UNIVERSITY OF MALAWI

College of Medicine

Does Training in Surgical Skills of Clinical Officers in the Southern Region of Malawi Reduce Number of Surgical Referrals from District Government and CHAM Hospitals to Central Hospitals?

By

Ndiyudi Alfred Phiri
MBBS (MW)

Dissertation Submitted in Partial Fulfilment of the Requirements of the Master of Public Health Degree

December 2007

CERTIFICATE OF APPROVAL

The Thesis of Ndiyudi Alfred Phiri is approved by the Thesis Examining Committee

_____

(Chairman, Postgraduate Committee)

_____

(Supervisor)

_____

(Internal Examiner)

_____

(Head of Department)

DECLARATION

I Ndiyudi Alfred Phiri hereby declare that this thesis is my original work and has not been presented for any award at the University of Malawi or any other university.

Candidate Name **Ndiyudi Alfred Phiri**

Signature 

Date 15 December 2007

ACKNOWLEDGEMENTS

I am grateful to the Cornelis Viser foundation of Holland for financial support to conduct this survey. I am also grateful to Professor Bowie for his supervision during proposal development and all the Program Clinical Officers for their help in retrieving patient case notes and other hospital records.

ABSTRACT

Introduction : Central Hospitals in Malawi are still being overwhelmed by surgical referrals from district hospitals which are mainly manned by Clinical officers. A training programme was implemented for Clinical officers with the aim of reducing improving their skills and confidence in surgery. This study sought to assess the impact of this program on surgical referrals.

Objective: To assess the impact on surgical referrals after training of the Clinical officers in surgical skills in the southern region government and CHAM hospitals.

Design: Hospital based and 4 weeks attachment at MCHS of all enrolled Clinical Officers. This is a before and after study following a cohort of 22 Clinical officers 8 government and 6 CHAM hospitals in the southern region of Malawi.

Results: Of 5243 surgical patients collected in the ward from 2004 records 199 patients, representing 3.9% (95% confidence interval: 3.4 – 4.5) were referred to central hospitals for further management. The same data collected in 2005 after the training shows that of 4902 surgical admissions 141 (2.9%) were referred. This figure has a 95% confidence interval of 2.4 – 3.4 meaning that although there is an apparent decline in the referrals the change was still not significant. The major referral diagnoses were trauma of all forms with 36 (17.6%) cases and bowel obstruction with 34 (16.6%) cases.

Conclusion: This study has demonstrated that the lack of surgical skills in handling trauma and bowel obstruction cases leads to most referrals. The emphasis of the program should therefore mainly focus on bowel surgery and handling of accidents and emergencies.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

ACRONYMS

ATLS	Advanced trauma life support
CHAM	Christian Hospital Association of Malawi
CO	Clinical Officer
COM	College of Medicine
DHO	District Health Officer
GDP	Gross Domestic Product
EHP	Essential Health Package
HR	Human resources
MCHS	Malawi College of Health Sciences
MO	Medical Officer
MOF	Ministry of Finance
MOH	Ministry of Health
NORAD	Norwegian Agency for technical Assistance
NAC	National Aids Commission

CHAPTER 1 INTRODUCTION

1.1 Background on Malawi

Malawi is a small but densely populated country in sub-Saharan Africa. It has a total Area of 119 149 square Km and shares borders with Mozambique to the South and East, Tanzania to the North-East and Zambia to the West. The population is approximately 12 million. About 65% of the population live below the poverty line of less than US$ 1 per day[18]. Nearly all-formal health care services in Malawi are provided by three main agencies. These are the Ministry of Health (MOH), which provides about 60%, the Christian Hospital Association of Malawi (CHAM), which provides about 37% and the ministry of local government provides 1%. The other agencies namely Private practitioners, Commercial companies, the Army, and Police provide about 2% of the health services.

Health services in Malawi are delivered at three levels: primary, secondary, and tertiary levels. At primary level services are delivered through rural hospitals, health centres, health posts, and out reach clinics. District and CHAM hospitals (although some have specialist activities) provide secondary level health care services. The secondary level mainly functions to back up services of the primary level by providing surgical services. These services are mainly trauma management and obstetric emergencies. They also provide general medical and paediatric in-patient care for common acute conditions. At present tertiary level hospitals provide services similar to those provided at the secondary level but with a small range of specialist surgical and medical services.

1.2 Problem Statement

Malawi has a network of 21 district hospitals, one in each health district, and four central hospitals in the four major towns[4]. There has been recent interest in district hospital surgery in Africa with the publication of the new World Health Organisation Book "Surgery at the District Hospital" encouraging surgery to be done at a district level where it is needed rather than being transferred to tertiary centres. Even though WHO recommends surgery to be done at the district hospitals this is not happening in Malawi since there are only fifteen trained surgeons of any specialty in the whole country and there are no surgeons stationed at any of the district hospitals[4].

Most district hospitals have one doctor, the district health officer (DHO), who is recruited straight from internship and is busy with running the hospital and health district as well as overseeing the clinical work. The district health officer is helped by a number of clinical officers who are paramedic clinicians with 4 years practically orientated training. Surgeons from central hospitals also periodically visit the districts to run clinics and sometimes to operate. According to Colin Steinlechner et al from their national survey of District Hospitals and CHAM hospitals surgical activity comprised mainly of Obstetric and Gynaecological procedures (See figure 1). The reason for this discrepancy in the number of surgical procedures compared against Obstetric and Gynaecological is that clinical officers tend to refer the surgical cases. It is assumed that this is so because the clinical officers either lack surgical skills or simply do not have enough confidence to take on the challenge of tackling a surgical procedure which might be beyond their competence[4]. It is out of this context that this project was born. With support from the Ministry of health, CHAM decided to

embark on a 2 year training program in a bid of trying to reduce the number of referrals from the district to the central hospitals.

