

**COMPARATIVE STUDY BETWEEN ENHANCED RECOVERY
AFTER SURGERY (ERAS) VERSUS CONVENTIONAL
POSTOPERATIVE CARE IN GASTROINTESTINAL SURGERIES
IN COIMBATORE MEDICAL COLLEGE & HOSPITAL**



**Dissertation submitted to
THE TAMILNADU DR. M.G.R. MEDICAL UNIVERSITY
CHENNAI-600032.**

**With partial fulfillment of the requirements for the award of
M.S.DEGREE IN
GENERAL SURGERY (BRANCH I)
REGISTRATION NO: 221711317**



COIMBATORE MEDICAL COLLEGE HOSPITAL

COIMBATORE

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CERTIFICATE BY THE GUIDE

This is to certify that the dissertation entitled “**COMPARATIVE STUDY BETWEEN ENHANCED RECOVERY AFTER SURGERY(ERAS) VERSUS CONVENTIONAL POSTOPERATIVE CARE IN GASTROINTESTINAL SURGERIES IN COIMBATORE MEDICAL COLLEGE & HOSPITAL** ” is a bonafide dissertation done by **DR. VIDYA.V** in Department of General Surgery, Coimbatore Medical College and Hospital and is submitted in partial fulfillment of the requirement for the Degree of M.S. General Surgery, Branch I of the Tamilnadu Dr. M.G.R. Medical University, Chennai.

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PROFESSOR

Department of General Surgery

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DATE:

DR. B. ASOKAN M.S., M.Ch (Plastic)

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CERTIFICATE – II

This is to certify that this dissertation work titled **COMPARATIVE STUDY BETWEEN ENHANCED RECOVERY AFTER SURGERY(ERAS) VERSUS CONVENTIONAL POSTOPERATIVE CARE IN GASTROINTESTINAL SURGERIES IN COIMBATORE MEDICAL COLLEGE & HOSPITAL**” of the candidate **DR.VIDYA.V** with registration Number **221711317** for the award of M.D in the branch of General Medicine .I personally verified the urkund.com website for the purpose of plagiarism Check. I found that the uploaded thesis file contains from introduction to conclusion pages and result shows 2% (Two percentage) of plagiarism in the dissertation.

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DECLARATION

I solemnly declare that the dissertation titled “**COMPARATIVE STUDY BETWEEN ENHANCED RECOVERY AFTER SURGERY(ERAS) VERSUS CONVENTIONAL POSTOPERATIVE CARE IN GASTROINTESTINAL SURGERIES IN COIMBATORE MEDICAL COLLEGE & HOSPITAL**” was done by me from January 2018 to December 2018 under the guidance and supervision of **DR.T.SRINIVASAN M.S.**, Professor, Department of General Surgery, Coimbatore Medical College and Hospital.

This dissertation is submitted to the Tamilnadu Dr. M.G.R Medical University towards the partial fulfillment of the requirement for the award of M.S Degree in General Surgery (Branch I).

Date:

Place: Coimbatore

SIGNATURE OF THE CANDIDATE

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Lastly I express my sincere thanks to all my patients without whom this study would not have been possible.

**INSTITUTIONAL HUMAN ETHICS COMMITTEE
COIMBATORE MEDICAL COLLEGE, COIMBATOR - 14**

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CERTIFICATE OF APPROVAL

To
Dr.Vidya V
Post Graduate,
Department of General Surgery,
Coimbatore Medical College & Hospital
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Dear **Dr.Vidya V**

The Institutional Ethics Committee of Coimbatore Medical College, reviewed and discussed your application for approval of the proposal entitled **"Comparative Study between enhanced recovery after surgery (ERAS) versus conventional Post - operative care in Gastrointestinal Surgeries in Coimbatore Medical College & Hospital.No.0109/2017.**


The following members of Ethics Committee were present in the meeting held on 30.11.2017,conducted at MM - II Seminar Hall, Coimbatore Medical College Hospital Coimbatore-18

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15	Mr.V.A.Shahul Hameed, +2	Lay Person

We approve the Proposal to be conducted in its presented form.

Sd/Chairman & Other Members

The Institutional Ethics Committee expects to be informed about the progress of the study, and SAE occurring in the course of the study, any changes in the protocol and patients information/informed consent and asks to be provided a copy of the final report.


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INTRODUCTION

INTRODUCTION

Enhanced recovery after surgery (ERAS) programs are associated with reduced mortality and morbidity. ERAS protocols are multimodal perioperative care pathways designed to achieve early recovery after surgical procedures by maintaining preoperative organ function and reducing the profound stress response following surgery.

The key elements of ERAS protocols include preoperative counseling, optimization of nutrition, standardized analgesic and anesthetic regimens and early mobilization. The present study discusses particular aspects of ERAS protocols which represent fundamental shifts in surgical practice to decrease postoperative complications, morbidity and to reduce the length of hospital stay..

JUSTIFICATION OF THE STUDY

Gastrointestinal surgeries ranging from major to minor require a sufficient amount of hospital stay and a complication rate of 15-20%. “fast track” or enhanced recovery programs are developed to improve perioperative care in these patients. All elements in ERAS separately have been shown to improve patient outcome. Preoperative education about ERAS program diminishes anxiety and is associated with early return of GI motility after surgery. Colonic lavages are associated with patients discomfort and electrolyte

imbalance and can safely be avoided in elective gastro intestinal surgeries. Epidural analgesia provides better treatment of post operative pain and leads to an earlier gastrointestinal motility. Postoperative pain is best managed without opioid analgesia because of the adverse effects it has on the CNS, respiratory function and GI function. Intraoperative fluid management aiming at zero balance reduces the number of patients who experience morbidity and shortens time to recovery of GI motility and reduces hospital stay. Early post op enteral feed shows a reduction in the risk of postoperative complications, hospital stay and mortality. Bed rest after surgery is undesirable because it impairs pulmonary function and tissue oxygenation and predisposes to pulmonary complications. To avoid this early mobilizing patients as soon as possible is an important factor in improving post op care. Avoidance on intraoperative drains, NG tube, urinary catheter , early enteral feedings all these have shown their own benefits, which are usually not done in conventional postoperative care, In this study we are going to compare between ERAS protocol and conventional postoperative care, and to know their merits and demerits.

AIMS AND OBJECTIVES

AIM

Our aim of the study is to compare the difference between ERAS (enhanced recovery after surgery) protocol with the conventional postoperative care for the patients undergoing elective major gastrointestinal surgeries in Coimbatore medical college & hospital

OBJECTIVES

Enhanced recovery after surgery (ERAS) programs are associated with reduced mortality and morbidity

So in our study we compare these studies based on

1. Morbidity
2. Duration of hospital stay
3. Complications

And to tell which study is better for patients undergoing major gastrointestinal surgeries.

REVIEW OF LITERATURE

2.1 ERAS

ERAS or Enhanced recovery after surgery is the term used for the perioperative protocol by which patients are treated in a tertiary center. This perioperative treatment protocol is also called as ERP or “ Early recovery program “ or FTS or “Fast track surgery”. There are several key elements that make up any ERAS program and the principles of such kind of program is to modulate the surgical stress response so that the patients can recover faster and also reducing post operative complications.(1)

2. 2 ERAS PRINCIPLES

Conventional or traditional post operative care stresses on prolonged bed rest for the patient and also bowel rest for the gastrointestinal tract with acceptance of surgical stress response._The ERAS protocol aims to eliminate the surgical stress response by applying optimal perioperative anesthetic, analgesic and metabolic support. The main aim is to maintain the patients preoperative state and imply enhanced recovery and return of normal functions. This enables the patient to recover from major abdominal surgery faster, and also avoiding post operative complications and reducing health care costs by reducing the period of hospital stay.(1)

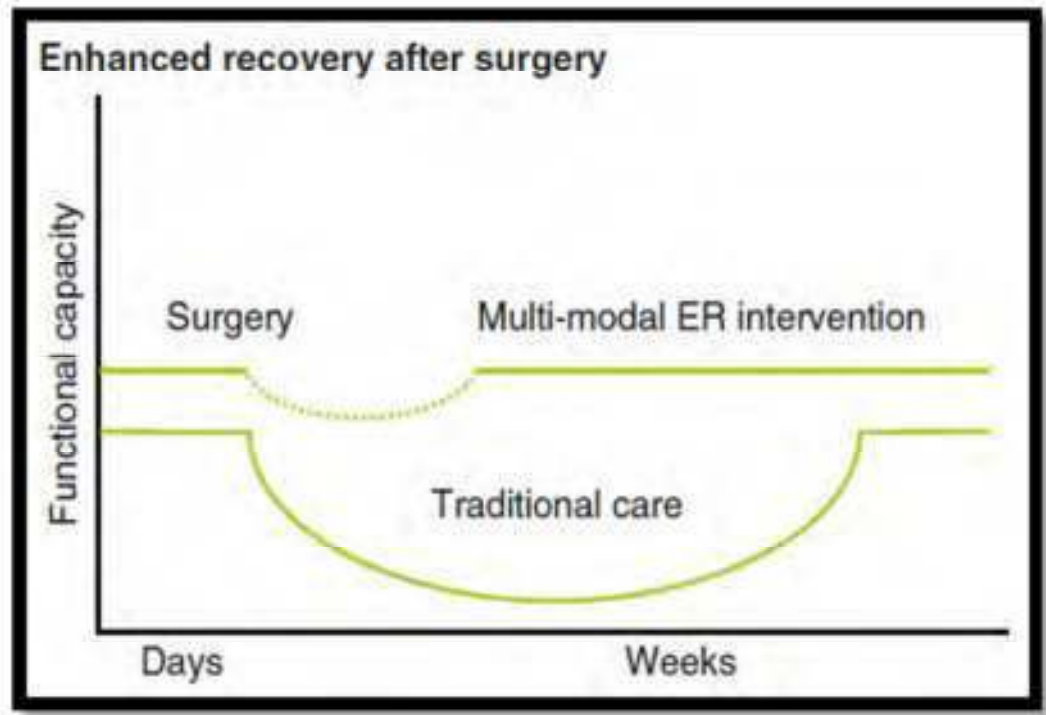


Fig 1- Conventional or traditional postoperative care results in patient being exposed to metabolic /nutritional debilitation which results in prolonged recovery interval. A multimodal ERAS prevents these declines & allows the patient to recover fast⁽²⁾

2.3.MAIN ELEMENTS OF ERAS

There are several elements which make up any ERP. These elements are diverse and variable and include a multidisciplinary team approach to patient care.

Key elements include: preadmission information and counseling, selective bowel preparation, carbohydrate loading & avoidance of preoperative fasting, avoidance of pre-anesthetic medications, avoidance of nasogastric tubes, thoracic epidural anesthesia, short acting anesthetic agents, avoidance of

sodium and fluid overload, short incisions, maintenance of normo-thermia intra-operatively, standard early mobilization, non opioid analgesia and NSAIDS, prevention of postoperative nausea and vomiting, stimulation of early gut mobility with early enteral nutrition, early removal of catheters and drains, perioperative oral nutrition and audit of compliance and outcomes.⁽¹⁾

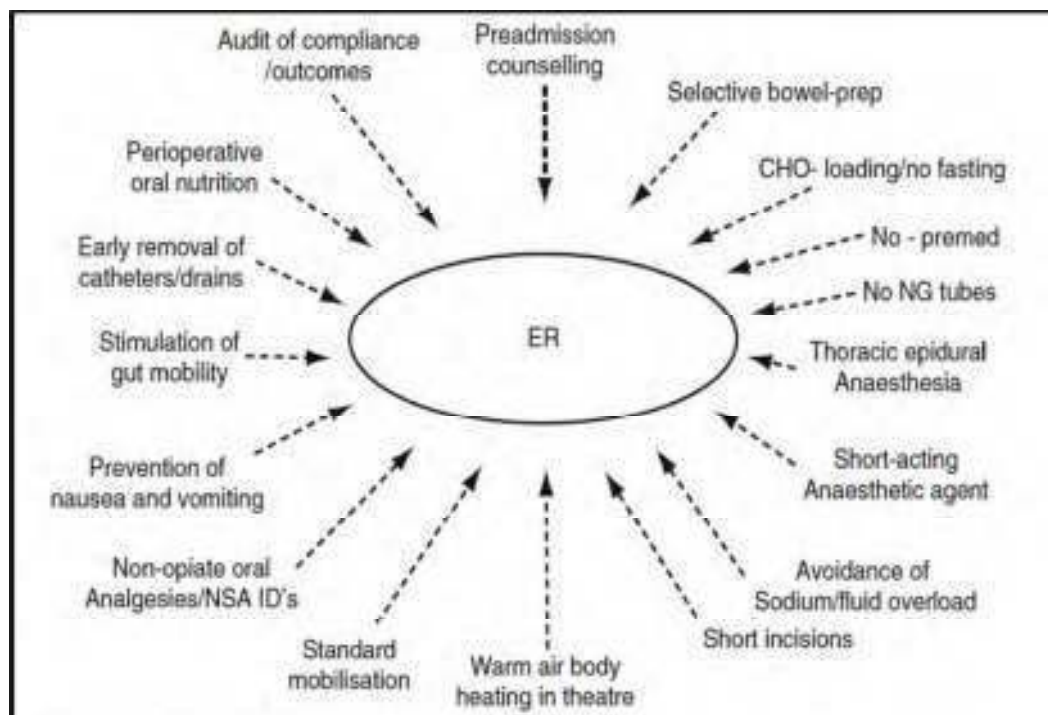


Fig 2- Elements of Enhanced recovery protocol.(1)

Not all ERP includes all of the above elements,

It is the combination of the elements rather than any 1 specific element that is important when developing and establishing any ERP. Here in Coimbatore medical college hospital, ERP has been adjusted for elective gastrointestinal surgeries according to patients compliance and also regarding cost effective factor. The ideal multidisciplinary team which is required to run

a good ERAS program include: ERAS trained nurses, dieticians, physiotherapists, occupational therapists, pain team, theatre staff, an anesthetists surgeons, hospital management and the audit team

2.4. ERAS SOCIETY

The ERAS society was actually established in 2001 as a collaborative of 5 university or specialized departments of surgery from 5 northern European countries . They have since produced a comprehensive and guidelines for the perioperative management of patients undergoing colorectal resection, pancreaticoduodenectomy, gastrectomy and cystectomy .⁽¹⁾

2.5 HISTORY OF ERAS/ERP

PIONEERS IN THE MODERN SURGICAL EVOLUTION



Claude Bernard from France



Walter cannon from USA

They developed the concept of “ MILIEU INTERIERUR” meaning internal environment, and they described the major complex homeostatic

responses involving the brain, heart, lungs, nerves, renal, spleen that works to maintain the body constantly.



