Short term outcomes and associated factors For Relaparotomies At Muhimbili National Hospital

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SHORT TERM OUTCOMES AND ASSOCIATED FACTORS FOR RELAPAROTOMIES AT MUHIMBILI NATIONAL HOSPITAL

By

Andrew Y. Swallow

A Dissertation Submitted in (Partial) Fulfilment of the Requirements for the Degree of Master of Medicine (General Surgery) of

Muhimbili University of Health and Allied Sciences

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CERTIFICATION

The undersigned certifies that he has read and hereby recommends foracceptance by Muhimbili University of Health and Allied Sciences a dissertation entitled, ***short term outcomes and associated factors for relaparotomies at Muhimbili National Hospital***in (partial) fulfillment of the requirements for the degree of Master of Medicine (General Surgery) of Muhimbili University of Health and Allied Sciences.

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Dr Larry Akoko

Supervisor

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Date

DECLARATION AND COPYRIGHT

I, **Andrew Swallow,** declare that this dissertation is my original work and that it has not been presented and will not be presented to any other university for a similar or any other degree award.

Signature …… Date……...

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DEDICATION

To my **parents** for being thebest in the world.

To my lovely wife, **Nkeshimana** and daughter,**Eleuteria** fortheir love and support.

ABSTRACT

Background: Relaparotomies continue to be a challenge since they carry a high morbidity and mortality despite developments in general surgery services. Globally, an incidence of 0.6-24% of relaparotomy rates with its indication and adverse effects have been reported in various studies. At MNH, it has been observed that a significant proportion of abdominal surgery cases due to intestinal obstruction and peritonitis have high likelihood of subsequent relaparotomy. This study will determinethecharacteristics, magnitude and outcome of relaparotomies among patients attending MNH.

Methods: A cross sectional, hospital-based study was carried out for a period of 12 months involving 101 patients who underwent relaparotomy within a period of 60 days of the index laparotomy in the department of surgery at MNH. Indications, findings at surgery, surgery done and short-term outcomes were recorded in a data collection tool and analyzed.

Results: There were 101 relaparotomiesdone at MNH withrepeat laparotomy rate of 7.6%. Patient's mean age was 37±19.7 (0.024 – 86) years. Residents and registrars performed majority of emergency surgery, 68.4%. Bowel repair or anastomosis was the leading procedure done (47.5%).The common indications for relaparotomy included anastomotic leak (37.6%), abdominal abscess/collection (29.7%), bowel fistula (19.8%) and wound dehiscence (18.8%). Short term outcomes for relaparotomy included electrolyte imbalance (22.9%), anemia (21.5%), wound infection (18.9%), prolonged hospital stay and death (40%). Septicemia (80%) was the main cause of post-operative deaths.

Conclusion: Repeat laparotomy at MNH was low compared to other studies but its accompanying mortality rate and complications were both highat 40 %. Bowel leak following emergency bowel surgeries is the most frequent cause for relaparotomies and subsequent fatalities. These surgeries are done at night by junior surgeons, residents and registrar**s**.

Key words: Relaparotomy, morbidity, mortality

TABLE OF CONTENTS

CERTIFICATION i
DECLARATION AND COPYRIGHT ii
ACKNOWLEDGEMENT iii
ABSTRACT v
1.0 INTRODUCTION 1
1.1 BACKGROUND 1
1.2 LITERATURE REVIEW 2
2.0 PROBLEM STATEMENT 4
3.0 RATIONALE 5
4.0 RESEARCH QUESTIONS 5
5.0 RESEARCH HYPOTHESIS 5
5.1 Null hypothesis 5
5.2 Alternative hypothesis 5
6.0 OBJECTIVES 6
6.1 Broad objective 6
6.2 Specific objectives 6
7.0 METHODOLOGY 7
7.1 Study design and duration 7
7.2 Study area 7
7.3 Study population 7
7.4 Inclusion criteria 7
7.5 Exclusion criteria 7
7.6 Sample size 7
7.7 Sampling procedure 8
7.8 Data collection procedure 8
7.8.1 Pre operative evaluation 8
7.8.2 Post-operative evaluation 9
7.9 Study Variables 9
7.9.1 Independent variables 9
7.9.2 Dependent (outcome) variables 9

7.10 Data analysis 9
7.11 Study limitations 10
7.12 Ethical considerations 10
7.13 Dissemination of findings 10
8.0 RESULTS 11
8.1 Description of study participants 11
8.2.1 Procedures done during index surgery (laparotomy) 13
8.2.2 Indications for relaparotomies 13
8.2.3 Description of the most common indications for relaparotomy 15
8.3 Short term outcomes of relaparotomy 19
9.0 DISCUSSION 20
10.0 CONCLUSSION AND RECOMMENDATIONS 23
10.1 CONCLUSION 23
10.2 RECOMMENDATION 23
11.0 REFERENCES 24
12.0 APPENDICES 26
12.1 APPENDIX 1; PATIENT'S DATA SHEET 26
12.2 APPENDIX 2; CONSENT FORM (ENGLISH VERSION) 29
12.3 APPENDIX 3: CONSENT FORM (KISWAHILI VERSION) 31

LIST OF TABLES

Table 1: Baseline characteristics of study participants and laparotomy 12
Table 2: Association between study participant characteristics and anastomotic leak..... 15
Table 3: Association between study participant characteristics and peritoneal abscess..... 16
Table 4: Association between study participant characteristics and bowel fistula..... 17
Table 5: Association between study participants characteristics and wound dehiscence..... 18
Table 6: Short term outcomes of relaparotomy 19

LIST OF FIGURES

Figure 1: Index laparotomy procedures 13
Figure 2: Indications for first relaparotomy..... 14
Figure 4: Indications for second relaparotomy 14

LIST OF ABBREVIATIONS

CT	-	Computerized Tomography
HIV	-	Human Immunodeficiency Virus
ICU	-	Intensive Care Unit
MNH	-	Muhimbili National Hospital
MUHAS	-	Muhimbili University of Health and Allied Sciences
SPSS	-	Statistical Package of Social Sciences
UK	-	United Kingdom
USA	-	United States of America

DEFINITION OF TERMS

Short term outcome; Refers to treatment outcome within 30 days after surgery.

Mortality; Refers to occurrence of death within 30 days following relaparotomy.

1.0 INTRODUCTION

1.1 BACKGROUND

The term "Relaparotomy" refers to operations performed within 60 days in association with the initial surgery. It is categorized as early or late; urgent or elective; and, planned or unplanned depending on the performed period, urgency, and whether or not it is scheduled (1,2). The two widely used relaparotomy strategies are on-demand or unplanned and planned relaparotomy. The planned relaparotomy is scheduled relaparotomy performed every 36–48 hours after the index laparotomy to inspect, drain, lavage and perform other necessary abdominal interventions for residual peritonitis or new infections until findings are negative macroscopically. On-demand relaparotomy is performed in patients with clinical deterioration or lack of improvement with a likely intra-abdominal cause (3, 4).

