



**ST. PAUL'S HOSPITAL MILLENNIUM MEDICAL COLLEGE,
DEPARTMENT OF PUBLIC HEALTH**

**INTRA-HOSPITAL DELAY IN EMERGENCY CARE AT THE
SURGERY DEPARTMENT IN ST. PAUL'S HOSPITAL
MILLENNIUM MEDICAL COLLEGE FROM MAY 2017 TO
MAY 2018**

**A STUDENT RESEARCH PROPOSAL TO BE SUBMITTED TO
DEPARTMENT OF PUBLIC HEALTH, SPHMMC IN PARTIAL
FULFILLMENT FOR THE REQUIREMENT OF DEGREE OF
DOCTOR OF MEDICINE**

JANUARY, 2018

ADDIS ABABA, ETHIOPIA.

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MEDICAL COLLEGE FROM MAY 2017 TO MAY 2018**

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Abstract

Background: Despite dedication of surgery team, emergency surgery can be often delayed due to competing urgencies or done ad hoc, suggesting a need for appropriate triaging system. It is a well-known fact that timing of surgical intervention is critical for outcomes of patients diagnosed with surgical emergencies.

Aim: To determine intra-hospital delay and factors associated with delay in management of surgical emergencies in the surgery department at St. Paul's Hospital Millennium Medical College.

Methods: This is a retrospective study reviewing the charts of the patients admitted with emergency diagnosis from May 2017 to May 2018. Data abstraction checklist will be used to guide data collection from charts of patients who fit the inclusion criteria. Demographic and peri-operative data, time from admission to surgery, postoperative length of stay and total length of stay and complications will be analyzed using multivariable binary logistic regression using Statistical Package for Social Sciences (version 21) software.

Budget: Funding is by St. Paul's Hospital Millennium Medical College, Department of Public Health and the estimated budget is Birr 2195.

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ACRONYMS

AAST.....	American Association for the Surgery of Trauma
CI.....	Confidence Interval
CSA.....	Central Statistical Agency
DALYs.....	Disability-Adjusted Life-Years
EGS.....	Emergency General Surgery
GDP.....	Gross Domestic Product
HICs.....	High Income Countries
HMIS.....	Health Management Information System
LMICs.....	Low and Middle Income Countries
NSQIP.....	National Surgical Quality Improvement Program
OR.....	Operating Room/Odds Ratio
PUD.....	Peptic Ulcer Disease
SPHMMC.....	St. Paul's Hospital Millennium Medical College
SPSS.....	Statistical Package for Social Sciences
USA.....	United States of America

1. Introduction

1.1. Background

By definition, an emergency general surgery (EGS) patient is any patient (inpatient or emergency department) requiring an emergency surgical evaluation (operative or non-operative) for diseases within the realm of general surgery as defined by the American Board of Surgery. Both operative and non-operative patients are included as there are many emergencies that may require surgical evaluation without operative interventions, such as diverticulitis, pancreatitis, or even appendicitis in certain cases. EGS has been contained within general surgical practice for many years, however, American Association for the Surgery of Trauma (AAST) has created the specialty of acute care surgery which branches into trauma, surgical critical care, and EGS at its core. The AAST Acute Care Surgery Committee has gone on to establish acute care surgery as a specialty with its own curriculum, site visits to ensure program requirements are met, and a certificate of completion¹. This highlights the importance of emergency general surgery.

Patients undergoing emergency surgery are at high risk of adverse outcomes. Although patient characteristics and surgical indication are the most important risk factors, system factors, such as delay from triage to operating room, also affect outcomes. Therefore, triage is initiated to avoid resource misappropriation and ensures proper care in a timely manner for the most physiologically unstable patients. The outcome of patients is frequently the result of clinical assessment and physiological findings. However, modern approaches to triage are scientific and systematic and some are algorithm-based. More so, triage has evolved to guide caregivers' decisions. But, the concept of triage is practiced most of the time in mass casualty incidents and its rationale is accepted worldwide. Such systems should also be implemented for the care of surgical emergencies other than injury related. In these cases, the concept of triage is especially important for managing multiple patients with diverse needs. This is particularly important to patients requiring emergency surgery, because minutes or hours of delay before treatment have a profound impact on potential disability and chance of survival.

In literature, an estimated 234 million major surgeries are performed worldwide per year, but less than 41% of these reach the populations of the poorest (30%) of the world's countries⁵.