SIR DAVID CUTHBERTSON(UK)

He followed the metabolic response to injury and proposed the Ebb and flow model.

Doughlas Wilmore and Francis moore- they were mainly responsible for the response of injury in humans and the methods of optimal nutritional and metabolic support.



HENRIK KEHLET

Henrik Kehlet- he began to investigate main reason for prolonged hospital stay for major gastrointestinal mainly colorectal surgeries- at that time the average length of hospital stay after colorectal and other major abdominal surgeries was still 10-15 days. then he came into the results that the key elements which keep the patients after uncomplicated abdominal surgeries were

1. Prolonged bed rest- due to lack of mobility
2. Prolonged parenteral analgesia – due to persistent pain
3. Prolonged intravenous fluid due to persistent gut dysfunction.

Along with any postoperative complications which will again prolong the duration of hospital stay. So based on these discoveries Kehlet developed a clinical pathway to speed up the recovery after major gastrointestinal /colonic resection based on a “multimodal program with optimal pain relief, stress reduction with regional anesthesia, early nutrition and early mobilization. By doing this he demonstrated the improvements in physical performance , body composition, lung function and decreased duration of hospital stay. In 1997, Professor H Kehlet published a paper on the multimodal approach to control postoperative pathophysiology and rehabilitation. This became a seminal paper in the field of fast track surgery and set the stage for what is now a well-established and widely practiced clinical approach to the perioperative care of patients. He highlighted the fact that if you were to exclude surgical and anesthetic technical failures, the key factor causing postoperative morbidity is

the body's natural defense mechanism, the surgical stress response; that places an increased demand on organ function .⁽¹⁾

According to this many different group have published their own “ fast – track” or “Enhanced recovery programs” and achieved similar outcomes relating to decreased hospital stay, decreased complications.⁽¹⁾

2.6 SURGICAL STRESS

It is the result of physical injury, mechanical injury and chemical changes that body is exposed during the perioperative period . the body's response to these physiological stressors is called as surgical. This stimulates the central nervous system and activates the hypothalamus-pituitary-adrenal axis (HPA axis) and the peripheral autonomic nervous system (PANS).

Both these systems gives an integrated response, referred to as the ‘stress response’, which controls body's functions such as cardiovascular tone, respiration, and metabolism. they also alters normal gastrointestinal activity and depresses immune/inflammatory reactions. By altering the stress response with perioperative interventions such as early aggressive resuscitation, closure of wounds and restoring normal anatomy, draining pockets of infection and early appropriate antibiotics, providing cardiovascular, respiratory, metabolic and nutritional support we can improve outcome of surgical management.

The metabolic stress response to surgery – THE EBB AND FLOW

MODEL

The natural response to any surgery or injury includes

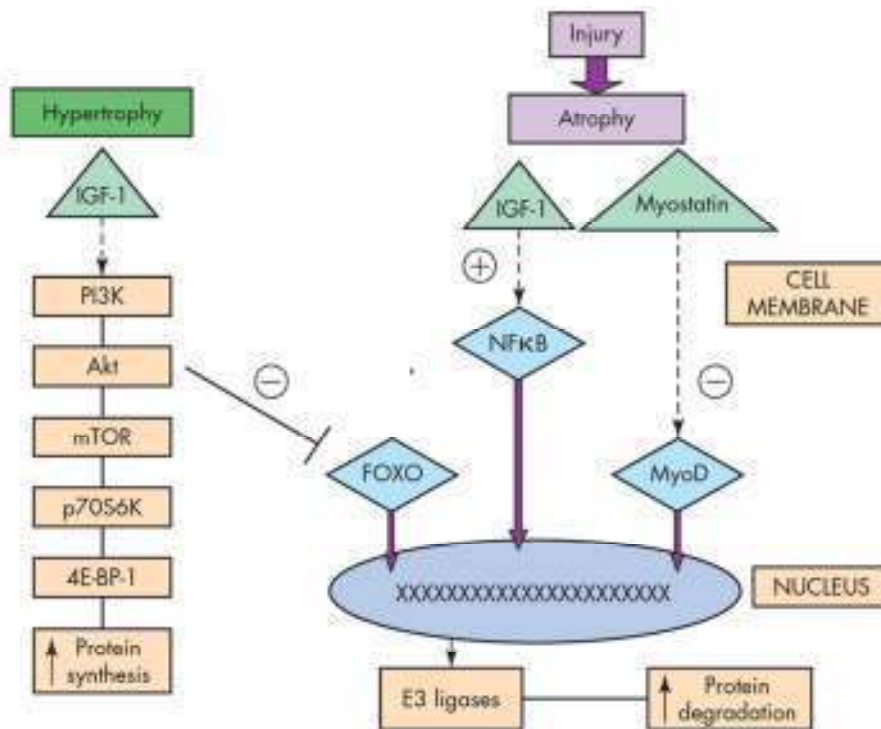
1. Immobility
2. Anorexia
3. Catabolism

In 1930, sir David Cuthbertson divided the metabolic response to injury in humans as “EBB and flow” phases.⁽²⁾

The Ebb phase begins at the time of injury and lasts approximately for 24-48 hours. It may be attenuated by proper resuscitation but cannot be abolished completely. The Ebb phase is characterized by hypovolemia, decreased BMR, decreased cardiac output, hypothermia and lactic acidosis. The major hormones that regulate ebb phase are catecholamine, cortisol and aldosterone-by activating renin angiotensin system. The magnitude of neuroendocrine system depends upon the degree of blood loss and activation of somatic afferent nerves at the site of injury. the main physiological role of ebb phase is to conserve both circulating volume and energy stores for recovery and repair.

After resuscitation, the ebb phase changes into a hypermetabolic flow phase, which corresponds to SIRS. This phase involves the mobilization of body energy stores for recovery and repair, and also replacement of lost or

damaged tissues. It is characterized by tissue edema from vasodilatation and increased capillary leakage), increased BMR increased oxygen consumption and also gluconeogenesis. This flow space maybe divided into an initial catabolic phase, lasting around 1 week followed by an anabolic phase, which may even last for week if extensive recovery and repair and required following serious injury. During catabolic phase, the increased production of counter regulatory hormones like catecholamine's, insulin and glucagon, and inflammatory cytokines like interleukins like IL-1,IL6,TNF alpha results in fat and protein mobilization, leading to significant weight loss and increased urinary nitrogen excretion. The increased amount of production of insulin at this time is associated with a significant insulin resistance, so surgery patients often exhibits poor glycemic control, so this combination of increased catabolism in association with insulin resistance which allows the patients in this phase with increased risk of complications. This complications will further aggravate the neuroendocrine and inflammatory stress response, thus creates a vicious catabolic cycle.⁽²⁾



Catabolic and anabolic signaling pathways involved in skeletal muscle homeostasis.(2)

SURGICAL STRESS & POST OPERATIVE ORGAN DYSFUNCTION

Surgery induces a surgical stress response which is directly proportional to the magnitude of the surgical insult. This stress response is complex and well-coordinated process. It consists of an endocrine-metabolic response and an inflammatory response. The endocrine-metabolic response can be profound, which results in changes with hypermetabolism and catabolism. The inflammatory response activates a humoral system which results in malaise, myalgia, hyperthermia and immunosuppression. This surgical response, which is thought to be protective, is the cause of perioperative morbidity. It causes stress on the body and makes the patients risky during the perioperative

period, especially patients with preexisting organ dysfunction and with comorbidities.⁽³⁾

Studies have provided evidence for single perioperative interventions showing improved surgical morbidity. These interventions have been combined in a multimodal perioperative rehabilitation care program to optimize surgical outcome and reduce the undesirable sequel of surgery. These programs enhance and accelerate recovery and reduce perioperative complications and overall health care costs.⁽⁴⁾

2.7 POST OPERATIVE STRESS REDUCTION

Perioperative risk factors to surgery must be identified appropriately and they should be treated in order to control perioperative physiological imbalance and reduce morbidity. Various risk factors have been identified during the preoperative, intraoperative and postoperative period.

Preoperative risk factors include: concomitant disease, malnutrition, smoking and alcohol abuse.

Intraoperative risk factors include: surgical stress, blood transfusion, heat loss.

Postoperative risk factors include: pain, immunosuppression, nausea, vomiting, hypoxemia, sleep disturbances, muscle loss, prolonged immobilization, intra-abdominal drains or intra peritoneal; drains, urinary

catheters, nasogastric tubes and development of ileus and other surgical tradition.⁽⁴⁾

Preoperative factors:

It is known fact that patients with pre-existing organ dysfunction and co-morbidities are important factors of increased perioperative risk and postoperative morbidity.

Pre-operative plans aims to reduce this risk and convert high risk surgical patients to moderate or low risk, and hence decreasing the perioperative morbidity. Smoking, alcohol a and malnutrition are also well established risk factors for adverse surgical outcome and it is during this pre-operative period that these factors can be said.

Intraoperative factors:

The magnitude of the surgical stress response is related to the magnitude of the surgical traumatic insult. This surgical stress response activates the endocrine-metabolic and inflammatory cascade which sets off a line of events that lead to increased secretion of catabolic hormones, decreased secretion of anabolic hormones, hyper metabolism occurs and increased cardiac load, decreased pulmonary function, pain, gastrointestinal side effects with nausea and vomiting and ileus, changes in coagulatory-fibrinolytic systems leading to coagulation and thrombosis, and loss of muscle tissue and immunosuppression.

Reducing the magnitude of the surgical insult can be achieved by minimally invasive surgical techniques, blocking the afferent neural stimulus by various neural block techniques such as continuous epidural analgesia, pain relief, modifying the coagulatory-thrombotic effect, pharmacologically altering the inflammatory response and limiting heat loss by using external warming devices.⁽⁴⁾

Postoperative factors:

Pain will increase the organ dysfunction and delays mobilization of the patient; immunosuppression will increase the infective complications; nausea vomiting and ileus delays recovery and early enteral nutrition thereby enhancing catabolism; hypoxemia increases risk for cardiac, cerebral and wound complications; sleep disturbances may increase postoperative hypoxemia, fatigue and stress; muscle loss and catabolism increases all-over morbidity and fatigue, which will delay in recovery; immobilization increases the risk of thromboembolism and pulmonary complications, increases fatigue, hypoxemia and muscle loss; and the unnecessary use of intra-abdominal or intra peritoneal drains, urinary catheters, nasogastric tubes surgical traditions all add to the delay in recovery.

The treatment modalities are thus aimed to decrease postoperative pain through effective multimodal analgesia; reducing stress by immunomodulation and avoiding unnecessary blood transfusion; avoiding postoperative nausea and vomiting by opioid sparing analgesia, use of neural

blockade and pre-emptive treatment; oxygen administration; avoidance of sleep disturbances and stress reduction; early oral nutrition, active rehabilitation and avoidance of unnecessary use of drains, catheters, and drainage tubes.

