



ADDIS ABABA UNIVERSITY
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DEPARTMENT OF SURGERY

**Assessment of ERAS Protocol Implementation at Tikur Anbessa
Specialized Hospital; An Observational Cross-Sectional Study from
Jan. 1 to April 30, 2025.**

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**Assessment of ERAS Protocol Implementation at Tikur Anbessa
Specialized Hospital; An Observational Cross-Sectional Study from
Jan. 1 to April 30, 2025.**

**A Final Thesis submitted to the department of surgery as Partial Fulfilment of
the requirement for Certificate of Subspeciality in Colorectal Surgery.**

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Declaration

This is to certify that this thesis entitled “**Assessment of ERAS Protocol Implementation at Tikur Anbessa Specialized Hospital; An Observational Cross-Sectional Study**” submitted in partial fulfillment of the requirements for certificate of “**subspecialty in colorectal surgery**” of Department of Surgery, AAU-CHS. It 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.

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Approval for thesis defense

I hereby certify that I have supervised, read, and evaluated this research entitled “Assessment of ERAS Protocol Implementation at Tikur Anbessa Specialized Hospital; An Observational Cross-Sectional Study” Addis Ababa, Ethiopia, prepared under my guidance. I recommend this thesis to be defended at the department of surgery, CHS-AAU.

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Approval of Thesis Evaluators

We hereby certify that we have examined this thesis entitled “Assessment of ERAS Protocol Implementation at Tikur Anbessa Specialized Hospital; An Observational Cross-Sectional Study”. We approve this thesis for partial fulfillment for the requirements of the Certificate of subspecialty in Colorectal Surgery at Department of Surgery, Addis Ababa University college of health sciences.

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Acronyms

ERAS= Enhanced Recovery After Surgery

AAU= Addis Ababa University

CHS= College of Health Science

TASH= Tikur Anbessa Specialized Hospital

CRS= Colorectal Surgery

GI= Gastrointestinal

IRB= Institutional Review Board

LOS= Length of Hospital Stay

PONV= Postoperative Nausea and Vomiting

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Abstract

Background:

Enhanced Recovery After Surgery (ERAS) programs are multimodal perioperative care pathways designed to achieve early recovery for patients undergoing major surgery.

While ERAS protocols have been extensively studied and implemented in high-income countries, their application in and middle-income countries (LMICs) is low and less well-documented.

The International Surgical Outcomes Study (ISOS) and the African Surgical Outcomes Study (ASOS) highlighted the urgent need to address the quality gap in perioperative care in LMICs.

Adaptation and effective implementation of ERAS is the best solution to achieve closing gap in perioperative care of a surgical patient including resource limited countries.

Aim of this study is to assess ERAS implementation at TASH assuming that its practice is low at TASH

Methods: An observational cross-sectional study was conducted on 52 colorectal patients who underwent elective surgery. Colorectal patients who will have isolated perianal procedure were excluded and no randomization technique was utilized. The data was cleaned and entered on SPSS version for analysis. The strength of associations was assessed using adjusted odds ratios (AOR) with 95% confidence intervals (CI), and a p-value of ≤ 0.05 was considered statistically significant.

Result: A total of 52 patients were included in the study, with a male predominance of 61.5%. The most common diagnoses were stoma-related conditions (28.8%), rectal cancer (23.1%), and colon cancer (19.2%). Mechanical bowel preparation was administered to 63.5% of patients, and 82.7% received oral antibiotic prophylaxis. The vast majority (94.2%) underwent open surgery, with an average operative time of 150 minutes. Postoperative complications occurred in 26.9% of patients, and the mortality rate was 1.9%. The mean total length of hospital stay was 13.6 ± 6.5 days. And, the post operative hospital stay was 6.9days.

Conclusion: This study highlights a mixed level of adherence to ERAS protocols in colorectal surgery. While basic safety measures and some prophylactic interventions are well established, there is a clear gap in implementing core ERAS principles such as early feeding, DVT prophylaxis, and minimally invasive techniques. These gaps may be contributing to prolonged hospital stays and elevated complication rates.

