PERIOPERATIVE OUTCOMES AND ASSOCIATED FACTORS AMONG ADULT PATIENTS UNDERGOING LAPAROTOMY FOR NON-TRAUMATIC ACUTE ABDOMEN: A MULTI-CENTER COHORT STUDY, HARAR, EASTERN ETHIOPIA

COLLEGE OF HEALTH AND MEDICAL SCIENCE
SCHOOL OF MEDICINE
DEPARTMENT OF GENERAL SURGERY

By: Dr. Yaried Awoke

Major Advisor: Dr. Yoseph Solomon (MD, Assistant professor of General Surgery and HPBS)

Co-Advisor: Dr. Abdurhaman Aliye (MD, Assistant professor General Surgery)

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APPROVAL SHEET

HARAMAYA UNIVERSITY

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Major Advisor

Dr. Yoseph Solomon (MD, Assistant professor of General Surgery and HPBS)

Signature _____ Date_____

Co- Advisor

Dr. Abdurrahman Aliye (MD, Assistant professor General Surgery)

Signature _____ Date_____

As a member of the Board of Examiners of the Medical Specialty program Thesis-Open Defense Examination, I certify that I have read and evaluated the thesis prepared by Dr. Yaried Awoke and examined the candidate. I recommend that the thesis be accepted as fulfilling the thesis requirement for the Medical Specialty program of General Surgery.

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Name: Dr. Yaried Awoke (MD)

Signature ----------

Date: ----------

School/Department: General Surgery

BIOGRAPHICAL SKETCH

I was born on November 29, 1994, in Yismala Kebele, West Gojjam Zone, Amhara Region, Ethiopia. I earned my Doctor of Medicine (M.D.) degree from Jimma University in April 2020, following an extensive educational journey that began at Yismala Elementary School and continued through Yismala Secondary and Preparatory Schools.

After completing my medical degree, i worked as a general physician at Janamora Primary Hospital from September 2020 to February 2021. During this time, I actively participated in hospital training programs on tuberculosis and HIV treatment, enhancing my expertise in public health. Currently, I am pursuing my residency in general surgery at Haramaya University, further solidifying my commitment to advancing healthcare services.

Beyond my professional life, i enjoy a range of recreational activities, including watching football games and movies, playing football, traveling, and swimming. These hobbies provide me with balance and rejuvenation, reflecting my dynamic and well-rounded personality. As an Ethiopian national with a strong sense of purpose, I am dedicated to improving the health and well-being of my community through my medical practice and continuous professional growth.

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF ABBREVIATIONS/ACRONYMS

AHR	Adjusted hazard Ratio
AOR	Adjusted Odds Ratio
BP	Blood Pressure
CHR	Crude hazard ratio
CI	Confidence Interval
CRC	Colorectal cancer
ETB	Ethiopian birr
HAI	Hospital acquired infection
HFCSUH	Hiwot fana comprehensive specialized university hospital
IHRERC	Institutional Health Research Ethics Review Committee
KM	Kilo Meter
LBO	Large Bowel Obstruction
MSc	Master of Science
NTAA	Non-Traumatic Acute Abdomen
PPUD	Perforated peptic ulcer disease
PR	Pulse Rate
RR	Respiratory Rate
SBO	Small Bowel Obstruction
SD	Standard deviation
SO2	Oxygen Saturation
SPSS	Statistical Package for Social Science
SRC	Surgical referral clinic
SSI	Surgical Site Infection
T˚	Temperature

ABSTRACT

Introduction: The term acute abdomen designates symptoms and signs of intra-abdominal disease usually treated best by surgical operation. The proper management of patients with acute abdominal pain requires a timely decision about the need for surgical operation. However, evidence regarding this issue is limited in Hiwot Fana Comprehensive specialized University Hospital and Jugol General Hospital , which are the study areas. Therefore, doing this study will reduce those limitations regarding perioperative outcomes of surgically treated non-traumatic acute abdomen and associated factors in adult patients in these two hospitals.

Objective: This study aimed to assess perioperative outcomes and associated factors among patients undergoing laparotomy for non-traumatic acute abdomen at Hiwot Fana Comprehensive specialized University Hospital and Jugol General Hospital from July 1 to October 31, 2024.

Methodology: A facility based prospective cohort study design was conducted in two public hospitals found in Harar town, Eastern Ethiopia from July 1 to October 31, 2024. A total of 141 adult patients underwent laparotomy for non-traumatic acute abdomen. Postoperative morbidity and mortality within 30 days of surgery were assessed. Data was collected using structured checklists. The collected data entered into Kobo tool box and exported to STATA version 17 for further analysis. A Kaplan-Meier analysis was used for categorical variables, and a log-rank test was used to determine the statistically significant difference between variables. A Cox regression analysis was conducted to identify factors associated to time to develop complications.

Results: The overall rate of unfavorable outcome was 13.5% and 29.08% of the cases developed postoperative complications. The hazard of developing unfavorable treatment outcomes among those with preoperative shock was 33.19 times higher than those without preoperative shock (AHR 33.191, 95% CI [1.376, 800.464]). Fever was another significant factor, with an AHR of 16.474, 95% CI [1.372, 197.756], indicating that patients with fever were more than sixteen times more likely to develop unfavorable treatment outcomes. Age above 50 years was also another factor with AHR of 13.950, 95% CI [1.551, 125.493]. The mortality rate in this study was 8.5%.

Conclusion: Patients who had shock, fever, and age above 50 years are at increased risk for unfavorable perioperative outcomes. Therefore, due attention should be given to those patients who are going for laparotomy after presented with shock and fever. Clinicians may use these results to optimize these patients to decrease their elevated risk of serious morbidity and mortality.

Keywords: *shock, fever, laparotomy, Harar*

1 INTRODUCTION

1.1 Background

The term acute abdomen designates symptoms and signs of intra-abdominal disease usually treated best by surgical operation. Many diseases, some of which do not require surgical treatment, produce abdominal pain, so the evaluation of patients with abdominal pain must be methodical and careful. The proper management of patients with acute abdominal pain requires a timely decision about the need for surgical operation (Jones, p. 2020). This decision requires evaluation of the patient's history and physical findings, laboratory data, and imaging tests. The syndrome of acute abdominal pain generates a large number of hospital visits and may affect the very young, the very old, either sex, and all socioeconomic groups. Abdominal pain accounts for 5% to 10% of all emergency department visits or 5 to 10 million patient encounters in the United States annually. Another study demonstrated that 25% of patients presenting to the emergency department complained of abdominal pain (Jones, p. 2020).

The most common symptoms are abdominal pain and vomiting whereas tenderness and guarding are the most frequent clinical signs. It is common surgical emergency accompanied with high morbidity and mortality if not managed properly. Worldwide, appendicitis, bowel obstructions, incarcerated or strangulated hernias, volvulus, and acute biliary pathology remain the most common causes of the acute abdomen in adults (Awori, p. 2015).

In a study conducted at Dil Chora referral hospital in Dire-Dawa of eastern Ethiopia, the most common cause of non-traumatic surgical acute abdomen was found to be acute appendicitis followed by intestinal obstruction and gastro-duodenal ulcer perforation. The overall mortality rate in this study was 10.9%. A statistical significance association was found between outcome of acute abdomen and duration of illness less, age and season of presentation (Addisu M.,Tadess A. et al, 2012).

The mortality rate following emergency surgery for non-traumatic acute abdomen was 4% according to the study done at Wolaita Sodo referral hospital and most of the patients died were operated for bowel obstruction. The majority of the patients were from rural areas (88.1%) and the rest were from urban. Majority of patients, 63.3% were presented within

2-5 days of illness before operation. The three top causes of non-traumatic surgical acute abdomen were bowel obstruction 49.3%, acute appendicitis 31.5% and peritonitis 19.2% (Negash, 2017).

Based on a study done at Nekemte Referral hospital the overall mortality rate of surgically treated acute abdomen was 3%. The most common cause of acute abdomen was acute appendicitis 47.4% followed by bowl obstruction 40.0%. Age, residence, duration of illness and length of hospital stay are independent predictors of management outcomes of non-traumatic acute abdomen in this study. Almost all of the patients operated for bowel obstruction contributed to the fatality (Zinabu A., Abraham T. et al , 2013).