In 2011, after 15 years later, Kehlet reviewed his original work on postoperative physiology and rehabilitation. By this time enhanced recovery programs had attained good amount of interest and acceptance. many of the principles of enhanced recovery programs were being employed in surgical disciplines including colorectal surgeries , orthopedic surgery , vascular surgery, urology and gynecological surgeries. . The combination of uni-modal evidence-based practices into a multimodal system has changed surgical practice. Aspects such as preoperative assessment, nutrition, use of tubes, drains, catheters, mechanical bowel preparation and temperature control, are all well established and evidence based principles that have shifted perioperative surgical management away from traditional surgical management to evidence based practice.⁽⁵⁾

The elements mentioned are usually practiced individually and it is Kehlet who pioneered the integration of these individual aspects of postoperative care into a multimodal package. Despite the evidence supporting these elements of postoperative care, they challenge surgical dogma and as such implementation has been slow .⁽⁵⁾

In conclusion, Kehlet poses the following statements, “ *The ultimate goal of fast track surgery is to achieve a pain and risk free operation, one needs to constantly ask the questions of why the patient is still in hospital and why the high risk patient is still high risk?* ⁽⁵⁾,”

Finally, he comments that fast track surgery has led to major improvements in the quality of care as well as socioeconomic benefits due to enhanced recovery with reduced need for hospitalization, medical morbidity and convalescence .

Though ERAS is mainly used for colorectal surgeries, here in our study we are going to compare the efficacy between fast track surgery and conventional post operative care in gastrointestinal including colorectal surgeries in a tertiary care setup.

2.8 FAST TRACK SURGERIES IN OTHER SPECIALITIES

Enhanced recovery programs have been Implemented in high-risk surgery such as radical cystectomy, lung lobectomy and infra-renal aortic surgery. The implementation of such programs in these varieties of surgical domains such as urology, thoracic and vascular surgery affirms that their benefits are reproducible outside colorectal surgeries. So these supports the fact that enhanced recovery programs can also be used in other gastrointestinal surgeries apart from colorectal surgery.

Examples such as

1. Tovar et al ⁽⁶⁾ One-day admission for lung lobectomy: an incidental result of a clinical pathway.

They evaluated the clinical impact of an enhanced recovery pathway for lung lobectomy. Their study included 10 consecutive elective major lung resections. They concluded that a clinical pathway based on patient education, meticulous minimally invasive operation, analgesia, and early mobilization, was associated with rapid recovery of preoperative status which allowed for a 1-day hospital stay after major lung resection ⁽⁶⁾. This study provides evidence for the role of an enhanced recovery perioperative care pathway in major thoracic surgery.

1. Podore et al ⁽⁷⁾ reported with a clinical pathway for elective infra-renal aortic surgery. His clinical pathway focused on early feeding, early mobilization, and selective ICU utilization. He reviewed 50 consecutive patients that underwent infra-renal aortic surgery and concluded That the ability to ambulate independently and to tolerate a diet were related to early discharge. His study showed that a clinical pathway can allow safe and early discharge from hospital after major vascular surgery and also reduce the cost of hospitalization ⁽⁷⁾.

3. Nicholson et al ⁽⁸⁾ conducted a systematic review and meta-analysis of enhanced recovery programs in surgical patients across different specialities. Their aim was to investigate whether the effect of ERP's on patient outcomes varies across surgical specialties or with the design of individual programs. They evaluate quasi-randomized trials comparing ERP's with standard care in adult elective surgical patients. 38 trials with 5099 participants were included in the review. Their study included various specialties including upper GI, thoracic, vascular, orthopedic, genito-urinary and pelvic surgery. They also included open vs laparoscopic surgery. The results of their review showed that ERP's reduce the length of stay and reduce the risk of all complications within 30 days. There was no evidence of a reduction in mortality, major complications or readmission rates. They concluded that the impact of ERP's in reducing length of hospital stay and overall complication rates was similar across all specialties. There was no consistent evidence to identify individual components included within the ERP's that affected patient outcomes ⁽⁸⁾.

This systematic review and meta-analysis once again supports that ERAS can not only be applied in colorectal surgeries but also in other major gastrointestinal surgeries.

2.9 COST RELATED FACTORS

Cost related Factors evaluated include the influence on clinical outcome, quality of life after surgery, cost-effectiveness of implementation, optimization of resource utilization and overall costs.

King, et al. ⁽⁹⁾ examined the influence of an enhanced recovery program on clinical outcomes, costs and quality of life after surgery for colorectal cancer. They compared a prospective group of patients undergoing colorectal surgery within an enhanced recovery program, with a historical cohort receiving conventional care. Their study included 146 patients, 60 within the enhanced recovery program and 86 within the conventional care arm. Both groups were comparable in terms of baseline clinical data. They found that postoperative hospital stay was significantly shorter in the enhanced recovery program arm, with patients staying 49% as long as those in the conventional care arm. ($P < 0.001$). In their study there was no differences in the number of complications, readmissions or re-operations. They also found no significant difference in health economic outcome ⁽⁹⁾. They concluded that patients that were managed according to a standard multimodal program stay in hospital half as long as those that receive conventional perioperative care, with no increased morbidity or increased cost.

Hence this study supports that ERAS programs are superior to conventional care in terms of duration of patients stay in hospital, without any adverse perioperative outcomes and without increase in the cost of care.

From this meta-analysis it was evident that patient management as per an enhanced recovery program, standardizes the health care process and this achieves a reproducible improvement in the quality of care. Structured care can fasten up the recovery and safely reduce hospital length of stay, with optimal utilization of health care resources. This supports the consensus that enhanced recovery programs should be used in all major gastrointestinal procedures . Duration of hospital stay, perioperative morbidity and complication rate, and re-admission and reoperation rate are key determinants of cost. Thus, by improving patient outcome with early discharge and reduced morbidity we are able to save a significant share of our limited health budget .⁽⁹⁾

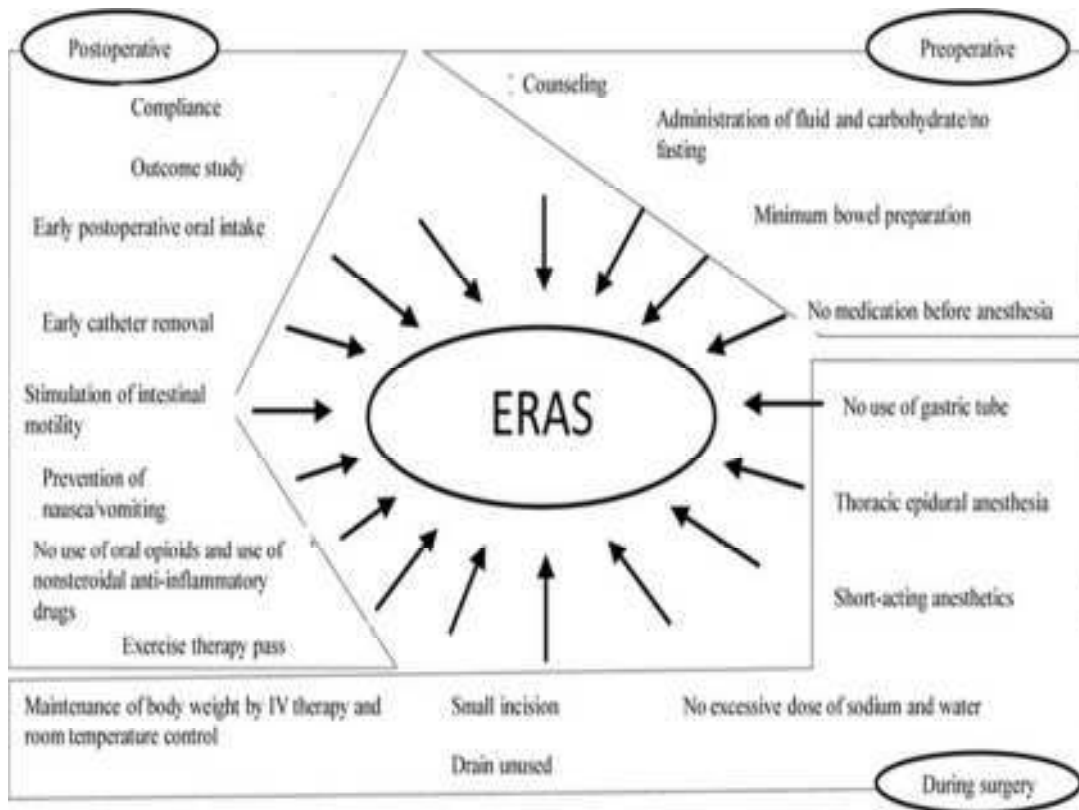
2.10 PATIENT FACTOR

Gastrointestinal surgeries are associated with postoperative complications which include pain, nausea, vomiting, gastrointestinal dysfunction and paralytic ileus, reduced cardio-pulmonary function and loss of muscle mass and , all of these may contribute to postoperative morbidity and need for increased duration of hospital stay. ERAS aims to decrease the postoperative complication and also preserving preoperative physiology.

Early active mobilization is associated with positive outcomes including improved pulmonary function , and less reduction of lean body mass and work

performance. This early aggressive mobilization requires an optimized pain relief program along with appropriate patient education . The benefits of early mobilization are associated with the reduced duration of postoperative ileus, less patient discomfort and pain through better pain control programs and early nutrition Improved pulmonary function leads to reduced pulmonary morbidity. Analgesia and early mobilization are further means of improving pulmonary function. The improved pulmonary function leads to improved oxygen saturation, this has important secondary implications by reducing postoperative cardiac morbidity, cerebral dysfunction and wound complications through a more favorable supply-demand balance . Preservation of body composition is vital in order to reduce postoperative morbidity. Even short periods of immobilization lead to muscle atrophy and loss of lean body mass. Early oral nutrition with protein drinks and early mobilization will preserve lean body mass and maintain work performance. This is particularly important for patients undergoing major abdominal surgery .

The physiological response to exercise decreases after operation, but this can be maintained through a multimodal perioperative care program. Patients who undergo multimodal rehabilitation with early oral nutrition and early mobilization are home sooner with a greater degree of independence and early mobilization and therefore preserved physical performance. Another feature of multimodal rehabilitation is the reduction in postoperative ileus. Early mobilization and early oral nutrition contribute to this outcome. Early aggressive postoperative rehabilitation is superior to conventional care ⁽⁷⁾.



ERAS PROTOCOL

2.11 ERAS PROTOCOL KEY ELEMENTS

1. preadmission counselling⁽¹⁰⁾

Evidence proves that if patients are counseled properly preoperatively, about the surgery and the postoperative period with clear explanation of expectations during their hospital stay, postoperative recovery is enhanced and improved.. Patients and patient attenders should be given clear explanations of their role during the recovery period, with particular tasks and targets for postoperative period like food intake, oral nutritional supplementation and mobilization.

Kiecolt-Glaser et al ⁽¹¹⁾ showed that preoperative information can facilitate postoperative recovery and pain control, particularly in patients who exhibit denial and anxiety.

Halaszynski et al ⁽¹²⁾ and Forster et al ⁽¹³⁾ showed that a clear explanation of patient expectations during hospitalization facilitates adherence to the care pathway and allows early recovery and discharge.

So ERAS protocol recommends oral and written preadmission consent telling what will happen during hospitalization, and what is their role is in the recovery process.

2. Preoperative bowel preparation.⁽¹⁰⁾

Mechanical bowel preparation can lead to fluid and electrolyte abnormalities and dehydration, and is not shown to reduce the risk of anastomotic leak. It is thus not recommended as part of an enhanced recovery program.

Jung et al ⁽¹⁴⁾ and Contant et al ⁽¹⁵⁾ they showed no benefit with preoperative bowel preparation in elective colonic resection.

Mainly In colonic surgery , data suggests that bowel preparation is stressful and prolongs postoperative ileus.

Bucher et al ⁽¹⁶⁾ and Ram et al ⁽¹⁷⁾ showed that bowel preparation may actually increase the risk of anastomotic leak.

ERAS protocol thus recommend that patients undergoing elective colonic resection above the peritoneal reflection shouldn't receive routine oral bowel preparation, however those planned for low rectal resection with a diverting stoma may be considered for bowel preparation.



Solutions used in Mechanical Bowel Preparation

3. Pre operative fasting and preoperative carbohydrate loading

Preoperative fasting from midnight before surgery had been a standard protocol to avoid pulmonary aspiration in elective surgery.

RCTs showed that by minimizing the preoperative fasting period to 2 hours for clear fluids does not increase complications of pulmonary aspiration.

The national anesthesia society now recommends the intake of clear fluids until 2 hours before anesthesia and solid food for up to 6 hours before induction. Common misconceptions is present for obese and morbid obese patients, and it suggests that gastric emptying characteristics are similar to lean patients. Diabetic patients are the excluded, as patients with neuropathy may have delayed gastric emptying.

Feeding patients preoperatively minimizes preoperative thirst and hunger, decreases anxiety and decreases postoperative insulin resistance. This can be achieved by providing patients with a clear carbohydrate drink before midnight and 2 to 3 hours before surgery.

By giving preoperative nutrition the patients, preoperative anabolic state is maintained and this reduces postoperative protein loss and maintains lean body mass and muscle strength. Evidence tells that avoidance of preoperative starvation and giving preoperative carbohydrate loading facilitate accelerated recovery and a shorter length of hospital stay^(19,20).

4. Pre anesthetic medication⁽¹⁰⁾

A Cochrane review suggested that long-acting premedication such as opioids, long-acting sedatives and hypnotics has a negative impact on recovery by altering the patient's ability to take oral foods and mobilize after surgery. So it ultimately prolongs length of hospital stay⁽²¹⁾.