1. Introduction

1.1 Background

Enhanced Recovery After Surgery (ERAS) programs are multimodal perioperative care pathways designed to achieve early recovery for patients undergoing major surgery. They encompass a range of preoperative, intraoperative, and postoperative interventions aimed at reducing the physiological stress of surgery and promoting faster recovery. ERAS programs have demonstrated significant benefits, including reduced postoperative complications, shorter hospital stays, and improved patient outcomes in high-income settings. (1)

While ERAS protocols have been extensively studied and implemented in high-income countries, their application in and middle-income countries (LMICs) is low and less well-documented. LMICs often faces unique challenges with limited healthcare resources, insufficient infrastructure, and varying levels of healthcare worker training, which can hinder the adoption and implementation of comprehensive ERAS protocols (1) (2).

Additionally, cultural beliefs and practices regarding postoperative care can impact the acceptance and effectiveness of ERAS protocols. Addressing these barriers requires a multifaceted approach, including capacity building, healthcare worker training, and the adaptation of ERAS guidelines to fit local contexts. Moreover, collaborative efforts between high-income countries and LMICs, including knowledge transfer and joint research initiatives, can facilitate the adaptation and scaling of ERAS in resource-limited settings ((3), (4)).

1.2 Statement of the problem

The Lancet Commission and the Global Surgery Foundation highlighted the urgent need to improve the access gap to safe surgery and anesthesia for essential surgical services in low- and middle-income countries (LMIC's) (5), (6). In addition to the access gap, the International Surgical Outcomes Study (ISOS) and the African Surgical Outcomes Study (ASOS) highlighted the urgent need to address the quality gap in perioperative care in LMIC's (7), (8).

The effective implementation of an Enhanced Recovery After Surgery program, when combined with a compliance of approximately 70% or greater, has demonstrated significant improvement in the quality of perioperative care and patient outcomes in high-income countries (HICs) (1). However, there are only a few studies that show ERAS being used successfully in Africa (2). There is also a lack of an up-to-date and comprehensive assessment of the evidence regarding its implementation in LMICs, (2), (9). This situation is even worse in Ethiopian setting where there is no single publication regarding ERAS utilization to date.

1.3 Significance of the study

Western world is widely practicing the utilization and implementation of ERAS. Findings across America and Europe showed the added significance of ERAS integration in the surgical patient care pathways. Individualized guidelines have been devised for different surgical procedures and have been in use for the last two decades (10), (11). This utilization during the perioperative pathway has shown a strong evidence-based improvement in surgical outcome and effective service utilization.

However, evidence-based data and practice regarding ERAS is lacking in developing countries including Ethiopia (2), (9). This study is intended to assess utilization of ERAS and its potential short-term benefits in Ethiopian health care setting serving as a springboard for further researches.

In addition, the overall information derived from this study will be used as an input to adapt tailored ERAS protocols that are feasible and effective for patients undergoing colorectal surgery.

2. Literature Review

An innovative perioperative package of early oral nutrition, early mobilization, and epidural analgesia for a small group of nine patients following colon surgery was first described in 1995 by Professor Henrik Kehlet from Copenhagen, Denmark (12). His brand new practice showed that most patients had recovered well to be discharged 2 days after open sigmoid resections, representing a tangible paradigm shift in the perioperative care (13).

These findings were met with disbelief but subsequent work with other groups revealed that this was possible, with the use of multimodal approach to recovery (14).

Surgical care delivery is facing challenges in access, safety, affordability, and overall performance. The Lancet Commission on Global Surgery found that over 5 billion people worldwide do not have access to safe and timely surgical care, with sub-Saharan African countries having less than 5% of patients receiving such care (5) (15). Despite improvements in surgical and anesthetic techniques and the growth of the workforce, postoperative complications still occur in around 25% of patients undergoing surgery. Nearly half of these complications are preventable (7). Low- and middle-income countries have the highest burden of mistreated surgical illness (8).

In response to these challenges, the ERAS Society was established in Europe in 2010 (2), (11). This non-profit multi-disciplinary society promotes multimodal care for surgical patients. The interest in ERAS programs in perioperative care continues to grow, making it one of the hot topics in surgery. Despite economic, demographic, and infrastructure shifts generating interest in programs to increase efficiency, the surgical community remains slow in adopting change and embracing novel treatments. An example of this is the practice of overnight fasting on the day of surgery, despite recommendations for change backed by data over 25 years ago (15).

Population growth has exceeded the growth of hospital infrastructure, leading to a shortage of hospital beds in many countries. The number and complexity of surgeries have also increased. Although surgical care is vital, its delivery still faces major gaps in safety, access, affordability, and overall performance. Low- and middle-income countries are affected the most by mistreated surgical illness, with sub-Saharan African countries having less than 5% of the population

receiving safe and timely surgical care (16) (6). The global volume of surgery is estimated at 312.9 million operations per year, but rates of surgery vary greatly. Despite improvements, the rate of major postoperative complications occurs in about 25% of patients undergoing surgery (7) (8).