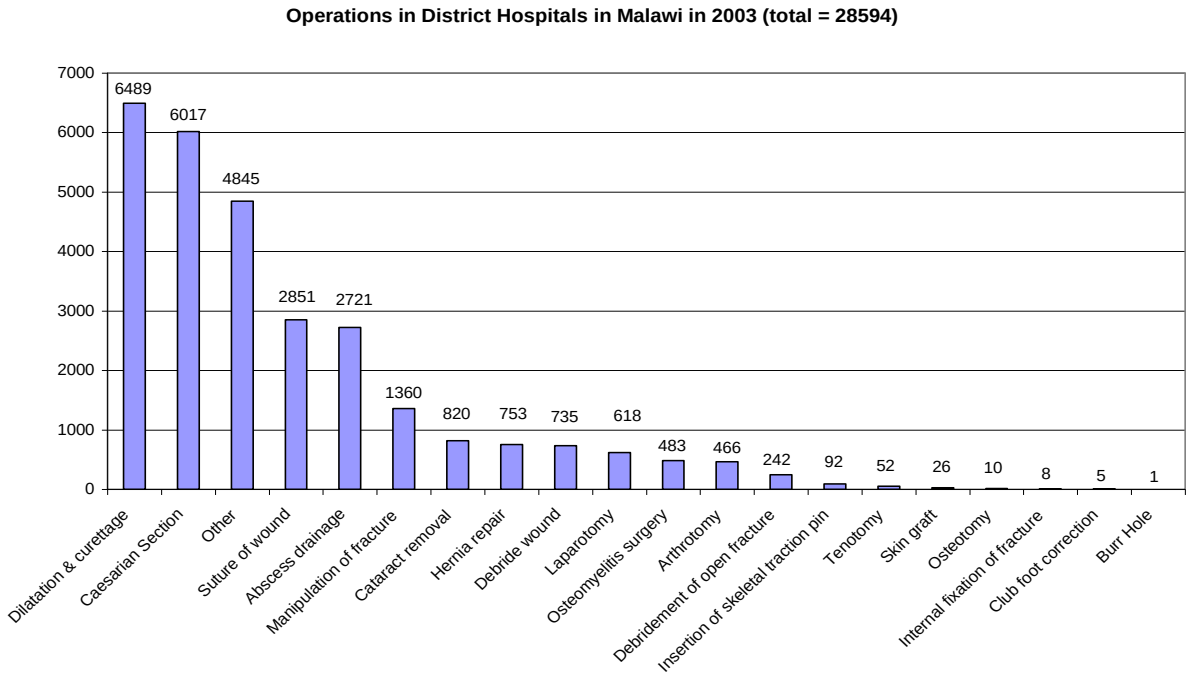

Fig 1 Operations in District Hospitals in Malawi in 2003

Source:

Colin Steinlechner, Alistair Tindall, Chris Lavy, Nyengo Mkandawire and Sandy Chimangeni. Surgery at the District hospital – What is going on? A national survey of surgical activity in the district hospitals in Malawi.

1.3 Literature review

1.3.1 The birth and role of clinical officers:

The arrival of first doctors in Malawi dates back to the year 1861 with the arrival of Dr David Livingstone who headed the Universities mission to Central Africa. Amongst the team that Dr Livingstone was heading was Dr Kirk (the first surgeon to

Malawi). The team's primary responsibilities were to discover the source of the Nile river and spread the gospel. They soon discovered that they had to be holistic in their approach hence they played a crucial role in the abolishment of the slave trade, they soon set the first mission at Cape Maclear in Mangochi in 1876. Due to harsh weather they were soon forced to move Camp to Bandawe in Nkhatabay. It was this work that led to Malawi being declared a British protectorate in 1891. With this declaration the British Government soon started sending its doctors to Malawi and set up District Hospitals. When Malawi gained its independence from the British colonial rule the British doctors also left. This paved way for Dutch doctors while Malawi started to train its own doctors abroad. Eventually the Dutch Government stopped sending its doctors in their multitude and unfortunately most if not all the doctors Malawi was training abroad were not returning due to poor working environment. After being faced with such a grave HR crisis Malawi as did most African governments resorted to reducing the rigidity in professional medical practice. They did this by removing barriers to enable lesser-trained health workers take on additional functions. The idea was to increase service delivery by compromising quality and also reducing costs of service delivery because of the phenomenon of salary compression. The salary compression rate in Malawi between the non-skilled and skilled health workers ranges from 1: 6 to 10. Looking at the Malawi's strategic human resource plans for 2013 it is almost inconceivable that Malawi can beef up her capacities for the highly trained staff (medical specialist and medical officers) by 2010. It takes almost 7 years to train a medical officer and at least further 4 years for one to become a medical specialist. Even if training opportunities were available for the above cadres it is so difficult to retain them with the present conditions of service. It is evident from this that by 2010 the Clinical officers will still remain the backbone of health service delivery. So many

countries are emulating Malawi's example of training clinical officers. Mozambique for example started training its own equivalents of clinical officers, Tecnicos de cirugia (assistant medical officers) in 1984. Zambia as well has its own equivalents of Clinical officers and the medical registration board begun recognising them in 1997 [2,6,14,23].

Clinical officers are comparable to physician assistants in the Western world. They train for three years in college and do one year of internship making up 4 years of training. Due to the lack of doctors in Malawi; doctor: patient ratio (1.6: 100 000) [10, 23] . Clinical officers go a long way in the delivery of health services. Unlike their counterparts (Physician assistants) Clinical Officers attend to several surgical and obstetric emergencies and they are managing a good proportion of CHAM and government district hospitals[4]. The lack of adequate training in surgical skills however leads to most cases being referred to tertiary level health care institutions. It is this apparent lack of surgical skills that prompted the birth of this training program and the intention is to beef up the already inculcated skills in surgery.

1.3.2 Health sector situation in Sub-Saharan Africa

The human resource (HR) situation in Malawi and the rest of the Sub Saharan Africa has reached crisis situations [5, 9, 14, 23]. The gravity varies from country to country but Malawi is one of the hardest hit countries. Factors resulting in such a grave HR situation are complex, some are exogenous and others endogenous. Exogenous factors include fiscal measures that introduced structural adjustments that resulted in cutbacks in the numbers of health workers. Endogenous factors include among others are misdirected human resource and training policies, weak institutions and inappropriate

structures [9, 14, 23]. Data on HR in the whole of Sub Saharan Africa is characterised by the following: Production of health workers has not kept pace with the need, especially with the ever-increasing burden of disease brought about by HIV/AIDS and its associated resurgent epidemics.

The number of health workers has historically been inadequate, but recent years many African countries including Malawi are suffering from scarcity of all cadres of workers. Many government health workers are ill motivated because they are poorly paid, poorly equipped, infrequently supervised and have very limited career development opportunities within the civil service [10, 23]. Many medical, technical and managerial positions are vacant and many senior medical personnel have to shoulder the responsibility of being misused by carrying out management tasks. Attrition of civil servants has reached critical rates mainly due to the search for greener pastures both locally and abroad.

Although the proximate determinant for the HR crisis is budgetary difficulty, the underlying causes can be traced to policies towards public sector employment that most African governments adopted soon after attaining independence from their colonial masters. In general most governments expanded the sizes of the civil service faster than their economies grew [23]. Employment growth was favoured at the expense of economic growth and this trend in the public sector made the real wages of the civil servants to have a nosedive[25]. The nosedive in the salaries made most trained health professionals to seek employment overseas: mainly America and Europe. Many governments after being faced with such an acute shortage of trained health professionals turned to recruiting unskilled or very lowly skilled health workers just to

supplement the few that were 'brave' enough not to be affected by the winds of change[10, 21, 23, 25, 26.] As a result of the above practice the total number of health workers in most African countries is quite high only that the workers are unskilled or very lowly trained. For instance Malawi has a total of 21 337 health workers but this figure boasts of a ratio of skilled to unskilled staff of 27: 73[10].