ERAS protocol avoids such agents, but do allow for the use of short-acting medications given to facilitate the insertion of epidural catheters.⁽²²⁾

5. Thrombo embolic prophylaxis⁽¹⁰⁾

Subcutaneous low-dose unfractionated heparin has been shown to be effective in reducing deep vein thrombosis, pulmonary embolism and mortality^(23,24,25,26). Meta-analyses comparing unfractionated heparin with low-molecular weight heparin showed no difference in efficacy or associated bleeding risk.

The present recommendation therefore supports the use of low-molecular weight heparin because of its OD regimen and lower risk of heparin-induced thrombocytopenia.

Regarding the continuous use of low-molecular weight heparin and epidural analgesia is still under debate. The recommendation is for prophylactic doses of LMWH not to be given within 12 hours of insertion or removal of the epidural catheter.

Level of Risk	DVT Risk (%) in the Absence of Prophylaxis	Suggested Pharmacological Options
Low Risk <ul style="list-style-type: none"> • Minor surgery in mobile patients • Medical patients who are fully mobile 	< 10	No specific prophylaxis Early and aggressive ambulation
Moderate Risk <ul style="list-style-type: none"> • General, open, gynecologic, or urological surgery • Medical patients, bed rest or sick • Moderate VTE risk + high bleeding risk 	10-40	LMWH, LDUH bid or tid, fondaparinux
High Risk <ul style="list-style-type: none"> • Hip/Knee arthroplasty, HFS • Major trauma 	40-80	LMWH, fondaparinux, VKAs (INR: 2-3)

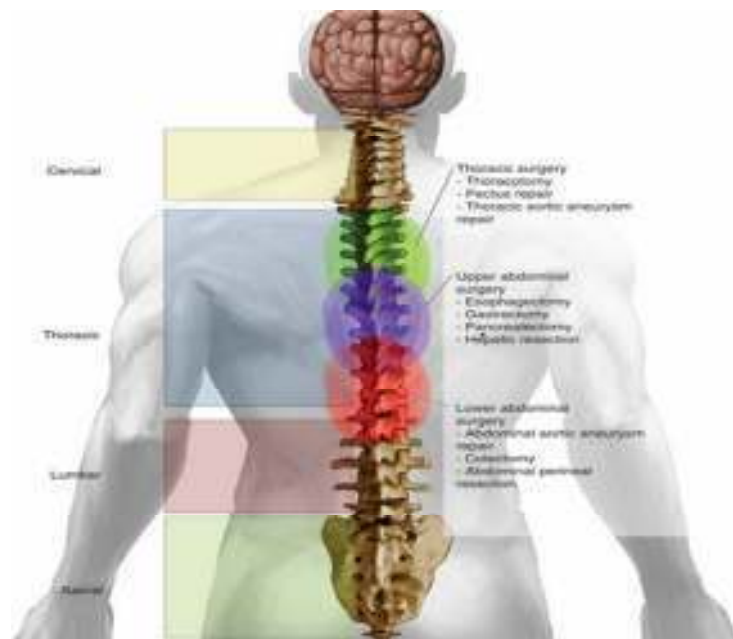
DVT, deep vein thrombosis; LMWH, low molecular weight heparin; LDUH, low-dose unfractionated heparin; VTE, venous thromboembolism; HFS, hip fracture surgery; VKAs, vitamin K antagonists; INR, international normalized ratio.

6. Antimicrobial prophylaxis⁽¹⁰⁾

The use of prophylactic antibiotics effective against both aerobes and anaerobes can minimize infection and other complications. A second-generation cephalosporins and metronidazole is recommended and the first dose should be given at induction about 1 hour prior to the skin incision with further doses given in prolonged cases more than 3 hours^(26,27)

7. Standardized anesthesia protocol⁽¹⁰⁾

There is currently no evidence to direct the choice of the optimal anesthetic method. However, long acting opioids could be avoided, and patients should receive a mid-thoracic epidural preoperatively containing a combination of local anesthetic and low-dose opioid.



8. Prevention and treatment of postoperative nausea and vomiting.⁽¹⁰⁾

Patient experience suggests that postoperative nausea and vomiting can be more stressful than pain. Risk factors for postoperative nausea and vomiting include being female, a non-smoker, history of motion sickness and postoperative administration of opioids. Individuals deemed at moderate to high risk, having 2 or more risk factors, should receive prophylaxis. The agents used depend on availability, but should be administered at the beginning and prior to the end of surgery.

9. Surgical Incisions⁽¹⁰⁾

Some RCTs suggest that transverse or curved incisions cause less pain and pulmonary dysfunction than vertical incisions following abdominal procedures, while others have found no advantage of transverse incisions. A Cochrane review of RCTs comparing midline with transverse incisions for abdominal surgery confirms that although analgesic use and pulmonary compromise may be reduced with transverse or oblique incisions, complication rates and recovery times are the same as with midline incisions. However, the length of the incision affects patient recovery. Overall, choice of incision remains the preference of the surgeon.

10. Nasogastric tube⁽¹⁰⁾

A meta-analysis showed that avoidance of nasogastric tubes in colorectal surgery is associated with good outcomes as they decrease the risk of postoperative complications such as fever, atelectasis and pneumonia, consolidation and increase and improve the return of normal bowel function . This was supported by a Cochrane review of more than 33 trials ⁽²⁸⁾. Nasogastric tubes should thus be avoided and if placed should be removed before reversal of anesthesia.

11. Prevention of Intraoperative hypothermia (10)

Randomized Control Trials have shown that by preserving and maintaining normothermia intra operatively , postoperative complications such as wound infections, cardiac complications, bleeding from wound and blood transfusion requirements can be decreased . This can be achieved with the use of upper-body forced-air heating covers.

12. Perioperative fluid management ⁽¹⁰⁾:

Traditional perioperative fluid regimens can lead to significant positive fluid balance in excess of 5 liters, leading to a three - to six -kg weight gain. This will lead to delay in return of normal gastrointestinal function, impaired wound healing and anastomotic site healing, and affect tissue oxygenation, leading to prolonged hospitalization. Evidence suggests that decreasing postoperative intravenous fluid administration and maintaining a neutral fluid balance, guided by body weight may significantly reduce postoperative complications and reduce hospital length of stay. The best way to achieve this is to limit intravenous fluid administration, and initiate early oral fluid intake, which should be feasible from day 1 postoperatively.

13. Drainage of peritoneal cavity following gastrointestinal resection and anastomosis ⁽¹⁰⁾

Meta-analysis have demonstrated that the use of drains after colonic surgery does not reduce the incidence or severity of anastamotic leaks or other complications (29,30). To unnecessary use of drains will promote immobilization, and will prolong duration of hospital stay, so ERAS protocol does not allow unnecessary use to intraabdominal drains.



Small laparotomy incision with no placement of drain



Pateint with large laparotomy incision with intraabdominal drain- which may delay postoperative recovery.

14. Urinary drainage ⁽¹⁰⁾

Meta-analysis suggests that supra-pubic catheters are better tolerated by patients with reduced morbidity compared to trans-urethral catheters ⁽³¹⁾. The overall advantage of prolonged catheterization seems to benefit patients

undergoing pelvic surgery with prolonged catheterization times. But early removal of urinary catheter will motivate the patient to mobilize and there by will decrease the risk of urinary tract infection too.

15. Prevention of postoperative ileus ⁽¹⁰⁾

Preventing postoperative ileus is a key objective of all ERAS protocol since it delays initiation of full ward diet and thus prolongs overall length of hospital stay. Analgesic protocols such as epidural analgesia as opposed to intravenous opioid analgesia has been advocated as highly efficient in reducing postoperative ileus. Intravenous fluid restriction is also important in this regard as patient wont take oral foods.

16. Postoperative analgesia ⁽¹⁰⁾

Evidence suggests that epidural analgesia provides better postoperative analgesia with added beneficiary effects on the surgical stress response compared to intravenous opioid analgesia. After removal of the epidural catheter, postoperative analgesia is best achieved with a combination multi-modal approach, using oral or intravenous paracetamol, non-steroidal anti-inflammatory drugs, and limiting intravenous opioids.

17. Postoperative nutritional care ⁽¹⁰⁾

RCTs of early enteral or oral feeding vs 'nil per oral' have shown that there is no advantage of prolonged fasting of patients after major gastrointestinal resection (29,30,31). Early feeding will reduce both the risk of infection and the length of hospital stay and was not associated also with an increased risk of anastomotic dehiscence. In ERAS oral nutritional supplementation have been used successfully during the perioperative period to achieve the recommended intake of energy and protein.

18. Early mobilization⁽¹⁰⁾

Evidence say that bed rest not only will increases insulin resistance and muscle loss, but also decreases muscle strength, pulmonary function, and tissue oxygenation . This will increase risk of thromboembolism.

Effective pain relief which is a key objective in ERAS aims to facilitate and encourage early mobilization. ⁽³²⁾ . Early removal of abdominal drains and urinary catheters and nasogastric tube will also facilitate and motivate early mobilization. A prescheduled care plan should be provided which states the daily goals for mobilization. The aim is to get the patient out of bed for 2 hours in the day of surgery and for 6 hours per day until discharge.

19. Audit (10)

Proper Systematic review and audit is important to determine clinical outcome and to establish the successful implementation and launch of the ERAS protocol.

2.12 VALIDATION OF ERAS

Major abdominal surgery including gastrointestinal surgeries they results in major physiological and surgical stress, which is followed usually by prolonged period of recovery. ERAS aim to decrease this period of surgical stress and enhance recovery. Since the introduction of ERAS many studies have provided evidence of the benefits associated with ERAS, most importantly the decreased length of hospital stay without an increase in postoperative complications.

Length of hospital stay has thus been used as a surrogate for recovery. However, postoperative recovery is more than just a shortened length of hospital stay and it begins at the time of surgery and is only complete when the patients returns/recovers to their baseline. Recovery is a complex process that depends on objective physiological variables and patient-related variables such as symptoms, emotions, social an economic function, health perception and overall quality of life.

At present, most studies evaluating the benefits of ERAS have focused on hospital length of stay. But it seems that length of stay alone is not a true

reflection of postoperative recovery. The challenge is thus how best to assess the benefit of ERAS, not only related to length of hospital stay and also about the post operative complications and the quality of life led by the patient after the surgery.

Length of stay is thus based on time to discharge. Protocols rely on certain criteria for discharge , such as

1. Ability to tolerate oral intake,
2. Pain controlled with oral analgesia,
3. Return of bowel function - patient passing stools and flatus
4. Ability to mobilize independently.

Once patients reach these postoperative goals they are deemed recovered and fit for discharge. But the actual recovery for return to baseline, may take months. It is very important that future studies evaluate patient outcomes such as resolution of pain and fatigue, and late post-discharge outcomes reflecting return to baseline.

MATERIALS AND METHODS

3.1 AIMS AND OBJECTIVE

Our aim of the study is to compare morbidity and duration of hospital stay and complications in patients receiving conventional postoperative care versus patients receiving the ERAS program

3.2 STUDY DESIGN-

Prospective cohort study

3.3 STUDY POPULATION-

Patient's undergoing elective major gastrointestinal surgeries.

3.4 DURATION OF STUDY-

Period of 1 year from January 2018 to January 2019

3.5 SAMPLE SIZE-

N=50

3.6 PLACE OF STUDY

Coimbatore medical college & hospital

3.7 STUDY APPROVAL

Prior to commencement of this study – thesis and ethical committee of Coimbatore medical college hospital had approved this thesis protocol.

3.8 SELECTION OF PATIENTS

A. SAMPLING METHOD - Random

B.INCLUSION CRITERIA

1. Patients undergoing elective gastrointestinal surgeries
2. Patients >18 years of age

C.EXCLUSION CRITERIA

- 1.<18 years are excluded from this study
2. Patients undergoing emergency surgeries
3. Patients with severe comorbidities

3.9 METHODOLOGY-

Identifying the patients satisfying the above mentioned inclusion criteria. And comparing between patients undergoing conventional post operative care versus patients undergoing ERAS protocol. Comparing the outcome on the basis of morbidity, duration of hospital stay , complications and improvement in quality of life.

A. STUDY PROCEDURE

The method of sampling was random. Total 50 people were selected for this study, in which 25 patients were given conventional postoperative care and another 25 of them received treatment according to ERAS protocol.

All these 50 patients had major gastrointestinal problems may be due to carcinoma of gastrointestinal tract , abdominal tuberculosis ,or any other tumor in gastrointestinal tract. Proper history taking, clinical examination, and investigations including baseline investigations to imaging studies were done and diagnosis was confirmed and patient was prepared for surgery.

Preadmission counseling was given to those patients undergoing ERAS protocol, no bowel preparation were given for patients undergoing ERAS protocol and also preoperative antibiotic prophylaxis was given for patients undergoing ERAS protocol.

Proper informed written consent for surgery was taken from all these 50 patients .undergoing surgery.

Sterile aseptic precautions were taken during surgery.

