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Postoperative Ileus Magnitude and Associated Factor Among Patients Underwent Abdominal Surgery at Specialized hospitals In Bahirdar, Ethiopia: A Cross-Sectional Study 2023

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BAHIR DAR UNIVERSITY, COLLEGE OF MEDICINE AND
HEALTH SCIENCES, SCHOOL OF MEDICINE, DEPARTMENT OF
General Surgery

Postoperative Ileus Magnitude and Associated Factor Among Patients
Underwent Abdominal Surgery at Specialized hospitals In Bahirdar,
Ethiopia: A Cross-Sectional Study 2023

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A THESIS SUBMITTED TO BAHIR DAR UNIVERSITY SCHOOL OF
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HEALTH SCIENCES, SCHOOL OF MEDICINE, DEPARTMENTS
OF GENERAL SURGERY

POSTOPERATIVE ILEUS MAGNITUDE AND ASSOCIATED
FACTOR AMONG PATIENTS UNDERWENT ABDOMINAL
SURGERY AT SPECIALIZED HOSPITALS IN BAHIRDAR,
ETHIOPIA: A CROSS-SECTIONAL STUDY 2023

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DECLARATION

This is to certify that the thesis entitled “postoperative ileus magnitude and associated factor among patients underwent abdominal surgery at specialized hospitals in Bahirdar, Ethiopia: a cross-sectional study 2023”, submitted in partial fulfillment of the requirements for the certificate of specialty program in general surgery, Department of surgery, Bahir Dar University, is a record of original work carried out by me and has never been submitted to this or any other institution to get any other degree or certificates. The assistance and help I received during the course of this investigation have been duly acknowledged.

Principal investigator Fasika Chanie signature Date

APPROVAL OF THESIS FOR DEFENSE

I hereby certify that I have supervised, read, evaluated, this thesis titled "postoperative ileus magnitude and associated factors among patients underwent abdominal surgery at Tibebe Ghion specialized hospital and Felege Hiwot Comprehensive specialized hospital cross sectional study 2023" by Fasika Chanje final year general surgery resident prepared under my guidance. I recommend the thesis be submitted for oral defense.

Advisors name

1 Dr. Sintaye Teka (General surgeon) signature.....Date.....

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First and for most I would like to give my deepest gratitude to our college of medicine and health science, Department of general surgery (Bahirdar university) who have continuously encouraged the residents in pursuit new knowledge through our thesis.

I would like to acknowledge my advisor for valuable comments and follow-ups throughout the process. This work would not be possible without their excellent scientific guidance and tireless efforts.

ABSTRACT

Background: Postoperative ileus is a well-known consequence and complication of gastrointestinal, pelvic, and some non-abdominal surgeries, resulting in significant morbidity and patient discomfort and dissatisfaction. It is a virtually universal complication after abdominal surgery that prolongs duration of hospitalization. Postoperative ileus has a great economic burden and, interestingly, it was as expensive as managing severe postoperative complications (such as deep venous thrombosis, pulmonary embolism, and surgical site infection) that might not lead to ileus.

Objective: The main objective of this study is to assess the magnitude and associated risk factors of postoperative ileus among adult patients underwent abdominal surgery at Tibebe Gihon specialize hospital & Felegehiwot Comprehensive Specialize Hospital, Bahirdar, Ethiopia

Method: Institution based multicenter cross-sectional study was conducted on patients who underwent abdominal surgeries at governmental specialized hospital in Bahirdar from September 20 to November 20 2023. A total of 252 selected from the two hospitals by consecutive sampling techniques and included in the final analysis. Before being imported into STATA/MP version 17, the data were originally input into Epidata version 4.6. The analysis fitted in bivariable and multivariable binary logistic models to find the explanatory variables. The 95% confidence interval of the odds ratio was calculated, and factors with a p-value less than 0.05 in the multivariable model were declared significantly associated with the dependent variable.

Results: The magnitude of Postoperative ileus at selected hospitals in Bahir Dar was 16.27% (95% CI: 12.19%, 21.38%). Age (AOR= 3.81, 95%CI: 1.41, 10.33), BMI (AOR= 11.54, 95%CI: 1.97, 67.55), intestine surgery (AOR= 3.27, 95% CI: 1.01, 11.77) were significantly associated with Postoperative ileus. On the other hand being female decrease the risk of Postoperative ileus by 61 % (AOR= 0.39, 95%CI: 0.15, 0.97).

Conclusion: Magnitude of Postoperative ileus among patients underwent abdominal surgery in Bahir Dar was an average when compare it with results reported from different studies. Old age, male sex, low BMI and intestinal surgeries were significant determinant factors associated with Postoperative ileus.

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ACRONYMS

ASA	American society of anesthesia
AU\$	Australian dollar
CI	Confidence interval
ERP	Enhanced recovery protocols
ENS	Enteric nervous system
FHCSH	Felegehiwot Comprehensive Specialize Hospital
GI	Gastrointestinal
IOB/BW	Intraoperative in-out balance per body weight
NGT	Nasogastric tube
NPO	Non per os
POI	Postoperative ileus
SF + D	solid food tolerance & defecation
TGSH	Tibebe Ghion Specialize Hospital
TPN	Total parenteral nutrition
USA	united States of America
UK	United Kingdom
Vs	Versus

1 INTRODUCTION

1.1 Background of the study

Every year, nearly three hundred million surgical operations are performed globally, almost comparable to one in every twenty-five people. In Ethiopia, extremely few surgical rates are recorded; just 148 persons underwent surgery from the 100000 population. Worldwide almost seven million people having surgery experienced complications and substantial morbidity in the perioperative phase (1).

Postoperative ileus affects all parts of the GI tract. Recovery of each section of the GI tract occurs at different rates. Small intestinal function returns first, as early as 4 to 8 hours after surgery, to 24 hours after surgery. Then, in 24 to 48 hours, the function of the stomach returns. The colon is the last section of the GI tract to return to normal function, which generally occurs 48 to 72 hours after surgery. Delayed return of colonic function postoperatively is the clinically relevant problem affecting patient recovery. Postoperative complications are often inevitable following abdominal surgeries. They range from altered postoperative recovery which does not require medical intervention, to life-threatening conditions requiring intensive care management and may lead to mortality. Among these complications, postoperative ileus (POI) is still the most common postoperative problem causing delays in patient discharge(2).

POI is an impairment of gastrointestinal (GI) motility after abdominal or other surgery and is characterized by abdominal distention, lack of bowel sounds, accumulation of gas and fluids in the bowel, and delayed passage of flatus and defecation. As improvement of these parameters is believed to represent recovery of GI transit and resolution of POI, especially time to return of bowel sounds, first flatus and defecation are often used as primary and/or secondary outcome measures in clinical trials. Time to SF + D is the best objective parameter to assess clinical recovery and readiness to be discharged and should preferentially be used to determine the duration of POI in future clinical trials(3, 4).

It is considered a normal and inevitable response to laparotomy and other surgical procedures if it is not prolonged. Although accepted as inevitable, POI has never been shown to serve any useful purpose, and prolonged POI contributes to a number of undesirable consequences(3).