ERAS programs have now expanded into many specialties and surgeries worldwide. However, the slow adoption of change and embracing novel treatments has been a critical obstacle to improving surgical care delivery. Ultimately, the inspiration to treat as many patients as possible with the best possible outcomes remains the driving force for surgical teams.

2.1 Preoperative Elements

Preoperative components of ERAS include patient education, nutritional optimization, and minimal fasting (12). Preoperative intake of carbohydrate solutions for non-diabetic patients two hour prior to the induction of anesthesia lowers insulin resistance, serum tumor necrosis factor receptor and perioperative complications (17) (18).

Standard use of prophylactic antibiotic is recommended by different guidelines and WHO to reduce surgical site infection and mortality from it. Cephalosporins are preferred prophylactic antibiotics, unless exceptions are there. Antimicrobial prophylaxis should be administered within 1 hour of surgical incision to get maximum serum level at incision site (4) (19).

Preoperative nausea and vomiting (PONV) happen in 30-50% in all surgical patients, and up to 80% of high risk of patients. PONV is an important factor which causes patient dissatisfaction, prolong intravenous fluids, and delay initiation of enteral feeding, increase hospital stay, complication rate and overall health care cost. Administration of preoperative PONV prophylaxis avoids the above complications and increase possibility of outpatient and fast-track surgery (20).

Studies indicate that patient education and engagement are crucial for the success of ERAS. In LMICs, where educational resources may be limited, tailored educational programs that consider local languages and literacy levels are essential (2), (9).

2.2 Intraoperative Elements

Intraoperative measures focus on minimizing surgical stress and maintaining homeostasis. These include the use of minimally invasive surgical techniques, optimal fluid management, and effective pain control (22) (23). In LMICs, the availability of minimally invasive surgical equipment and trained personnel can be limited. However, studies suggest that even simple interventions, such as balanced fluid therapy and multimodal analgesia using locally available drugs, can significantly improve outcomes (3) (9).

2.3 Postoperative Elements

Postoperative care in ERAS emphasizes early mobilization, optimal pain management, and early enteral nutrition (24). Early mobilization and feeding are particularly challenging in LMICs due to cultural practices and the availability of postoperative care resources (3) (4). Community health workers and family caregivers can play a vital role in supporting these interventions, highlighting the need for community-based approaches in ERAS implementation.