It is an undeniable fact that Sub-Saharan African countries, faces significant challenges in the provision of health services and poor access to surgical services being one limb of these challenges results in excess morbidity and mortality from a broad range of treatable surgical conditions. Two recent studies done in this country found that Ethiopia's total health expenditure per capita was 4.4% of gross domestic product (GDP), general surgeons were 0.02–0.13 per 100000 population, physician anesthetists per 100000 population were 0.02 and emergency surgical case load was 54 per cent^{2,3}.

1.2.Statement of the problem

In the year of 2010 alone, 896 000 deaths, 20 million years of life lost and 25 million disability-adjusted life-years (DALYs) from 11 emergency general surgical conditions reported individually in the Global Burden of Disease Study⁴. Therefore, EGS is having a heavy hand in public health. Though it may be under-recognized, surgical and public health communities need to plan appropriate responses.

This is complemented by a study in USA which found that EGS conditions account for 27 million of annual admissions in all USA hospitals.

In SPHMMC, non-traumatic EGS emergencies account for almost 50% of all surgical admissions in the surgical ward per year.

However deficient the data may be in our setup, a few studies have consistently shown that access to basic surgical care in LMICs is very low. Moreover, the poor access is attributed to a wide range of factors including inadequate manpower, equipment, financial issues, OR facilities and many more. These factors however, are identified to underlie delay in management of surgical emergencies in addition to patient related factors, such as medically decompensated patients. All of which have influence on the outcomes following surgery.

1.3.Significance of the study

This study will provide insight on timing of emergency, non- traumatic operations and how it affects the outcomes and will determine association of surgical delay with inpatient mortality, postoperative length of stay and postoperative complications. By conducting this study the patients will be benefited by information generated by this research and will help clinicians to be more suspicious of the patients who require urgent care. This study also will lay foundation for further studies regarding timing of emergent surgical care in developing countries.

2. Literature review

From global burden and distribution of conditions requiring emergency surgery, it was found that surgical disease is inadequately addressed globally, and emergency surgery contribute substantially to the global disease burden. The most common causes of death were complicated peptic ulcer disease (PUD; 3.5 deaths per 100 000 population); with 85 per cent of PUD-related deaths in LMICs, followed by aortic aneurysm (2.7), bowel obstruction (2.1), biliary disease (1.3), mesenteric ischemia (1.0), peripheral vascular disease (0.7), abscess and soft tissue infections (0.6), and appendicitis (0.5). Burden per population was found to be higher in high-income countries (HICs) than in low and middle income countries (LMICs). This was attributed to the higher burden for vascular-related emergencies. However, owing to the higher population in LMICs, 70 per cent of all deaths from the 11 conditions were in LMICs. Given the large burden of PUD in LMICs, and evidence that perforated and bleeding PUD are twice as common in the poor of HICs than in the wealthy, the incidence and associated mortality is probably much higher in LMICs⁴. Surgical capacity to address this burden is said to be suboptimal in LMICs, with less than one operating room per 100 000 population in many LMICs, whereas some developed countries have more than 14 per 100 000 inhabitants.

In Ottawa Hospital, Canada; a study identifying emergency surgery patients with delay, showed that about 20% of patients requiring emergency surgery experienced delay and mortality rates were 4.9% for those with delay and 3.2% for those without delay. They concluded that delay was significantly associated with mortality, increased length of stay also and higher total costs. The nonlinear association between wait time and mortality, suggests opportunities to match patient need for rapid operating room access with scarce resources. The odds of dying increased for waits of up to 1.1 multiples of the accepted wait-time window. Reasons for delay included system issues such as availability of human or physical resources such as access to operating (independently associated with increased mortality) and patient related such as being medically complex or physiologically decompensated who needed resuscitation⁶. A study conducted in Tulane University Hospital, USA found that timing of surgery for acute appendicitis (18 hours) did not affect the incidence of complications including perforation. However, in that study, delay in surgical consultation and treatment was associated with increased length of hospital stay and increased hospital costs.

The investigators concluded that optimal timing of appendectomy for uncomplicated acute appendicitis appears to be within 18 hours of emergency department presentation⁷. Another study in New York, USA investigating impact of in-hospital timing to appendectomy on rate of perforations in pediatrics patients found that those patients operated within 9 hours after emergency department (ED) presentation did not develop perforation compared to those with in-hospital delay greater than 9 hours (4.6% vs 25%).

Further delay beyond 24 hours the rate of perforation increased to 41% and the risk for developing perforation increased by 1.1 for each hour of delay.

The risk of developing perforation was significantly associated with longer mean time delay from ED to operating room.