This is not different from Tanzania, Malawi's northern neighbour which has a total of 67000 health workers but more than half of this number is accounted for by unskilled staff [23, 26]. Because of this disparity in the mix of skills most African governments' policy makers realised that most of the work in the hospitals was actually being delegated to unskilled staff. In view of this they had very little respect for the trained health staff so they brought about a phenomenon called salary compression. This policy tends to favour salary increases in the lower ranks, further frustrating the trained health workers [9, 10, 16, 17, 23]. The salary difference between skilled and unskilled workers is in the ratio of 6 and 10 to 1[23].

1.3.3 The health sector human resource situation in Malawi

The current situation with regard to human resources in the health sector in Malawi has been described in various terms such as critical, dangerously close to collapse, collapsed, and melt down[10, 16, 17, 23].

- Total number of established posts in the health sector is 21,337. Of these 16,397 or 77% are filled leaving 4,940 or 33 % vacant.
- The total establishment for all nurses in the public sector is 6,084. Of these 2,178 (36%) are filled and 3,906(64)% are vacant.

- The total establishment for Clinical officers (in the public sector) is 560. Of these 369 (66%) are filled and 191 (34%) are vacant.

On average the population to nurse ratio for Malawi is 1: 3,500. The average for Africa in 1998 was 1: 1,000. This is equivalent to 28.6 per 100,000 for Malawi while South Africa has a ratio of 471.8: 100 000, Zimbabwe 128.7 and Tanzania 85.2. Based on the norm for Africa, Malawi needs 12 000 nurses but currently only has slightly over 4 000.

There are 156 Physicians working in MOH and CHAM. The MOH has 103 Physicians working in all the Health facilities. Of these, 81 are working in Central hospitals with 22 available outside of these. One third of the 156 are with CHAM. WHO lower case of 30 years ago, calls for 1 doctor per 12 000 population. At this rate, Malawi needs another 850 medical doctors[10]. There are 10 districts without an MOH doctor and 4 districts without any doctor [4, 10]. The national ratio of doctors to population is 1.6 to 100 000. South Africa has 56.3 per 100 000, Zimbabwe has 13.9 and Tanzania has 4.1. Of the 115 surgeons required only 17 or 15% are filled and 98 or 85 % vacant.

1.3.4 Malawi government Solutions to current health sector Human resource situation:

University of Malawi only produces 20 medical doctors per year while the Malawi College of Health sciences together with CHAM produce 120 clinical Officers.All the training institutions had plans for expansion in their strategic plans and these plans were submitted to the Ministry of health (MOH) and are available in the program of works for the MOH. By 1st March 2005 the Ministry of Health was supposed to start

implementing a compensation enhancement policy for all health workers. This has so far materialised into an addition of 52 % of old salaries for all health workers in November 2005. Training and retention alone can not meet the health sector demands for health workers, so the strategy was to recruit more, either from abroad or within the country. This activity was required to begin not later than March the 1st 2005 but delayed because there were a few critical steps that would need to be addressed among others: Carrying out a labour market survey and workload analysis and contracting an agency to conduct an in-country nurses and clinical officers' survey.

CHAPTER 2 STUDY OBJECTIVES

2.1 Broad objective:

The general objective of this project was to monitor and assess the impact of the Clinical officers training program on its goal of reducing referral of surgical cases from secondary to tertiary level health care delivery facilities. The program aims to achieve this in 2 years from January 2005 to December 2006. The goal is expected to be realised by equipping the COs with necessary skills so that they are able to do most common operations like hernia, to stabilize those patients that really need referral and to do damage controlled surgery i.e. small bowel resection in strangulated hernia and large bowel resection and colostomy in sigmoid volvulus.

2.2 Specific objectives:

1. To conduct a baseline survey in order to obtain a general overview of the number of patients treated surgically at the District and CHAM hospitals. This will involve assessment of quality of care provided, the number of surgical cases that are referred from secondary to tertiary level health care delivery facilities and also assessment of each clinical officer's surgical capabilities.
2. To have an insight into the range of surgical procedures that are referred so that this information could act as a guide to the program implementation; emphasising on the areas of surgical skills that the program needs to focus on.
3. To monitor the program so as to identify the changes in surgical practice following the training and to identify what further training is required.
4. To measure the success of the training in improving the clinical officers surgical skills and so provide evidence to support future training programs throughout Malawi.

5. To conduct a needs assessment survey in order to gain an insight into the route causes of the accelerated referrals: be it lack of equipment, shortage of Human resources or just a deficiency in surgical skills.
6. To check the quality of the training program by conducting a survey of all non- emergency Herniorrhaphies.

Chapter 3 STUDY METHODOLOGY

3.1Type of research study:

This is a before and after training study. Of the 26 Clinical officers that were initially enrolled with the program only 22 were followed up because of drop outs (1 CO for being taken out of the clinical area, 1 for moving to a teaching institution to take up a teaching post and last 2 because of a break in the visits when the contract for the specialist surgeon ended).

3.2 Study place:

This study took place in the Southern region of Malawi in 8 district hospitals (Mulanje, Thyolo, Chiradzulu, Nsanje, Balaka, and Mwanza) and 6 Mission hospitals (Mulanje, Malamulo, Nguludi, Montfort, Trinity and Mlambe).

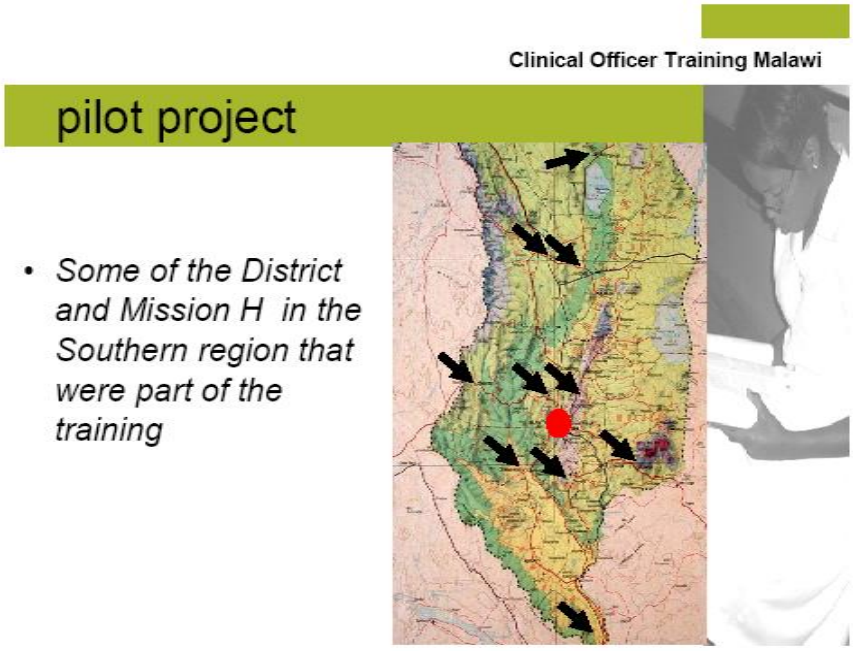

Figure 2 - Map Of the Southern Region of Malawi showing some of the Hospitals

3.3 Study population:

The program enrolled Clinical officers trained either by the Malawi College of Health Sciences or Malamulo College of Health Sciences. The Clinical Officers were only those that had already completed their 1 year of internship after graduating from college and a minimum of 3 years of experience in a clinical practice in a district or Mission hospital.