2.4 Conceptual Framework

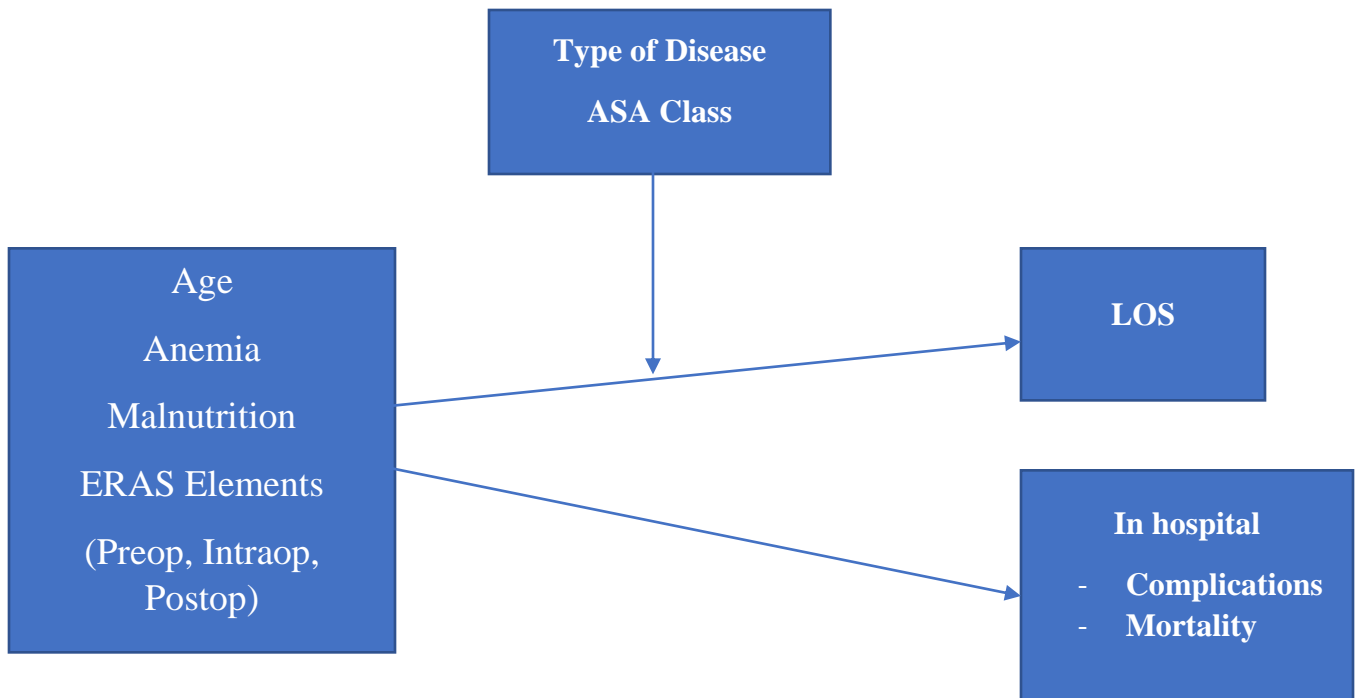


Figure 1 Conceptual Framework

3. Objective

3.1 General Objective:

- To assess ERAS Protocol Implementation at Tikur Anbessa Specialized Hospital, Colorectal Surgery Unit

3.2 Specific Objective:

- To determine frequency of ERAS element implementation
- To compare the LOS in relation to the number of ERAS elements implemented
- Asses in-hospital complications and mortality in relation to the number of ERAS element implemented.

4. Methodology:

4.1 Study Area and Period: this study was conducted at TASH located in Addis Ababa, Central Ethiopia. TASH is currently giving specialized colorectal surgery service. TASH is the largest teaching and referral hospital in the country, with over 700 beds. It is also an institution where specialized clinical services that are not available in other public or private institutions are rendered to the whole nation. Data was collected for four consecutive months from January 1 to April 30, 2025.

4.2 Study Design: an observational cross-sectional study design was used

4.3 Source Population: All Colorectal Surgery Patients older than 18years who were operated in the study period

4.4 Study Population: All Colorectal Surgery patients older than 18yrs who were admitted and underwent elective colonic and /or rectal surgery.

4.5 Sample Size and Sampling Procedure

All colorectal surgery patients to whom elective colorectal surgery was performed from January 1 to April 30, 2025 were included in the study

4.6 Inclusion Criteria: All CRS patients who underwent elective colonic and rectal surgery and gave their consent

4.7 Exclusion Criteria: CRS patients who underwent perianal procedures alone, second surgery in the same admission, patients who were transferred to ICU from the operation theatre

4.8 Sampling Technique:

No sampling technique was used as all patients who fulfill the inclusion criteria in three consecutive months was taken.

4.9 Study Variables

4.9.1 Independent Variables: Age, gender, diagnosis, ASA class, nutritional status, anemia, preoperative, intraoperative and postoperative ERAS elements

Primary Outcome Variable: LOS

Secondary Outcome Variables: Complications, mortality

5. Operational Definitions

Total Length of Hospital Stay: Total number of days spent in the hospital from date of admission to discharge

Postoperative Hospital Stay: Number of days the patient stayed in the hospital starting from the date of surgery to date of discharge.

Complications: Clavien Dindo class 3b and above complications occurring while the patient is in the hospital after surgery

Mortality: death related to the surgery/anesthesia occurring before the patient was discharged

6. Data collection Methods

An extraction format that contains study variables of interest was prepared in English language to extract relevant information about age, sex, investigations, diagnosis. The tool also included implementation of the preoperative, intraoperative and postoperative ERAS elements. An electronic data collection method (Kobocollect) was used.

7. Data Collectors and Data Collection Process

Data was collected by surgery residents and medical interns being supervised by principal investigator at admission, date of surgery and date of discharge. Some of the data was retrieved by interviewing colorectal surgery patients that were admitted to GI ward of TASH from Jan.1, 2025- April 30, 2025. Most of relevant information was retrieved from patients' medical records.

8. Data Quality Control Measures

Data collectors were trained and regular follow up was made. Content and quality of data collected daily was supervised to ensure the quality of data. Improperly collected data was redone after communicating personally to data collectors. Pretest was done on 5 % of records before the actual data collection started. The data collection format was checked for its completeness and any gap identified was corrected before the patient was discharged.