There is also similar study done in Black Lion Hospital whereby acute appendicitis was the leading cause of acute abdomen (52%) followed by intestinal obstruction (26%) and perforated Peptic ulcer disease (PPUD) (9%). Of all, 28% of patients developed post-operative complications sepsis being the most common one followed by wound infection and pneumonia. The overall mortality rate was 15.3% in this study. The mortality rate was very high (25%) in those operated patients who came more than 2 days of illness duration (Kotiso, B.and Z.Abdurahman, 2007).

1.2 Statement of problem

Non traumatic acute abdomen is an integral part of acute abdomen and is an important public health problem that remains a primary concern to both patients and surgeons. It is relatively non preventable common global emergency consuming much in terms of surgical cost. It represents up to 54% of general surgical admissions in some Asian countries whereas up to 88.2% total emergency operations in few African countries. Despite modern surgery is being practiced; the mortality rate following non traumaticacute abdominal surgical emergencies is still high worldwide being the highest at the extremes of age (Nyundo and Rugwizangoga, 2013; Yemane,Kiflom et al , 2013).

The pattern of the disease changes from time to time and needs periodic studies to evaluate the etiological factors and behavior of the disease. Global as well as regional variations in the magnitude of non-traumatic acute surgical abdomen and changes in thedisease pattern over the years are well documented in the literature (Tsegaye, 2007; Negash, 2017; Addisu M.,Tadess A. et al, 2012).

The management of patients with abdominal conditions like any other surgical condition needs to be followed by the fewest number of complications possible. In many poor communities worldwide, acute abdominal conditions continue to cause many deaths (Ohene-Yeboah, 2006; Bizuayehu T.,Mekonnen T. et al , 2017).

In Hiwot Fana Comprehensive Specialized University Hospital (HFCSUH), Harar, very little is known about the pattern and associated factors of surgically treated non-traumatic acute abdomen and there is no literature that indicates the outcome and its associated factors. This study is therefore, aimed at assessing this problem so that the importance of an accurate data regarding outcomes and associated factors of non-traumatic acute abdomen in Hiwot Fana Comprehensive Specialized University Hospital (HFCSUH), would be indisputable, with the goal of identifying actionable strategies to improve care and outcomes.

1.3 Significance of the study

This study will be the first of its kind to be done in General surgery department of HFCSH, Harar, and Eastern Ethiopia. This study helps to inform the hospital management about the common causes, and management outcomes,and its associated factors among patients with non-traumatic acute abdomen which helps to evaluate our experience and to analyze the magnitude of the problem. It also helps to compare the pattern with other figures, to design an appropriate management outline and preventive measures and to conduct training programs. The results of the study will serve as a benchmark for future researchers, especially for those in developing nations, who are interested in working on further studies on this topic and also each and specific causes of acute abdomen.

The result may contribute the health management at Harari Regional Health Brue to develop strategies to alleviate this problem. The research findings can also inform healthcare resource allocation, guiding the focus of resources towards patients who may face higher risks.

1.4 Objectives of the study

1.4.1 General objective

- To assess the perioperative outcomes and associated factors among adult patients undergoing laparotomy for non-traumatic acute abdomen at Hiwot Fana Comprehensive Specialized University Hospital and Jugol General Hospital from July 1 to October 31,2024.

1.4.2 Specific objectives

- To assess the perioperative outcomes of surgically treated non-traumatic acute abdomen in adult patients.
- To identify the associated factors of outcomes of surgically treated non-traumatic acute abdomen in adult patients.

2 LITERATURE REVIEW

2.1 Perioperative Outcomes of non-traumatic acute abdomen

Despite modern surgery is being practiced; the mortality rate following non traumatic acute abdominal surgical emergencies is still high worldwide being the highest at the extremes of age (Yemane,Kiflom et al , 2013; Nyundo and Rugwizangoga, 2013).

The management of patients with abdominal conditions like any other surgical condition needs to be followed by the fewest number of complications possible. In many poor communities worldwide, acute abdominal conditions continue to cause many deaths. The overall morbidity and mortality of patients admitted with acute abdominal pain is, not surprisingly, much higher than for elective surgery. Emergency abdominal surgery is associated with a high mortality estimated at 5% to 25% (Nyundo and Rugwizangoga, 2013).

The management of non-traumatic acute abdomen depends on different factors such as etiology and presentation. Most patients with acute appendicitis can be managed with appendectomy. In our set up all patients with acute appendicitis who need surgery are treated with open appendectomy. Most of the patients diagnosed to have peritonitis presented to emergency department are treated with laparotomy and intra operatively those patients who had gastric and duodenal perforation underwent closure of perforation (Awori, 2005).

Study done in Sinai Hospital, in Tehran, acute appendicitis was the most common cause of acute abdomen (56.8%). Acute appendicitis was the most common etiology of acute abdomen in 67% of male and 38.8% of female patients and other common causes were 14.4% peritonitis among which 5.7% resulted from PPUD, (3.5%) were perforated appendicitis, 1.4% pancreatitis, 7.2% cholecystitis, and bowel obstruction 7.2% of which 2.2% adhesion and volvulus each, 1.4% incarcerated hernia and only 0.7% case of invaginationfound (Samuel, 2011).

A retrospective hospital based study done at Suhul general Hospital, Ethiopia, from March 2012 to 2014 on 166 patients who underwent emergency abdominal surgeries showed the most common cause of acute abdomen was acute appendicitis followed by peritonitis and intestinal obstruction. The overall mortality rate was 4.2% which was observed in patients

who presented late and the study also conducted on a total of 277 patients at Black Lion teaching Hospital the overall mortality was 15.3% which was also observed in patients who presented late (Gebre, 2014), (Kotiso, B.and Z.Abdurahman, 2007).

In a hospital based prospective cross sectional study done at Attat general Hospital, Ethiopia, between January 2017 to September 2018, there were 192 non traumatic emergency surgical acute abdomens admitted in surgical ward and the overall mortality rate of surgically treated non-traumatic acute abdomen was 9.35% which is lower than the study done in Black Lion specialized hospital (15.3%) and Goba referral hospital 2017 (16%) but higher than the study done in Mekelle and Nekemte referral hospitals which had shown 2.4% and 3.05% mortality rate respectively. In this study, 81% of death was secondary to sepsis and 61% in higher extreme age group with mean age of the expired patients (43.5 years). Most of patients who died were managed for generalized peritonitis following perforated appendix followed by large bowel obstruction and perforated PUD (Tekalign A.,Tilahun B. et al, 2019; Bizuayehu T.,Mekonnen T. et al , 2017; Yemane,Kiflom et al , 2013; Zinabu A., Abraham T. et al , 2013).

In a one year retrospective cross sectional study done at Dil Chora Referral Hospital from October 1, 2011 to September 30, 2012, the most common cause of acute abdomen was acute appendicitis followed by intestinal obstruction and gastro-duodenal ulcer perforation. Its' peak incidence was in age groups between 20 and 29 years. Acute abdomen mortality ratio was 10.9% (Addisu M.,Tadess A. et al, 2012).

2.2 Associated factors of outcomes of non-traumatic acute abdomen

Many factors have been described as responsible for surgical morbidity and mortality of patients who underwent emergency abdominal surgery. These include age of the patient, increased time between the onset of symptoms and the hospital admission, the hospital admission and surgery, nature of operation, hematocrit level, malignant disease with metastasis, presence of peritonitis, a delayed diagnosis, management, complication detection time and postoperative stay (Nyundo and Rugwizangoga, 2013).

In a study conducted on 190 cases at Kamuzu Central Hospital in Lilongwe, Malawi, during the calendar year 2008 the most common etiologies were appendicitis (22%), intestinal volvulus (17%), perforated peptic ulcer (11%) and small bowel perforation

(11%). The overall mortality rate associated with peritonitis was 15%, with the highest mortality rates observed in solid organ rupture (35%), perforated peptic ulcer (33%), primary/idiopathic peritonitis (27%), tubo-ovarian abscess (20%) and small bowel perforation (15%). Factors associated with death included abdominal rigidity, generalized (versus localized) peritonitis, hypotension, tachycardia and anemia ($p < 0.05$). Age, gender, symptoms (obstipation, vomiting) and symptom duration, tachypnea, abnormal temperature, leukocytosis, hemoconcentration, thrombocytopenia and thrombocytosis were not significantly associated with mortality (Jonathan C.,Javeria S. et al, 2011).