There remains a lack of an internationally accepted standardized clinical definition for POI. Additionally, the terminology used when describing POI is inconsistent, with little distinction being made between the ‘normal’ obligatory period of gastrointestinal dysmotility following surgery and the more clinically problematic and pathologically significant entity of a ‘prolonged’ postoperative ileus which may last several days(5).

Data from the systematic review and global survey were amalgamated to propose terminology and definitions for postoperative ileus. Postoperative ileus (physiological), interval from surgery until both the following criteria are met: Passage of flatus OR stool &Tolerance of an oral diet, these events should occur within 72 hours(5).

Prolonged postoperative ileus /paralytic/pathological is defined if two or more of the following five criteria are met on or after day 4 postoperatively without prior resolution of “postoperative ileus” Nausea or vomiting, Inability to tolerate an oral diet over last 24 hours, Absence of flatus over last 24 , Abdominal distension &Radiologic confirmation.(4, 5).

POI occurs after gastrointestinal and other types of surgery, and its incidence rate is reported to range between 10 and 30% following a major abdominal surgery. Additionally, POI affects 6% to 10% patients undergoing colon surgery and 10% of patients undergoing cardiac or orthopedic surgeries(6, 7, 8).

Existing ambiguity in clinical definition of POI made identification of risk factors for POI difficult. However, studies repeatedly reported male gender, advanced age and major blood loss as risk factors for POI(9).Clinical strategies of preventing POI, such as thoracic epidural anesthesia, gum chewing, and avoidance of water overload, have shown little success(10).

Ethiopia has a dearth of research on surgical patients in the perioperative outcome context. To the best of our literature search we could not find a study reporting about POI among abdominal surgical patients. The magnitude and factors associated with POI among patients underwent abdominal surgery have not been determined.

1.2 Statement of the problem

Patients undergoing an abdominal surgical procedure develop a transient episode of impaired gastrointestinal motility or POI. Although postoperative ileus is more commonly associated with abdominal surgery, it occurs with other surgeries as well. An “uncomplicated ileus” is caused by the neurohumoral stimulation that occurs during surgery and resolves spontaneously 2 to 3 days. In fact, some degree of ileus is essentially a normal physiological response in most cases, but there is a variation in how clinically significant this is, the majority will run a benign self-limiting course(4, 5).

POI has been shown to increase perioperative morbidity such as the enteral nutrition delay and patient discomfort with subsequent financial burden due to extended length of hospital stay by days to weeks (5).

POI is common complication after abdominal surgery that prolongs duration of hospitalization. The economic burden of postoperative ileus has been estimated to exceed US \$750 million per year and, interestingly, postoperative ileus was as expensive as managing severe postoperative complications (e.g. deep venous thrombosis, pulmonary embolism, surgical site infection) that might not lead to ileus(11).

POI increases the risk of pneumonia, and the delay of adequate nutritional intake contributes to wound healing impairment and anastomotic failure. Furthermore, POI leads to higher risk of organ failure (such as renal and hepatic failure), prolongs hospital stay and increases 30-day readmission and mortality rates(4, 12). Furthermore, delayed gastrointestinal recovery such as uncomplicated POI, directly impedes recovery of patient autonomy and subsequent discharge. Preventing POI from occurring could reduce delayed discharges by 33%, readmissions by 21% and mortality by 20%(13).

There is no evidence that routine use of a nasogastric tube (NGT) prevents a prolonged ileus. In fact, as discussed previously, early feeding and avoidance of a NGT are key components of most fast track and ERPs. Other contributing factors are avoidance of opiate analgesia and fluid overload. The use of such multimodal approaches is associated with a reduction in time to passage of flatus and a shorter length of hospital stay. However, in the setting of a prolonged

ileus, where the patient has persistent vomiting and is still unable to tolerate oral diet, several days postoperatively, more aggressive measures are appropriate.

The aim of this study is to examine the magnitude and potential risk factors for POI among patients underwent abdominal surgeries.

1.3 Significance of the Study

As recommended by multiple programs improving perioperative patient outcome is the main stay for delivering quality of care for abdominal surgical patients. In order to improve perioperative patient outcome there should be a focus on prevention and management of postoperative complication such as POI. A high index of suspicion and early identification of the risk factors for POI is an important issue for early institution of therapy and prevention of the risk factors by employing evidence-based practice for health professionals working in the perioperative phase.

Previous published data on POI is from developed countries and mainly arising from colorectal and urologic procedures. However, in Ethiopia and the study region, there is limited information regarding POI. The result of this study can serve as a baseline data for future studies to be done in this subject matter.

This research will help health care providers, governmental, and non-governmental organizations make the most of efforts to prevent POI among patients underwent abdominal surgery across the country and the study area while also serving as a valuable resource for other researchers. It will also serve as a guide for future research, including developing local POI risk prediction models.

2.LITERATURE REVIEW

2.1 Magnitude of POI

Ambiguity surrounding the definition of POI has made it difficult to reliably and consistently estimate incidence (often quoted as being between 3 and 32 % after abdominal surgery) and identify risk factors. Nevertheless, the incidence rate of POI remains high and is probably underestimated.

A cross-sectional study from the national inpatient sample in USA found that the total number of hospitalizations with paralytic ileus increased by 29.7% between 2001 and 2011. The age group 65–79 years was most commonly affected by paralytic ileus throughout the study period(8).

Prospective registry data analysis was conducted in 40 centers in five countries (France, Belgium, Switzerland, the Netherlands and Algeria) between January 15, 2018, and April 15, 2018. A total of 786 patients scheduled for colorectal surgery within enhanced recovery programs were included, in this study POI occurred in 15.4%(14).

A cost analysis was performed, for major elective colorectal surgical cases between 2018 and 2021 at the Royal Adelaide Hospital, Australia. Of the 415 patients included, 34.9% (n = 145) developed POI. POI was more prevalent in males, smokers, previous intra- abdominal surgery, and converted laparoscopic surgery(11).

A single-center retrospective cohort study on patients who underwent colorectal surgery at the Chugoku Rosai Hospital (Kure, Japan) shows POI occurred in 48 out of 356 patients (13.5%). In multivariate analysis, male sex, poor performance status, and intraoperative in–out balance per body weight were independently associated with postoperative ileus development. The incidence of postoperative ileus was 2.5% in the cases with no independent factors; however, it increased to 36.1% when two factors were observed and 75.0% when three factors were matched(15).

Another retrospective study with patients who underwent laparotomic resection and anastomosis surgery, Sanglah National Hospital, Bali, Indonesia between January 2019 and July 2020 found that 50% of subjects are patients with post-operative ileus(7).

Retrospective cohort study was conducted at a Private Academic Hospital in Parktown, Johannesburg, Gauteng Province, South Africa. In this study total of 155 patient cases were included, and 56 (36%) of them developed POI. The incidence rate previously reported at the same institution was 13,7% (19 POI out of 139 elective colorectal resections between December 2016 to November 2017)(16).