9. Data Analysis and Interpretation

Data was collected by Kobotool and analyzed by SPSS version 25. After data collection, each questionnaire was given a unique code by the Investigator. Frequency distribution and other descriptive statistical procedures were used for appropriate variables.

10. Ethical Considerations

Ethical clearance was obtained from Department of Surgery IRB in accordance with the Helsinki Declaration and National and Institutional guidelines. Then, official letter for cooperation and permission was delivered to TASH Chief Clinical Director and all responsible bodies to get permission for the study. Moreover, brief explanation was given to the hospital manager concerning the purpose of the study and the procedures used to collect the data.

Consent was also taken from all participants/patients after oral and written briefing on the aim of the research. Confidentiality of data collected was maintained.

11. Result

Demographic Characteristics

A total of **52 patients** were included in the study. The **median age** was **40.6 years (IQR: 40–60)**. The majority were **male (61.5%)**, while **38.5% were female**. The most frequent diagnoses were stoma related cases (28.8%), rectal cancer (23.1%) and colonic cancer (19.2%). See bar fig.2

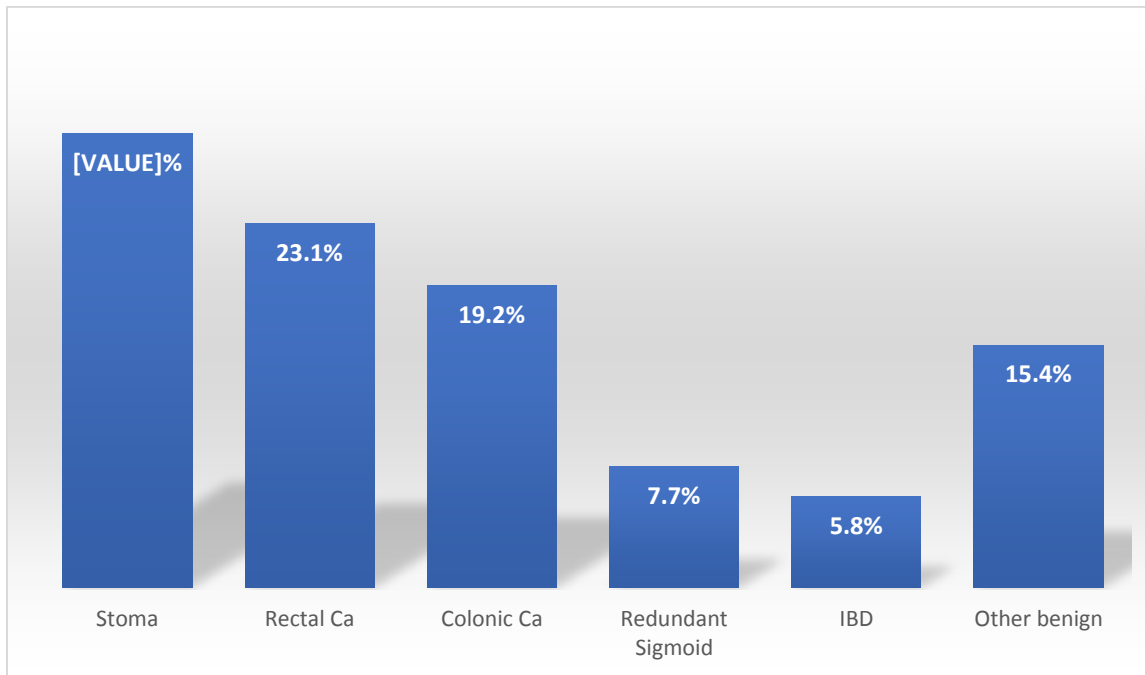


Figure 2 Distribution of diagnoses of cases

Pre-admission and Risk Factors

- **Pre-admission education** was provided to 75% of patients and Heavy alcohol consumption was uncommon (9.6%). Most patients (78.8%) had no comorbidities. Among those with comorbidities: retroviral infection (9.6%), diabetes with hypertension (5.8%), hypertension alone (3.8%), and diabetes alone (1.9%).

Preoperative Preparation

- Majority (63.5%) received one day of castor oil (3 doses) as part of mechanical bowel preparation and oral antibiotics prophylaxis was given in 82.7%. Ninety six percent were restricted from taking anything after midnight including clear fluids. Preoperative carbohydrate loading was rarely practiced (3.8%).