Based on a study done at Lilongwe, Malawi, abdominal rigidity, generalized (versus localized) peritonitis, hypotension, and tachycardia were found to be associated with higher mortality rate. Age, gender, symptoms and symptom duration, tachypnea, abnormal temperature, leukocytosis, thrombocytopenia and thrombocytosis were not associated with mortality (Jonathan C.,Javeria S. et al, 2011).

Based on a retrospective cross sectional study done at Nekemte Hospital from January 2011 to December 2013, the age of the patient, increased time between the onset of symptoms and the hospital admission, residence, length of hospital stay were associated with significant morbidity and mortality (Zinabu A., Abraham T. et al , 2013).

In a study done at Dil Chora Referral Hospital, the most common cause of acute abdomen was acute appendicitis followed by intestinal obstruction and gastro-duodenal ulcer perforation. Its' peak incidence was in age groups between 20 and 29 years. A statistical significance association was found between outcome of acute abdomen and duration of illness less than 2 days, age between 18-50 years old season of presentation from September–November (Addisu M.,Tadess A. et al, 2012).

Based on a hospital-based prospective cross sectional study done at Attat general Hospital, Ethiopia, from January 2017 to September 2018, age, sex, late presentation of patients before intervention, postoperative complications, peritonitis at presentation were associated with bad outcome. The overall mortality found in this study was relatively high compared with some studies in Ethiopia even if it is lower than in some areas (Tekalign A.,Tilahun B. et al, 2019).

Based on a retrospective cross-sectional study done at Teklehaimanot General Hospital, Adis Ababa, January 1, 2018 and August 1, 2019, age, duration of illness and tachycardia were significantly associated with postoperative complication. Age, sex, place of residence and duration of illness were the factors significantly associated with postoperative mortality (ademe, 2022).

2.3 Conceptual frame work

After reviewing different literatures, factors that tends to affect the outcomes of surgically treated non traumatic acute abdomen patients are identified and used to construct the conceptual frame work.

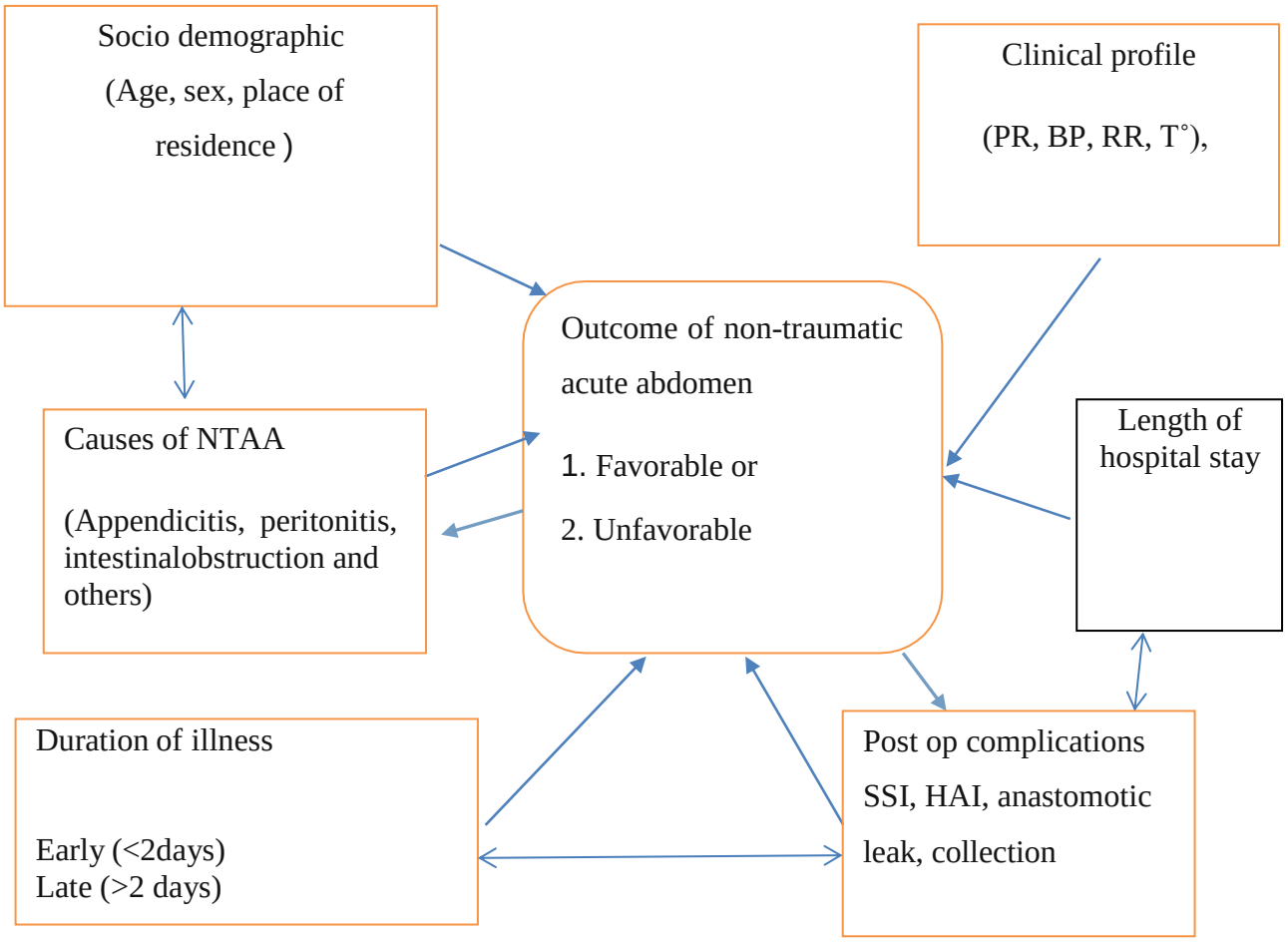

Figure 1. Conceptual framework for assessment of outcomes of non-traumatic acute abdomen (NTAA) and associated factors in adult patients admitted to HFCSUH, Harar, Eastern Ethiopia, 2024(constructed by the investigator from readings of different literatures)

3 METHODS AND MATERIALS

3.1 Study area and period

The study was conducted in two public hospitals, Hiwot Fana Comprehensive Specialized University Hospital and Jugol General Hospital, harar town, Eastern Ethiopia from July 1, 2024 to October 31, 2024. Harar is the capital city of Harari Regional State. The region is located in Eastern Ethiopia, found 518 KM away from Addis Ababa. Harari is the smallest of the 12 states of Ethiopia, located in the eastern part of the country and surrounded by the east Hararghe zone of the Oromia regional state. It has 2 public hospitals and 5 health centers. This study was conducted on adult patients who were surgically treated for non-traumatic acute abdomen at HFCSUH and Jugol General Hospital, the two public hospitals in Harar. HFCSUH is the teaching hospital for Hiwot Fana Comprehensive Specialized University Hospital for Eastern Ethiopia (including Harari region, some parts of Somali region, and eastern Hararghe zone of Oromia) that is expected to serve about 5.8million people in the Eastern part of Ethiopia. HFCSUH offers specialties in emergency medicine, anaesthesiology, internal medicine, obstetrics and gynaecology, general surgery, and orthopaedics. Additionally, the hospital delivers treatments at different subspecialty levels, such as radiology, dermatology, pathology, oncology, neurology, neurosurgery, plastic surgery, and paediatrics surgery.

3.2 Study Design

A multi-center prospective cohort study design was conducted.

3.3 Population

3.3.1 Source population:

All adult patients with surgically treated non-traumatic acute abdomen admitted to surgical ward at HFCSUH and Jugol General Hospital were our source population.