3.4 Study period:

This study was conducted over a period of 2 years starting from January 2005 to December 2006.

3.5 Sample size:

A convenient sample of 26 Clinical Officers that met the enrolment criteria were identified from the 16 district/CHAM hospitals in the southern region and asked to participate in the program. A few months into the program some Clinical officers moved to other places outside the program area, others were still at the same place but not actively involved with daily patient care and this led to some hospitals (St Lukes Mission and Machinga district hospitals being dropped from this evaluation survey.
This left only a cohort of 22 Clinical officers that were followed up for the sake of this evaluation survey.

3.6 Data collection and analysis:

This prospective cohort of 22 clinical officers was assessed for surgical competence through a structured questionnaire before and after the training program. (See appendix II). This cohort was followed for 2 years according to the training program

but only for one year for the sake of the evaluation project. Data was also collected from the theatre records from January 2004 to December 2005: all the procedures done in the major theatre were entered into an excel worksheet. Again the person performing the procedure was noted whether; Program clinical officer, other clinical officer or medical officer.

Data was also collected from the ward records for each surgical patient, hospital days of stay for hernia patients, patient outcome (whether referred, died, absconded or discharged), if referred the reason for referral and referral diagnosis. Finally data was collected on the status of surgical supplies at each hospital. This involved a questionnaire administered to the DHOs or second in command (See appendix III).

Baseline data was compiled on an Excel worksheet and analysed with the aid of Epi. Info 2002 computer package. Confidence intervals were generated and these formed the basis for comparison with evaluation data collected after one year of the initial training.

3.7 Ethical considerations

There were no serious ethical issues to be considered with this survey since it mostly dealt with collection of data from ward and theatre records. The data itself involved no patient details.

3.8 Limitations of the study

- Funding for the baseline survey came in after the training had already started so it was difficult to assess the quality of surgery using the designed tool (Appendix I) Because of this the focus for assessing quality changed to the

complications that were present after each hernia operation done by the Clinical Officers enrolled into the training program.

- Confidence among the Clinical Officers enrolled in this program might dwindle once the project comes to an end if there is no support from the visiting surgeons. This might reverse the situation making the country lose all the ground the project might have gained in terms of Clinical Officers' confidence and competence to do procedures.
- Record keeping in District and most CHAM hospitals leaves a lot to be desired; it is very likely that most case notes for patients that were operated on for hernia will not be found. This will reduce the numbers of possible data to be collected and hence reduce the power of the results.

CHAPTER 4: RESEARCH FINDINGS

In this chapter the research findings are presented. These are discussed under 5 main areas, i.e:

- Ward records – these look at the top surgical diagnoses that led to most admissions and the actual patient outcomes after admission.
- Theatre records – these focus on the type / range of surgical procedures done and the cadre performing them.
- Hernia operations – these focus on the care and outcome after hernia operation and the cadre doing the procedure.
- Competence and confidence to do surgery.
- Needs assessment survey.

4.0.0 Ward records

4.0.1: Top ten surgical diagnoses leading to admission

More than 40% of surgical admissions are due to trauma: be it trauma with or without fracture, head injury or joint dislocation. See table 1 below.

Diagnosis	Count 2004 (%) n = 5243	Count 2005 (%) n = 4902	95 % confidence interval Pre (Post)
Fracture	1098 (20.9)	861 (17.5)	19.5 – 21.7 (16.5 – 18.6)
Trauma without fracture	977 (18.6)	1213 (24.7)	17.6 – 19.7 (23.5 – 25.9)
Abscess	414 (7.9)	488 (9.9)	7.2 – 8.7 (9.1 – 10.8)
Hernia	383 (7.3)	505 (10.3)	6.6 – 8.1 (9.4 – 11.2)
Hydrocoele	262 (5.0)	273 (5.5)	4.4 – 5.6 (4.9 – 6.2)
Burns	227 (4.3)	142 (2.9)	3.8 – 4.9 (2.4 – 3.4)
Wound	190 (3.6)	204 (4.1)	3.1 – 4.2 (3.6 – 4.8)
Cellulitis	140 (2.7)	148 (3.0)	2.3 – 3.2 (2.6 – 3.5)
Dislocations	82 (1.6)	72 (1.5)	1.3 – 1.9 (1.2 – 1.9)
Bowel Obstruction	68 (1.3)	81 (1.6)	1.0 – 1.7 (1.3 – 2.7)

Table 1: Top surgical diagnoses in the ward records

4.0.2: Surgical patients outcome

At least 2.4 – 4.5 % of surgical admissions at the secondary level care institutions end up being referred to tertiary level care institutions. See Table 2 below.

Patient outcome	Count 2004 (%) n =5243	Count 2005 (%)n =4902	95 % confidence interval, pre (post)
Referral	205 (3.9)	141 (2.9)	3.4 – 4.5 (2.4 – 3.4)
Discharged	4741 (91.0)	4521 (92.2)	90.2 – 91.8 (91.4 – 93.0)
Death	103 (2.0)	89 (1.8)	1.6 – 2.4 (1.5 – 2.2)
Absconded	159 (3.1)	151 (3.1)	2.6 – 3.6 (2.6 – 3.6)

Table 2: Surgical patients' outcome

4.0.3: Leading causes of referral

Trauma of all forms and bowel obstruction are by far the 2 most important referral diagnoses. See Figure 3 below.