Surgical Characteristics

- **Procedures performed:**

The most frequently performed procedures were colonic resection (28.8%), stoma reversals (28.8%) and rectal resection (23.1), see fig.3 bellow.

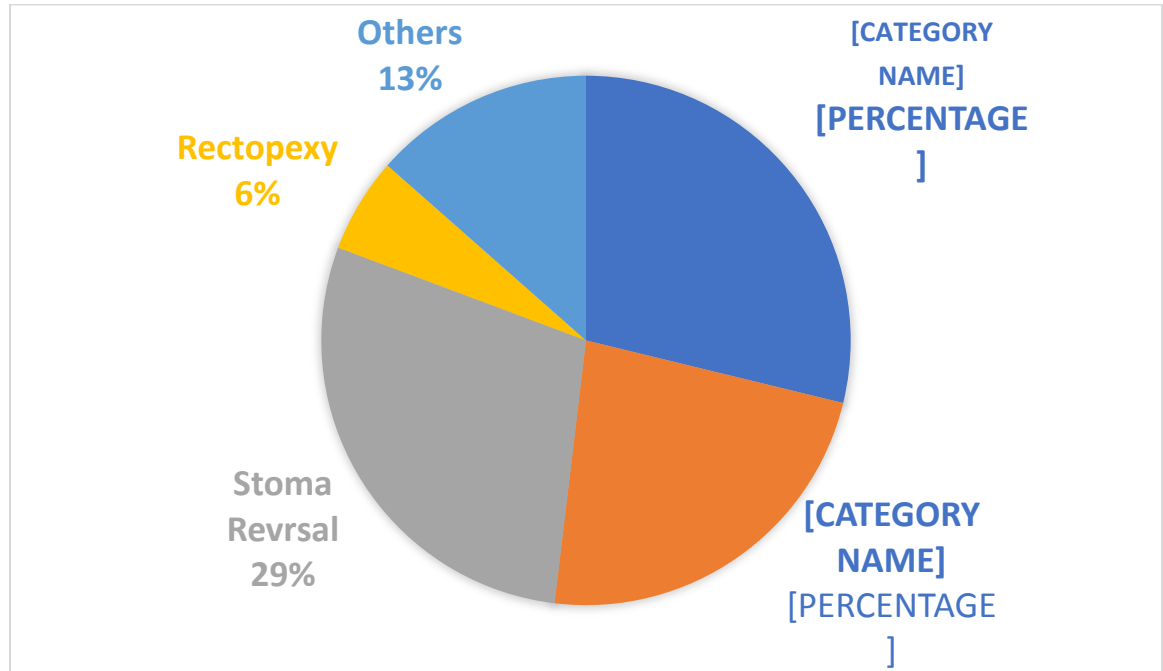


Figure 3: Types of procedures performed

Intraoperative ERAS Components

- All procedures have WHO surgical safety checklist filled and all patients received parenteral antimicrobial prophylaxis within one hour of incision. General anesthesia was the most frequently used anesthesia type (98.1%). Majority of surgeries were open (94.2%) and only 5.8% were laparoscopic. Sixty five percent of patients received warmed IV fluids yet intraoperative core temperature monitoring was rarely practiced (1.9%). No

patient did receive perioperative (intraoperative) DVT prophylaxis. The median duration of surgery was 150minutes (IQR=120-210min.) Intraoperative multimodal analgesia usage was common where Most patients received combinations of opioids, paracetamol IV, and NSAIDs (34.6%). Additional use of local/regional blocks occurred in some cases (up to 19.2%).

Postoperative ERAS Components

- Urinary catheter removed within 24 hours in 86.5% of patients. Abdominal drain placement was used in 13.5%. Postoperative nausea and vomiting (PONV) were reported in 19.2%. While, early enteral feeding was initiated in only 11.5%. Total Length of hospital stay (LOH) was (Mean) 13.6 ± 6.5 days and total postoperative hospital stays was (Mean) was 6.9 days

Postoperative Outcomes

- The overall complication rate was 26.9% and the most frequent complication was surgical site infection (11.5%) followed by urinary retention (5.7%). One patient (1.9%) had anastomotic leak with refractory septic shock and acute kidney injury (see fig.4 below). Only one patient had died of severe post operative complication (1.9%). And, the overall survival rate at discharge was 98.1%.