3.3.2 Study population

All adult patients diagnosed with non-traumatic acute abdomen by history, physical examination or by other investigation modalities and treated surgically at HFCSUH and Jugol General Hospital during the data collection period was the study population.

3.4 Inclusion and exclusion criteria

3.4.1 Inclusion criteria

All adult patients whose age is >=18 years old and diagnosed with non- traumatic acute abdomen by history, physical examination or by other investigation modalities and

surgically treated at HFCSUH and Jugol General Hospital were included in the study.

3.4.2 Exclusion criteria

All patients discharged against medical advice. Patients with diagnosis of non-traumatic surgical acute abdomen and who are operated out of HFCSUH and Jugol General Hospital and admitted to the hospital after the operation. Patients who have diagnosis of traumatic, gynecologic and medical causes of acute abdomen also were excluded in this study. Patients with diagnosis of non-traumatic surgical acute abdomen who were managed non-surgically were also excluded.

3.5 Sample size determination

For objective 1:

$$n = \frac{(z_{\alpha/2})^2 \cdot pq}{d^2}$$

The sample size was calculated by using single population proportion formula by taking those patients who had non favorable outcome (P=25%) in a study done at Wolaita (Negash, 2017) and considering level of significance to be (α = 5%) with 5% margin of error.

Where; - n=minimum sample size

$Z_{\alpha/2}$= 1.96 (for 95% of CI)

d = marginal error =(5%)

q=1-p

$$\frac{n= (1.96)^2 \text{ X } 0.25\ (0.75)}{(0.05)^2} = 288.12$$

The minimum sample size for this research was 289. With 5% non-response rate the total sample size was 304.

For objective 2:

To calculate the sample size for associated factors of perioperative outcomes among adult patients undergoing laparotomy for non-traumatic acute abdomen, different exposure variables were considered by revising different literatures. The sample size was then calculated by Epi Info software version 7.2.5.0. It is calculated by considering the CI= 95%, 5% margin of error, power of 80%, and using ratio of unexposed-to-exposed of

1.The summary of sample size calculation is shown in the following table.

Table 1.summary of sample size calculations for objective 2 of the study on perioperative outcomes and associated factors among adult patients undergoing laparotomy at hiwot Fana Comprehensive and Specialized University Hospital and Jugol General Hospital, Harar, Eastern Ethiopia.

Factors	Proportions in exposure status		AOR	Ratio of unexposed to exposed	Initial sample size	NR (5%)	Final sample size	References
	Exposed	Unexposed						
Age	>55 years	<55years	6	1	72	4	76	(Tekalign A.,Tilahun B. et al, 2019)
Duration of illness	>48hours	<48hours	5.7	1	116	6	122	
Postoperative complication	Developed complication	Not developed complication	5.6	1	38	2	40	
Type of diagnosis	Peritonitis	Not peritonitis	2.8	1	236	12	248	

Considering both objectives 1 and 2 the maximum sample size was 304. And this was used as the total sample size for the study. But, the source population was only 141, which is less than 304. Because of these, all the source population in the study period was used to collect data for achieving the objective of the study. The charts were reviewed and patients were followed until discharge or until 30 days from the day of surgery.

3.6 Sampling procedure

Initially, the two public hospitals found in Harar town were purposefully selected as study sites. A total of 141 adult patients were operated for non-traumatic acute abdomen in both hospitals that are eligible for the study. Out of 141, 116 were from hiwot fana and the remaining 25 from jugol. Since the source population is less than the calculated sample size, all source population who fulfill the eligibility criteria was included in the study.

3.7 Data collection methods

3.7.1 Data collection instruments

Structured data extraction checklists were prepared through reviewing varieties of literatures. The first part of the questionnaire consisted of issues related to the personal information of patients including the age, sex, place of residence. The second part is concerned with presenting complaints and signs of the patient. The third part included causes of non-traumatic acute abdomen (diagnosis) and the procedure done. Finally, the fourth part is concerned on management outcome of the patients. Then the patients were followed in the hospital and at SRC, medical records were reviewed and data was collected using a pre-prepared standard checklist.

3.7.2 Data collectors and supervisors

Training was given for two days on the objective of the study and the procedure of data collection for data collectors. Data extraction checklist were filled out by 10 trained surgical residents and supervised by principal investigator.

3.7.3 Procedure of data collection

Ten surgical residents undertook the data collection process. Then the patients were followed in the hospital and at SRC, medical records were reviewed and data was collected using a pre-prepared checklist. All data collection activities were supervised by principal investigator.

3.8 Variables of the study

3.8.1 Dependent variables

Outcome of surgically treated non-traumatic acute abdomen as “favorable or unfavorable”.

3.8.2 Independent variables

- Socio demographic characteristics (age of patient, sex, Place of residence)
- History of previous surgery
- Clinical profile (BP,PR, RR, To)
- Etiology of NTAA (Appendicitis, Intestinal obstruction, PPUD, strangulated/incarcerated hernia)

- Duration of illness
- Length hospital stays
- Procedures done

3.9 Operational definitions

The primary outcome measure was the presence of 30-day morbidity and mortality, which was measured according to Clavien-Dindo grading (Dindo, 2014).

- **Favorable** - when operatively managed patients' chart were documented with a clinical diagnosis of stable vital sign and/or documented as improved at discharge summary sheet and discharged from the hospital and the Clavien-Dindo grading after 30 days of the surgery is from grade 1 up to grade 3A (Tekalign A.,Tilahun B. et al, 2019; Dindo, 2014).

- **Unfavorable** - Patients with a clinical diagnosis and operatively managed for non-traumatic acute abdomen but not improved on discharge(including death, referral, worsened)and their Clavien-Dindo grading after 30 days of the surgery is from grade 3B up to grade 5 (Tekalign A.,Tilahun B. et al, 2019; Dindo, 2014)

3.10 Data quality control measures

The structured data extraction checklists prepared in English version was assessed.During data collection in order to avoid discrepancy, data was collected by the data collectors under supervision of investigator. The data collectors were among the surgical residents involved in the treatment of each particular patient. Before data analysis the completeness and consistency of each checklist was checked with direct supervision. All the collected data was checked & rechecked and necessary correction was made each day.

3.11 Methods of data analysis

After data was collected, it was coded and entered in to Kobo tool box and exported to STATA version 17 computer software for descriptive and logistic regression analysis of the data. Descriptive binary and multivariate logistic regression analysis was used. On binary logistic regression analysis, a p value of <0.25 was used as a candidate for

multivariate logistic regression analysis. Data was presented by frequency, tables, and figures. Association between dependent and independent variables was checked by using logistic regression model. Crude and adjusted hazard ratio was used to know and ascertain any association between the independent and dependent variables. Adjusted Hazard Ratio (AHR) with 95% CI and P-value less than 0.05 was considered as statically significant in this study.

3.12 Ethical consideration

Ethical clearance was obtained from Institutional Health Research Ethics Review Committee (IHRERC) of Haramaya University College of health and medical sciences. Informed, written and signed voluntary consent was obtained from head of the hospital prior to distributing the checklist. The hospitals were provided the right to stop the research at any phase if they found the study to be unethical or wrong by any means. The hospitals had also have the right to be informed about the results of the study.

3.13 Expected outcome

This study was expected to show the perioperative outcomes of adult patients treated surgically for non-traumatic acute abdomen and factors that are associated with the outcome.

3.14 Information dissemination

After the whole process of the research work, hard and soft copy of the result of the study was submitted to Haramaya University College of Health and Medical Sciences, College of Medicine, Department of surgery, and send to HFCSUH. Formal defense of the paper was considered as one mechanism of dissemination and utilization of the result. Finally, the research will be published in recognized journal to be available for those who could benefit from the study.

4 RESULTS

4.1 Socio-demographic characteristics

Between July 1, 2024 and October 31, 2024, 141 patients with non-traumatic acute abdomen underwent emergency laparotomy at two public hospitals in Harar, Eastern Ethiopia. Out of 141 patients, 113 (80.1%) were males and 28 (19.9%) were females with a male to female ratio of 4:1. Out of the total 94(66.7%) were from rural areas and the remaining 47(33.3%) from urban areas. Considering the age of the patients, 72(51.1%) were between the age of 18 and 30 years. The mean age of patients at surgery was 34.6 years (±SD13.6).