Research done in neighborhood country Kenya , East Africa found that incidence of POI at Kenyatta national hospital underwent abdominal surgery is 10.7 %(17).

2.2 Factors associated with POI

Socio-demographic factors

Multiple retrospective follow up studies in Italy and Japan showed that an increased age and male sex are significantly associated with an increased risk of POI (18, 19). There is an association between patients' age and postoperative prolonged ileus. Patients older than 60 years had a significantly higher rate of prolonged ileus compared to patients younger than 50 years (14.1 vs. 10.9 %, AOR 1.31, CI 1.16–1.47, $P < 0.01$). When patients with POI were compared with the others demographic characteristics suggested greater age in patients with POI (66 vs 57.2 years; $P < 0.001$; OR, 1.24)(20).

Older age is usually associated with a general decline in body functions, including decreased gastrointestinal function, one of which is a slowdown in gastric emptying. In addition, increasing age is also associated with decreased mobility, which causes a slowdown in mobility after surgery. Increasing age is also associated with increased comorbidities which can lead to increased length of surgery and an increased risk of surgical complications. These are then hypothesized to explain the effect of age on the incidence of post-operative ileus(7).

Significant sex-related differences were detected in the time required for the restoration of intestinal motility (> 3 days) in patients who had undergone intestinal resection, those with long operation periods, those with excessive intestinal manipulation, those with prolonged nasogastric catheter drainage, and those with systemic inflammation (systemic inflammation, $P = 0.030$; others $P < 0.001$)(21).

Univariate analysis of the preoperative modules identified only being a man and previous smoking status as risk factors for POI. Men were found to be in themselves an independent risk factor by several other studies. The association between men and POI may be attributed to an increased inflammatory response to surgery which is described in the literature(16).

In a study conducted by Vather *et al.* in 2014 found that gender is an independent risk factor for post-operative pathological paralytic ileus. Male sex had higher risk for post-operative pathological paralytic ileus when compared to women, about 3 times(3).

Clinical factors

A recent systematic review involving 9 studies have identified higher BMI is positively associated with an increased risk of POI (6).

In a retrospective review of 356 elective colorectal surgeries in 2021 which is done in Japan showed, poor ASA physical status score was associated with POI development. POI incidence was 11.6% in patients with a ASA physical score of 1 or 2 and 27% in patients with a PS of 3 or more ($P < 0.01$) (15).

In one retrospective study, using the Premier research database, USA, concluded that use of opioids in patients who develop ileus following abdominal surgeries is associated with prolonged hospitalization, greater costs, and increased readmissions. Furthermore, higher doses of opioids are associated with higher incidence of POI(7).

Studies done in Kenya (17) and Korea (8) found that a higher Dindo-clavien scale is associated with a higher risk of POI. In an article review regarding POI smoking, previous abdominal surgery, presence of hemodynamic instability and presence of abdominal soiling are frequently reported risk factors for the development of POI (2). Other significant factors related to post-operative ileus are duration of surgery, comorbidities (coagulopathy and chronic obstructive pulmonary disease), blood transfusion and fluid infusion intraoperative, type of anesthesia and analgesics, other post-operative complication and previous history of surgery(7).

Surgical factors

Comparisons of laparoscopic and open surgical procedures have generally shown a decreased duration of POI after the laparoscopic procedures, this is due to, first as opposed to open procedures it reduces the inflammatory response (i.e., less leukocytosis, acute phase proteins, interleukin-6) A second possible contributing factor that has not been evaluated completely is intra-abdominal humidity, which is not affected during laparoscopy but is clearly changed with laparotomy, leading to evaporation and possible retardation of enteric motility(18).

According to a study done in Indonesia analyzed the association between clinicopathological characteristic and surgical finding with post-operative ileus and reveal that there was an association between the duration of surgery to the occurrence of post-operative ileus(22). In addition, it was also found that patients who had duration of surgery for 180 min or longer had 2.49 times (95% CI: 1.20 - 5.15) risk of having a post-operative ileus surgery ($P = 0.010$). (23). Ay *et al.* found that the incidence of post-operative ileus in patients with duration of surgery <90 min, 90 - 180 min, and >180 min, respectively, was 0%, 34.1% and 84.4%(22).

Study conducted by Moghadamyeghane*et al.* found that anastomoses are a significant risk factor to post-operative ileus. This study found that patients with colon surgeries, with ICA, anastomotic leak and intra-abdominal infections resulted in the highest rate of postoperative prolonged ileus(4).

Site and type of surgery was found related to postoperative ileus. The risk of ileus depends on the type of surgery: the rate of POI for colorectal surgery is 10—30% Vs. 8—13% after pancreatic and gastric surgery(4).

In conclusion, wide range of incidence rates reported by different studies/centers may be attributed to the lack of standardized definitions for POI and differences in clinical settings. A variety of factors contribute to POI among patients underwent abdominal surgery.