Preoperative factors, per operative factors, postoperative factors were considered in this study and they were compared between these 2 groups depending on the morbidity, complications and duration of hospital stay, and to sort out which study is better.in a systematic way.

B. VARIABLES STUDIED

1. Age

2. Diagnosis of the disease

3. Procedure done

4. Preoperative factors

a. Pre-admission counseling

b. Preoperative mechanical bowel preparation- patient undergoing ERAS protocol were not given / selective bowel preparation was given whereas in conventional postoperative care group mechanical bowel preparation was given

c. Preoperative antibiotic prophylaxis- was given to ERAS Group - Augmentin or Triple antibiotic combination (Penicillin, Gentamycin and Metronidazole) whereas it wasn't given to conventional postop care group

5. Intraoperative factors

a. Thoracic epidural analgesia-was given to ERAS group whereas it wasn't given to conventional postop care patients, limited intraop IV fluids used(1-2l crystalloids/colloids)/blood products

b. Prevention of hypothermia- ERAS group patients were prevented from hypothermia by using active warming air blanket whereas conventional postop care didn't receive hypothermic correction

c. Nasogastric tube and urinary catheter insertion- was done for both group patients intraoperatively.

d. Short surgical incision-was made for ERAS group patients while conventional large incisions were made for the other group patients

e. Intraoperative drain placement- drain wasn't placed for ERAS group patients whereas 2 drains were placed for conventional post op care patients calf stockings were applied at the end of surgery.

6. Post operative period

a. On the day of surgery- oral intake of fluids started within 6 hours of surgery

1. Early mobilization- ERAS group patients were mobilized within 6 hours of surgery- active chest physiotherapy whereas it wasn't done for the other group

2. Thromboprophylaxis-s/c LMWH was given for ERAS group patients whereas not given for the other group

3. Non opiate analgesia-paracetamol 1g 6th hourly and tramadol 6th hourly given, continued until discharge for ERAS group patients

b. Post operative day1-2-

1. NG tube/ foleys/drain removal- was done for ERAS group patients whereas it was retained for the other group

2. Initiation of oral fluids /solid food- was started for ERAS group patients whereas it was delayed for >4 days for the other group.

c. Post operative day 3-4

1. Patients passing flatus/feces- ERAS group, whereas conventional postop care patient did not pass flatus or stools

2. Tolerating solid food-ERAS group patients tolerated solid foods within 3-4 days of surgery , whereas solid food wasn't tolerated by the other group

7. Discharge within 4 days of surgery- ERAS group patients were discharged within 4 days as they had adequate pain control, passed flatus and stools and tolerating solid diet, ambulating independently and had a satisfactory support at home. Whereas it wasn't done for the other group since the above mentioned criteria were not fulfilled after discharge patient was given phone no. of the ward for contacting if required and followup OP appointment was given following 7 days of discharge

8. Readmission within 30 days- if there was any complications

9. Complications

10. Reason for readmission.

3.10 ETHICAL CONSIDERATIONS

All the patients and their legal guardians were given an explanation of the study and about the investigations and operative procedures and postoperative period, and about the merits, demerits, expected results, and possible complications. If he / she agreed then the case had been selected for the study. The study did not involve any additional investigations/ patient burden or any significant risk. It didn't cause any economic burden to the patient. The study was approved by the institutional review board prior to starting of data collection.

3.11 DATA ANALYSIS

Data analysis was done both manually and by using computer. Calculated data were arranged in systemic manner, presented in various table and figures and statistical analysis was made to evaluate the objectives of this study with the help of statistical package for social science(SPSS).

RESULTS

This is a prospective cohort study where 50 patients were randomly selected who underwent major gastrointestinal procedures , and they were randomly divided into 2 groups , 1 group underwent conventional postoperative care, and the other group underwent treatment according to ERAS protocol. The results were studied based on the different variables used in ERAS PROTOCOL, based on duration of hospital stay, based on complications ,and based on readmission rate and audit was done.

Table- 1 Distribution of Study Population according to gender

Gender	Eras surgery group		Conventional surgery group		Chisquare Value	Significance
	No	%	No	%		
Male	18	72	21	54	1.05	0.30
Female	7	28	4	16		

Males and females are equally distributed in both groups. The results are statistically significant

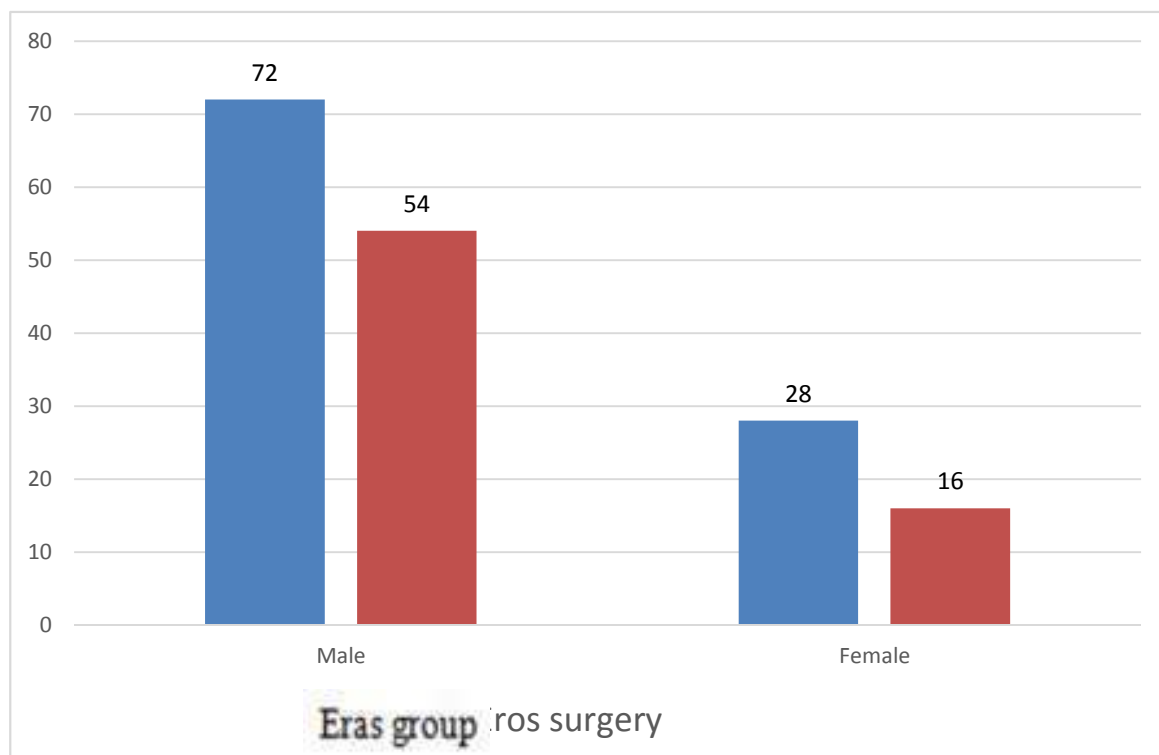


Table – 2 Distribution of Study Population according to Age group classification

Age group (years)	Eras surgery group		Conventional surgery group		Chisquare Value	Significance
	No	%	No	%		
≤ 25	3	12	1	4	3.120	0.754
26-35	1	4	3	12		
36-45	6	24	4	16		
46-55	5	20	7	28		
56-65	8	32	9	36		
> 65	2	8	1	4		

There is an equal representation in each group and the results are statistically significant

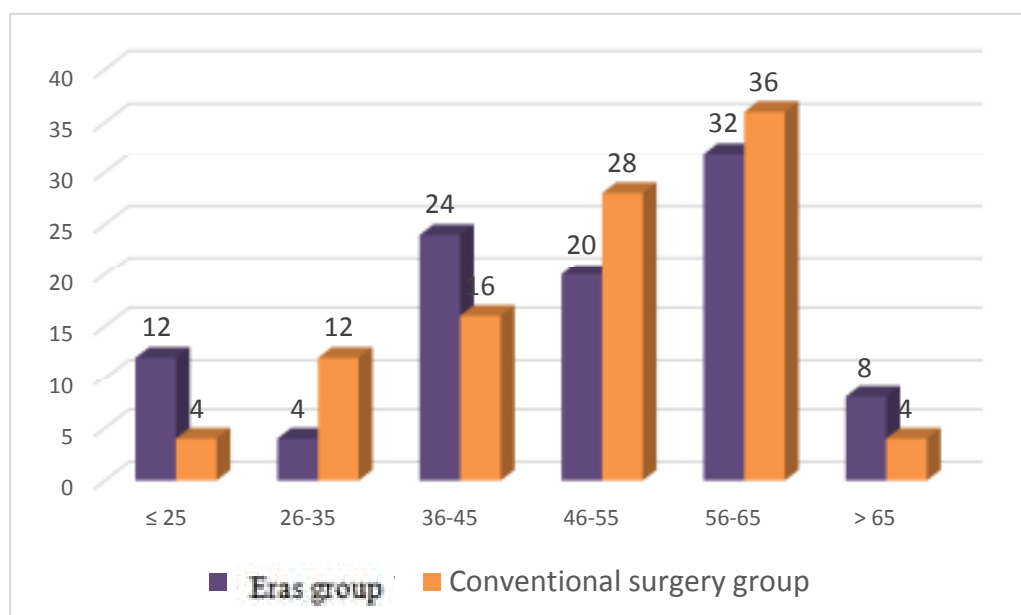


Table – 3 Distribution of Study Population according to Age

Gender	Mean age	Mean Difference	F value	Significance
Eras surgery Group	48.28	2.04	0.130	0.720
Conventional surgery group	50.32			

There is no significant difference in mean between two population

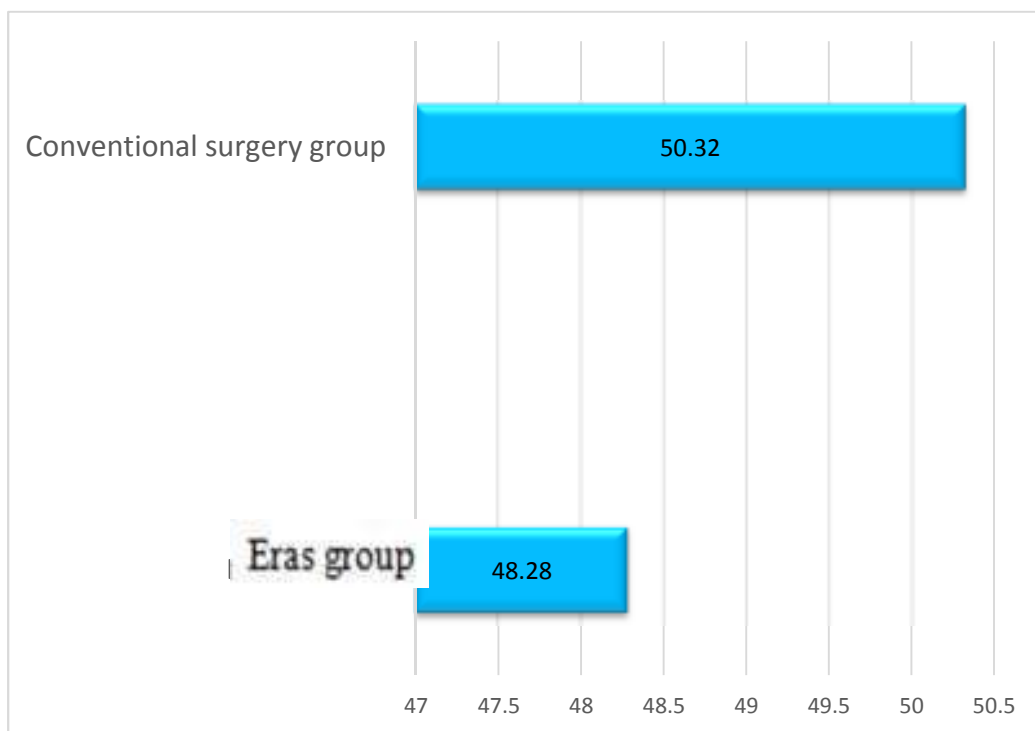


Table- 4 Distribution of Study Population according to preadmission counselling

preadmission counselling	Eras surgery group		Conventional surgery group	
	Frequency	Percentage	Frequency	Percentage
Given	25	100	0	0
Not Given	0	0	25	100

All the patients in Eras group were given preadmission counselling while all the patients in the conventional group were not given preadmission counseling