There has traditionally been reticence to perform relaparotomy after abdominal surgery because of difficulty in establishing the diagnosis, risks of transporting critically ill patients to theatre and subjecting them to further surgery and anesthesia. However, intra-abdominal sepsis and continued hemorrhage is associated with a high mortality. Relaparotomy itself increases morbidity and mortality such as patient’s stress and intraoperative handling of abdominal contents may lead to ileus and delays in performing surgery increase chances of multi organ failure which is the common final pathway for death in many of these patients. (4,5) Monitoring of patients by combining clinical criteria, laboratory tests and imaging results makes adequate and timely identification of patients for relaparotomy within the on-demand strategy possible.

Despite lack of evidence from randomized trials, overall support for the on-demand strategy even among patients with severe peritonitis is growing (3, 6). Some studies show that on demand relaparotomy did have a substantial reduction in subsequent relaparotomies, health care utilization, and medical costs but there was no significant difference in the postoperative mortality rate compared to that of planned relaparotomy (7, 8, 9). Whether it is planned or OD(on demand) will influence the rates reported from any institution: it is expected that facilities that perform OD repeat laparotomy will report lower rates (8, 10, 11).

The success of any operation depends on the well-being of the patient after the surgery. Thus the decision to operate and the surgery itself must be performed by senior and experienced surgeons (12).This decision is more difficult in children than adults due to difficulties in establishing their symptoms and signs and atypical presentation of diseases in children. It is estimated that the mortality rate for this type of re-do surgery ranges up to 61% (9, 13−17).

In our setting, medical officers of two groups perform general surgery (residents in training and medical doctors not in training) taking the most of emergency operations while the specialists take almost all elective operations. Secondly, the hospital practices primary abdominal wall closure even in extensively contaminated peritoneal cavity with pus and late presentation of our patient population. Observation had it that there is high rate of repeat laparotomies here and the feeling of reduced supervision among medical officers performing surgery. Coupled with lack of clear guidelines on how to handle emergency laparotomies, documenting and understanding the depth of this practice is necessary.

1.2 LITERATURE REVIEW

Relaparotomy can sometimes be required following various complications of intra-abdominal operations. Relaparotomies continue to be a challenge in general surgery services since they carry a high morbidity and mortality risk despite developments in surgical techniques, anesthesia, intensive care monitoring, antibiotherapy, and medical technology(18).Incidences of 0.6-24% of relaparotomy rates have been reported around the world in various studies (19−21). At MNH it was observed that there were increased incident of relaparotomy due to mainly surgical inflammatory conditions with no clear protocol on handling these patients. Efforts to optimize these patients' outcome are very vital as they are prone to have multiple morbidities and death.

Various studies have been done on and found that indications for relaparotomy were bleeding, infection, anastomotic leakage, intestinal fistula, explorative relaparotomies, wound dehiscence, necrotizing pancreatitis, bowel necrosis, bowel obstruction and other miscellaneous causes (15, 18, 22).

At our center we don't have any published data on these indications thus lacking of preventive measure protocol to reduce the occurrence of relaparotomy and subsequent complications.

Relaparotomy has been associated with varied rates of mortality ranging from 15− 44% in various clinical situations.(18,22) Various studies have investigated factors responsible for this high mortality rate. Sepsis has been found to be the leading cause of death.(23) This can be very high in our setting especially in the retrospective review due to lack of well coordinated post operative critical care at the time of their management. Other factors found to be associated with this high mortality are poor ASA class and existence of cormobidities.(22) This is especially true where the index surgery was an emergency and in need of a lot of life support. Time between index surgery and relaparotomy has also been shown to be significantly associated with high mortality. (8) The timing can be long especially when patients were discharged and have to be readmitted with a complication in need of relaparotomy. Bowel anastomosis related anastomotic leak has also been shown to increase mortality rate significantly.(15)

Studies have noted various factors affecting mortality following relaparotomies. Among them are whether the relaparotomy is planned or emergency, early or delayed, old age, and whether it was done during the day or night time.(18) How this factors play among our relaparotomy patients at MNH has not been studied and need to be investigated to enhance outcome among our patients. The practice in our setting is most likely going to fall under the unplanned relaparotomy approach usually depending on availability of operating slot can be during day time or at night since there is no understanding of the magnitude of the problem hence no policy.

Relaparotomies also carry high morbidity to both patients and hospitals. It has been reported that these patients experience long hospital stays, long ICU stay, invasive management costs and distress to the families.(6, 8) In this study being set in a public hospital, the morbidity are expected to be even costly to the institution than the patients due to exemption and cost sharing policy. This means that services are not at their best with lack of ICU beds, lack of parenteral nutrition, not readily available dialysis services and blood shortages.

2.0 PROBLEM STATEMENT

Relaparotomy can sometimes be required as a result of various complications following abdominal surgery. It continues to be a problem in general surgery practice since it carries high morbidity and mortality risk despite developments in surgical techniques, anesthesia, intensive care monitoring and medical technology.

There are limited studies which have been done at specific centers and none from MNH and Tanzania as a whole on relaparotomies after abdominal surgery for the purpose of establishing its magnitude and the related adverse effect.

3.0 RATIONALE

It has been observed that a significant proportion of major abdominal surgery cases including those due to intestinal obstruction and peritonitis have high likelihood of subsequent relaparotomy.It is against this background results of this study will help in refining our methods for the purpose of limiting the need for avoidable relaparotomiesand unwanted consequences of it.

4.0 RESEARCH QUESTIONS

i. Is relaparotomy a big problem at MNH? What is its magnitude?
ii. What is the outcome of relaparotomy at MNH?

5.0 RESEARCH HYPOTHESIS

5.1 Null hypothesis

The frequency and short term outcome of relaparotomies after abdominal surgery are not associated with socio-demographic characteristicsof patients or rank of operating surgeon.

5.2 Alternative hypothesis

The frequency and short term outcome of relaparotomies after abdominal surgery are associated with socio-demographic characteristics of patientsor rank of operating surgeon.

6.0 OBJECTIVES

6.1 Broad objective

To determine patient characteristics, magnitude and outcome of relaparotomies among patients attending Muhimbili National Hospital.

6.2 Specific objectives

i. To describe characteristics of patients undergoing relaparotomies at MNH
ii. To determine the magnitude of relaparotomy at MNH.
iii. To establish the outcome of relaparotomies at MNH.