3. CONCEPTUAL FRAMEWORK

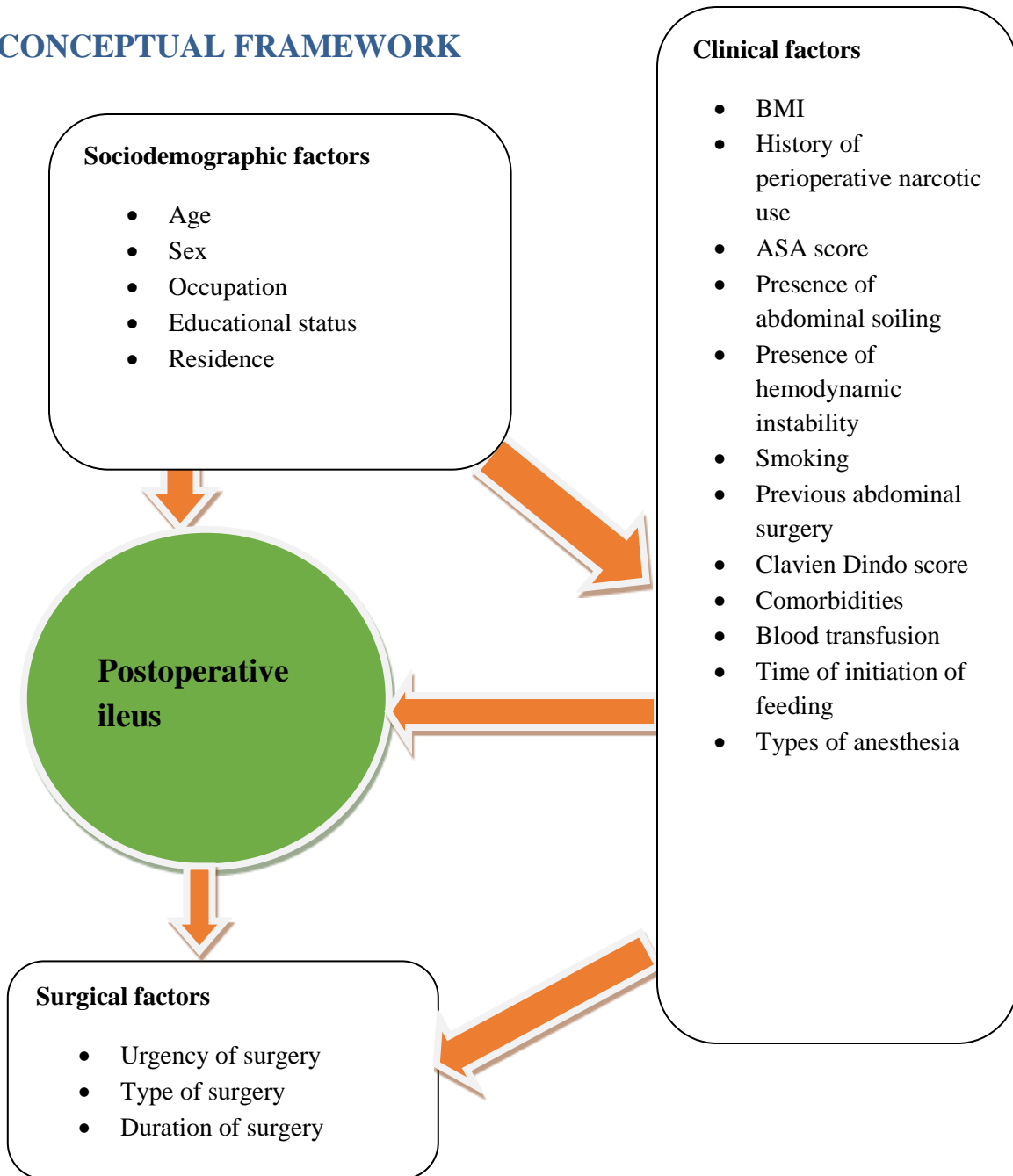


Figure 1: Conceptual framework that shows the association of postoperative ileus with potential risk factors developed from literature review (4, 18, 22).

4. OBJECTIVES

4.1 General objective

- To assess the magnitude and factors associated with postoperative ileus among patients underwent abdominal surgery at governmental specialized hospitals in Bahir Dar from September 20 to November 20, 2023.

4.2 Specific objective

- To determine the magnitude of postoperative ileus among patients underwent abdominal surgery at governmental specialized hospitals in Bahir Dar
- To identify factors associated with of postoperative ileus among patients underwent abdominal surgery at governmental specialized hospitals in Bahir Dar

5. METHODS AND MATERIALS

5.1 Study design and period

A hospital-based cross-sectional study was conducted from September 20 to November 20, 2023 at governmental specialize hospital in Bahir Dar.

5.2 Study area

The study was conducted in governmental specialized hospital in Bahir Dar. There are two specialize hospital; TibebeGhion Specialize Hospital (TGSH) and Felegehiwot Comprehensive Specialize Hospital (FHCSH).

Bahir Dar is the capital of the Amhara National Regional State, which is located about 565 kilometers northwest of Addis Ababa (the capital city of Ethiopia). Bahir Dar is found at 2058m altitude above sea level.

Felegehiwot Comprehensive Specialize Hospital is one of the main referral hospitals in Amhara region and found in Bahir Dar city kebele 13 along the shore of Lake Tana.

TibebeGhion Specialize Hospital is found about 10km south from the center of Bahirdar city and about 7 km from the new bus station ('AddisuMeneharia') on the way to Adet District and about 23km from the Blue Nile Falls (locally called 'TisEsat' (Smoke of Fire)). It is a tertiary universityteaching hospital, started to function on January, 2019, with 472 bed capacity out of which 100 occupied by surgical patients. The two hospitals receive patients who are referred from across the Amhara region and gives outpatient and inpatient services in all major departments. The study was undergone in surgical wards in both hospitals.

5.3 Source population

All patients who underwent abdominal surgery

5.4 Study population

All patients who underwent abdominal surgery from September 20 to November 20 2023 and fulfill the inclusion criteria recruited.

5.5 Inclusion criteria and Exclusion criteria

5.5.1 Inclusion criteria

All patients aged 15 and above who underwent abdominal surgery in surgical wards were recruited.

5.5.2 Exclusion criteria

- Patients who were intentionally NPO due to planned reentry to the abdomen
- Patients who were on total parenteral feeding postoperatively.
- Patients on mechanical ventilation on postoperative period.

5.6 Sample size determination and Sampling procedure

The sample size was determined by modified Cochran single population proportion formula.

$$n = \frac{z^2(pq)}{e^2}$$

n= sample size

z= standard error associated with the chosen level of confidence (typically 1.96)

p= proportion of POI is 10.7 % where (p=0.107) from study done at Kenya (17).

q= 1-p

e= acceptable sample or marginal error= 0.04

There for the sample size is $n = \frac{(1.96)^2 (0.107 \times 0.893)}{(0.04)^2} = 229$

The final sample is calculated by adding 10% of contingency and the final sample size was 252.

5.6.1 Sampling procedure

The calculated total sample size (n= 252) was divided to each hospitals. Consecutive sampling method was used to choose the needed number of participants from all patients who underwent abdominal surgery in the study period from September 2020 to November 20 2023.

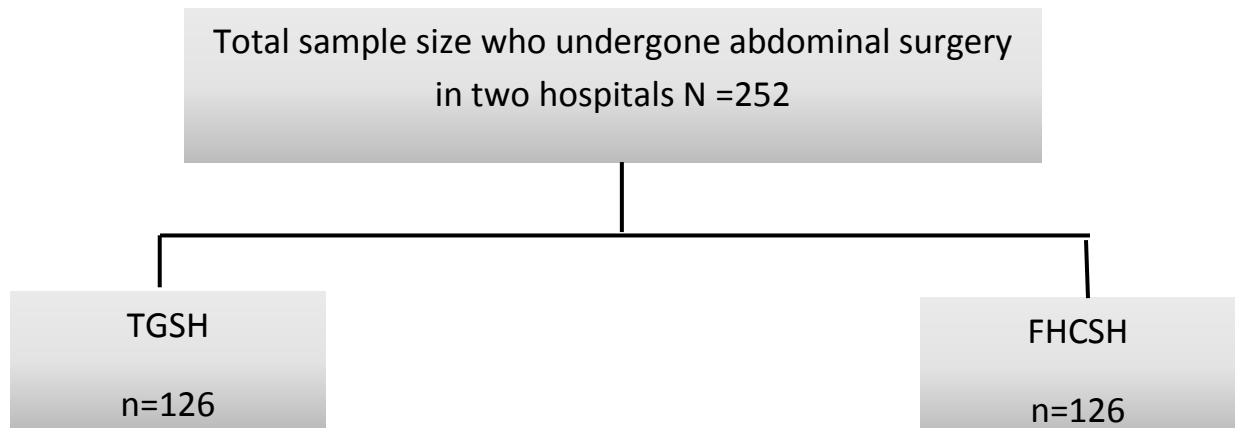


Figure 2 Flow diagram of allocation and sampling

5.7 Study variables

5.7.1 Dependent variables

- Postoperative ileus(yes/no)