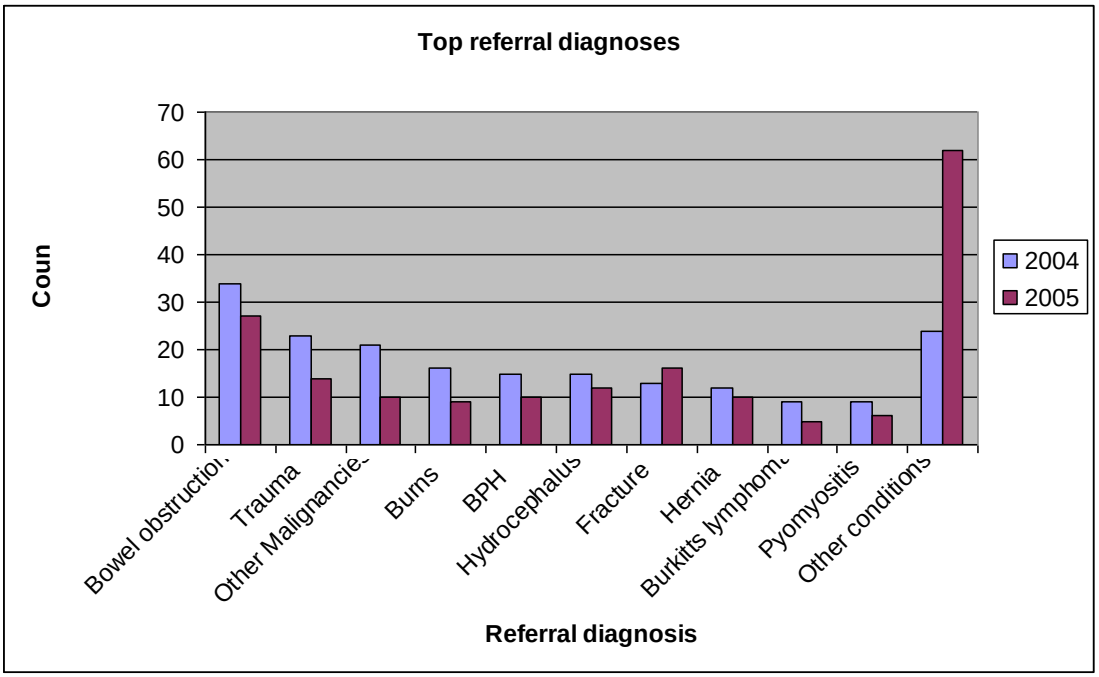

Figure 3: Top referral Diagnoses

4.0.4: Causes of deaths in surgical patients

Just as trauma is the single most admission diagnosis for surgical patients it also happens to be the single most important cause of death among surgical patients. Cancer of the Oesophagus and Bowel obstruction come second to trauma as leading causes of death. See Figure 4 below

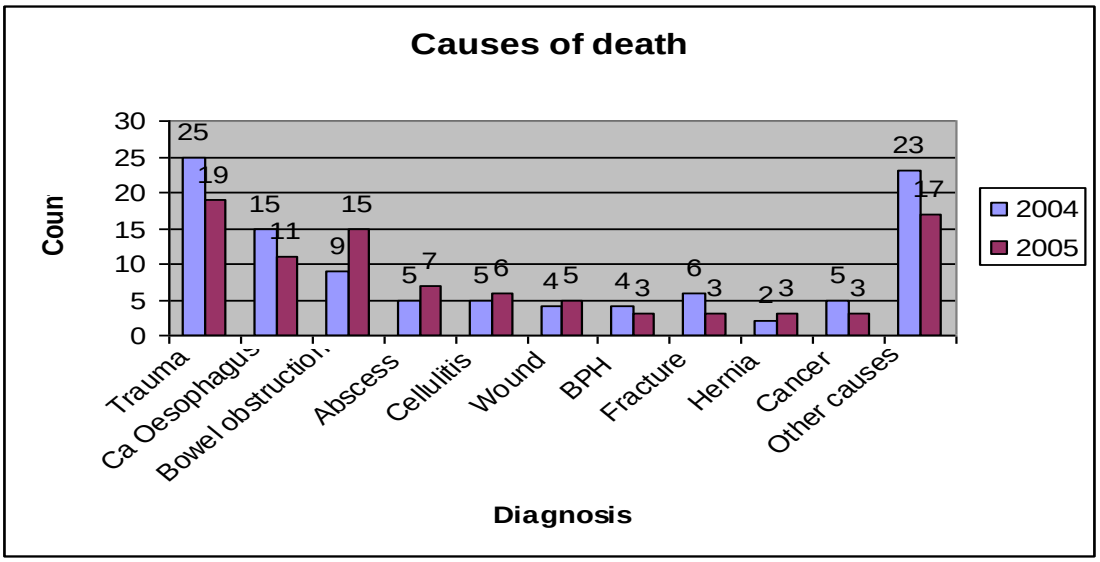

Figure 4: Causes of deaths among surgical patients

4.1.0 Theatre Records

4.1.1: Cadre performing Procedures

At least 90% 0f the surgical procedures at the District level are done by Clinical Officers. Doctors do less than 10 % of the procedure at the district level. See Table 3 below.

Cadre performing procedure	Count 2004 (%)	Count 2005 (%)	95 % confidence interval Pre (Post)
Clinical Officer	7767 (71.0)	8732 (72.1)	70.2 – 71.9 (71.3-72.9)
Program Clinical officer	2369 (21.7)	2760 (22.8)	20.9 – 22.2 (22.1-23.6)
Doctor	797 (7.3)	611 (5.0)	6.8 – 7.9 (4.7-5.5)
Total	10934	12103	

Table 3: Cadre performing Procedures

4.1.2: Procedures performed

By far the most frequent procedure in the District/CHAM hospitals' theatres is Caesarean section seconded by Evacuation of retained products of conception. The real surgical activity comprises of draining abscesses and hernia operations which are third and fourth on the most performed procedures ranking.

Procedure	Count 2004 n = 10934 (%)	Count 2005 n = 12171 (%)	95 % confidence interval Pre (Post)
Caesarean section	3622 (33.1)	3918 (32.2)	32.2–34.0 (31.3-33.0)
Evacuation	2909 (26.6)	2999 (24.6)	25.8–27.4 (23.9-25.4)
Incision and drainage	524 (4.8)	746 (6.1)	4.4 – 5.2 (5.6 – 6.7)
Hernia repair	459 (4.2)	505 (5.0)	3.8 – 4.6 (4.6-5.4)
Suturing	423 (3.9)	571 (4.7)	3.5 – 4.3 (4.3-5.1)
Laparatomy	369 (3.4)	725 (5.9)	3.0 – 3.7 (5.5- 6.4)
Hydrocelectomy	275 (2.5)	286 (2.3)	2.2 – 2.8 (2.1-2.6)
Manipulation under anaesthesia	248 (2.3)	446 (3.7)	2.0 – 2.6 (3.3-3.7)
Cutaneous cyst and tumour excision	229 (2.1)	397 (3.3)	1.8 – 2.4 (3.0-3.6)
Wound debridement	222 (2.0)	369 (3.0)	1.8 – 2.3 (2.7 – 3.4

Table 4: Procedures performed

4.1.3 Categories of procedures performed

Obstetric and Gynaecological procedures by far dominate theatre activity, with surgical activity comprising roughly 30%. See Table 5 below.

Type of procedure	Frequency 2004 (%)	Frequency 2005 (%)	95% confidence interval Pre (post)
Obstetric and Gynaecological	7797 (71.3)	8089 (66.5)	70.5–72.2 (65.6-67.3)
Surgical	3136 (28.7)	4082 (33.5)	27.8–29.5 (22.7-34.4)
Total	10933	12171	

Table 5: Categories of procedures performed

4.1.4 Personnel performing Hernia operations

Doctors do about 20% of the hernia operations compared to a modest less than 10% of all surgical operations. See Table 6 below.

Personnel	Count	Percent	95 % confidence interval
Clinical officer	200	49.4	44.4 – 54.4
Program Clinical officer	131	32.3	27.9 – 37.2
Doctor	74	18.3	14.7 – 22.5
Total	405	100	

Table 6: Personnel performing Hernia operations

4.1.5 Care and outcome after hernia operations

Of the131 hernia operations done by program Clinical Officers in 2004 only 101 case notes could be retrieved from the records; representing 77.1 %, and of 280 procedures done in 2005 only 196 case notes could be retrieved; representing 70%. This shows

serious problems with record keeping in the hospitals and reduces the power of the study because some data was lost. There was however a significant improvement in patient outcome after training in terms of non use of antibiotics both pre and post surgery, wound infection and hospital days. See Table 7 below.