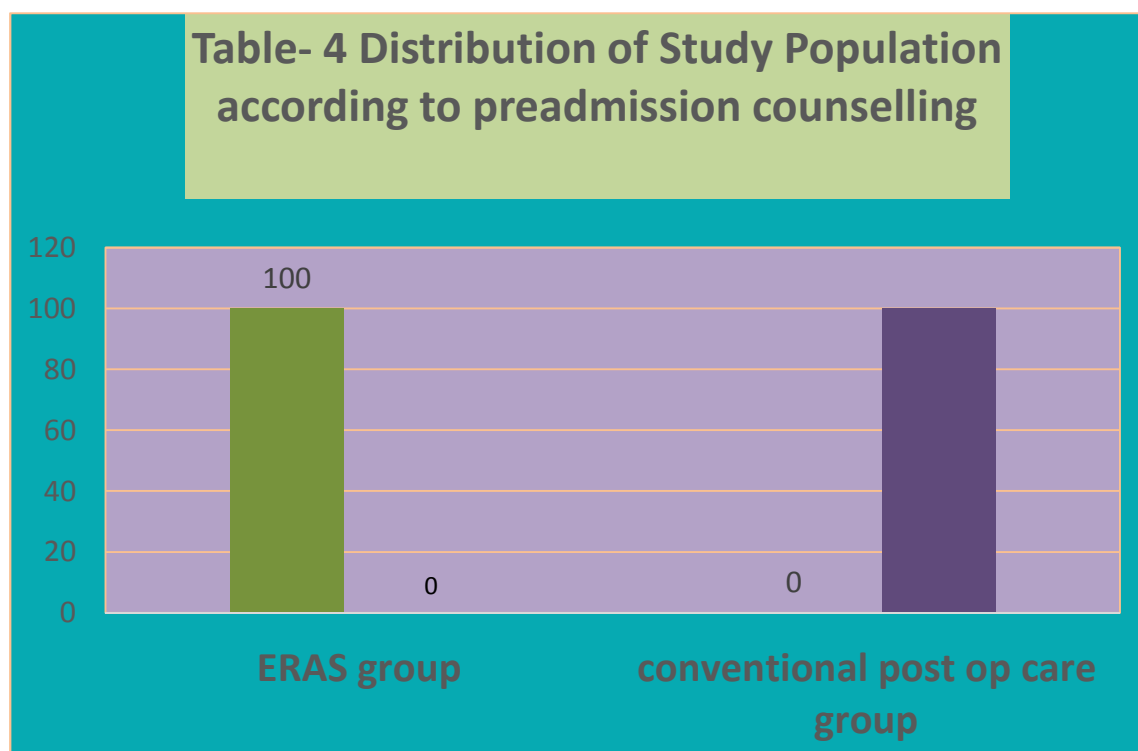


Table- 5 Distribution of Study Population according to Pre OP Bowel Preparation

Pre bowel preparation	Eras surgery group		Conventional surgery group	
	Frequency	Percentage	Frequency	Percentage
Given	1	4	22	88
Not Given	24	96	3	12

Pre bowel preparation was given to only 4% of the Eras group while 88% in the conventional group received pre bowel preparation.

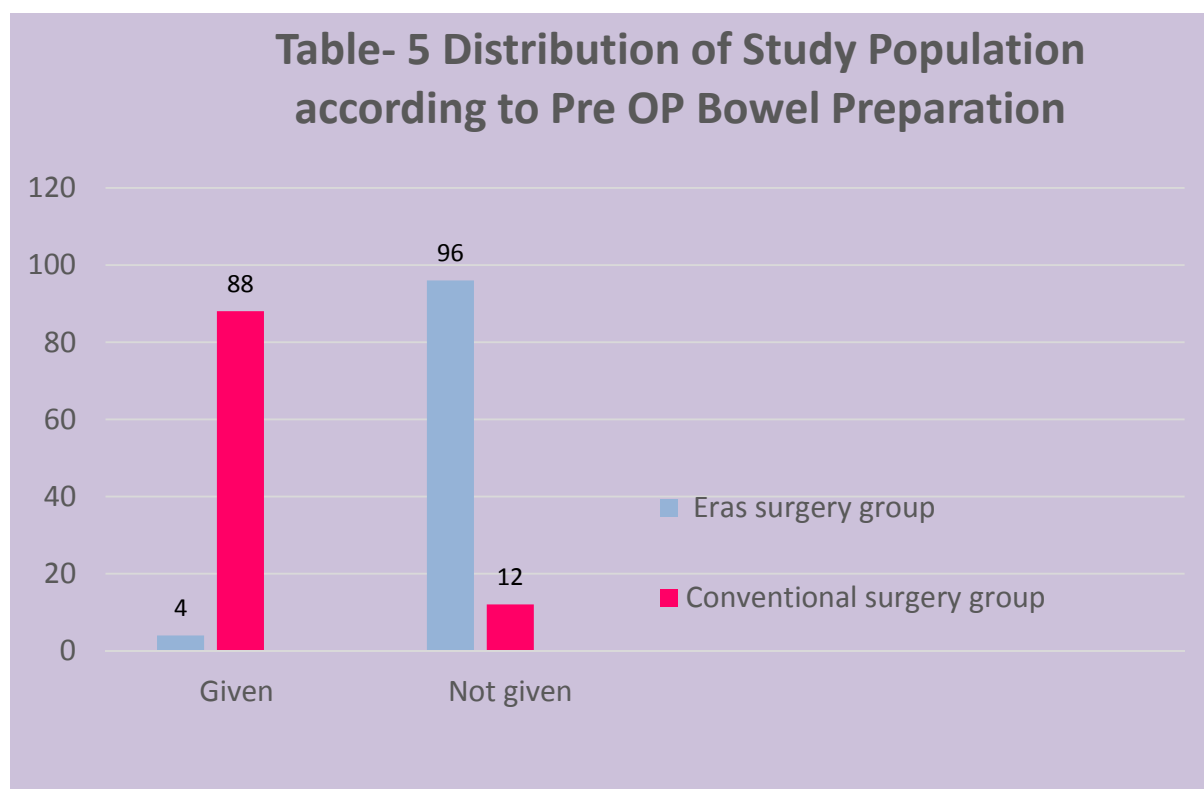


Table- 6 Distribution of Study Population according to Pre Operative antibiotics

Pre Operative antibiotics	Eras surgery Group		Conventional surgery group	
	Frequency	Percentage	Frequency	Percentage
Given	25	100	4	16
Not Given	0	0	21	84

All the patients in Eras group were given preoperative antibiotics while only 16% in conventional group got preoperative antibiotics

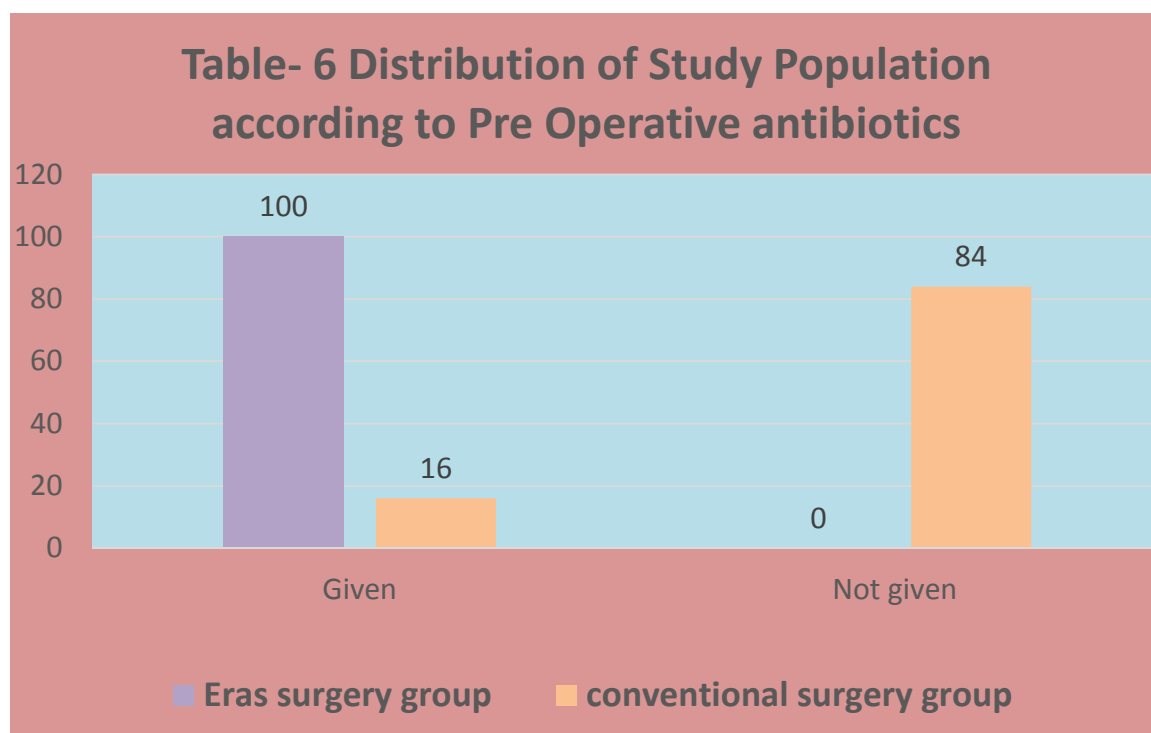


Table- 7 Distribution of Study Population according to Thoracic epidural anaesthesia

Epidural anaesthesia	Eras surgery group		Conventional surgery group	
	Frequency	Percentage	Frequency	Percentage
Given	25	100	0	0
Not Given	0	0	25	100

All the patients in Eras group were given Thoracic epidural anaesthesia while all the patients in the conventional group were not given Thoracic epidural anaesthesia.

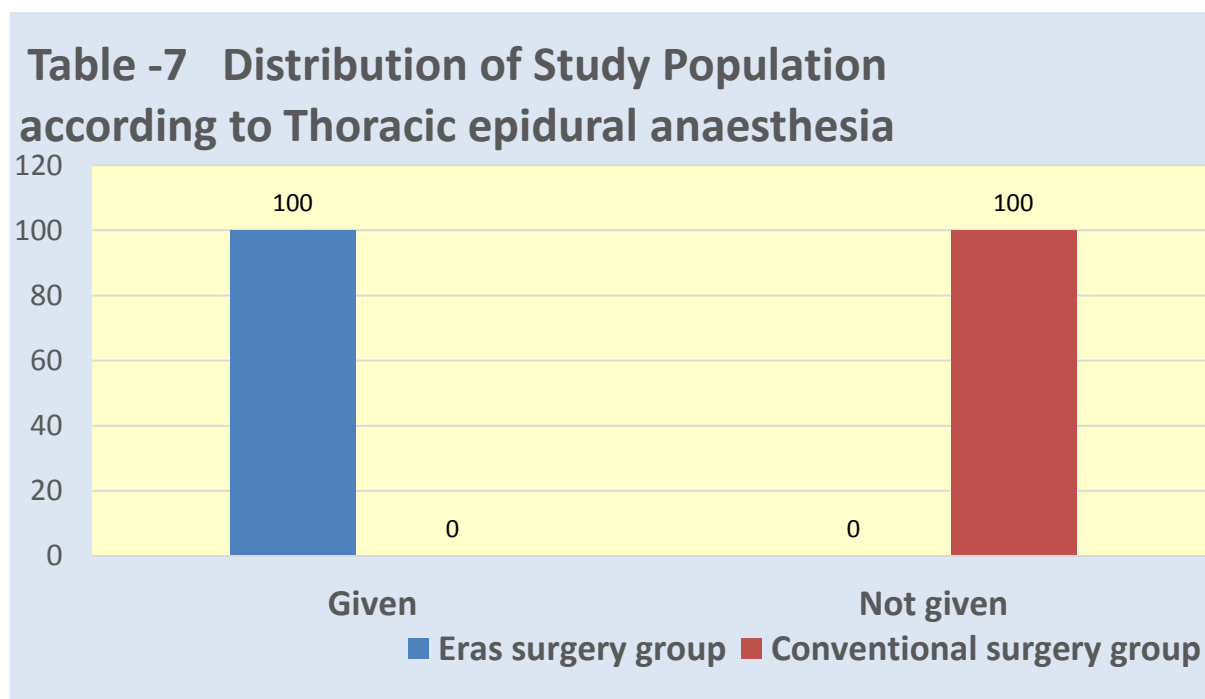


Table- 8 Distribution of Study Population according to prevention of hypothermia

Hypothermia correction	Eras surgery group		Conventional surgery group	
	Frequency	Percentage	Frequency	Percentage
Given	25	100	0	0
Not Given	0	0	25	100

Whole ERAS study group were corrected for hypothermia, while none in conventional group received hypothermia correction