5.7.2 Independent variables

- **Socio-demographic:** Age, sex, residence, educational status, occupation
- **Clinical factors:** BMI, History of perioperative narcotic use, Previous abdominal surgery, ASA physical score, Presence of abdominal soiling, claviendindo score, Presence of hemodynamic instability, Smoking history, Comorbidities, time of initiation of feeding, Blood transfusion & Types of anesthesia
- **Surgical factors:** Duration of surgery, urgency of surgery, nature of surgery

5.8 Operational Definitions

- **Postoperative ileus:** POI occurs if patients have two or more of the following five criteria on the fourth postoperative day without improvement: nausea and vomiting, inability to tolerate oral food intake over last 24 h, absence of flatus /stool for 24 h abdominal distension and radiological evidence of ileus(5).
- **Nausea and vomiting:** presence of unpleasant sensation of being about to vomit and the forceful expulsion of gastric contents
- **Abdominal distention:** connotes visible or measurable increase in abdominal girth reported by the operating team
- **Intolerance of feeding:** presence of vomiting, abdominal cramp or abdominal bloating after initiation of oral feeding
- **Radiological evidence of ileus:** evidence of bowel distention without mechanical obstruction as documented by radiologist
- **Abdominal contamination:** presence of gross abdominal soiling ,intra-abdominal purulence or gangrenous visceral
- **Hemodynamic instability:** if patients necessitating fluid resuscitation and /or blood transfusion intraoperatively.

5.9 Data Collection Tool and Procedure

The data was collected using pre-tested check list which is prepared by the principal investigator after reviewing different literatures findings of other similar studies

The data extraction checklist was prepared according to the objectives of the study in English language. Then it was translated to Amharic for data collection purpose, and back to English for analysis. Data was collected by Two Bsc surgical nurse under the supervision of 2 surgical residents at surgical ward of TGSH and FHCSH using a data collection sheet. The socio-demographic, clinical factor and surgical factor related variables were collected from patient's medical record on the 1st postoperative day. Outcome variable was collected at the 4th postoperative day from the patient and operating team. Study subjects who are discharged before 4th postoperatively day considered as not having POI.

5.10 Data Quality assurance

To ensure data quality, a pre-test was conducted on 5% of the calculated sample size (12 study subject) at Addis Alem hospital and corrections were made accordingly. Training on the study objective and how to review the documents per the data extraction format and how to collect outcome was given to data collectors and the supervisor for one day before data collection. The principal investigator, with another supervisor, supervised the overall process. The filled format was checked for completeness by the principal investigator and the supervisor daily.

5.11 Data Analysis and Interpretation

Data was checked manually, entered into Epidata version 4.6 and exported to STATA/MP version 17 for further analysis. Descriptive statistics were used to summarize the study variables. Binary logistic regression analysis was performed to identify factors associated with postoperative ileus and variables having a P-value less than 0.2 were entered into multivariable binary logistic regression model. A P-value of less than 0.05 was used to determine statistically significant association of factors with the outcome variable.

5.12 Ethical Considerations

Ethical clearance was obtained from the Ethical Review Committee of College of Medicine and Health Science, Bahir Dar University. A Permission letter was obtained from the hospitals. The purpose and the importance of the study were explained and written informed consent was secured. Confidentiality was maintained at all levels of the study.

5.13 Finding dissemination plan

The finding will be submitted to the department of General surgery, Bahir Dar University. It will be also disseminated to ministry of health, Amhara regional health bureau, Bahir Dar city Health Office and for each of the 2 respective referral hospitals, through report, presentation, symposiums and conferences.

6. RESULTS

6.1 Socio-demographic characteristics of study subjects

Two hundred fifty-two patients who underwent abdominal surgery between September 20, 2023 and November 20, 2023 were selected consecutively and included in this study. Approximately 114 (45.24%) of individuals aged 15 to 30 years. About 67.86% of the whole sample consisted of male subjects, and more than 30% of study subjects were illiterate in their educational background. More than half (52.38%) of patients were reside in rural area while most (41.27%) of study subjects are farmers by occupation.

Table 1 Socio-demographic characteristics of study subjects

Variable	Category	Frequency	Percentage
Age	15-30	114	45.24
	31-45	33	13.10
	46-60	52	20.63
	>60	53	21.03
Sex	Male	171	67.86
	Female	81	32.14
Educational background	Unable to read & write	81	32.14
	Read & write only	44	17.46
	Primary school	16	6.35
	Secondary school	46	18.25
	College/University	65	25.79
Residence	Urban	120	47.62
	Rural	132	52.38
Occupation	Government employee	36	14.29
	Housewife	21	8.33
	Merchant	39	15.48
	Farmer	104	41.27
	Student	41	16.27
	Other	11	4.37

6.2 Clinical characteristics of the study participants

Of 252 abdominal surgical patients more than 83.73% of study subjects had a BMI within the normal range. Among 252 surgical patients, 207 had a history of perioperative narcotic use, 33 subjects had previous abdominal surgery, and 11.51% of patients (29) underwent abdominal surgery had abdominal contamination. Generalized peritonitis was the most frequent indication for abdominal surgery, followed by acute appendicitis and symptomatic cholelithiasis, with regards to the indication of surgery. From all study subjects, 236 (93.65%) exhibiting ASA physical status I/II, 198 (78.57%) had no comorbidity, nearly two third (72.02%) of study subjects had a Clavien-Dindo score of 1/2, 247 (98.02) patients had no smoking history. Most of abdominal surgeries were performed under general anesthesia while more than 6% (16) of patients had intraoperative hemodynamic instability. One fourth (25%) of patients underwent abdominal surgery had intraoperative blood loss more than 500 milliliter and 47 patients received blood transfusion. More than half (53.67%) of study subjects feeding was initiated after 24 hours.