7.0 METHODOLOGY

7.1 Study design and duration

This was a cross sectional, hospital based study that was conducted from March 2017 to February 2018.

7.2 Study area

The study was conducted in the department of surgery of MNH which is a Public university teaching hospital and a National referral medical center located in Dar-es-Salaam city in the Eastern part of Tanzania. The city has a population of approximately of about 5 million people. MNH has a capacity of 1600 beds of which 240 beds are dedicated to General surgery, Urology and pediatric surgery services.

7.3 Study population

All patients seen at emergency department, wards and outpatient clinics of MNH who were planned for a relaparotomy.

7.4 Inclusion criteria

Patients included in this study had the following criteria

i. The indication for relaparotomy was the complication of previous laparotomy done at or outside MNH.
ii. Patients who underwentrelaparotomy.
iii. All ages and sex were included.

7.5 Exclusion criteria

Patients who had index laparotomy more than sixty days before relaparotomy.

7.6 Sample size

The sample size required was calculated by using a single standard proportion formula (Kirk wood, 2003). The proportion of the incident rate, 9% taken from a study done in Lusaka was used.The sample size was 101 instead of 126 cases due to study limitation.

7.7 Sampling procedure

Patients who met the inclusion criteria and were planned for relaparotomy were consecutively recruited in the study.

7.8 Data collection procedure

Data were collected from March 2017 to February 2018. There were three research assistants informing principal researcher on the presence of patient booked for relaparotomy at main, emergency department and pediatric theaters. The principal researcherwas collecting data for patients who consented for the studyperioperatively using a data collection tool, patient data sheet. Personal particulars, preoperative, intraoperative and post-operative clinical information of the study subject entered into a data collection tool. This included patient's and surgeon's biodata, duration of illness prior to relaparotomy, indications for relaparotomy, time of surgery, findings at surgery, surgical procedure done, days of hospitalization (ICU and hospital stay), postoperative complications, need for anotherrelaparotomy, and death.

Data extracted from the patient files/ operation notes and some information which was missing from case notes were obtained directly from the patient and/or relative or operating staffs.

Complications were determined by performing clinical assessments, hematological and radiological examinations upon observation of patient's altered general condition. Patients were followed up till day of discharge or death to establish perioperative morbidity and mortality.

7.8.1 Pre operative evaluation

Patients planned for relaparotomy were attended at emergency department or in surgical wards. Preoperative evaluation was mainly done by clinical assessment and hematological investigations. Patient's history taking and physical examination were done by attending doctor. For patients who were suspected to have intestinal obstruction, plain abdominal X rays were done, Abdominal Ultrasound was done inafew patients suspected to have peritoneal collection, one patient suspected to have bowel leak had abdominal CT scan. All patients were starved, resuscitated and hadblood prepared for operation and informed consents were obtained before surgery.

7.8.2 Post-operative evaluation

Few patients were admitted to ICU postoperatively due to few ICU beds. Post-operative progress was monitored on daily basis and complications arising were recorded. Postoperative evaluation was mainly done by clinical assessment and hematological investigations; Abdominal Ultrasound was done in 3 patients suspected to have peritoneal collection. Most patients were dischargedwith mild anemia, electrolyte imbalance and superficial surgical site infection.

7.9 Study Variables

The study had the following variables;

7.9.1 Independent variables

- Patient's biodata; Age and Gender.
- Surgeon biodata; Rank ; Registrar, Resident, Specialist, Consultant surgeon
- Time between index laparotomy and relaparotomy; hours, days.
- Time and day of relaparotomy done; weekend or public holiday, working day ,day, night
- Identified indications for relaparotomy.
- Intraoperative; Surgical procedure done, findings/cause for the complication leading to a relaparotomy.

7.9.2 Dependent (outcome) variables

- Postoperative short term outcome; hospitalization duration, postoperative complications, need for second relaparotomy and death.

7.10 Data analysis

All data were recorded in data collection tool and accuracy of information checked by research team for completeness and consistency. Only patients with inclusion criteria undergoing relaparotomy weretaken for analysis. Data analyzed using the statistical package of social sciences (SPSS) computer software 20.0. Data summarized using two way tables and association between variables summarized using Pearson's chi square test and probability value of less than 0.05 consideredto be significant.

7.11 Study limitations

Inadequacy of perioperative data not documented or reported from operating staff for study results accuracy.

7.12 Ethical considerations

The study protocol followed the ethical guidelines of the 1975 Helsinki Declaration. Approval of the study was sought from MUHAS research ethics committee. Voluntary participation and the right to withdraw from the study at any time were emphasized. Written informed consent or assent (for those under the age of 18 years) to participate in the study were obtained from each subject or close relative.

Permission to collect data was obtained from the Teaching, Research, and Consultancy Coordination Unit of the MNH. Confidentiality of subjects' data wasmaintained. There were 5 patients who refused to consent for the study due to personal reasons; hence they were not included in the study.

7.13 Dissemination of findings

This study is used to produce a Dissertation for MMed award. These results will be disseminated to the Teaching, Research, and Consultancy Coordination Unit of MNH. The research report will be presented at the Department of Surgery and a derived manuscriptwill be submitted to the East and Central African Journal of Surgery for possible publication.

8.0 RESULTS

8.1 Description of study participants

During the study period, 101 repeat laparotomies were carried out of which 64 were from 842 primary laparotomies carried out at MNH giving a repeat laparotomy rate of 7.6%. The mean age of the patients was 37±19.7 (0.024 – 86) years, majority were aged 26−50(43.6%) with a male to female ration of 1:1. HIV status was known in 58.4% only with positivity rate of 5%. Of the 101 repeat laparotomies, 63% had primaries at MNH, 76.2% were elective in nature, 60.4% had primary surgery done during the night and another 89.1% had the repeat laparotomy done within 21 days. Majority of repeat laparotomy were during the day time with 23.8% of patients requiring more than one repeat laparotomy. 40 deaths were recorded giving a repeat laparotomy mortality rate of 40%. Primary laparotomy load was equally shared between the three categories of personnel while the repeat surgery was mostly done by the specialist surgeon, 60.4%.[Table 1]