Table 2 : socio demographics of patients undergoing emergency laparotomy for non-traumatic acute abdomen at hiwot Fana Comprehensive and Specialized University Hospital and Jugol General Hospital, Harar, Eastern Ethiopia.

Variables	Category	Frequency	Percentage %
Age	18-30	72	51.1
	30-50	53	37.6
	>50	16	11.3
Sex	Male	113	80.1
	Female	28	19.9
Residency	Rural	94	66.7
	Urban	47	33.3

4.2 Clinical patterns

The majority, 139 (98.6%), of the patients present with abdominal pain and 131 (92.9%) of the patients experienced vomiting. Nausea was present in 61 (43.3%) of patients, while abdominal distention and constipation were present in 57(40.4%), and 67(47.5%) of the cases, respectively. Fourteen (9.9%) patients had a history of previous abdominal surgery. The majority, 81(57.4%), arrived at the hospital within 48 hours of symptom onset, while the remaining 60(42.6%) presented after 48 hours. About 97(68.8%) patients exhibited abdominal tenderness, either localized or diffuse, upon presentation. Guarding was present in 34 (24.0%) while 56 (39.7%) of patients had an empty rectum. Hypotension and tachycardia were recorded in 6 (4.3%) and 89 (63.1%) of the patients, respectively, at the time of presentation.

Table 3: clinical symptoms and signs of patients undergoing emergency laparotomy for non-traumatic acute abdomen at hiwot Fana Comprehensive and Specialized University Hospital and Jugol General Hospital, Harar, Eastern Ethiopia.

Variables	Category	Frequency	Percentage %
Abdominal pain	Yes	139	98.6
	No	2	1.4
Vomiting	Yes	131	92.9
	No	10	7.1
Nausea	Yes	61	43.3
	No	80	56.7
Abdominal distension (symptom)	Yes	57	40.4
	No	84	59.6
Constipation	Yes	67	47.5
	No	74	52.5
Previous abdominal surgery	Yes	14	9.9
	No	127	90.1
Other symptoms*		13	9.2
Duration of illness (in days)	< 2	81	57.4
	>=2	60	42.6
Abdominal tenderness	Yes	97	68.8
	No	44	31.2
Guarding	Yes	34	24.1
	No	107	75.9
Abdominal distention (sign)	Yes	65	46.1
	No	76	53.9
Bowel sound	Hyperactive (>34)	43	30.5
	Hypoactive (<5)	30	21.3
	Normoactive(5-34)	68	48.2
Rectum empty	Yes	56	39.7
	No	85	60.3
Hyper tympanic percussion note		51	36.2
Others		6	4.3
BP	High (>140/90)	10	7.1
	Low (<90/60)	6	4.3
	Normal (90-140/60-90)	125	88.7
PR	Bradycardic (<60)	2	1.4
	Normal (60-90)	50	35.5
	Tachycardia (>90)	89	63.1
RR	High (>24)	7	5.0
	Normal (12-24)	134	95.0
Temperature	High (>37.5)	25	17.7
	Normal (36.5-37.5)	116	82.3
SO2	Low (<90)	4	2.8
	Normal (>90%)	137	97.2

* *Fever, groin swelling, rectal bleeding, known gastric cancer, weight loss, vaginal discharge*

4.3 Patterns of diseases

Out of the total patients 45 (31.9%) were diagnosed with acute appendicitis,with the majority being simple 27 (19.1%). Complicated appendicitis (phlegmonous, gangrenous, perforated, abscess) accounted for 17 (12.1%) of the total cases. There were 58 (41.1%) cases of intestinal obstruction, including 54 (38.3%) with SBO and 4 (2.8%) with LBO. The most common causes of SBO were primary volvulus 27(19.1%), adhesions/bands 18(12.8%), hernia 5(3.5%), and intussusception 3(2.1%). There were 2 (1.4%) cases of sigmoid volvulus and 1 (0.7%) case of obstructing CRC. Among SBO cases, 45 (31.9%) were viable and the remaining 9 (6.4%) were gangrenous. In the case of LBO, 3 (2.1%) were viable and 1 (0.7%) was gangrenous. Peritonitis was responsible for 37 (26.2%) cases, with the causes being perforated PUD 23 (16.3%), perforated appendicitis 10 (7.1%), typhoid ileal perforation 1 (0.7%), and perforated SBO 1 (0.7%). The remaining 2 (1.4%) cases were primary peritonitis.

Table 4: patterns of the diseases of patients undergoing emergency laparotomy for non-traumatic acute abdomen at hiwot Fana Comprehensive and Specialized University Hospital and Jugol General Hospital, Harar, Eastern Ethiopia.

Patterns of diseases	Types or causes		Frequency	Percentage %
Appendicitis			45	31.9
	Simple appendicitis		27	19.1
	Complicated appendicitis		17	12.1
	Appendiceal mass		1	0.7
Intestinal obstruction			58	41.1
	Small bowel		54	38.3
		Primary volvulus	27	19.1
		Adhesion\band	18	12.8
		Hernia	5	3.5
		Intussusceptions	3	2.1
		Others	2	1.4
		non-viable	9	6.4

		viable	45	31.9
	Large bowel		4	2.8
		Sigmoid volvulus	2	1.4
		Colorectal cancer	1	0.7
		others	1	0.7
		non-viable	1	.7
		viable	3	2.1
Peritonitis			37	26.2
	Perforated PUD		23	16.3
	Perforated appendicitis		10	7.1
	Typhoid ileal perforation		1	0.7
	Perforated bowel obstruction		1	0.7
	Others		2	1.4

4.4 Types of procedures

Table 5: types of procedures done for patients undergoing emergency laparotomy for non-traumatic acute abdomen at hiwot Fana Comprehensive and Specialized University Hospital and Jugol General Hospital, Harar, Eastern Ethiopia.

Types of procedures	Frequency	Percent
Appendectomy	45	31.9
Herniorhapphy	5	3.5
Laparotomy + adhesiolysis/band release	14	9.9
Laparotomy + derotation	26	18.4
Laparotomy + pedicled omental patch	23	16.3
Laparotomy + resection + anastomosis	10	7.1
Laparotomy + resection + stoma	8	5.7
Laparotomy + appendectomy	11	7.8
Laparotomy + lavage	2	1.4
Negative laparotomy (exploration)	1	0.7

4.5 Treatment outcomes

The treatment outcomes of the patients were assessed based on the Clavien Dindo grading system. Those with Clavien Dindo grade I, II, and IIIa were categorized as having favorable outcomes, while those with grade IIIb and above were classified as having unfavorable outcomes. Based on our finding 122(86.5%) had a favorable outcome, while

the remaining 19(13.5%) having unfavorable outcome.

Among all the 141 cases, 41 (29.08%) of them developed postoperative complications. The most common complications were wound infection 28 (19.8% of all operated patients), pneumonia 18 (12.8% of all operated patients), abdominal collection 11 (7.8% of all operated patients), sepsis & septic shock 10 (7.1% of all operated patients), and anastomotic leak 5 (3.5% of all operated patients). The total numbers of deaths were 12 (8.5% of all operated patients).

Table 6: postoperative complications of patients undergoing emergency laparotomy for non-traumatic acute abdomen at hiwot Fana Comprehensive and Specialized University Hospital and Jugol General Hospital, Harar, Eastern Ethiopia.

Variables	Specific complications	Category	Frequency	Percentage
Post op complications		Yes	41	29.08
		No	100	70.92
	Anastomotic leak	Yes	5	3.56
		No	36	87.80
	Abdominal Collect ion	Yes	11	7.80
		No	30	73.17
	Pneumonia	Yes	18	12.76
		No	23	56.10
	Sepsis/Septic shock	Yes	10	7.09
		No	31	75.61
	Wound infection	Yes	28	19.86
		No	13	31.71
	Death	Yes	12	8.51
		No	30	73.17
	Others	Yes	8	5.67
		No	33	80.49

Table 7: treatment outcomes of patients undergoing emergency laparotomy for non-traumatic acute abdomen at hiwot Fana Comprehensive and Specialized University Hospital and Jugol General Hospital, Harar, Eastern Ethiopia.