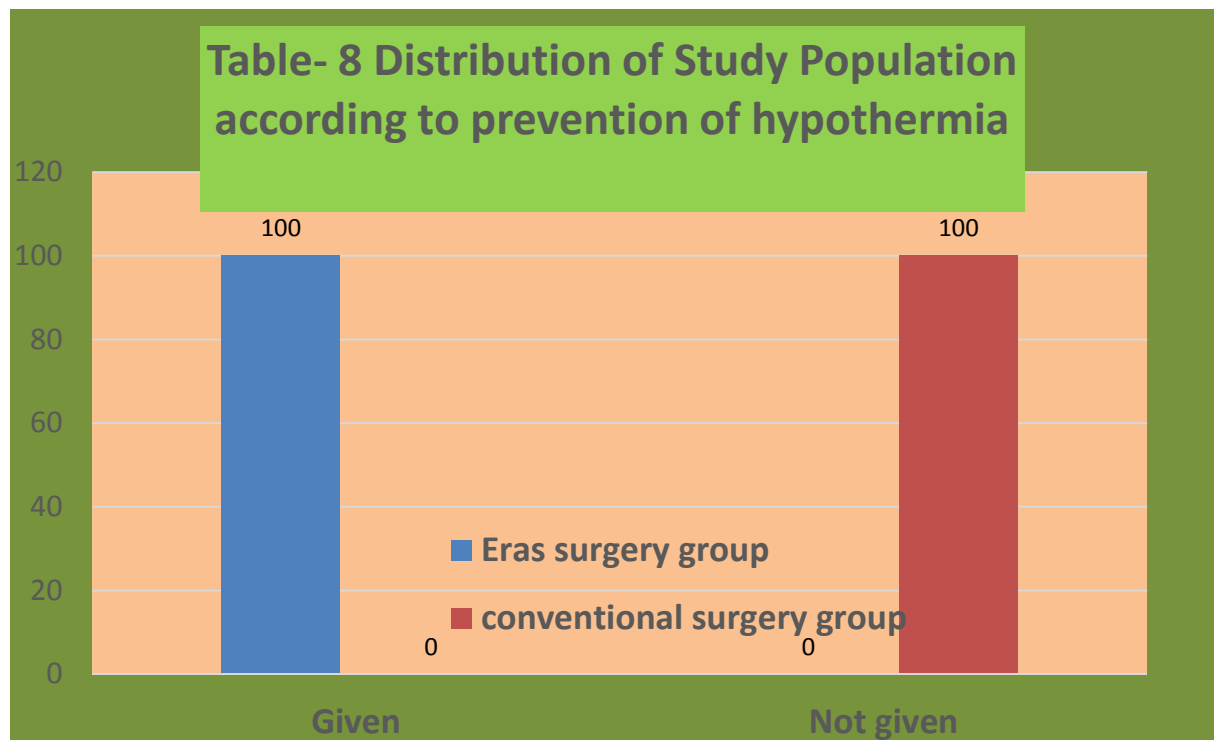


Table- 9 Distribution of Study Population according to insertion of Nasogastric tube and urinary catheter

NG tube/catheter	Eras surgery group		Conventional surgery group	
	Frequency	Percentage	Frequency	Percentage
Inserted	22	88	22	88
Not inserted	3	12	3	12

In both groups 88% of study population NG was inserted (secured in place)

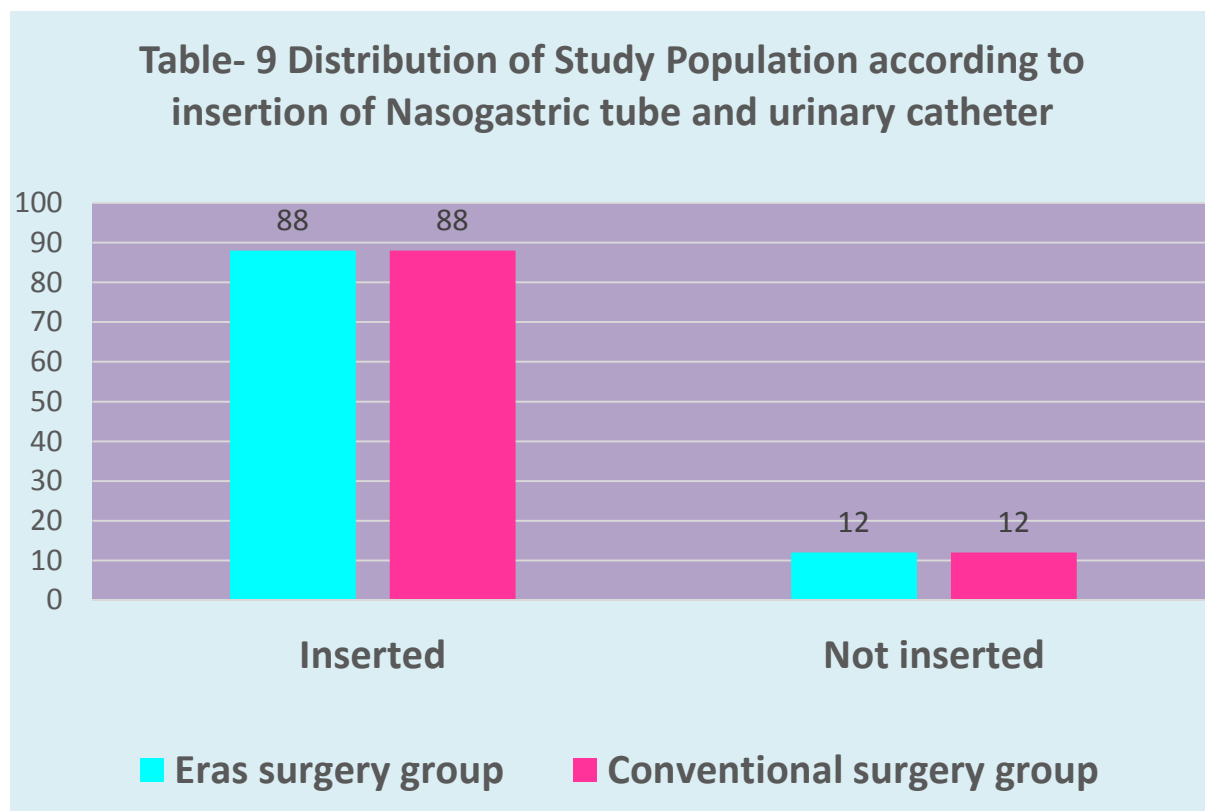


Table- 10 Distribution of Study Population according to length of incision

Incision length	Eras surgery group		Conventional surgery group	
	Frequency	Percentage	Frequency	Percentage
Small incision	25	100	2	8
Large incision	0	0	23	92

All patients in the Eras group had a small incision while only 8 % of the study population had small incision

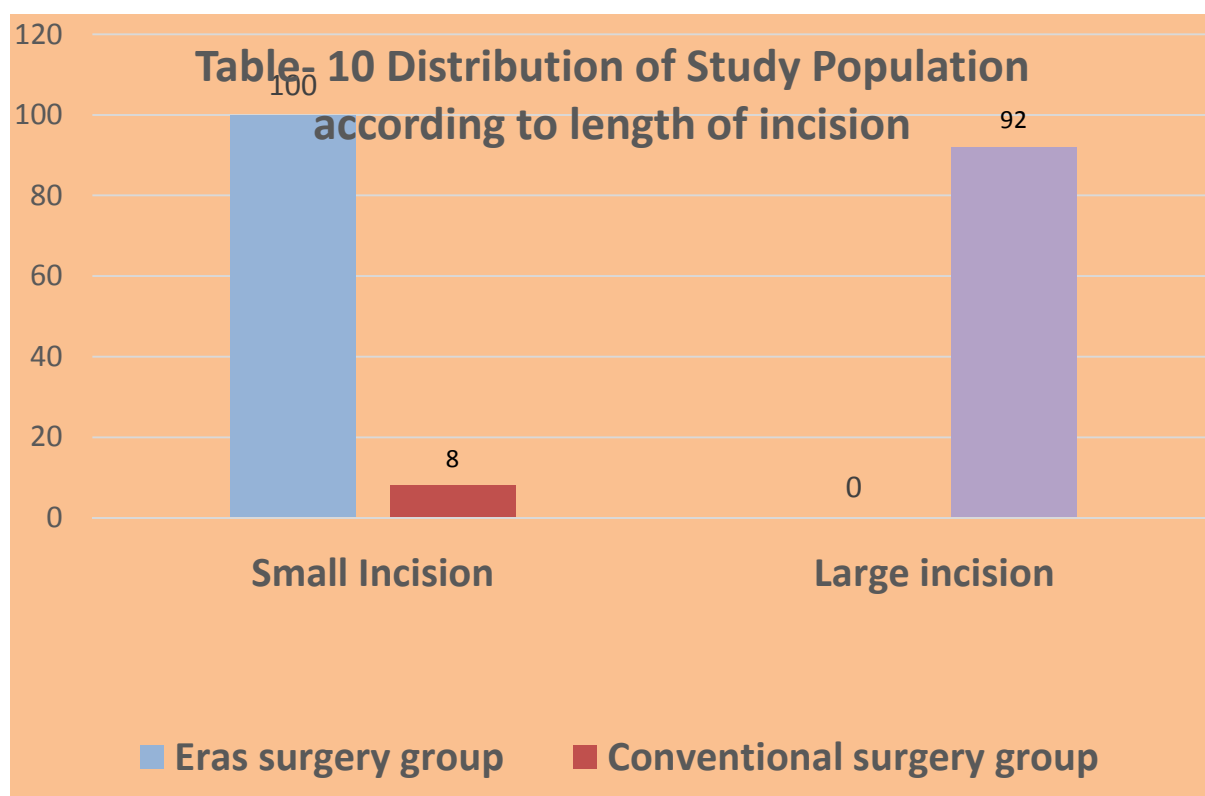


Table- 11 Distribution of Study Population according to placement of intraoperative drain

Intraoperative drain	Eras surgery Group		Conventional surgery group	
	Frequency	Percentage	Frequency	Percentage
Provided	9	36	23	92
Not provided	16	64	2	8

36% of Eras group had intraoperative drain while 92 % of the conventional group had intra operative drain

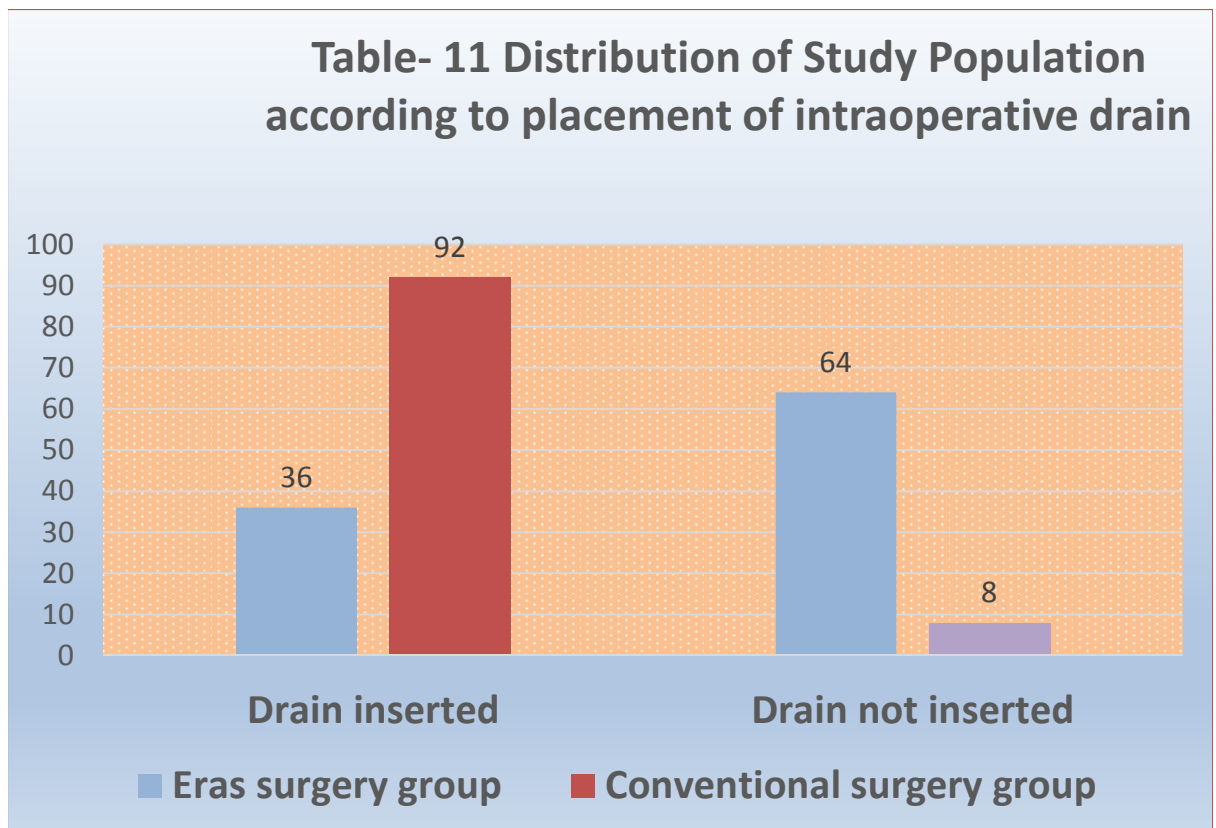


Table- 12 Distribution of Study Population according to making the patient mobilize early

Mobilization	Eras surgery Group		Conventional surgery group	
	Frequency	Percentage	Frequency	Percentage
Early mobilization	25	100	0	0
Late mobilization	0	0	25	100

All the patients in the Eras group were made to mobilize at an earlier stage.