Table 1: Baseline characteristics of study participants and laparotomy, n=101

Variable	Frequency	Percent (%)
Age(years)		
0−25	29	28.7
26−50	44	43.6
>50	28	27.7
Sex		
Male	50	49.5
Female	51	50.5
HIV status		
Positive	5	5.0
Negative	54	53.4
Unknown	42	41.6
Operating center for index laparotomy		
MNH	64	63.4
Other hospital	37	36.6
Laparotomy condition		
Emergency	77	76.2
Elective	**24**	23.8
Time of index surgery		
Day	40	39.6
Night	61	60.4
Time before relaparotomy		
Within 21 days	90	89.1
21 to 60 days	11	10.9
Time of relaparotomy		
Day	76	75.2
Night	25	24.8
Relaparotomy frequency		
Once	77	76.2
More than once	24	23.8
Relaparotomy mortality	40	39.6
Index surgeon		
Registrar	34	33.7
Resident	35	34.7
Specialist	32	31.7
Relaparotomy surgeon		
Registrar	3	3.0
Resident	37	36.6
Specialist	61	60.4

8.2 Factors associated with relaparotmy

8.2.1 Procedures done during index surgery (laparotomy)

The leading procedure at primary laparotomy involved bowel resection and anastomosis in 47.5% of all repeat surgeries, followed by appendectomy in 9.9%. [Figure 1]

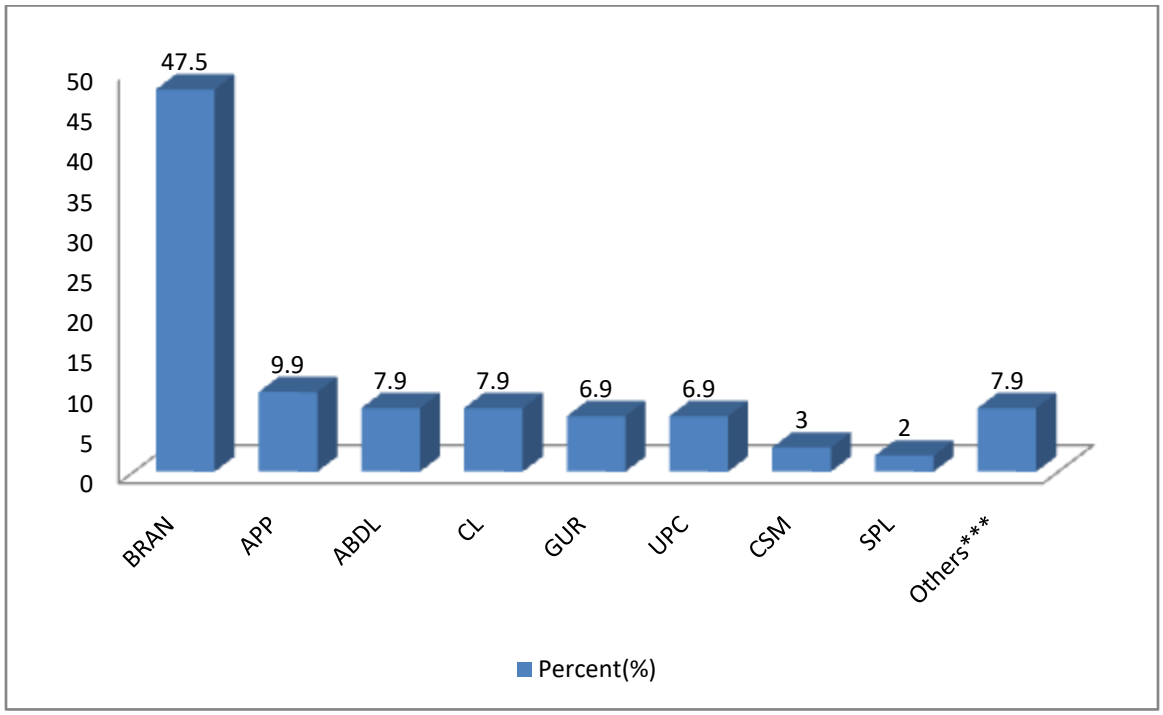


Figure 1: Index laparotomy procedures, n=101

***SPC, liver biopsy, GFT, Heller myotomy, cystectomy, herniorrhaphy, gastrectomy, Incision and drainage of pelvic abscessBRAN : bowel resection and anastomosis , APP: appendectomy,ABDL : abdominal lavage, CL: colostomy, GUR: gastric ulcer repair,UPC uterine procedure, CSM: cholecystectomy, SPL : Splenectomy

8.2.2 Indications for relaparotomies

Some of the patients had more than one indication giving a total of 148 incident episodes of indications; the leading indication for first repeat laparotomy was anastomotic leak in 37.6% of all patients followed by abdominal collection/abscess and bowel fistula in 29.7% and 19.8% respectively. [Fig. 2]

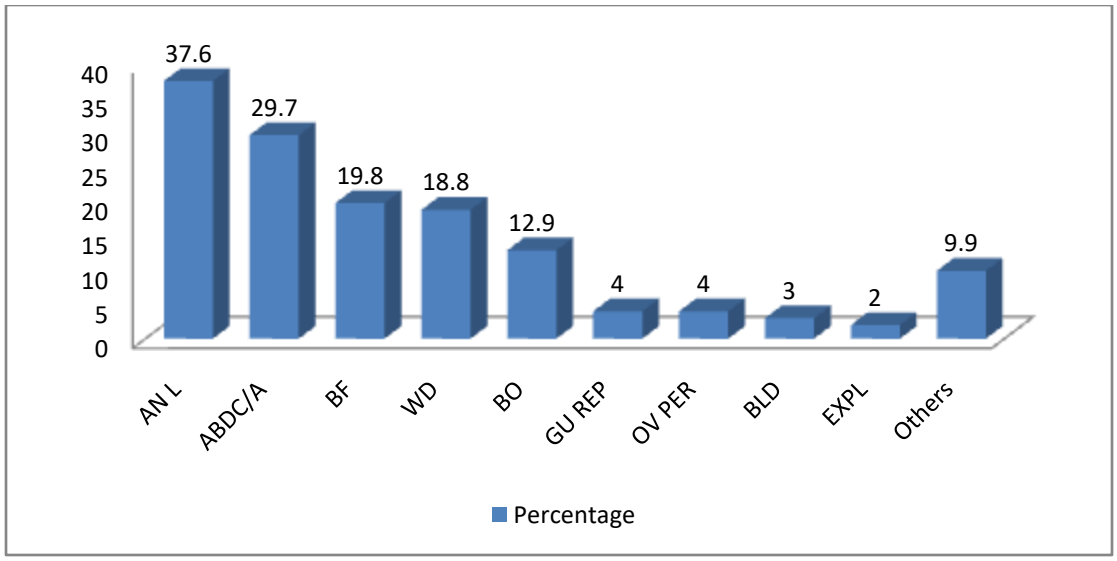


Figure 2: Indications for first relaparotomy, n=148

ANL: anastomotic leak, ABDC/A: abdominal collection/abscess, BF: bowel fistula WD: wound dehiscence, BO: bowel obstruction, GU REP: gastric ulcer repair, OV PER: overt peritonitis, BLD: bleeding, EXLAP: explorative laparotomy