Their recommendation was that appendectomy be performed as soon as possible to maximize patient outcome and prevent complications¹⁵.

Previous study in John Hopkins also found that delay to appendectomy is associated with increased perforation rates in children and adults⁸. World society of emergency surgery study group however, emphasized the importance of timely access to surgical care and its vitality to achieve optimal outcomes⁹. It is also found that excessive wait times can lead to increased costs¹⁰. At Khon Kaen Hospital, Thailand, a quality improvement program identified a high rate of preventable deaths among trauma patients owing to variety of problems, such as prolonged time to the operating room for head injuries and delayed resuscitation in the emergency department, among others. Corrective measures targeting these problems included increased senior staffing in the emergency department and improved communications within the hospital, as well as improved monitoring of care through the quality improvement program. This resulted in a sustained reduction in mortality (from 8.0 to 4.6 per cent among all admitted injured patients). The mortality benefit was the result of faster and more complete resuscitation, and shorter time to emergency surgery, all capabilities important to non-trauma surgical emergencies¹¹.

Delivery of surgical services is obviously dependent on the availability of all components inherent in a functioning health system. Systematic changes that address human resources, supplies/equipment and infrastructure are necessary to improve mortality from surgically treatable conditions. A study in Tanzania demonstrated the significant gaps in infrastructure, human resources, life-saving and disability-preventive surgical interventions and essential equipment.

The study surveyed 48 health facilities, on average, 34% of all admissions required either minor or major surgical interventions but many hospitals did not have the capacity to deliver basic lifesaving services¹². A similar study in the Gambia echoed that some health facilities did not have official operating rooms, several managed to carry out basic lifesaving procedures including burn management, incision and drainage of abscesses and foreign body removal; but, more technically difficult or equipment-intensive procedures such as laparotomy (54.5% of facilities could not perform laparotomy), 58.3% could not repair hernia, and appendectomy also were less frequently available¹³.

3. Objectives of the study

3.1. Major objectives

To investigate the intra-hospital delay in the treatment, identify factors associated with the delay and how the delay affect the outcomes of surgical emergencies in the department of surgery at SPHMMC from 2017 to 2018 G.C.

3.2. Specific objectives

To assess how the delay affect postoperative outcome of surgical emergencies.

To identify factors associated with the delay.

4. Methods of the study

4.1. Study setting

From 2007 Ethiopian Calendar census conducted by the Central Statistical Agency of Ethiopia (CSA), Addis Ababa has a total population of 3,384,569 and lies at an altitude of 2,300 meters above the sea level and has a surface area of about 530.14 km². SPHMMC is a tertiary-care academic medical center in northwestern part of Addis Ababa city. It has a capacity of 492 beds and giving medical services to about 5 million people and on average there are about 200000 patients seen per year, both urban and rural dwellers. The hospital has one major operating room (OR) and one minor OR. There was a total number of 3306 patients admitted to the General Surgery ward in the previous year. In the last six months 1532 non-traumatic cases were operated, and 708 of those were EGS cases.

4.2. Study design and period

A hospital based retrospective study reviewing the charts of patients admitted with emergency diagnosis from May 2017 to May 2018 to determine Intra-Hospital Delay in Emergency Care at the Surgery Department in St. Paul's Hospital Millennium Medical College.

4.3. Population and sampling

4.3.1. Source population

All adults who underwent non-trauma related emergency operations in the department of surgery.

4.3.2. Study population

All adults who underwent emergency non-trauma operations in the department of General Surgery.

4.3.3. Study subjects

All adults who underwent emergency non-trauma operations in the department of General Surgery.

4.3.4. Inclusion and exclusion criteria

Only cases in which the patient's clinical presentation warrants operating room access within 24 hours are included. More so, EGS patients are legible for the study.

Patients whose operation is postpone due to some reason beyond 24 hours after arrival will be included.

Traumatic surgical emergencies are excluded.

Subspecialty cases such as urology emergencies will be excluded.

Misdiagnosed and/or those with negative intraoperative findings will be excluded.