Variables	Categories	Frequency	Percent
Clavin dindo grade	grade 1	111	78.7
	grade 2	1	0.7
	grade 3a	10	7.1
	grade 3b	1	0.7
	grade 4a	5	3.5
	grade 4b	1	0.7
	grade 5	12	8.5
Outcomes	Favorable	122	86.5
	Unfavorable	19	13.5

4.6 Descriptive Survival and Kaplan Meier Analysis

Out of the 141 patients who underwent emergency abdominal surgery, 19 (13.5%) experienced unfavorable outcomes. Among these, 6 (31.6%) patients had unfavorable outcomes within the first 7 days, and another 6 (31.6%) experienced unfavorable outcomes within 7 to 14 days post-surgery. The hospital stay ranged from 2 to 30 days, with a mean (±SD) duration of 7.33 (±5.179) days. The mean (±SD) survival time (time to death) is 7.75 (±6.744) days.

When performing log-rank tests those patients with sepsis or septic shock had significantly shorter survival time than those with no sepsis or septic shock (P: <0.001; 95%CI [4.095 - 12.905]). Additional factors influencing survival included the presence of abdominal tenderness (P: 0.096; 95% CI [17.094- 24.418]), and age over 50 years (P: 0.188; 95% CI [10.825- 24.163]).

Table 8: life table of patients undergoing emergency laparotomy for non-traumatic acute abdomen at hiwot Fana Comprehensive and Specialized University Hospital and Jugol General Hospital, Harar, Eastern Ethiopia.

Interval Start Time	Number Entering Interval	Number Withdrawing during Interval	Number Exposed to Risk	Number of Terminal Events	Proportion Terminating	Proportion Surviving	Cumulative Proportion Surviving at End of Interval	Cumulative Hazard Rate
2	141	2	140.000	1	.01	.99	0.99	0.01
3	138	28	124.000	4	.03	.97	0.96	0.03
4	106	13	99.500	0	.00	1.00	0.96	0.00
5	93	20	83.000	0	.00	1.00	0.96	0.00
6	73	10	68.000	1	.01	.99	0.95	0.01
7	62	23	50.500	0	.00	1.00	0.95	0.00
8	39	3	37.500	3	.08	.92	0.87	0.08
9	33	1	32.500	0	.00	1.00	0.87	0.00
10	32	2	31.000	0	.00	1.00	0.87	0.00
11	30	1	29.500	0	.00	1.00	0.87	0.00
12	29	4	27.000	2	.07	.93	0.81	0.08
13	23	3	21.500	1	.05	.95	0.77	0.05
14	19	3	17.500	0	.00	1.00	0.77	0.00
15	16	4	14.000	1	.07	.93	0.71	0.07
16	11	0	11.000	4	.36	.64	0.45	0.44
17	7	1	6.500	0	.00	1.00	0.45	0.00
20	6	1	5.500	0	.00	1.00	0.45	0.00
21	5	2	4.000	0	.00	1.00	0.45	0.00
23	3	0	3.000	1	.33	.67	0.30	0.40
27	2	0	2.000	1	.50	.50	0.15	0.67
30	1	1	.500	0	.00	1.00	0.15	0.00

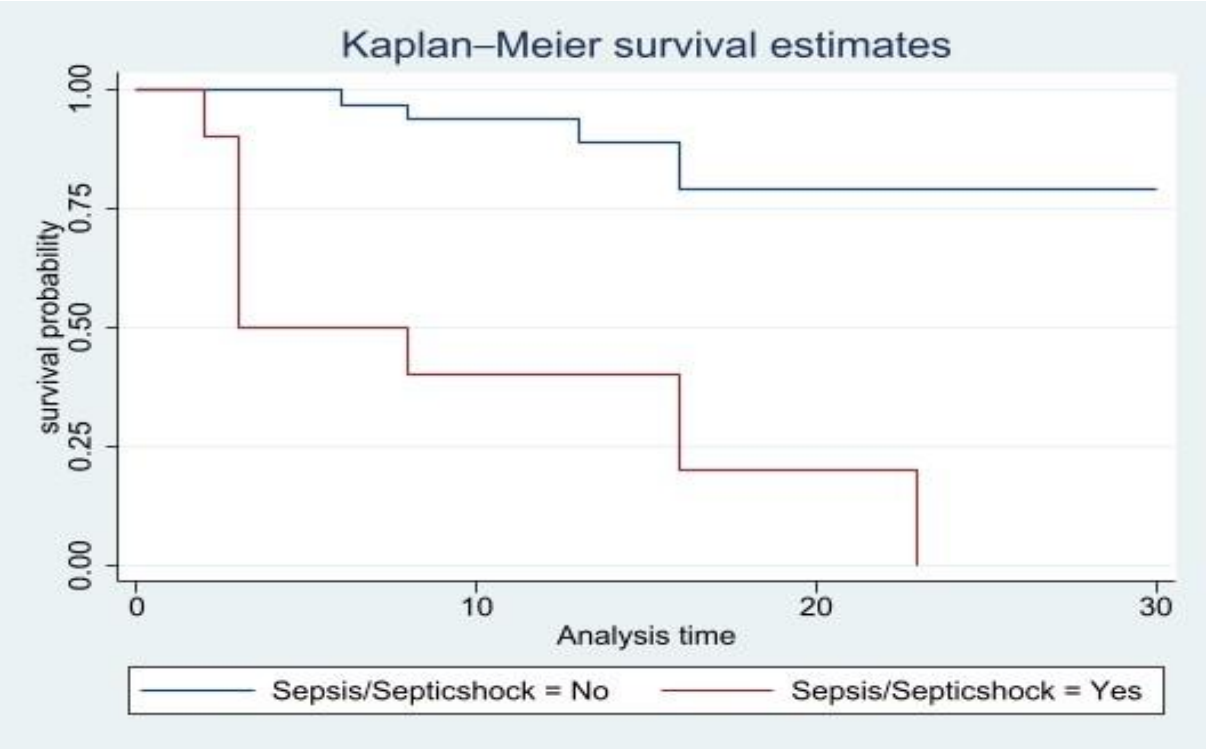

Figure 2: Kaplan-Meier survival analysis of patients with and without shock in those undergoing emergency laparotomy for non-traumatic acute abdomen at hiwot Fana Comprehensive and Specialized University Hospital and Jugol General Hospital, Harar, Eastern Ethiopia.

4.7 Predictors of unfavorable treatment outcome

In the bivariate analysis of predictors of undesirable treatment outcomes, several factors were associated with poor outcomes at a p-value of less than 0.25 and were included in the multivariate model. These variables included age >50 years (CHR 2.723, 95% CI: 0.859-8.632, p=0.089), presence of nausea (CHR 0.107, 95% CI: 0.014- 0.809, p=0.030), presence of abdominal distention on symptoms (CHR 2.465, 95% CI: 0.875- 6.946, p=0.088), presence of constipation (CHR 57.268, 95% CI: 1.211- 2707.881, p=0.040), presence of abdominal tenderness (CHR 0.460, 95% CI: 0.173- 1.219, p=0.118), presence of shock (CHR 3.105, 95% CI: 0.975- 9.888, p=0.055), and presence of fever (CHR 1.937, 95% CI: 0.750-5.001, p=0.172).

After adjusting for confounding factors in the multivariate analysis, several predictors remained significantly associated with unfavorable treatment outcomes. Shock emerged as the strongest predictor, with patients having shock at presentation being over thirty-three(33) times more likely to have unfavorable outcome (AHR 33.191, 95% CI: 1.376,800.464, p=0.031). Fever was another significant factor, with an AHR of 16.474

(95% CI: 1.372, 197.756, p=0.027), indicating that patients with fever were more than sixteen times more likely to develop unfavorable treatment outcomes. Age above 50 years was also another factor with AHR of 13.950 (95% CI: 1.551- 125.493, p=0.019).

Table 9: Binary Cox proportional hazard Model for predictors of treatment outcomes of patients undergoing emergency laparotomy for non-traumatic acute abdomen at hiwot Fana Comprehensive and Specialized University Hospital and Jugol General Hospital, Harar, Eastern Ethiopia.