Second repeat laparotomy was performed in 24 patipatients, with total of 30 incident episodes of indications reported(few had more than one indication), anastomotic leak reported in 33.3% followed by abdominal collection/abscess in 26.7%.[Fig. 3]

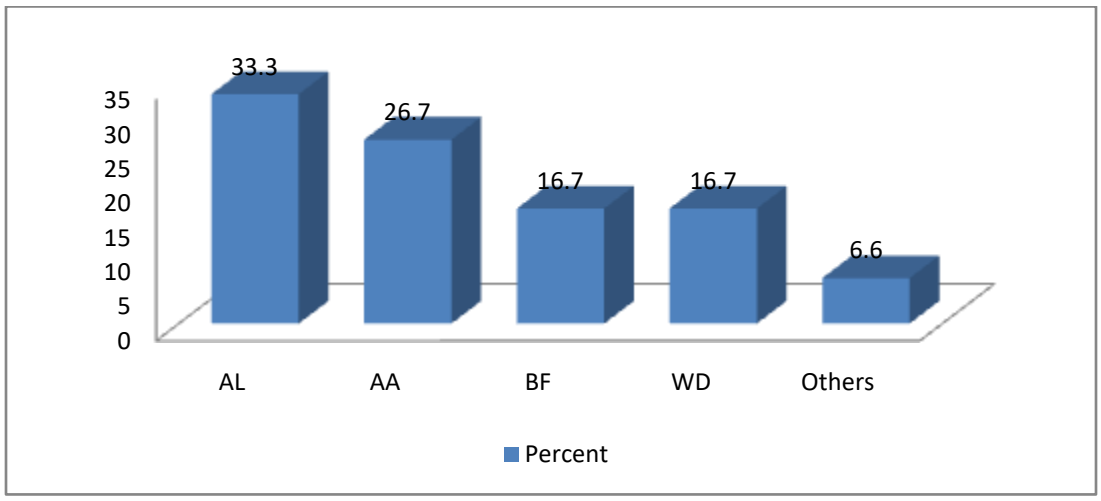


Figure 3: Indications for second relaparotomy, n=30

AL: anastomotic leak, AA:abdominal abscess BF: bowel fistula ,WD: wound dehiscence; Others: intestinal obstruction, explorative relaparotomy

8.2.3 Description of the most common indications for relaparotomy

In this study the most common indications for relaparotomy were found to be anastomotic leak,peritonealcollection/abscess, bowelfistula and wound dehiscence which occurred frequently in patients older than 10 years.Bowel leak occurred more among patients older than 25 years (73.7%). Patients who underwent relaparotomy due to bowel leak, 86.8% had emergency index laparotomy, 73.7% of index laparotomy was done at night. Twenty one (55.3%) cases of index laparotomy were done at MNH. Registrars (39.5%), residents (42.1%) and specialists (18.4%) were the index surgeons. [Table 2]

Table 2: Association between study participant characteristics and anastomotic leak, n=38

Variable	Bowel leak (%)	P value
Age (years)		
0−25	10(26.3)	
26−50	17(44.7)	
>50	11(28.9)	0.917
Sex		
Male	19(50)	
Female	19(50)	0.938
Operating center		
MNH	21(55.3)	
Other hospital	17(44.7)	0.996
Laparotomy condition		
Elective	5(13.2)	
Emergency	33(86.8)	0.052
Index surgeon		
Registrar	15(39.5)	
Resident	16(42.1)	
Specialist	7(18.4)	0.083
Time of index surgery		
Day	10(26.3)	
Night	28(73.7)	0.034

Peritoneal abscess occurred more among patients aged 26 to 50 years (46.7%). Of patients who underwent relaparotomy due to peritoneal abscess, 83.3% were female, 80% had emergency index laparotomy, 70% of index laparotomy was done at night and 63.3% of index laparotomy was done at MNH. Registrars (54.5%) and residents (45.5%) were the index surgeons. [Table 3]

Table 3: Association between study participant characteristics and peritoneal abscess, n=30

Variable	Peritoneal abscess (%)	P value
Age(years)		
0−25	10(33.3)	
26−50	14(46.7)	
>50	6(20)	0.514
Sex		
Male	5(16.7)	
Female	25(83.3)	0.00
Operating center		
MNH	19(63.3)	
Other hospital	11(36.7)	0.993
Laparotomy condition		
Elective	6(20)	
Emergency	24(80)	0.564
Index surgeon		
Registrar	6(54.5)	
Resident	5(45.5)	0.237
Time of index surgery		
Day	9(30)	
Night	21(70)	0.2

Bowel fistula occurred more among patients aged 26 to 50 years (50%). Patients who underwent relaparotomy due to bowel fistula, 50% were female, 90% had emergency index laparotomy, 75% of index laparotomy was done at night and 55% of index laparotomy was done at MNH. Registrars (50%), residents (35%) and specialists (15%) were the index surgeons. [Table 4]

Table 4: Association between study participant characteristics and bowel fistula, n=20

Variable	Bowel fistula (%)	P value
Age (years)		
0−25	3(15)	
26−50	13(65)	
>50	4(20)	0.091
Sex		
Male	10(50)	
Female	10(50)	0.961
Operating center		
MNH	9(45)	
Other hospital	11(55)	0.05
Laparotomy condition		
Elective	2(10)	
Emergency	18(90)	0.106
Index surgeon		
Registrar	10(50)	
Resident	7(35)	
Specialist	3(15)	0.124
Time of index surgery		
Day	5(25)	
Night	15(75)	0.136

Wound dehiscence occurred more among patients aged 26 to 50 years (47.4%). Of patients who underwent relaparotomy due to wound dehiscence, 68.4% were female, 63.2% had emergency index laparotomy, 52.6% of index laparotomy was done at night and 73.7% of index laparotomy was done at MNH. Registrars (21.1%), residents (47.4%) and specialists (31.6%) were the index surgeons. [Table 5]

Table 5: Association between study participants characteristics and wound dehiscence, n=19

Variable	Wound dehiscence	P value
Age (years)		
0−25	5(26.3)	
26−50	9(47.4)	
>50	5(26.3)	0.932
Sex		
Male	6(31.6)	
Female	13(68.4)	0.083
Operating center		
MNH	14(73.7)	
Other hospital	5(26.3)	0.3
Laparotomy condition		
Elective	7(36.8)	
Emergency	12(63.2)	0.137
Index surgeon		
Registrar	4(21.1)	
Resident	9(47.4)	
Specialist	6(31.6)	0.333
Time of index surgery		
Day	9(47.4)	
Night	10(52.6)	0.044

8.3 Short term outcomes of relaparotomy

Only 40% of the patients were admitted to ICU during repeat laparotomy with 65% staying over two weeks. The hospitalization duration for patient who underwent had mean stay of 8±5.44 (1 – 24) days and 17.75±9.2 (3– 54) days for ICU and Hospital stay respectively. Total of 354 incident episodes of complications were reported with electrolyte imbalance leading the log by 22.9%, followed by anemia, surgical site infection and septicemia each having 21.5%, 18.9% and 11% respectively. Mortality rate was 40%.