	Count 2004 (n=101)	Count 2005 (n=196)	Odds ratio	Significance at 95% CI
Consent for procedure obtained	101	196	1	
Patients blood pressure checked	80	164	1.35	
Patient's Haemoglobin checked	81	170	2.10	
No prophylactic antibiotics used	79	196		***
Sac identified and procedure done according to protocol	101	196	1	
Pain Killers adequately prescribed post operatively	101	196	0	
Post operative antibiotics used	18		0.26	***
Wound infected	21	17	0.36	***
Wound separation	10	7	0.34	
Patient discharged within 7 days after operation	75	175	2.89	***

Table 7: Care and outcome after hernia operations

4.2 Competence / confidence to do surgery:

A questionnaire was also administered to the Clinical officers to assess their competence on surgical skills. Most of the program clinical officers expressed confidence to handle hydrocoeles, hernias and cutaneous tumours and major emergency obstetric surgery but not major surgery for example there were 10 bowel obstructions in 2004 that were done in the 14 hospitals; 9 (90%) of these procedures were performed by medical officers and only 1 by a program clinical officer. The same picture arose in 2005; there were 6 bowel obstruction surgeries done and 4 (66.7%) were done by medical officers and only 1(16.7% by program clinical officers. The general feeling is that the clinical officers do not really know what to expect when they open an abdomen; whether they have the competence to handle the case or not; so they feel its safer to refer other than waste time for the patient by unnecessary delays since most patients come to hospital already late.

4.3 Needs assessment survey:

Human resources: in 2004 all the 6 CHAM hospitals surveyed had doctors available. The range was 1 to 3 with an average number of 2 per institution. Of the 8 Government district hospitals surveyed only 2 had a doctor. As for the Clinical Officers all the surveyed hospitals expressed adequacy only that in other cases these had been pulled out of the clinical area and put in areas not actively dealing with patient care. In 2005 there was a slight improvement in terms of Human resources; the 6 CHAM had a total of 15 medical officers making an average of 2.5 doctors per institution. All the 8 Government hospitals had a total of 8 Medical Officers with an average of 1 MO per institution even though 3 still had no Medical officer. Although

this was the picture it did not translate into increased surgical activity by medical officers.

Material resources: All the hospitals expressed adequacy of most of the surgical supplies and utilities. Of particular concern were skin grafting equipment which was still not available in 10 out of the 14 (71.4%) hospitals. However the concern that was there on sutures and gloves in 2004 had improved a bit because the District hospitals are now mandated to procure medical supplies outside of the Central Medical Stores (the then only supplier of medical/surgical equipment for the government hospitals).

All the hospitals except Chiradzulu expressed adequacy of electricity and water. During the year Chiradzulu district hospital was still experiencing water problems; the hospital had literally no water both in 2004 and 2005, however in the second half of 2006 the hospital started getting water using a gravity fed system with funding from Medicins sans frontier.

CHAPTER 5 DISCUSSION

5.1 Types of theatre procedures and cadre operating:

What is emerging from this survey is that over 90 % of the surgical procedures at the district level are performed by Clinical Officers be it those that were enrolled with the training program or otherwise.

5.2 Surgical diagnoses:

Almost 2 in 5 of surgical admissions are due to trauma with or without a fracture/head injury. This figure is actually an under estimation of how many trauma cases are dealt with because it is only looking at the inpatients. The figure would likely be very high if the out patients were included since most of minor cases of trauma are treated as out patients.

5.3 Causes of deaths

The leading causes of death in surgical patients are trauma of all forms, Cancer of the Oesophagus and bowel obstruction. As for Cancer of the oesophagus there is very little that the district hospitals could do, even at the referral hospitals very few of these patients are operable and even those that are operated on very few survive the procedure although data is not available. All in all prognoses for these patients is very poor country wide since at the moment of presentation to the hospitals most patients with oesophageal cancer already have metastasis in lymph glands/liver etc. All the different forms of trauma combined whether involving a head injury or fracture account for almost 25% of the deaths. The program only has capacity to train the clinical officers at their respective institutions. Accidents and emergency management needs to be emphasized; it would be even a good idea to organise a separate 2 week

course on trauma management. Clinical Officers handle a lot of trauma cases like car accident victims. It would be highly advisable that these Clinical officers learnt how to stabilize these patients before referral or at least they should be taught damage controlled surgery. Although this has started in Mulanje Mission and Nsanje Hospitals this needs to be extended to all the hospitals. Negotiations have been going on with the Department of Anaesthesia of the College of Medicine, University of Malawi that the Clinical officers should do a Diploma course in trauma (ATLS course). This idea needs to be further revived with the stake holders i.e. MOH and CHAM. The idea of further training of Clinical officers in laparotomies and in trauma care has been on several occasions forwarded to the MOH. Zomba Central Hospital expressed its willingness to further train COs for post graduate courses. Up to now the MOH has accepted Zomba CH as a hospital for training COs but nothing has since been effected.

Bowel obstructions make up more than 10 % of the surgical deaths. This only brings to light the need for proper theoretical and practical skills on how to handle trauma and bowel obstructions. A monthly visit by a surgeon and 4 weeks attachment at QECH will probably not be enough to impart the necessary skills for the Clinical officers to adequately handle these emergencies.

In all 4 attachment weeks at QECH the COs have to learn small bowel resections on bowels of goats, and how to perform colostomies. They have to learn this because in rainy seasons some hospitals in Malawi like Nsanje, Muona, and in Phalombe, patients with an acute abdomen, can not be transferred to a central hospital in good time because of poor road infrastructure and sometimes make shift bridges get swept away by flood waters worsening prognosis for the patients. In view of this the COs

are trained to do “”damage control surgery””, which means doing the minimal kind of surgery to have the patient survive the acute situation after which he can be transported to a central hospital for an operation or further management which requires more skills. Unfortunately this was only being done in Nsanje district and Mulanje mission Hospitals but Mulanje Mission Hospital does not face road infrastructure problems hence patients can be transported with ease to QECH.

The focus of the training needs to be changed if the program is to bring about any meaningful impact on referral of emergency surgical patients. There is a strong indication for the Clinical officers to be attached to Central hospitals for some weeks for them to get hands on experience on bowel surgery as opposed to the 4 weeks attachment at MCHS. It was suggested by CHAM to the MOH to have Zomba C Hospital as the centre for post graduate CO training to gain surgical experience in acute abdomen, trauma, prostatectomies etc. The Zomba CH is ready to have the COs, the MOH has accepted the idea but there are still no plans for implementation. QECH is not a good hospital for COs to have them trained as it is always the registrar, other than the intern, than the medical student who comes first.

5.4 Categories of theatre procedures:

The single most common operation in both years was caesarean section seconded by evacuation of retained products of conception. These two obstetric and gynaecological procedures comprised at least 50 % of all major theatre operations.