4.3.5. Sample size determination

Single population formula is used to calculate the sample size of emergency cases in the department of surgery.

$$n = [Z_{\alpha/2}]^2 p (1-p) / d^2$$

Where, n = desired sample size

Z = Z value at 95% CI [1.96]

P = 20% assuming that this is the rate of delay in management of surgical emergencies, since there is no similar study done to determine the sample size from

d = the margin of error tolerated is 0.05

$$n = 1.96^2 \times 0.2(0.8) / 0.05^2$$

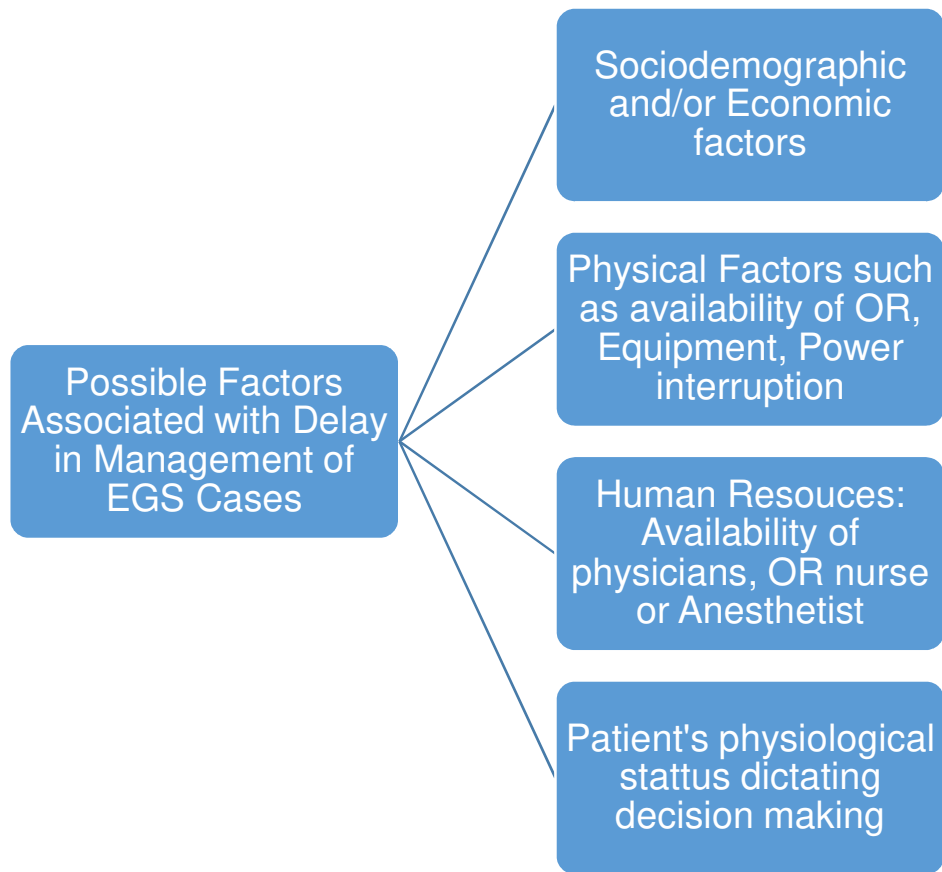
n = 246 is the calculated.

Actual sample size desired after correction for missing information rate by adding 10% is **271** after cases which do fit the exclusion criteria have been excluded

4.3.6. Sampling technique

Sampling frame for this study will be Health Management Information System (HMIS) log book of patient records, where card numbers for patients with an emergency general surgery diagnosis (see Table 3) will be extracted and sampled by systematic random sampling method. After excluding pediatric emergency cases, 560 cases fit the inclusion criteria. Therefore, the first chart to be reviewed will be selected by lottery method. With $k = 2$. Where k is every 2nd patient.

Figure 1. Conceptual Framework showing factors possibly associated with delay in management of surgical emergencies



4.4. Data collection

Data will be collected by using data abstraction checklist from the charts of patients who fit the inclusion criteria.

4.5. Study variables

Dependent variables

Intra-hospital delay in management of emergency surgical cases

Independent variables

1. Socio-demographic factors

2. Clinical Aspects

Duration of chief complaint

Admission_mode

Mode of transport

Qualification of the health worker having referred the patients

Qualification of the health worker who first saw the patient

Waiting period between admission and installation on the operating table

How was the diagnosis confirmed?

What is the provisional and/or confirmed diagnosis?

Duration of the operation

Intra-operative findings

3. Prognostic aspects

Postoperative complications

Postoperative length of stay in the hospital (NB. The first 24 hours postoperative counted as zero).

4.6.Data processing and management

Following ethical clearance and after obtaining permission from HMIS charts will be reviewed, information obtained and entered into the data abstraction checklist pamphlet by the volunteer data collectors after two days training. Check for completeness, accuracy and for missing data will be done to determine the validity.