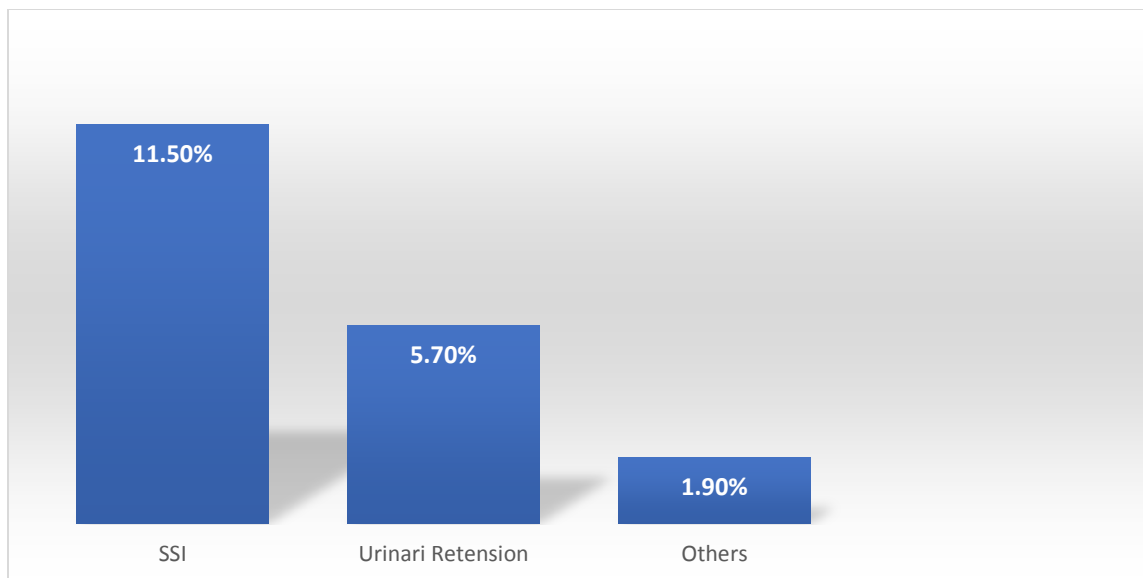


Figure 4Frequency of post operative complications

12. Discussion

This study provides insight into the adherence to Enhanced Recovery After Surgery (ERAS) principles and the associated outcomes in a resource-limited setting.

1. Demographics & Diagnosis

The cohort reflects a relatively young median age (40.6 years) for colorectal pathology, with a predominance of males. The high proportion of stoma-related cases and colorectal cancers is consistent with the surgical burden in tertiary centers.

2. ERAS Compliance

While certain preoperative ERAS elements were well adhered to—such as the use of oral antibiotics (82.7%) and surgical safety checklist (100%)—several critical ERAS components were underutilized:

- Carbohydrate loading (3.8%) and early postoperative feeding (11.5%) were notably limited.
- Postoperative urinary catheter removal was timely in most cases (86.5%), a positive deviation.

The low implementation of perioperative DVT prophylaxis (0%) and intraoperative core temperature monitoring (1.9%) are concerning, particularly as these are low-cost interventions with strong evidence supporting their benefit.

3. Surgical Approach

The very high rate of open procedures (94.2%) is expected in settings lacking widespread access to laparoscopic equipment and training. This correlates with longer recovery times, higher postoperative pain, and greater complication rates, which may partly explain the longer hospital stays and elevated morbidity.

4. Postoperative Outcomes

The overall complication rate (26.9%) and mean length postop hospital stay (6.9days) suggest opportunities for improved perioperative management. SSIs were the most common complications (11.5%), likely associated with open surgical techniques and prolonged operative times. Despite this, the low mortality rate (1.9%) and high survival rate (98.1%) are reassuring and may reflect adequate intraoperative safety protocols and postoperative care.

5. Analgesia Strategy

Use of multimodal analgesia was a positive finding, with a significant portion receiving opioids combined with NSAIDs and/or paracetamol. Local and regional blocks were used in some cases, indicating growing awareness of opioid-sparing strategies.

13. Conclusion

This study highlights a mixed level of adherence to ERAS protocols in colorectal surgery. While basic safety measures and some prophylactic interventions are well established, there is a clear gap in implementing core ERAS principles such as early feeding, perioperative DVT prophylaxis, and minimally invasive techniques. These gaps may be contributing to prolonged post operative hospital stays and elevated complication rates.