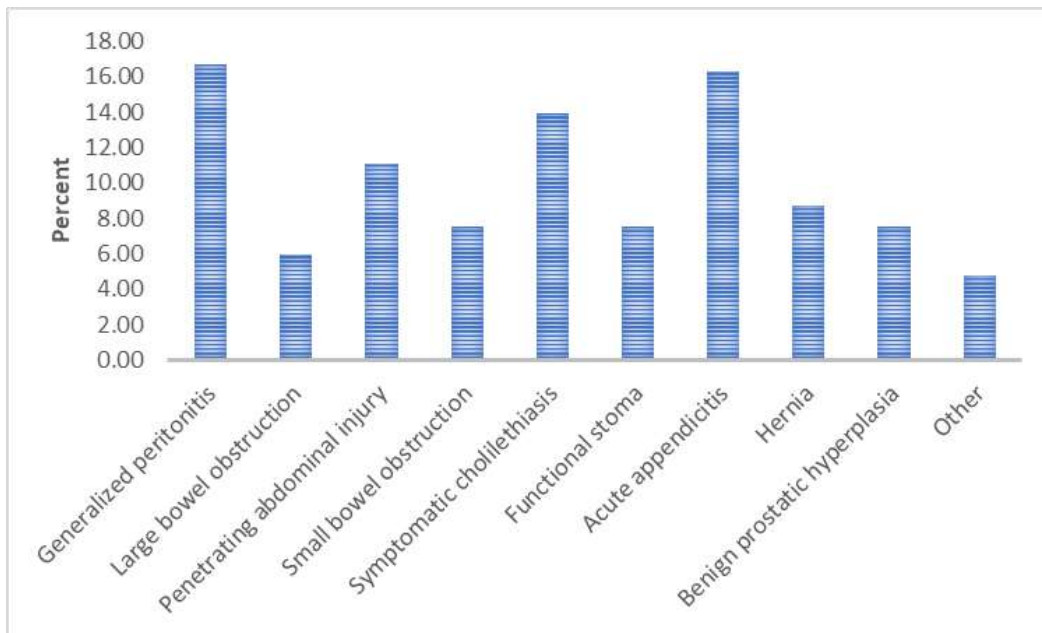


Figure 3 Indication for abdominal surgery

Table 2 Clinical characteristics of study subjects

Variable	Category	Frequency	Percentage
BMI	< 18.5	13	5.16
	18.5 – 24.9	211	83.73
	>25	28	11.11
History of perioperative narcotic use	Yes	207	82.14
	No	45	17.86
History of previous abdominal surgery	Yes	33	13.10
	No	219	86.90
Presence of abdominal contamination	Yes	29	11.51
	No	223	88.49
ASA physical score	I/II	236	93.65
	≥III	16	6.35
Presence of hemodynamic instability	Yes	16	6.35
	No	236	93.65
Smoking history	Yes	5	1.98
	No	247	98.02
Clavien-dindo score	1/2	182	72.22
	3/4	70	27.78
Type of medical illness	None	198	78.57
	Hypertension	13	5.16
	DM	15	5.95
	Others	26	10.32
Estimated Blood loss	< 500	189	75.00
	≥ 500	63	25.00
Types of anesthesia	General anesthesia	242	96.03
	Spinal anesthesia	10	3.97
Blood transfusion	Yes	47	18.65
	No	205	81.35
Time of initiation of feeding	<24 hr	118	46.83
	≥24 hr	134	53.17

6.3 Characteristics of the surgery

Regarding surgical factors, 140 (57.94%) had surgical duration less than 120 minutes, 146 (57.94%) underwent emergency surgery, and 156 (61.90%) had surgery involving the intestine.

Table 3 Characteristics of Surgery

Variable	Category	Frequency	Percentage
Duration of surgery	<120	146	57.94
	≥120	106	42.06
urgency of surgery	Elective	106	42.06
	Emergency	146	57.94
Nature of surgery	Intestinal	156	61.90
	Nonintestinal	96	38.10

6.4 The Magnitude of POI

Of 252 study subjects included in the final analysis, 41 developed POI. The overall magnitude of POI among patients underwent abdominal surgery at selected hospitals in Bahir Dar was 16.27% (95% CI: 12.19%, 21.38%)

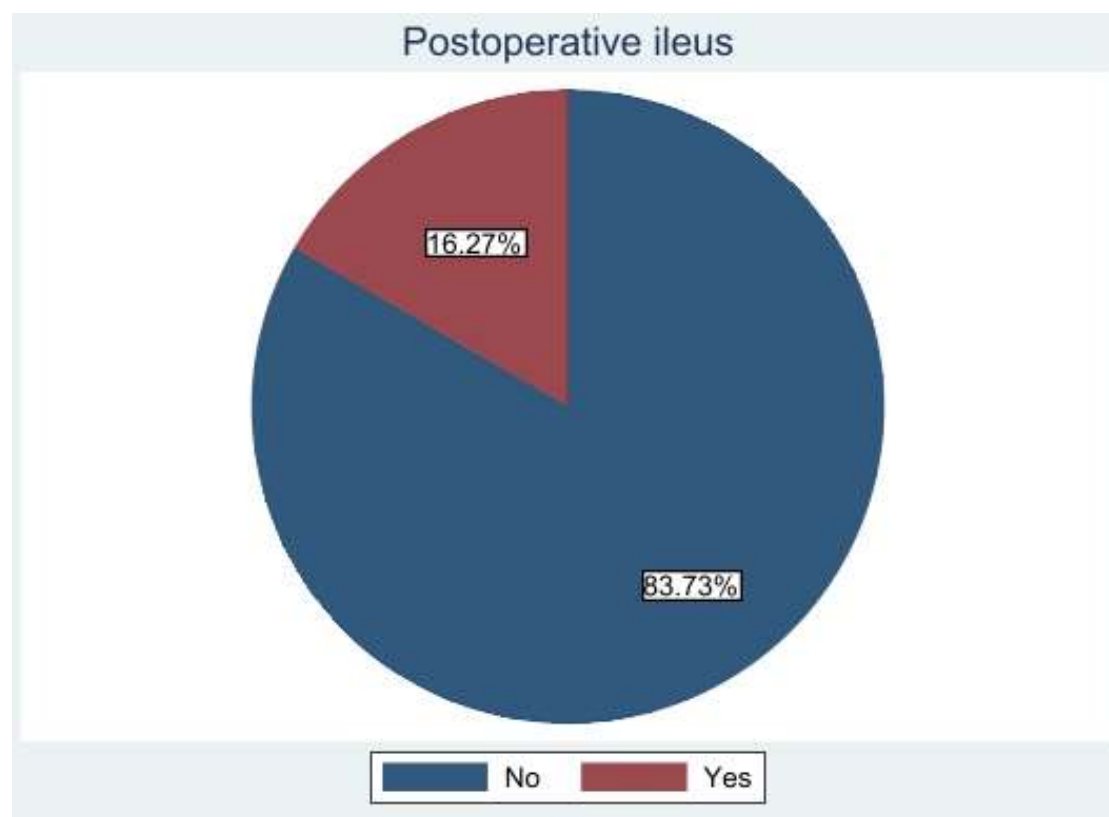


Figure 4 Magnitude of POI

6.5 Factors associated with POI among abdominal surgical patients

After assessing the assumptions of logistic regression, the binary logistic regression model was fitted to identify significant predictors of POI among patients underwent abdominal surgery.

In multivariable binary logistic regression covariates, age, sex, BMI and nature of the surgery were significant predictors for POI among patients underwent abdominal surgery.

The odds of developing POI after abdominal surgery among patients aged >60years was 3.81 (**AOR= 3.81, 95%CI: 1.41, 10.33**) times higher than those aged 15-30years. On the other hand being female decrease the risk of POI by 61% (**AOR= 0.39, 95%CI: 0.15, 0.97**) compared with male patient. Those patients who had BMI <18.5 kg/m² have a 11.54 (**AOR= 11.54, 95%CI: 1.97, 67.55**) times higher odds of developing POI following abdominal surgery compared to their counterparts. In addition, patient who underwent abdominal surgery involving the intestine had nearly 4 times (**AOR= 3.27, 95% CI: 1.01, 11.77**) increased risk of POI compared with those who did not involve the intestine.