Accordingly, corrections will be made on the spot before leaving the setting where data is being collected at. Each pamphlet will be coded and stored in a box which will be under the direct supervision of the data collector. Record reviews will be rechecked for errors in compilation.

4.7.Data analysis

Data collected will be coded, entered and analyzed using Statistical package for Social Sciences (SPSS 21) software. Patient characteristics, perioperative variables and outcome metrics will be analyze using Descriptive statistics such as frequency tables, graphs and cross tabulations will be calculated for dependent and independent variables; and also association between dependent and independent variables will be tested using multivariable binary logistic regression to test the outcomes.

4.8.Operational definitions

Intra-Hospital Delay: The time interval from triage to the operating table or final hospital admission will be regarded as delay. That is when it is longer than the standard definition; Emergent operations: one performed as soon as possible and no later than 12 h after the patient has been admitted to the hospital or after the onset of related preoperative symptomatology in accordance with the National Surgical Quality Improvement Program (NSQIP) ¹⁴.

Keeping in mind that this may be misleading, because inpatient work-up is often required to determine the risks and potential benefits of surgery. Moreover, in our setup resources availability is a well-known constraint, so beyond 24 hours will be considered a delay for this study.

Postoperative length of stay: the duration of time the patient spent in the hospital after surgery taking the first 24 hours as zero.

Time interval from the onset of symptoms to initial presentation to the hospital is regarded as patient delay; this figure will be entered in units of half-days (in hours).

This approach is used because, unlike other time data that is going to be retrieved from the hospital records, the information on the onset of symptoms is often imprecise.

5. Ethical consideration

Before data collection, ethical clearance will be obtained from the Research Ethics Committee following acceptance of the proposal by public health department, academic & research vice provost of SPHMMC. A formal letter will be written by the vice provost to the concerned office and a consent will be obtain from the head of the department from which the study is being conducted. Each and every concern personnel anyhow involved in this study from head of the departments, volunteer data collectors to patients will be adequately informed about the purpose, methods, and anticipated benefits of the study. However, this study will not alter clinical judgement or patient management. The information collected from the charts will be kept private, and to ensure confidentiality names will not be required and only number code for each questionnaire will be use. Patient consent is not deemed necessary and inclusion in the study will incur minimal risk to patients. Individual physician or any clinician who managed the patient will not be identified.

6. Dissemination of results

The findings will be first submitted to public health department for evaluation purpose and a copy will be given to department of surgery of SPHMMC. I would also like the contents of this research to be accessible to everyone irrespective of academic background.

7. Work plan

S/No.	Tasks	Months	Days required
1	Title selection	November 22,2017	15 days
2	Proposal development	Nov. 23 – Jan 24,2018	71 days
3	Submission of the proposal	Feb 7, 2018	1 day
4	Ethical clearance	Feb 19, 2018	1day
5	Data collection	Mar 12-May 7,2018	60 days
6	Data processing, analysis and report writing	May 8-July 3, 2018	54 days
7	Final thesis report submission	Until July16,2018	12 days
8	Research report presentation	July 25 -27, 2018	3 days
9	Submission of research document	July 30, 2018	1 day

Table 1. Work plan

8. Budget breakdown

No	Item	Unit cost	Multiplying factor	Total cost
1	questionnaire	2 ET Birr	271	542 ET Birr
2	pencils	2 ET Birr	2	4 ET Birr
3	sharpener	2 ET Birr	1	2 ET Birr
4	Printing	1.50 ET Birr	25	37.5 ET Birr
5	photocopying	1 ET Birr	3*25	75 ET Birr
6	Runner hire to access card	5 ET Birr	271	1355 ET Birr
7	Miscellaneous	200 ET Birr	-	200 ET Birr
8	Total	213.5 ET Birr	645	2195.5 ET Birr

Table 2. Budget breakdown

9. Annex

9.1. Data Checklist

A. Patient Identification/code.....

B. Socio-demographic factors

1. Age in numbers.....
2. Sex
 - ☐ Male
 - ☐ Female
3. Marital status
 - ☐ Single
 - ☐ Married
 - ☐ Divorced
 - ☐ Widowed
 - ☐ Separated
4. Religion
 - ☐ Christian
 - ☐ Moslem
5. Occupation
 - ☐ Employed
 - ☐ Unemployed
6. Educational status
 - ☐ Primary level
 - ☐ Grade 10+2
 - ☐ Grade 12+
 - ☐ Can read and write
 - ☐ Cannot read and/or write
7. Ethnicity
 - ☐ Amhara
 - ☐ Oromo
 - ☐ Other
8. Urban or rural dweller