Surgical activity comprised mainly of abscess drainage with at least 6 % of theatre procedures. The second highest surgical procedure was suturing of cuts. This is not surprising since at least 40% of surgical admissions are due to trauma anyway. The low ratio of general surgery to obstetric surgery is likely to be due to the urgency of

caesarean sections and evacuations; this means that they have to be done immediately while general surgical abdominal emergencies can be slower to develop and are more easily referred to a central hospital. It is also true that a Clinical officer can start a Caesarean section with a fairly clear knowledge of what needs to be done, but to open an acute abdomen is to take on a challenge that might be beyond their experience.

5.5 Referral of patients:

Bowel obstruction and trauma remained the 2 top referral diagnoses. The biggest number of referrals in terms of absolute figures was done by Mangochi District Hospital but in terms of percentages of surgical patients seen by each hospital then the number for Chiradzulu District Hospital is worrisome. Chiradzulu District Hospital referred more than 10 % of its surgical patients. This figure is too high; whether this is due to lack of competence to do surgery or lack of water during the years under review or due to its proximity to the referral hospital one can only speculate since this study did not specifically elucidate the reasons for referral because the data was collected in retrospect.

5.5 Discussion on hernias

Pre op care: although there were noticeable improvements in Pre op care in terms of taking patients' haemoglobin and checking Blood pressure these gains were not significant since the 95 % confidence intervals were overlapping. Intra operatively the enrolled Clinical Officers were able to identify the sac and to do the procedures according to protocol; either a Bassini or a Moloney darn repair. The training however provided some significant gains on the non use of prophylactic antibiotics. This goes a long way in saving the precious hospital antibiotics and also saves the patients income

since it would otherwise be the patients meeting the cost of these antibiotics in case of paying hospitals. Post operatively the study showed that there were significant improvements on wound infection and separation and also on hospital days patients had to stay after the procedure. With the training hernia patients are supposed to stay on average 2 days since skin is closed with a subcutaneous suture and hence no need to keep patients for 7 days waiting for the sutures to be removed which used to be the practice before the training.

Prior to the training one in three of the hernia repairs were already being done by the program Clinical Officers. The program needed to change focus, on the entry requirements; may be it picked already experienced Clinical Officers and this might have masked the actual impact this training program might have achieved. After the training the percentages of hernia operations done the Clinical Officers involved with the program may have increased but this does not necessarily mean that there is change in surgical practice but that there was a deliberate effort to reserve all the hernias for the program clinical officers for them to practice under the guidance of the visiting surgeons.

CHAPTER 6

CONCLUSION AND RECOMMENDATIONS

6.1 Conclusion

The most important fact emerging from this survey is that acute obstetric emergencies are being done in district hospitals while most acute abdominal surgery is being referred. It is well known that delay in operating on abdominal emergencies increases mortality, thus there is a strong case for improving surgical manpower and skills at a district level so that these cases can be performed. To have a surgeon at every district hospital is a distant goal for Malawi, but further training for existing medical and clinical officers in common life threatening abdominal emergency surgery and acute accidents and emergencies is a realistic first step towards that goal.

This training definitely increased the number of hernia operations at the district level not only for program Clinical Officers but also for the other COs. Not only were the numbers increased but also quality of the operation in terms of non wastage of precious Antibiotics and post operative outcomes in terms of wound infection and separation.

6.2 Recommendations:

Based on the above findings, the following recommendations are made:

1. Basing on the above findings it would be desirable if this training program were to be extended to the other regions of Malawi.
1. MOH in collaboration with College of Medicine (Anaesthetic Department) should strongly consider starting a Diploma Course in ATLS.
2. MOH in collaboration with CHAM should make Zomba Central Hospital as a Surgical skills training institution for Clinical Officers.

REFERENCES

1. Arvidsson D, Berndsen FH, Larsson LG, Leijonmarck CE, Rimback G, Rudberg C,Smedberg S, Spangen L, Montgomery A. Randomized clinical trial comparing 5-year recurrence rate after laparoscopic versus Shouldice repair of primary inguinal hernia. Br J Surg. 2005 Sep;92(9):1085-91.
2. Caetano Pereira, Antonio Bugalho, Staffan Bergstrom, Fernando Vaz, Manuel Cotiro. A comparative study of Caesarean section deliveries by assistant Medical officers in Mozambique. British Journal of Obstetrics and Gynaecology. June 1996, Vol. 103, pp. 508-512.
3. Cameron Bowie. Mid term review of the clinical officer surgical training program (Unpublished).
4. Colin Steinlechner, Alistair Tindall, Chris Lavy, Nyengo Mkandawire and Sandy Chimangeni. Surgery at the District hospital – What is going on? A national survey of surgical activity in the district hospitals in Malawi.
5. Dovlo D. The brain drain and retention of health professionals in Africa. Accra, September 23-25. 2003.
6. Fernando Vaz, Staffan Bergstrom, Maria de la luz Vaz, Jose Langa, Antonio Bugalho. Training medical assistants for surgery. Bulletin of the World health organisation, 1999, 77 (8) pp. 688 – 690.
7. Gibson D W., Conor DH, Brown HL et al. Onchocercal dermatitis; ultrastructural studies of microfilariae and host tissues, before and after treatment with Diethlycarbamazine. American journal of tropical medicine and hygiene. 1976 ; 25: 74-87
8. Gordon C. Mansons Tropical Diseases. 20th edition 1996. 1338-1351

9. Haggopian A., Thompson MJ, Fordyce M, Johnson KE, Hart LG. Migration of physicians from Sub – Saharan Africa to the United States of America: Measures of the African brain drain. Human resources for health 2004 ;2 :17. Elsevier Publishing inc. London.
10. Hornby P, Ozcan S. Human resources for health sector strategic plans for Malawi, 2003 to 2013. January 2003
11. J. van Driel, Incidence and predisposing factors of inguinal hernias an adults in the Presbyterian Medical Institution, Manyemen, Cameroon.
12. Junge K, Rosch R, Klinge U, Schwab R, Peiper Ch, Binnebosel M, Schenten F,Schumpelick V. Risk factors related to recurrence in inguinal hernia repair: a retrospective analysis. Hernia. 2006 Aug;10(4):309-15. Epub 2006 May 23.
13. King Maurice, Bewes Peter, Cairns James, Thorton Jim. Primary surgery – Oxford medical publications. Low priced edition. 1990
14. Liese B. The state of the health work force in Sub-Saharan Africa: Evidence of crisis and analysis of contributing factors. African Region Human development , Working paper series: September 2004.
15. Mc Mahon JE, Sowa SI, Mauda GH, Hudson CM, and Kirkwood BR. Epidemiological studies of Onchocerciasis in Savanna Villages of Sierra Leone. Tropical Medical Parasitology. 1988; 39: 260-268.
16. Muula A., Maseko F. How are health workers earning a living in Malawi? BMC Health services research 2006, 6:97.
17. Muula A., Maseko F,. Survival and retention strategies for Malawian Health professionals. EQUINET discussion paper number 32, Nov 2005.
18. National Stastical Office. Malawi demographic health survey 2004.