Table 4 Bivariable and multivariable binary logistic regression to identify factors associated with POI among abdominal surgical patients

Variable	Category	POI		COR (95% CI)	AOR (95% CI)
		Yes	No		
Age	15-30	12	98	1	1
	31-45	8	24	2.72 (1.00, 7.39)	2.21 (0.72, 6.83)
	46-60	5	47	0.86 (0.28, 2.60)	0.83 (0.24, 2.86)
	>60	16	41	3.18 (1.38, 7.32)	3.81 (1.41, 10.33)*
Sex	Male	28	143	1	1
	Female	13	68	0.97 (0.47, 2.00)	0.39 (0.15, 0.97)*
BMI	< 18.5	5	8	4.66 (1.34, 16.18)	11.54 (1.97, 67.55)**
	18.5 – 24.9	32	179	1	1
	>25	4	24	0.89 (0.29, 2.74)	2.27 (0.60, 8.54)
History of perioperative narcotic use	Yes	4	41	0.44(0.15, 1.32)	0.36 (0.10, 1.33)
	No	37	17	1	1
History of previous abdominal surgery	Yes	8	25	1.79 (.74, 4.31)	1.63 (0.55, 4.82)
	No	33	185	1	1
Presence of abdominal contamination	Yes	13	17	5.62 (2.44, 12.93)	4.16 (0.55, 11.19)
	No	28	194	1	1
Clavien-dindo score	I/II	28	142	1	1
	III	13	69	0.95 (0.46, 1.95)	0.93 (0.39, 2.23)
Time of initiation of feeding	<24 hr	8	111	1	1
	≥24 hr	33	100	4.57 (2.02, 10.37)	3.36 (0.81, 11.24)
Nature of surgery	Intestinal	34	121	3.61 (1.53, 8.52)	3.27 (1.01, 11.77)*
	Nonintestinal	7	90	1	1

*p-value <0.05 **p-value<0.001

7. DISCUSSION

This study investigated the magnitude and associated factors of POI among patients who underwent abdominal surgery in two selected hospitals in Bahir Dar, Northwest Ethiopia. POI following surgery is associated with increased morbidity and hospital cost. While previous research has identified several potential risk factors for POI after abdominal surgery, our study went a step further by analyzing socio-demographic, clinical, and surgical factors. Among potential factors contributing to POI, age, sex, BMI and nature of the surgery were significantly associated with POI after abdominal surgery.

In this study, the magnitude of POI among patients who underwent abdominal surgery in Bahir Dar, Ethiopia, was 16.27% (95% CI: 12.19%, 21.38%). Our results were consistent with studies conducted in Europe, where incidence of POI was found to be 15.4% (14), and in Chugoku Rosai Hospital (Kure, Japan) where POI occurred in 13.5% (15). The result of this study was lower than reports from Australia, where around 34.9% developed POI (11) and from USA postoperative ileus increased between 2001 and 2011 by 29.7% (8). This discrepancy might be due to differences in the study population since these studies included a high proportion of patients with colorectal cancer in which this group of population has an increased risk of POI. On the contrary, our results were higher than a report from Kenya (17). The possible explanation for this contradiction might be a difference in the study design and sample size.

Our study found that the magnitude of POI after abdominal surgery increased with age >60 years. This finding is in line with multiple studies, as age is reported to be an independent risk factor for POI (24, 25). This link could be age-related changes in gastrointestinal functions, including digestion, absorption, motility, and sphincter function, and immunity undergo. These changes lead to not only a decrease of function of the gastrointestinal tract which increase the risk of POI (26). Furthermore, age-related alterations to the gastrointestinal tract also lead to loss of adaptability to stress such as surgery on the gastrointestinal system increase elderly susceptibility to POI. In addition, advanced age is associated with diminished gene expression, and synthesis and catalytic activity of neuronal nitric oxide synthase this increase the delayed colonic transit which have a negative effect on the gastrointestinal system (27).

In this study, low BMI increased the likelihood of POI after abdominal surgery. This finding agrees with a study by S Fujiyoshi et al at Hokkaido University Hospital, Japan(28). The association between low BMI and POI could be explained by patients with low BMI has malnutrition which impacts all organ systems including gastrointestinal negatively. This group of patient might be deficient for metabolic nutrient to keep digestive system functional this might lead to delayed gastric emptying time increasing the chance of POI(29). Moreover, patients with the low BMI have a higher risk of severe complications such as infection and sepsis, increasing the postoperative risk of paralytic ileus(30).

The result of our study is that patients who underwent intestinal surgery have an increased risk of POI. This result is consistent with studies done in the United Kingdom(31) and Italy(32)..The possible reason might be that patients underwent intestinal surgery will have interruption of the gastrointestinal continuity or manipulation of the bowel. In addition, excessive small bowel manipulation, prolonged nasogastric catheter use, and systemic inflammation have been shown to retard bowel motility(33).

Our finding showed that being female decreases the risk of POI. The possible explanation for this finding might be that in our setting females are likely to chew gum during the postoperative period in which chewing gum is associated with a less risk of POI(34).

The clinical significance of this investigation was to provide patients and healthcare providers with information about factors associated with the risk of POI after abdominal surgery so that they could act to minimize the risk and maximize their efforts in preventing the problem while the public health significance of this study was to prevent economic loss associated with POI and its complications.

7.1 Strength and limitation

7.1.1 Strength of the study

- A multi-center study

7.1.2 Limitations of the study

- Using of non-probabilistic sampling technique which might affect the generalizability of this study.
- Due to the unavailability of investigation for all patients underwent abdominal surgery, like albumin and electrolytes were not assessed as a potential predictor of POI.

8. CONCLUSION AND RECOMMENDATIONS

8.1 Conclusion

In this cross-sectional study, we found that the magnitude of POI among patients underwent abdominal surgery of the two governmental hospitals in Bahir Dar was 16.27%. Old age, male sex, low BMI and surgeries that involve the intestine were associated with higher chance of developing POI.

8.2 Recommendation

Based on the findings of this study, we forwarded the following recommendations

For clinicians

- Target-specific interventions are recommended among older age, male sex and patients who underwent intestinal surgery.
- Preoperative nutritional rehabilitation should be encouraged in patients with low BMI

For Researchers

- Further studies are recommended by including other variables like nutritional, electrolyte variables
- Cohort studies with long follow-up time are regarded in order to identify causal-relationship
- Studies with large sample sizes are recommended in order to estimate the magnitude of POI better

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ANNEX: DATA COLLECTION SHEET

Information sheet

My name is Dr. FasikaChanie a final year surgical resident at Bahir Dar University College of medicine and health science department of general surgery.am carrying out a study on magnitude and risk factor of postoperative ileus in adult patients at governmental hospital, Bahir Dar

This will be determined by data collection through filling questionnaires reviewing the chart and patient examination. Information obtained from this study will reveal to doctors the magnitude and risk factors of POI at Bahirdar hospitals.