Table 6: Short term outcomes of relaparotomy

Outcomes	Frequency	Percent (%)
ICU stay (Days)		
≤ 5	14	35
≥ 5	26	65
Hospital stay (weeks)		
≤2	72	71.9
≥ 2	29	28.7
Death	40	39.6
Complications (n=354)		
Electrolyte imbalance	81	22.9
Anemia	76	21.5
SSI	67	18.9
Septicemia	39	11.0
Wound dehiscence	27	7.6
Acute renal failure	21	5.9
Bowel fistula	12	3.4
Pulmonary complication	12	3.4
Abdominal collection/Abscess	10	2.8
Anastomotic leak	7	2.0
DVT	1	0.3
Others	1	0.3

9.0 DISCUSSION

In this study there were 101 relaparotomies of which 64 (63.4%) relaparotomies were contributed by index laparotomies done at MNH. The prevalence of relaparotomy at MNH was found to be 7.6%. This is low comparedto the study done in South Africa in whichrelaparotomy was found to be 24% of all laparotomies.In the setting of gun violence in SA, the data included planned repeat laparotomy which was very high. It might be logical to perform a repeat laparotomy due to nature of bullet injury, but the almost 1 OD repeat laparotomy for every 10 laparotomies is still of public health concern. (21)

Patient's mean age was 37 ±19.66 years, majority range 26−50 years (43.6%). These are economically active people who succumb morbidity and mortality due to relaparotomies. As in other LMIC centers, most of these patients present to health hospital lately due poor health seeking behavior or prolonged referral system and there is poor surveillance for deteriorating physiology in patients who develop postoperative complications (24) or probably there is disease pattern at this age to be investigated. Patients aged more than 50 years died (8 in 10) post relaparotomy due to gastric repair leak. These are similar findings to the other study in which advance age was associated with high morbidity and mortality due to co existence of other cormobidities. (18)

Bowel resection and anastomosis was the leading primary procedure among patients who had repeat laparotomy. This is a fairly basic procedure and whether the surgeons are over ambitious to perform primary anastomosis in places where a diverting stoma would save a lot needs to be restudied. But also, the technical skills in performing atraumatic bowel resection and a water/air tight anastomosis among residents and registrars need to be assessed. Doing it right the first time is the single most important strategy in avoiding the consequences of a repeat laparotomy. Even at repeat laparotomy, residents still were the senior surgeons in about 3 in 10 patients. The hospitals should take responsibility with patients' safety issues as repeat surgeries have been shown to have poor outcome with more complications. (25)

The common causes of relaparotomy were anastomotic leak, bowel obstruction, overt peritonitis,bowel fistula, wound dehiscence, abdominal abscess, bleeding and gastric ulcer repair leak. Anastomotic leak, bowel obstruction, overt peritonitis, bowel fistula and wound dehiscence were leading indications for relaparotomies. These are similar findings to other centers.(18, 22)

Among patients who got wound dehiscence, majority (1 in 2) of them are those whose index laparotomy done at night. These night surgeries are done under emergence conditions of which peritonitis and intestinal obstruction are the leading ones. The hospital practice primary abdominal wall closure even in extensively contaminated peritoneal cavity with pus could be the reflection of these results similar to the study by Nasib et al. (26)

Although majority of patients who had peritoneal abscess were female (8 in 10) we couldn't find the reason for this. Also peritoneal collectionfound to occurred more in emergency laparotomy(80%), being done at night (70%) and low rank of surgeon, registrar (54.3%)though the differences were found not to be statistically significant.

Junior surgeons, registrar and or residents perform more of the index emergency laparotomies and at night than specialists. These are risks patients to get postoperative complications and hence relaparotomy. This could be the reflections of those bad outcomes due to low rank of surgeons similar to the study done by Unalpwhich showed that junior ranks of surgeon associated with increased number of relaparotomy compared to their senior due to their low technical knowledge and low experience.(11)

Only forty patients were admitted to ICU just after relaparotomy with meant stay of 8 ± 5.44 (1−24) days but majority died(6 out of 10) died.This is less stay if compared to other studies(3) though mortality rate is high.This was due to the fact that most of the patients who were admitted in ICU were only who had hemodynamic instability with septic conditions including; anastomotic leak, wound dehiscence, septicemia two or more relaparotomy, and bowel fistula which found to contribute to high morbidity and mortality rate(4).Other factors like patient monitoring follow up and time for intervention should be investigated.

There was no intraoperative death, suggesting a possible good preoperative resuscitation and intraoperative anaesthesia.Most deaths occurred after surgery, suggesting apossible weakness in postoperative surveillance for deteriorating patients. Majority of patients who died hadsepticemia (8 in 10).Similar to other studies, the main cause of mortality post relaparotomy was mainly due to infections (23,27).Post operative surveillance of deteriorating patients is of clinical important but with limitations of laboratory services as culture and sensitivity and timely release of results this continues to be a challenge.

Planned relaparotomyis uncommon to be done at MNH. During period of study there were 3 cases that had persisting abdominal sepsis and had to undergo planned relaparotomy,twoof them died due to septicemia and acute renal failure. This type of surgery is still debatable on its significance. In study done byOddeke et al patients in the on-demand relaparotomy group did not have a significantly lower rate of death or major peritonitis-related morbidity compared with the planned relaparotomy group but did have a substantial reduction in relaparotomies, health care utilization, and medical costs (7). Koperna et al found that there was no significant difference in the postoperative mortality rate between “planned relaparotomy” and “relaparotomy on demand” (54.5% versus 50.6%).(8)

The mean duration between index laparotomy and relaparotomy ranged was 11 ±5.95 (4−30) days. This delayed intervention was contributed by delayed diagnosis of post operative deterioration of patient condition due to the fact that it was done by mainly clinical assessment. Studies done by Ömer et al and Koperna et al found that relaparotomy done within first week after the first operation associated with decreased mortality and morbidity and this could be achieved by efficient timely management in handling the postoperative complications where combining clinical criteria, laboratory, and computed tomography (CT) results makes adequate and timely identification of patients for relaparotomy (8, 18).