Variables	Category	Outcome		CHR (95%CI)	p-value	AHR (95%CI)	p-value
		Favourable N (%)	Unfavourable N (%)				
Age (years)	18-30	66(54.1%)	6 (31.6%)	1		1	
	31-50	46 (37.7%)	7 (36.8%)	1.655(0.552-4.966)	0.369	0.911(0.132- 6.300)	0.925
	>50	10(8.2%)	6(31.6%)	2.723(0.859-8.632)	0.089*	13.950(1.551-125.493)	0.019*
Sex	Female	22(18.0%)	6(31.6%)	1.612(0.602-4.316)	0.342		
	Male	100(82.0%)	13(68.4%)	1			
Place of residence	Urban	45(36.9%)	2(10.5%)	1			
	Rural	77(63.1%)	17(89.5%)	1.858(0.412- 8.383)	0.421		
Abdominal pain	Yes	120 (98.4%)	19 (100.0%)	20.839	0.746		
	No	2 (1.6%)	0 (0%)	1			
Vomiting	Yes	114 (93.4%)	17 (89.5%)	1.295(0.278- 6.022)	0.742		
	No	8(6.6%)	2(10.5%)	1			
Nausea	Yes	60 (49.2%)	1 (5.3%)	0.107(0.014- 0.809)	0.030*	0.219(0.002, 25.725)	0.532
	No	62(50.8%)	18 (94.7%)	1		1	
Abdominal distension (symptom)	Yes	43 (35.2%)	14 (73.7%)	2.465(0.875- 6.946)	0.088*	0.664(0.086 , 5.145)	0.695
	No	79 (64.8%)	5 (26.3%)	1		1	
Constipation	Yes	49 (40.2%)	18 (94.7%)	57.268(1.211- 2707.881)	0.040*	1958549.53	0.801
	No	73 (59.8%)	1 (5.3%)	1		1	
Previous abdominal surgery	Yes	10 (8.2%)	4 (21.1%)	2.267(0.733- 7.004)	0.155*	0.272(0.015 , 4.943)	0.379
	No	112 (91.8%)	15 (78.9%)	1		1	
Duration of illness(in hours)	<48	77 (63.1%)	4 (21.1%)	1		1.499(.705, 3.189)	0.293
	>48	45 (36.9%)	15 (78.9%)	1.258(0.358- 4.428)	0.720	1	
Abdominal tenderness	Yes	85 (69.7%)	12 (63.2%)	0.460(0.173- 1.219)	0.118 *	0.041(0.002 ,0 .948)	0.046*
	No	37 (30.3%)	7 (36.8%)	1		1	
Guarding	Yes	26 (21.3%)	8 (42.1%)	0.905(0.348- 2.349)	0.837		
	No	96 (78.7%)	11 (57.9%)	1			
Abdominal distension(sign)	Yes	47 (38.5%)	18 (94.7%)	12.535(1.653- 95.064)	0.014*	1.042(0.006,175.925)	0.987
	No	75 (61.5%)	1 (5.3%)	1		1	
Bowel sound	Normoactive	64(52.5%)	4(21.1%)	1			
	Hyperactive	38(31.1%)	5(26.3%)	2.262(0.601- 8.518)	0.227	1.384(0.146, 13.136)	0.777
	Hypoactive	20(16.4%)	10(52.6%)	2.835(0.874- 9.197)	0.083*	2.510(0.317, 19.874)	0.383
Percussion note	Tympanic	78(63.9%)	12(63.2%)	1			
	Hyperty mpanic	44(36.1%)	7(36.8%)	1.489(0.565- 3.928)	0.421		
Rectum empty	Yes	43 (35.2%)	13 (68.4%)	2.348(0.881- 6.261)	0.088*	0.570(0.055 , 5.880)	0.637
	No	79 (64.8%)	6 (31.6%)	1		1	
BP	High	9 (7.4%)	1 (5.3%)	1.624(0.200-13.177)	0.650	0.445(0.058, 3.442)	0.438
	Normal	111 (91.0%)	14 (73.7%)	1		1	
	Low	2(1.6%)	4(21.1%)	3.105(0.975- 9.888)	0.055*	33.191(1.376,800.464)	0.031*
RR	Normal	120 (98.4%)	14(73.7%)				
	Tachypenic	2(1.6%)	5(26.3%)	1.670(0.554-5.033)	0.362		
Temperature	Normal	105(86.1%)	11(57.9%)	1		1	
	High	17(13.9%)	8(42.1%)	1.937(0.750-5.001)	0.172*	16.474(1.372,197.756)	0.027*

**statistically significant*

5 DISCUSSION

This multicenter cohort study assessed the clinical presentation, perioperative outcomes, and associated factors among adult patients undergoing emergency laparotomy for non-traumatic acute abdomen. The findings provide valuable insights into the perioperative challenges, burden of complications, and predictors of adverse outcomes in this patient population, with implications for improving surgical care and outcomes.

Over a four-month period, 141 emergency abdominal surgeries were performed for non-traumatic acute abdomen. Male patients were predominantly affected, with a male-to-female ratio of 4:1. This ratio is higher than those reported in Goba Referral Hospital (2.1:1), Suhul General Hospital (1.3:1), Tikur Anbessa Hospital (2:1), and Ayder Referral Hospital (3:1). The disparity could stem from sociocultural dynamics where men may have better healthcare seeking behavior or be more prone to conditions requiring surgery. The predominance of patients in their third decade of life aligns with findings from Aden University in Yemen, where most patients were aged 15–24 years, potentially due to heightened exposure to risk factors during this active life stage (Bizuayehu T.,Mekonnen T. et al , 2017; Gebre, 2014; Kotiso, B.and Z.Abdurahman, 2007; Yemane,Kiflom et al , 2013; Bux, 2022).

Approximately 66.7% of participants were from rural areas, similar to findings from Goba Referral Hospital (70%), Suhul General Hospital (60%), and Attat General Hospital (67%), and slightly higher than Kigali (58%). These figures highlight the persistent healthcare access challenges in rural regions, contributing to delayed presentations and worse outcomes. A significant proportion (43%) of patients presented after 48 hours of symptom onset, lower than Goba Referral Hospital (58%), Attat General Hospital (56%), and Wolaita Sodo Teaching and Referral Hospital (73%). This could reflect differences in study period, healthcare-seeking behaviors, awareness, or the availability of transport and medical services, which means some improvement in health care accessibility and awareness remains a significant issue (Bizuayehu T.,Mekonnen T. et al , 2017; Gebre, 2014; Tekalign A.,Tilahun B. et al, 2019; Nyundo and Rugwizangoga, 2013; Negash(MSC), 2017).

Intestinal obstruction was the leading cause of acute abdomen in this study, consistent with findings at Gondar University Hospital and Wolaita Sodo Hospital. In contrast, Tikur Anbessa Hospital, Goba Referral Hospital, Suhul General Hospital, and Attat General Hospital identified acute appendicitis as the most common cause, while Kigali University Teaching Hospital reported peritonitis followed by intestinal obstruction. These differences could be attributed to variations in dietary habits (like khat chewing in our setup), regional disease prevalence, referral patterns, and diagnostic capabilities, underscoring the importance of tailored diagnostic and management strategies (Tsegaye, 2007; Kotiso, B.and Z.Abdurahman, 2007; Bizuayehu T.,Mekonnen T. et al , 2017; Negash(MSC), 2017; Tekalign A.,Tilahun B. et al, 2019; Gebre, 2014; Nyundo and Rugwizangoga, 2013).

The postoperative complication rate in this study was 29%, comparable to Tikur Anbessa Teaching Hospital (28%) but higher than rates reported in Goba Referral Hospital (17%), Suhul General Hospital (20%), Ayder (17%), Nekemte Referral Hospital (16%), and Aden University Hospital in Yemen (21.7%). Surgical site infections (19.9%) and pneumonia (12.8%) were the most common complications, aligning with Gondar University Hospital (20% and 10%, respectively). However, these rates were higher than wound infection rates reported at Attat General Hospital (7.6%), Goba Referral Hospital (15.5%), and Kigali University Teaching Hospital (8.7%). In Yemen, surgical site infections accounted for 39% of complications, which may reflect differences in infection control practices, healthcare infrastructure, or patient profiles (Bizuayehu T.,Mekonnen T. et al , 2017; Gebre, 2014; Kotiso, B.and Z.Abdurahman, 2007; Zinabu A., Abraham T. et al , 2013; Yemane,Kiflom et al , 2013; Nyundo and Rugwizangoga, 2013; Tekalign A.,Tilahun B. et al, 2019; Bux, 2022).