I extend my invitation to participate in this study. The decision to participate in this study will be entirely voluntary after you have comprehensively understood the detail. By refusing to participate you will not be denied medical care. Furthermore you may stop participating in this study at any time without consequences.

I.....freely give my consent for my recruitment in the study conducted by Dr. fasikachanie, the nature which has been explained by her /her research assistant.

Signature of the patient.....

Data collection sheet

This data extraction checklist is prepared to collect sociodemographic, clinical factor, and Surgical related factor that is important for assessing magnitude and associated factors of postoperative ileus among patient underwent abdominal surgery at TGSH and FHCSH. All this information will be retrieved from individual patient cards without mentioning the name of clients. This information will be collected by health care providers (BSc nurse or Health Officer)
 Contact Information FasikaChanie +251918783717

Name of institution: _____ Participant ID _____

S.no.	Socio- demographic characteristics	Possible choices
100	Sex	1 Female 2 Male
101	Ageyears
102	Educational background	1. Illiterate 2. Read & write only 3. Primary school 4. Secondary school 5. College/University
103	Residence	1. Urban 2. Rural
104	Occupation	1. Government employee 2. Non-government employee 3. Housewife 4. Merchant 5. Farmer 6. Student 7. Other----- (specify)
	Clinical factors	
200	Weight	-----kg
201	Heightcm BMI.....
203	History of perioperative narcotic use	1.Yes 2.No
204	History of previous abdominal surgery	1.Yes 2.No
205	Presence of abdominal contamination	1.Yes 2.No
206	ASA physical score	1. ASA I 2. ASAI 3. ASAI 4. ASA IV 5. ASA V

207	Presence of hemodynamic instability	1 Yes 2. No
208	Smoking history	1. Yes 2. No
209	Claviendindo score
210	Type of medical illness	1. CHF 2. Hypertension 3. DM 4. CKD 5. COPD 6. Others specify (_____)
211	Estimated Blood lossml
212	Types of anesthesia	1.General anesthesia 2.Spinal anesthesia
213	Blood transfusion	1. Yes 2. No
214	Time of initiation of feeding	1 <24 hr 2.>24 hr
	Surgical factors	
300	Duration of surgery	----- minutes
301	urgency of surgery	1. Elective 2. Emergency
302	Surgical approach	1. Open 2. Laparoscopic
303	Nature of surgery:	1.Intestinal 2. Nonintestinal
304	Indication of surgery
	Outcomes	
400	Nausea and vomiting	1 Yes 2 No
401	Inability to tolerate oral food intake over the last 24 h	1. Yes 2. No
402	Absence of flatus for 24 h	1. Yes 2. No
403	Abdominal distension	1. Yes 2. No
404	Radiological evidence of ileus	1. Yes 2. No

Claviendindoscore: *Class 1* was defined as normal postoperative progress requiring no medication and no surgical or radiological intervention. *Class 2* was defined as requiring medication and/or transfusion. *Class 3* was defined as surgical, radiological, or endoscopic intervention. *Class 4* was defined as involving near lethal complications including central nervous system complications. *Class 5* was defined as the death of a patient.

		3. "አሳ" III 4. "አሳ" IV 5. "አሳ" V
207	"ኤፍዳይና ማክሊን ስቴብሊቲ"	1. አለ 2. የለም
208	ሲጋራያ ጨላላ	1. አዎ 2. የለም
209	"ክላቪን ዲን ዶስኮር"
210	የታካ ማዕከላዊ የህመም አይነት?	1 የልብሀ ማም 2 የግፊት በሽታ 3 የስኳር በሽታ 4 የኩላሊት በሽታ 5 የመተንፈሻ አካላት ማዘጋት ሌላ ካለ ይጠቀስ _-----
211	የፈሰሰ ወደ ምዕመን? ማሊ
212	የማይን ዘጃ አይነት?	1 ማሉ 2 ከወገ ብቦታች
213	ደምተል ግሶታል	1. አዎ 2. የለም
214	መቼ ምግብ መወሰድ ይጀምራል?	1 < 24 ሰዓት 2 > 24 ሰዓት
	ከቀደህ ክምና ጋር ተያያዥ ጅግ ዳዮች	
300	ቀደህ ክምና ወደ ወሰደ ወሰደ አት?	... ደቂቃ
301	የቀደህ ክምና ወሰደ ጣዳፊነት?	1 ድንገተኛ 2 ድንገተኛ ያልሆነ
302	የቀደህ ክምና ወሰደ ካሄደ?	1 ሆድተከፍቶ 2 ሆድ ሳይከፈት በመሳሪያ ("ላባራስ ኮቢካ")
303	የቀደህ ክምና ወሰደ አይነት?	1 የአንጀት 2 ከአንጀት ወጪ
304	ቀደህ ክምና ወሰደ ሲሰራ ምክንያት የሆነ ወብሽታ?
	ወጠኛ	
400	ማቅለሽ ለሽ እና ማሽታ ወክ	1. አለ 2. የለም
401	ምግብ አለ መመቻት	1. አለ 2. የለም
402	አየር / አይነ ምድር አለ መወጣት	1 አለ 2. የለም

403	ሆድሙን ፋት	1 አለ 2.የለም
404	”ራዲዮ ሎጂክ አብደን ስፎር አለየሰ”	1 አለ 2.የለም

አመሰግናለሁ!!

ANNEX: CHI-SQUARE/FISHER TEST FOR DETERMINANT FACTORS OF POI

Variable	Category	POI		P
		Yes	No	
Educational background	Illiterate	10	71	0.4875
	Read & write only	12	32	
	Primary school	7	9	
	Secondary school	7	19	
	College/University	5	60	
Residence	Urban	12	108	0.1157
	Rural	29	103	
Occupation	Government employee	4	32	0.954
	Housewife	4	17	
	Merchant	6	33	
	Farmer	19	85	
	Student	6	35	
	Other	2	9	
ASA physical score	I/II	40	196	0.262
	≥III	1	15	
Presence of hemodynamic instability	Yes	5	11	0.093
	No	36	200	
Smoking history	Yes	1	4	0.050
	No	40	207	
Type of medical illness	None	36	162	0.686
	Hypertension	2	11	

	DM	1	14	
	Others	2	24	
Estimated Blood loss	< 500	35	154	0.091
	≥ 500	6	57	
Types of anesthesia	General anesthesia	40	202	0.778
	Spinal anesthesia	1	10	
Blood transfusion	Yes	5	42	0.456
	No	36	167	
Duration of surgery	<120	28	118	0.157
	≥120	13	93	
Urgency of surgery	Elective	18	88	0.794
	Emergency	23	123	

ANNEX: VIF FOR PREDICTOR VARIABLES

Variable	VIF	1/VIF
nature	2.04	0.490850
time_feeding	1.85	0.541742
sex	1.16	0.861772
age_recode	1.13	0.886729
dindo	1.12	0.892181
abdominal_~n	1.11	0.900636
previous_s~y	1.08	0.930110
bmi_new	1.07	0.933890
narcotic	1.02	0.983588
Mean VIF	1.29	