19. Ogilvie L., Mill JE., Fanning A., Opare M. The exodus of health professionals from Sub Saharan Africa: balancing human rights and societal needs in the twenty first century. Nursing inquiry 2007; 14 (2) : 114-124.
20. Ooms G., Van Damme W., Temmerman M. Medicines without doctors: Why the global fund must fund salaries of health workers to expand AIDS treatment. Plos medicine. April 2007, Vol 4, Issue 4.
21. Record R, Mohiddin A. An economic perspective on Malawi's medical brain drain. Globalisation and Health 2006, 2:12.
22. Tessier DJ, Swain JM, Harold KL. Safety of laparoscopic ventral hernia repair in older adults. Hernia. 2006 Mar;10(1):53-7. Epub 2006 Feb 23.
23. The health sector: Human resources in Africa. Academy for educational development. An issues paper. February 2003.
24. The primary health care package for South Africa-norms and standards for district hospitals, Department of health, Pretoria, March 2001.
25. World Bank 1994. Better health in Africa: Experience and lessons learnt. Washington DC. The World Bank.
26. World Health organisation. 2002. The world health report 2002: Reducing risks, promoting healthy life. Geneva: WHO.

Appendix I - Quality of training assessment tool.

Pre op assessment and patient preparation

	YES	NO
Primary Hernia		
Consent for procedure obtained		
Patient's Blood Pressure checked		
Patient haemoglobin sample taken		
IV infusion with at least 18 G or bigger calibre		

Intra operative observations

	YES	NO
No Prophylactic Intra operative antibiotics given		
Able to identify the Sac		
Procedure performed according to protocol (Bassini/ Moloney darn)		
Technical errors like ilio-inguinal nerve entrapment		
Used non-absorbable suture for strengthening posterior wall		

Postoperative observations

	YES	NO
Post operative pain killers prescribed		
Collection of Haematoma on incision site/scrotum		
Wound separation		
Infected incision		

Patient requiring reopening after initial surgery		
Immediate recurrence of hernia		
Use of post op antibiotics because of infection		
Patient discharged within 7 days of procedure		
Patient stayed longer than 7 days because of complications		

Appendix II – Competence/Skills Questionnaire

Do you have the competence to do the following procedures on your own? If yes how many were you able to do last year?

Elective surgery

	YES	NO	Number done last year
Herniorrhaphy			
Hydrocelectomy			
Cutaneous cysts and tumours			
Skin grafting			
Male circumcision			
Lipoma excision			
Haemorrhoidectomy			
Tubal ligation			
Total hysterectomy			
Sub total hysterectomy			
Colostomy closure			
Limb amputation			
Anal dilatation			
Fistulectomy			

Emergency surgery

	YES	NO	Number done last year

Uterine curettage			
Caesarean section			
Ruptured ectopic pregnancy			
Obstetric hysterectomy			
Craniotomy			
Shrodikar/MacDonalds suture insertion			
Breast abscess			
Skin abscess			
Appendicectomy			
Strangulated hernia with bowel resection			
Strangulated hernia without bowel resection			
Bowel obstruction due to adhesions			
Bowel obstruction due to volvulus			
Colostomy			
Gastro-duodenal perforation closure			
Splenectomy			
Cystostomy			
Open fractures			
External fixation of open fractures			
Immobilisation of simple closed fractures			
Burr holes			
Amputation of limbs			
Suprapubic catheterisation			

Appendix III - Needs assessment questionnaire

For the following tick yes if always available, P for sometimes and No if not available

	YES	P	NO
Water			
Electricity			
Autoclave			
Boiler			
Sutures			
Dressings			
Gloves			
Oxygen			
General anaesthesia			
Craniotomy equipment			
Thoracic surgery equipment			
Orthopaedic surgery equipment			
Internal fixation tools i.e. nails, plates.			
Skin Grafting equipment			

For the following indicate number available

	How many
Oxygen concentrators	
Anaesthetic clinical officers	

General clinical officers	
Orthopaedic clinical officers	
Theatre nurses	
Visiting Surgeon frequency/month	
Bowel surgery sets	
Laparatomy sets	
Hysterectomy sets	
Caesarean section sets	
Hernia sets	
Minor sets	

Appendix IV – Monthly Hospital and 2 weeks at MCHS program

The clinical officers would each get a monthly visit from a specialist surgeon. The daily activities on this day of visit included the following:

- Selection by the clinical officer in collaboration with the visiting surgeon of surgical patients requiring theatre.
- The clinical officer made ward rounds of surgical patients in the company of the specialist surgeon.
- The clinical officer made operations together with the specialist surgeon.
- At lunch surgical topics from the book “Primary surgery” by Maurice King to be discussed.
- After theatre procedures the clinical officer would review together with the visiting specialist surgeon a maximum of 10 selected surgical patients.

On top of the above monthly visits the clinical officers were required to spend 1 week each year at the Malawi College of Health Sciences. See appendix IV for the proposed schedule of the 1 week. The program for the 2 weeks was in 2 parts: theory, taught by lecturers from the departments of general surgery, orthopaedics, obs/gynae, anaesthesia and the Department of Radiology, of the College of Medicine, University of Malawi and practical sessions at Queen Elizabeth central Hospital. See appendix IV for the proposed program.

Program for MCHS 1 week attachment:

1. Department of Surgery of the college of Medicine

Hernia

Surgery of sepsis

Intestinal obstruction

Burns

Acute abdomen

Urological abnormalities

The use of antibiotics

2. Orthopaedic department of the college of Medicine

Acute trauma management

Principles of primary trauma care

Orthopaedic techniques

Upper extremity injuries

Lower extremity injuries

Spine injuries

Fractures in children

Complications of fractures

Management of open fractures

Acute bone and joint infections

3 Anaesthetic department of the college of Medicine

Resuscitation

IV fluids

Local anaesthesia

Basic principles of local infiltration, penile ring blocks and blocks for hernia surgery

Parts of primary trauma care (ABC)

4. Department of Gynaecology and obstetrics

Caesarean section

Ectopic pegnancy

Bleeding

Infections

Proposed procedures to be learned within 2 years

Basic / essential Surgical skills

In trauma

Wound toilet and suturing

Amputations

Skin grafts

Intercostals drain placement

Suprapubic catheterisation

Skeletal traction

MUA and application of POP

Reduction of dislocations

Skull burr holes

In non trauma

Incision and drainage

Laparatomy: closure of single perforation

Caesarean section

Dilatation and curettage

Tubal ligation

Ectopic pregnancy and tubo-oophorectomy

Repair of perineal lacerations inobstetrics

Anal dilatation

Suprapubic catheterisation

Hydrocelectomy

Herniotomy and herniorrhaphy

Orchidectomy

Circumcision

Orchidopexy

Biopsy of tumours; lymph nodes

Sequestrectomy

Arthrotomy

Bowel anastomosis and colostomy

Primary trauma care