14. Recommendations

- I recommend to the colorectal surgery unit to develop standardized ERAS protocols tailored to local resource settings.
- It is also crucial for the unit to ensure routine DVT prophylaxis and intraoperative temperature monitoring.
- The unit has to promote early initiation of feeding postoperatively.
- The department of surgery and the hospital at large has to promote training and gradual adoption of laparoscopic colorectal surgery.
- The hospital has to monitor outcomes through regular audit to drive quality improvement.

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16. Annex

ERAS Data Collection Tool (will be deployed on KoBo Toolbox)

Instruction: tick the box (or fill in the space) provided with the patient's response

Part I: Demographics

- Patient EMR No. _____ Age _____ Sex _____
- Date of Admission: _____

Part II: Preadmission

- Pre-Op Diagnosis: _____
- Preoperative education provided:
 - Yes
 - No
- Is the patient smoking?
 - Yes
 - No
- If yes, for how long did the patient stop smoking before admission?
 - < 4 weeks
 - >= 4weeks
- Does the patient have the habit of heavy alcohol consumption?
 - Yes
 - No
- If yes, for how long did the patient stop heavy* alcohol consumption before admission?
 - < 4 weeks
 - >= 4weeks
- BMI= _____
- Serum Albumin= _____

- Does the patient need nutritional optimization?
 - Yes
 - No
- Does the patient get enteral or parenteral nutritional support?
 - Yes
 - No
- Hgb=_____
- If the Hbg <10mg/dl, does the patient receive oral or IV iron treatment?
 - Yes
 - No
- Which of the following comorbidities does the patient have?
 - Diabetes Mellitus
 - Hypertension
 - Other, specify: _____
 - None

Part III: Preoperative Care

- Risk assessment scores (e.g., ASA score) _____
- Is Mechanical bowel preparation done for left side colon and rectal surgeries?*(MBP)
 - Yes
 - No
- For how long did the patient fast before induction of anesthesia?
 - >/= 6 hours
 - 4 hours
 - 2 hours
- Was the patient loaded preoperatively with carbohydrate drinks?
 - Yes
 - No
 -

- Were premedications like anxiolytics given?
 - Yes
 - Not
- Is the patient high risk for PONV?
 - Yes
 - No
- Is prophylaxis for PONV given?
 - Yes
 - No
- Is prophylactic antibiotics indicated?
 - Yes
 - No

Part IV: Intraoperative Care

- Was surgical safety checklist completed?
 - Yes
 - No
- Was antimicrobial prophylaxis given within one hour of incision?
 - Yes
 - No
- VTE prophylaxis
 - Compression stockings
 - Pneumatic Compression
 - Heparin
 - Neither
- Type of anesthesia?
 - Nerve Block
 - SA
 - GA

- Is Core temperature monitored throughout the surgery?
 - Yes
 - No
- Which mode intraoperative temperature management is used? (If the operation lasted > 30 minutes)
 - Warmed IVF
 - Radiant Warmer
 - Blankets
 - None
- Which mode of management of pain used?
 - Opioid,
 - Ketamine,
 - NSAIDs,
 - PCM,
 - Epidural analgesia
 - Local/ regional blocks
 - Other, specify: _____
- Type of surgery: _____
- Operative time: _____
- EBL= _____
- Fluid balance*
 - Positive
 - Negative
 - Near zero
- Mode of surgery
 - Open
 - MIS
- Intra-abdominal or surgical site drains
 - Yes
 - No

- Is NGT placed?
 - Yes
 - No
- Is urinary catheter placed?
 - Yes
 - No

Part V: Postoperative Care

- Is IV fluid discontinued on day 1 postop?
 - Yes
 - No, Continued beyond day 1
- Is enteral feeding initiated within hours after surgery?
 - Yes
 - No, initiated on day one or beyond
- Has the patient started ambulation on the day of surgery?
 - Yes
 - No, Started ambulation after the day of surgery
- Pain management strategies
 - Epidural Analgesia
 - Opioids
 - NSAIDSe
 - Paracetamol
- Is postoperative nausea and vomiting (PONV) prevented and/or treated?
 - Yes
 - No
- Is urinary catheter removed within 24 hours of surgery of colonic surgery or within 48 hours of surgery of rectal surgery?
 - Yes,
 - No, kept beyond the above stated time

- Abdominal/another surgical site drains
 - Removed within 24 hours of surgery
 - Removed after 24 hours of surgery

Part VI: Outcome

- Post- operative complications
 - Surgical complication*, specify: _____

 - Non- surgical complications*, specify: _____

- Length of hospital stay: _____
- Status on discharge
 - Alive
 - Dead