C. Clinical Aspects

1. Duration of chief complaint
 - ☐ 12 hours or less
 - ☐ 12 to 24 hours
 - ☐ Greater than 24 hours
2. Admission mode
 - ☐ Referred from another health facility
 - ☐ Inter-departmental transfer

- ☐ Self-referral
- 3. Mode of transport
 - ☐ Ambulance
 - ☐ Private car
 - ☐ Taxi
 - ☐ Other
- 4. Qualification of the health worker who referred the patient
 - ☐ Physician
 - ☐ Health officer
 - ☐ Nurse
- 5. Qualification of the health worker who first saw the patient
 - ☐ Resident
 - ☐ Intern
 - ☐ Health officer
- 6. Waiting period between admission and installation on the operating table
 - ☐ 180 minutes or less
 - ☐ 180 to 360 minutes
 - ☐ 6 to 12 hours
 - ☐ 12 to 24 hours
 - ☐ Greater than 24 hours
- 7. Provisional diagnosis.....
- 8. Ascertained diagnosis.....
- 9. Was the patient resuscitation/transfusion needed before surgery?
 - ☐ Yes
 - ☐ No
- 10. How was the diagnosis confirmed?
 - ☐ Preoperative
 - ☐ Intraoperative
- 11. Type of the operation performed.....
- 12. Duration of the operation
 - ☐ 90 to 120 minutes
 - ☐ 121 to less than 180 minutes
 - ☐ 180 to 210 minutes
 - ☐ Greater than 210 minutes
- 13. Intra-operative findings
 - ☐ Perforated viscus
 - ☐ Gangrenous bowel
 - ☐ Localized peritonitis
 - ☐ Generalized peritonitis
 - ☐ Abscess
 - ☐ Other

D. Prognostic aspects

Postoperative complications

1. Major complication
 - ☐ Anastomotic leak
 - ☐ Pelvic/ intra-abdominal abscess
 - ☐ Surgical site infection requiring re-intervention
 - ☐ Reoperation for specified reason
 - ☐ Wound dehiscence
 - ☐ Death
2. Minor or no complication
 - ☐ Wound infection
 - ☐ Paralytic ileus
 - ☐ Sepsis treated conservatively
 - ☐ Other
 - ☐ No complication
3. Any identified comorbidities?
 - ☐ Yes
 - ☐ No
4. What is the comorbidity?
5. Does the patient smoke?
 - ☐ Yes
 - ☐ No
6. Postoperative length of stay in the hospital (NB. The first 24hr. postoperative counted as zero).
 - ☐ 2 days 7 days
 - ☐ 8 to 14 days
 - ☐ 14 to 30 days
 - ☐ More than 30 days

9.2. Table 3 Selected indications for emergency surgery reviewed in this study

Pediatric and urological emergency surgeries are excluded in this study

General surgery	Pediatric surgery	Urological surgery
Peritonsillar & retropharyngeal abscess	Typhoid ileal perforation	Ureteral obstruction
Acute airway obstruction	Pyloric stenosis	Acute urinary retention
Esophageal perforation	Intussusception	Testicular torsion
Gastrointestinal bleeding	Intestinal atresia	Paraphimosis
Complicated peptic ulcer	Imperforate anus	Priapism
Acute cholecystitis	Vascular surgery	
Intestinal obstruction or volvulus	Acute aorta	
Appendicitis	Acute limb ischemia	
Complicated diverticulitis	Critical limb ischemia and wet gangrene	
Toxic megacolon	Acute mesenteric ischemia	
Incarcerated or strangulated hernia		
Acute abdomen		
Abscess and soft tissue infections		
Perianal abscess		

Redrawn from the Global Burden of Disease Study 2013 or the University of Washington's Institute for Health Metrics and Evaluation Data visualization database⁴.

9.3. Table 4. Postoperative complications

Major complications	Minor complications
Anastomotic leak	Sepsis treated conservatively until resolved
Pelvic abscess	Paralytic ileus
Surgical site infection requiring re-intervention	Wound infection
Wound dehiscence	No complication
Death	

Assurance of Investigator

The undersigned agrees to accept responsibility for the scientific, ethical and technical conduct of the research Project and for provision of required progress reports as per terms and conditions of the Research and Publication Directorate and/or Department of Public Health of St Paul's Hospital Millennium Medical College.

Name of Student _____

Date _____ Signature _____

Approval of Advisors

Advisors

Dr. Teferi _____ Signature _____ Date _____

Dr. Gelan _____

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