Central Hospitals.

Funding:

1. University
2. MOH
1. Private funding (NGOs)
2. Via the Bellagio Group² (World Bank, Bill Gates Foundation)

Support:

From the WHO: books, power point presentations, guidelines, protocols

Other concerns:

1. Will a CO with a bachelor degree be allowed into the Medical School as part of his career perspective?
Not likely, but this is up to the College of Medicine in each country
2. What will be the career perspective of a Clinical Officer?
Example: Diploma CO - BSc- Masters (MPH)- PHD
3. What will be the legal framework to support this training program?
There are regulations already in place to authorize CO training. (MoH, Medical Council)
There will be a professional board that supervises practicing COs, establishes licensure/diploma rules, monitors performance quality and defines recertification plans in the long-term.
4. Could other specialization programs be created for COs?
Internal medicine/ paediatrics/ HIV may be other fields that could use this model of training to address staffing shortages.

Applicability of this model to other countries:

The specialized training could also be done in other African countries with a similar set up of specialized training COs such as the Registrar training for surgeons in the COSECSA countries.

Addendum 1

Teaching Subjects in surgery, orthopaedics and trauma and on gynecology

Books mainly: "Primary Surgery" of M.King "The Surgical care at the District Hospital (WHO) and the surgical protocols from College of Medicine

1. General surgery, Theory and skills in:
 - treatment of wounds
 - hernia and hydrocele
 - surgery of sepsis
 - burns and skin grafting
 - intestinal obstruction
 - acute abdomen
 - surgical skin diseases
 - urological abnormalities
 - the use of antibiotics

2. Obstetrics and Gynecology, theory and skills in:
 - Obstetrics: breech deliveries, vacuum extractions, craniotomy and extraction, care of the pre-eclamptic patient, the partogram
 - Gynecology: manual vacuum aspiration, de indications and treatment for (sub)total hysterectomy , care for the vvf/rvf patient
 - The care and treatment for acute obstetric and gynecological problems (C Section, ectopic pregnancy, bleeding, infections, outlet obstruction)

3. Orthopedics and trauma like, Theory and skills in:
 - fractures in children
 - complications of fractures
 - management of open fractures
 - acute bone and joint infections
 - acute trauma management
 - principle of primary trauma care
 - orthopedic techniques
 - upper extremities injuries
 - lower extremities injuries
 - spine injuries

4. Anesthesia, theory and skills in:
 - primary trauma care
 - resuscitation
 - iv fluids
 - local anesthesia
 - basic principles of local infiltration, penile ring blocs and blocks for hernia surgery

5. Others like:

- Diseases and trauma in Ophthalmology, ENT,
- Biopsies and Fine Needle Aspiration
- Dermatology

Proposed PROCEDURES/ SKILLS (to be learned in the first 2 years)

1. BASIC / ESSENTIAL SURGICAL SKILLS:

in trauma:

- Wound toilet & suturing
- Skin grafts
- Intercostals drain placement
- Supra pubic catheterisation
- MUA & application of POP
- Skeletal traction
- Resuscitation

in non trauma:

- I & Ds
- Herniotomy & Herniorrhaphy
- Orchidectomy
- Orchidopexy
- Circumcision
- Hydrocelectomy
- Anal dilatation
- Suprapubic catheterisation
- Caesarean Section
- D & C
- Tubal Ligation
- Biopsy tumours eg. Lymphnode/ FNA
- Local / regional anaesthesia

Addendum 2 (as proposed by the Bellagio group)

After the bachelor degree training the CO should be able to treat common surgical/orthopaedic/ obstetric conditions at a district hospital					
	Condition	Estimated incidence of the condition ¹	Min. need of surgical intervention for the condition	Type of surgical intervention	Minimum no. interventions /year/ 300 000 pop
Obstetrical complications	Abundant postp haemorrhage	5%	5-10%	Hysterectomy	
	Prolonged labour	5%		CS	
	Obstructed labour	1%		CS	
	Eclampsia	0.1-0.5%	5-15%	CS	
	Prolapsed cord	1%		CS	
	Labour with a scarred uterus	5-15%		CS	
	Foetal distress	5-10%		Vac extr, CS	
	Tubal pregnancy	2-3%		Laparotomy	
	Post abortion endometritis-myometritis/sepsis	n.a.		Hysterectomy	
	Postpartum endometritis-myometritis/sepsis	5%		Hysterectomy	
	Intrauterine fetal death	3-5%		Craniotomy	
Total			3-5%		450-750²
Trauma and violence	Major limb fracture/injury			Reduction, POP, traction, amputation	
	Burns			Debridement, escharectomy, Simple skin grafting	
	Joint dislocation			Reduction	
	Major soft tissue injury			Debridement/Amputation	
	Pneumo/hemothorax			Thoracic drain	
	Ruptured spleen/liver/intestines			Splenectomy Damage control surgery	
	Injury to the eye			Removal of foreign body/enucleation	
	Total				
Acute surgical emergencies	Strangulated hernia		30/100 000	Lap.tomy	100
	Intestinal obstruction			Lap.tomy	
	Intestinal perforation			Lap.tomy + anastomosis/ Colostomy	
	Appendicitis			Appendectomy	
	Liver abscess			Lap.tomy, drainage	
	Major wound infection			Debridement	
	Osteomyelitis/septic arthritis			Drainage/decompression	
Total					
Non-acute surgical conditions	Congenital Hernia			Herniotomy	
	Hernia		175/100 000	Hernioraphi	500
	Breast cancer			Mastectomy	
	Chronic osteomyelitis			Curettage	
	Hydrocele			Hydrocelectomy	
	Urethral stricture			Dilatation	
	Prostate enlargement			Supra Pubic Catheterization/ (Prostatectomy)	
	(cataract)				
	Preventive circumcision		All men in fertile age	Circumcision	
	Total				