10.0 CONCLUSSION AND RECOMMENDATIONS

10.1 CONCLUSION

Repeat laparotomy at MNH was low compared to other studies but its accompanying mortality and complications were both highat 40% of relaparotomies done.Bowel leak following emergency bowel surgeries is the most frequent cause for relaparotomies and subsequent fatalities. These surgeries are done at night by junior surgeons, residents and registrars.

10.2 RECOMMENDATION

- Emergency surgeries ifdone by junior surgeons should beunderdirect supervisionof specialists. .
- Further studies to address bowel resection and anastomosis, management of patients with peritonitis and subsequent abdominal wall closure are needed among the operating team.

11.0 REFERENCES

1. Girgor'ev SG, Petrov VA, Grigor'eva TS. Relaparotomy: Problems of terminology.Khirurgiia.2003 ;(6):60-62.
2. Barlow AP, Zarifa Z, Shillito RG, Crumplin MKH, Edwards E, McCarthy JM. Surgery in a geriatric population. Ann R CollSurg Engl. 1989;(71):110–4.
3. Van Goor H. Interventional management of abdominal sepsis: when and how. Langenbecks Arch Surg. 2002 ;(387):191-200.
4. Mc Crory C., Crowley K. Is repeat laparotomy of value in patients with suspected intra-abdominal sepsis in intensive care unit?. Irish J Med. Sci. 1997 ;(166):88-91.
5. Bandareko NM, Perets IV, Bondareko IN. The immediate results of treating patients with acute early postoperative intestinal obstruction KlinKhil. 1993:20−2.
6. Lamme B, Boermeester MA, Reitsma JB, Mahler CW, Obertop H, Gouma DJ. Meta-analysis of relaparotomy for secondary peritonitis.Br J Surg. 2002; (89):1516-1524.
7. Oddeke van Ruler; Cecilia W. Mahler; Kimberly R. Boer; etal.Strategy in Patients With Severe Peritonitis: JAMA. 2007;298(8):865-872 (doi:10.1001/jama.298.8.865)
8. Koperna T, Schulz F .Relaparotomy in peritonitis: prognosis and treatment of patients with persisting intraabdominal infection. World J Surg. 2000; (24):32-7.
9. Keller E, Neher M, Schuster HP. [Relaparotomy, retrospective analysis and intensive care aspects]. Langenbecks Arch Chir. 1983;(360):167–77.
10. Odimba B.F.K zuluR, Nthele M. A retrospective study of relaparotomies at the university teaching hospital. Ibis Garden scientific session of ASEA and SSZ.March, 2004.
11. MihmanliA, The effect of antibiotic therapy on prognosis in patients with severe sepsis. 2002 ;(8):3−5.
12. Unalp H, Kamer E, Onal M. Analysis of early relaparotomy after lower gastrointestinal system surgery. Surg Today. 2008 ;(38):323-8.
13. Tera H, Aberg C.relaparotomy.tenyears series. ActaChir Scand. 1975, 141(7):637-644.
14. Ganchev G, Baev S, Milushev G. Relaparotomy in early postoperative complications in the abdominal cavity. ProblKhig. 1980 ;(8):111-20.
15. Ching SS, Muralikrishnan VP, Whiteley GS. Relaparotomy: a five-year review of indications and outcome. Int J Clin Pr. 2003;(57):333–7.

16. Lehmann L et al. Clinical results of Child' and Philips mesenteric plication for the prevention and therapy of small intestinal ileus.Zentralbl Chir.1982.

17. B. Resch, J. Mayr, M. Kuttnig-Haim, F. Reiterer, E. Ritschl, W. MuÈller.Spontaneous gastrointestinal perforation in very low birth weight infants.PeditrSurgInt.1998;(13):1657.

18. Ömer BAŞOL, HüseyinPülat, İsmail Zihni et al.Predictive factors affecting mortality in relaparotomies.Int J ClinExp Med 2016 ;(9):14656-14662.

19. Kirk RM. Reoperative surgery for early complications following abdominal and abdominothoracic operations. J R Soc Med.1988; 81(1):7-9.

20. Gunther K, Taubert E Mehwald J. Disordered postoperative course. A retrospective analysis.ZentralblChir. 1988;113(6):384-90.

21. Scriba MF,Liang GL, Bruce JL, Clarkeci DL. Repeat laparotomy in a developing world tertiary level surgical service. The American Journal of Surgery, 2015;210(4):755-758.

22. Martínez-Casas I, Sancho JJ, Nve E, Pons MJ, Membrilla E, Grande L. Preoperative risk factors for mortality after relaparotomy: Analysis of 254 patients. Langenbeck's Arch Surg. 2010;(395:527–34.

23. Unalp HR, Kamer E, Kar H, Bal A, PeskersoyM,Onal MA. Urgent abdominal reexplorations.WorldJournal of Emergency Surgery 2006, 1:10.

24. Biccard BM et al. Perioperative patient outcomes in the African Surgical Outcomes Study: a 7-day prospective observational cohort Study.Lancet. 2018 Apr 21;391(10130):1589-1598. doi: 10.1016/S0140-6736(18)30001-1. Epub 2018 Jan 3

25. VanRuler OR, Mahler CW, Boer KR, et al. Comparison of On-Demand vs Planned Relaparotomy Strategy in Patients with Severe Peritonitis: A Randomized Trial. JAMA. 2007; 298(8):865-872. doi:10.1001/jama.298.8.865.

26. Gul Nasib et at. Laparotomy for peritonitis: primary or delayed primary closure? .J Ayub Med Coll Abbottabad 2015; 27(3)

27. Erdal SM, Abdulkadir T, Sıddık EM, Ender SH, Ali O, Sibel S, et al. Relaparotomy after initial surgery in obstetric and gynecologic operations: analysis of 113 cases. Ginekol Pol. 2012; 83:429-32.

12.0 APPENDICES

12.1 APPENDIX 1; PATIENT'S DATA SHEET

1. Patient file number----------
2. Age of the patient----------
3. Sex ----------
4. Domicile ----------
5. Patient or close relative phone number ----------
6. Duration of illness between initial/index laparotomy and relaparotomy. (Days…)
   a) Within 21 days.
   b) More than 21 days.
7. HIV sero status
   a) Positive
   b) Negative
   c) Not known
8. Initial/index laparotomy done at
   a) MNH
   b) Other hospital
9. Day of operation
   a) Working days
   b) Weekend or public holiday.
10. Time of index laparotomy
    a) Day
    b) Night
11. Laparotomy condition
    a) Elective
    b) Emergency
12. Who operated the patient in index laparotomy (index surgeon).
    a) Registrar
    b) Resident
    c) Specialist
    d) Consultant

13. Surgery done in index/initial laparotomy

a) Bowel resection and anastomosis
b) Abdominal lavaging
c) Incision and drainage.
d) Appendectomy
e) Gastrectomy
f) Splenectomy
g) Cholecystectomy
h) CBD exploration
i) Others, specify----------

14. Indication for relaparotomy

a) Anastomotic leakage
b) Bleeding
c) Overt Peritonitis
d) Bowel fistula
e) Wound dehiscence(burst abdomen)
f) Intraabdominal abscess(collection)
g) Foreign body(abdominal pack, gauze etc)
h) Exploratory laparotomy
i) Bowel obstruction
j) Others specify …….