The overall mortality rate of 8.5% was comparable to Attat General Hospital (9.3%) but lower than Kigali University Teaching Hospital (18%), Tikur Anbessa Hospital (18.6%), and Goba Referral Hospital (16%). Conversely, it was higher than the mortality rates reported in Yemen (2%), Mekele (2.4%), and Nekemte Referral Hospital (3.05%). Sepsis and septic shock, which accounted for 66.7% of deaths in this study, are common challenges in emergency abdominal surgeries, emphasizing the importance of timely diagnosis and aggressive management of sepsis. The re-laparotomy rate of 5.67% was within the range of reported rates, underscoring the complexity of surgical decision-

making in this setting (Tekalign A.,Tilahun B. et al, 2019; Kotiso, B.and Z.Abdurahman, 2007; Bizuayehu T.,Mekonnen T. et al , 2017; Nyundo and Rugwizangoga, 2013; Zinabu A., Abraham T. et al , 2013; Yemane,Kiflom et al , 2013; Bux, 2022).

Shock emerged as the strongest predictor of unfavorable outcomes, with patients in shock being over 33 times more likely to experience poor outcomes (AHR 33.191, 95% CI: 1.376–800.464). This is consistent with findings from Tikur Anbessa Hospital, where shock significantly increased the risk of complications. Fever (temperature >37.5°C) was associated with a 16-fold increased risk of unfavorable outcomes (AHR 16.474, 95% CI: 1.372–197.756), also aligning with Tikur Anbessa Hospital (AHR 7.83, 95% CI: 3.45–1.786). Older age (>50 years) was another significant predictor, increasing the risk of poor outcomes 14-fold (AHR 13.950, 95% CI: 1.551–125.493). These findings highlight the importance of early recognition and aggressive management of high-risk patients, particularly those presenting with systemic signs of illness or advanced age. Other factors, such as duration of illness, postoperative complications, and gangrenous bowel obstruction, were not significantly associated with outcomes in this study, unlike previous findings from Attat General Hospital. Similarly, factors identified at Gondar University Hospital, such as hematocrit levels and the timing of complication detection, were not significant in this cohort. These differences emphasize the need for localized research to understand context-specific determinants of outcomes (Kotiso, B.and Z.Abdurahman, 2007; Tekalign A.,Tilahun B. et al, 2019; Tsegaye, 2007).

6 STRENGTH AND LIMITATION

6.1 Strength

This research may be an entry point for further research when published.

The study is prospective cohort providing better data quality & accuracy, longitudinal analysis and establishing temporal relationships.

Inclusion of multiple centers enhances the representativeness of the findings, reflecting diverse patient populations and healthcare settings.

6.2 Limitation

Although multicenter, the study did not fully represent settings outside the included hospitals, particularly the private hospitals.

Short study period which is 4 months is another limitation resulting in smaller sample size.

Unmeasured variables (e.g., socioeconomic status, nutritional status, healthcare-seeking behaviors, and comorbidities) could influence outcomes.

7 CONCLUSION AND RECOMMENDATION

7.1 Conclusion

In conclusion, our study identified shock, fever, and age above 50 years as significant predictors of undesirable outcomes emphasizing the need for prompt resuscitation, vigilant monitoring, and tailored interventions for high-risk patients. The study's postoperative complication rate (29%) and mortality rate (8.5%) reflect the critical need for optimized perioperative care and infection control strategies. Wound infections and pneumonia were identified as the predominant postoperative complications, consistent with findings from comparable studies. Overall, the favorable outcome rate of 86.5% is encouraging but underscores the potential for improvement through early diagnosis, enhanced access to care, and targeted perioperative management. These findings can guide clinicians and policymakers in addressing the challenges of emergency laparotomies and improving outcomes for this vulnerable population.

7.2 Recommendation

1. For Health Facilities

- Hospitals should enhance preoperative resuscitation protocols, with a focus on managing patients presenting in shock or with fever, given their strong association with poor outcomes.
- Infection control measures, including proper surgical site care and pneumonia prevention protocols, should be prioritized to reduce postoperative complications.
- Implementing risk stratification tools could aid in identifying and prioritizing care for high-risk individuals (those with shock, fever and age >50years).

2. For Participants (Patients and Families)

- Learn to identify symptoms of acute abdomen, such as severe abdominal pain, vomiting, fever, or changes in bowel habits, and seek medical care promptly.
- Avoid delay in consulting healthcare providers, as timely intervention can significantly improve outcomes.

3. For Future Researchers

- Further studies are needed to investigate the role of other potential predictors of adverse outcomes, such as comorbidities, hematocrit levels, and other biomarkers in predicting perioperative complications and mortality.

- Comparative studies across different healthcare settings can help identify best practices and guide context-specific interventions.

- Assess long-term outcomes, including quality of life and functional recovery, in patients undergoing emergency laparotomy for acute abdomen.
- Identify factors associated with improved recovery trajectories to guide postoperative care strategies.

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9 ANNEXES

9.1 Data collection checklist

This checklist is prepared to assess "Perioperative outcomes and associated factors among patients undergoing laparotomy for non-traumatic acute abdomen" (from August 01/2024 – November 30/2024).

Date of operation ……..

Card No. .....

Part 1: Socio demographic factors

Age_____ In Years

Sex_____ (M –for male & F – for female)

Address_____ Urban_____ Rural_____

Part II. Presenting complaints of the patient

Presenting complaints of the patient	**Yes---1**	**N0---2**
1. Abdominal pain		
2. Vomiting		
3. Nausea		
4. Abdominal distension		
5. Constipation		
6. Previous abdominal surgery		
7. Others		
Duration of illness before operation (in days) ……		

Sign	yes	no
1. Abdominal tenderness		
2. Guarding		
3. Abdominal distension		
4. Rectum empty		
5. others ……		
Vital signs; BP…….. …….. PR…..…. RR…… Tem…….. SO2_____ At admission		

Part III. Physical examination

Part IV. Diagnosis

1. What is the diagnosis?
    a. Appendicitis
    b. Intestinal obstruction
    c. Peritonitis
    d. Others
2. If intestinal obstruction in Q.1
    a. Small bowel
    b. Large bowel
3. If small bowel Obstruction in Q.2

Causes of SBO	viable	Non-viable
1) Primary volvulus		
2) Adhesion/band		
3) Hernia		
4) Intussusceptions (ileocolic)		
Others……		

4. If large bowel obstruction for Q.2

Causes of LBO	Viable	Non-viable
1) Sigmoid volvulus		
2) Colorectal cancer		
3) Ileosigmoid knotting		
4) Intussusceptions		
5) Others		

5. If Appendicitis for Q.1
    a. Simple appendicitis
    b. Complicated appendicitis(perforated,gangrenous,phlegmonous)
    c. Periappendiceal abscess
6. If peritonitis, what is the primary cause?
    a. Perforated appendicitis
    b. Perforated large bowel obstruction
    c. Perforated small bowel obstruction
    d. Perforated PUD
    e. Typhoid ileal perforation
    f. Others (mention)……..
7. Type of procedure done (write in short)…….
    ……

Part V: What was the complication postoperatively if any?

complication postoperatively if any	**Yes-1**	**No-2**	**Date of complication In POD**	**What was done?**	**Clavien dindo class of postop complication**
1. Anastomotic leak					
2. Bleeding					
3. Collection					
4. Pneumonia					
5. Sepsis/ Septic shock					
6. Wound infection					
7.Death					
8. Others (if any, mention)					

PartVI. Postoperative hospital Stay (in days)_____days

Part VI I. Condition of the patient on discharge

1) Improved
2) Worsened/referred
3) Dead