15. Who did relaparotomy (re-visiting surgeon)

a) Registrar
b) Resident
c) Specialist
d) Consultant

16. Day of relaparotomy.

c) Working day
d) Weekend or public holiday.

17. Time of relaparotomy

a) Day b) Night

18. Findings at relaparotomy as the cause of the complication.

a) Anastomotic leakage
b) Bleeding
c) Overt Peritonitis
d) Bowel fistula
e) Wound dehiscence(burst abdomen)
f) Intraabdominal abscess(collection)
g) Foreign body(abdominal pack, gauze etc)
h) Exploratory laparotomy
i) Bowel obstruction
j) Others specify …….

19. Number of relaparotomy done for the patient.

a) One b) Two or more

20. Short-term outcomes after first relaparotomy (following relaparotomy)

a) Duration of stay in ICU post surgery (days)
b) Duration of stay at the hospital post surgery (days)
c) Surgical site infection
d) Wound dehiscence
e) Intrabdominal collection(abscess)
f) Anastomotic breakdown/leak
g) Fistula formation
h) Perforation at a different site (away from the site of anastomosis)
i) Electrolyte imbalance
j) Septicemia
k) Pulmonary complications
l) Deep vein thrombosis (DVT)
m) Anemia
n) Multiple organ failure
o) Death
p) Others specify----------

12.2 APPENDIX 2; CONSENT FORM (ENGLISH VERSION)

Greetings Madam/Sir,

My name is Dr. Andrew Swallow, a resident in the Department of general surgery. I am conducting a research on short term outcomes of relaparotomy after abdominal surgery at MNH.

Purpose of the study: This study aim to determine short term outcomes of relaparotomy after abdominal surgery at MNH.

Who are involved?All patients undergoing relaparotomy managed in the department of general surgery at MNH

Risks: There are no risks associated with being involved in the study.

Benefits: Patients involved in this study will be treated accordingly depending on their clinical presentation and in accordance to the attending doctor and the department protocols.

Confidentiality: All the information collected from the patient will not be revealed to anybody except attending doctors and the patient herself/himself.

Costs: No payment will be requested from you as a fee to participate in the study

Voluntary participation and rights to withdraw: Your participation is voluntary and you have the right to discontinue from participating in the study at any time. Your decision will not affect in anyway your right to care and treatment.

Person to contact in case of questions or any clarifications regarding this research: Dr. Andrew Swallow 0714654537, Principal Investigator or Prof. Leonard E.K. Lema, 0754275969, Lecturer and Supervisor of this study, MUHAS

In case of any information about your rights as a participant in this study, please contact:
Dr. Joyce Masalu,Director of Research and Publications,Muhimbili University of Health and Allied sciences (MUHAS),P. O. Box 65001, Dar es Salaam.Phone: +255 754757577

I …… have read/been told of the contents of this form and understood its meaning. I agree to participate in this study.
Signature …….. (Participant) Date …….
Signature ……. (Researcher) Date ……

12.3 APPENDIX 3: CONSENT FORM (KISWAHILI VERSION)

Fomu ya ridhaa katika utafiti kuhusu matokeo ya muda mfupi baada ya kufanyiwa upasuaji wa tumbo kwa mara ya pili au zaidi katika Hospitali yaTaifa Muhimbili

Salaam,

Ndugu, habari za wakati huu!

Utambulisho

Jina langu ni Dkt. Andrew Swallow, mwanafunzi wa shahada ya uzamili ya udaktari wa upasuaji wa binadamu katika Chuo Kikuu cha Muhimbili. Ninafanya utafiti kuhusu matokeo ya muda mfupi baada ya kufanyiwa upasuaji wa tumbo kwa mara ya pili au zaidi.

Lengo la utafiti

Lengo la utafiti huu ni kuangalia matokeo ya muda mfupi baada ya kufanyiwa upasuaji wa tumbo kwa mara ya pili au zaidi kwa wagonjwa wote watakaohudumiwa na idara ya upasuaji katika hospitali ya Taifa Muhimbili

Utafiti huu unamhusu nani?

Utafiti huu unamhusu mtu yoyote, atakaye hiari, anayekuja hapa katika idara hii na atakayehudumiwa kwa njia ya upasuaji wa tumbo kwa mara ya pili au zaidi. Mshiriki atahojiwa maswali kadhaa kuhusiana na maisha yao na ugonjwa wao.

Faida na athari

Utafiti huu hauna athari yoyote kwa mshiriki. Mshiriki ataelimishwa kuhusu ugonjwa husika.

Usiri wa taarifa

Taarifa tutakazochukua zitatunzwa kwa usiri. Taarifa hizo zitatumika tu kwa ajili ya utafiti huu.

Gharama ya kushiriki katika utafiti huu

Mshiriki hataingia gharama yoyote ili kushiriki katika utafiti huu.

Kushiriki kwa hiari na haki ya kujitoa

Kushiriki katika utafiti huu ni kwa hiari na unaweza kujitoa wakati wowote.Vyovyote vile uamuzi wako hautaathiri mwenendo wa matibabu yako.

Ukiwa na maswali au shida wakati wowote kuhusiana na utafiti huu wasiliana na wafuatao:

Dkt. Andrew Swallow 0714654537, Mtafiti Mkuu, au Prof, Leonard E.K. Lema 0754275969 , mkufunzi katika chuo kikuu cha Afya na sayansi shirikishi Muhimbili na Msimamizi wa utafiti huu.

Iwapo utakuwa na swali lolote kuhusu haki zako kama mshiriki katika utafiti huu wasiliana na:

Dr. Joyce Masalu,Mkurugenzi wa Utafiti na Machapisho,Chuo Kikuu cha afya na Sayansi shirikishi Muhimbili,S.L.P. 65001, Dar es Salaam.Simu: +255 754757577

Mimi …….. nimeelezwa/nimesoma yaliyomo katika fomu hii na nimeelewa maana yake. Nakubali kushiriki katika utafiti huu.

Sahihi…… (Mshiriki) Tarehe…….

Sahihi …… (Mtafiti) Tarehe ……