None of the patients in conventional group were allowed to move early

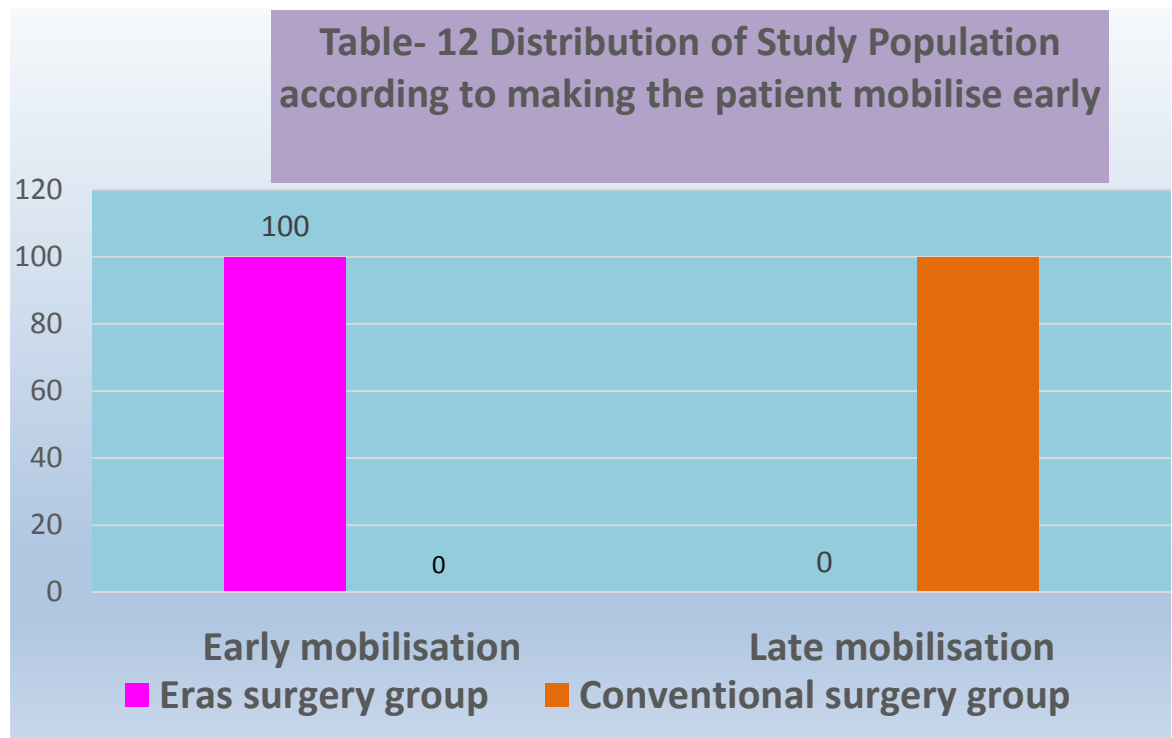


Table- 13 Distribution of Study Population according to provision of thromboprophylaxis

Thromboprophylaxis	Eras surgery Group		Conventional surgery group	
	Frequency	Percentage	Frequency	Percentage
Given	24	96	0	0
Not given	1	4	25	100

Thromboprophylaxis was provided for 96% of study population while none in conventional group received thromboprophylaxis.

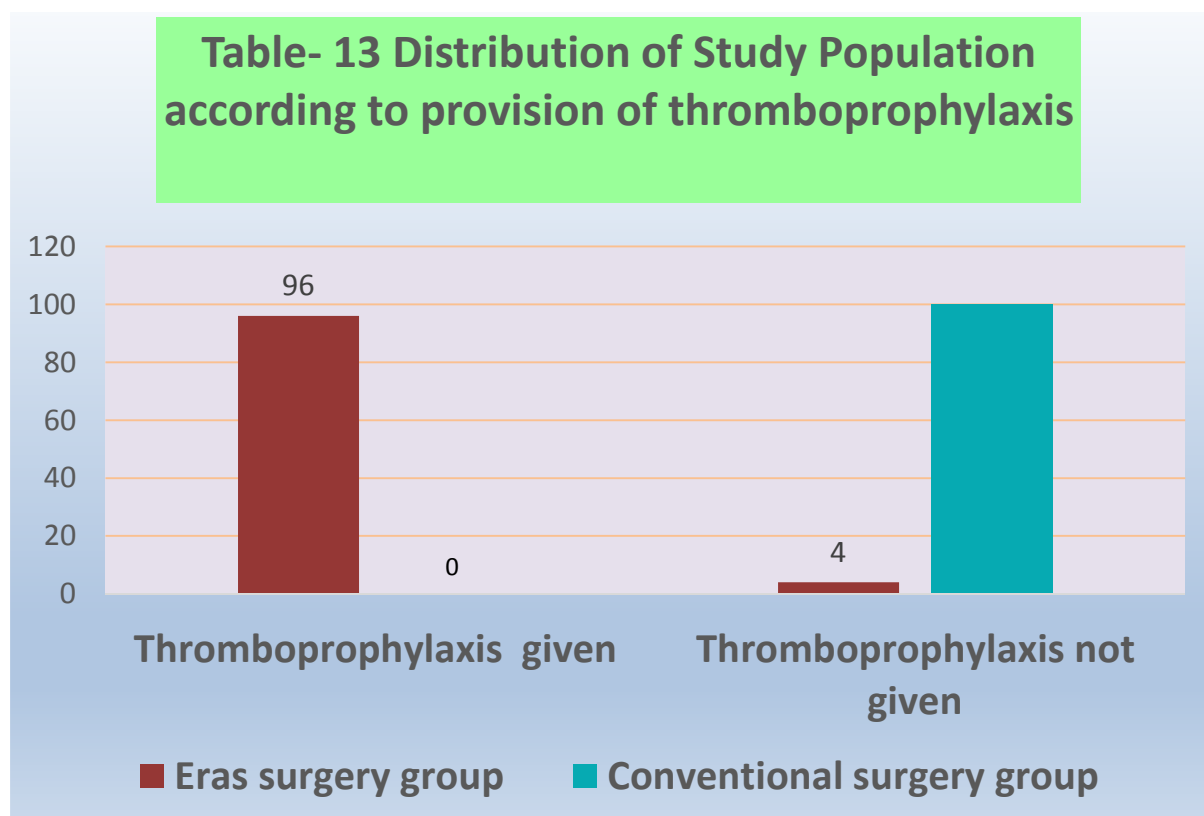


Table- 14 Distribution of Study Population according to Non-opioid analgesia

Non-opioid analgesia	Eras surgery group		Conventional surgery group	
	Frequency	Percentage	Frequency	Percentage
Given	25	100	0	0
Not given	0	0	25	100

Non Opioid analgesia was provided to all the patients in Eras group while no one in conventional group received non opioid analgesia.

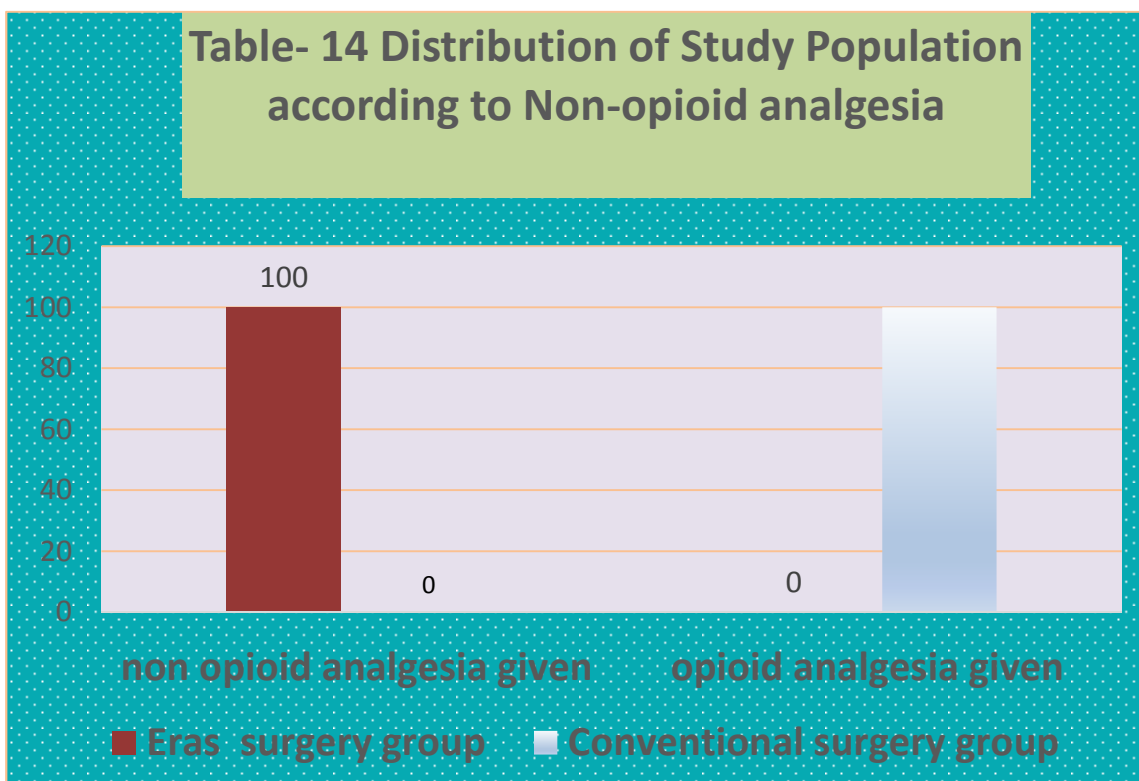


Table- 15 Distribution of Study Population according to removal of Nasogastric tube and urinary catheter within two days

NG tube/catheter	Eras surgery group		Conventional surgery group	
	Frequency	Percentage	Frequency	Percentage
Removed early	23	92	0	0
Removed late	2	8	25	100

NG tube and urinary catheter was removed within two days in around 92% of Eras group of population while in conventional group it was removed as usual.

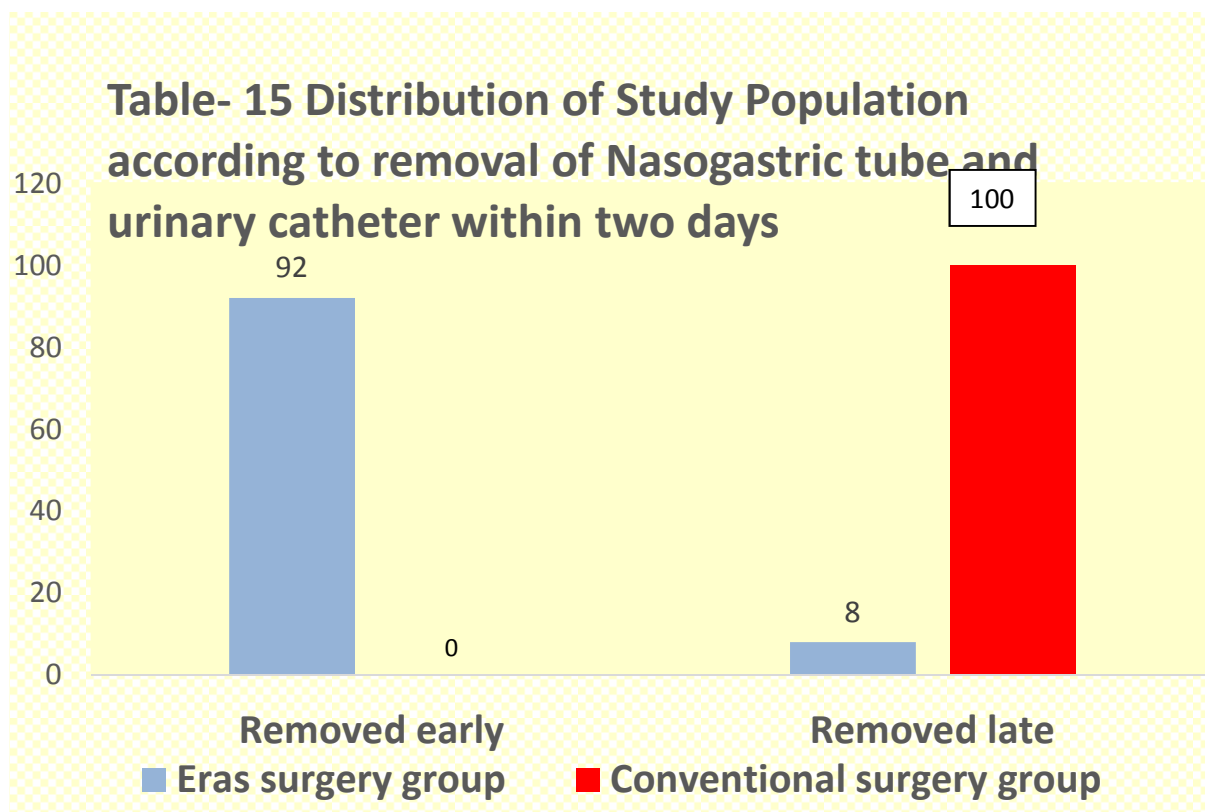


Table- 16 Distribution of Study Population according to provision of oral fluids and solid food early within postop day 1-2

Early fluids and food	Eras surgery group		Conventional surgery group	
	Frequency	Percentage	Frequency	Percentage
Given	25	100	0	0
Not given	0	0	25	100

All Eras group participants were given early fluids and food Vs none in conventional group.

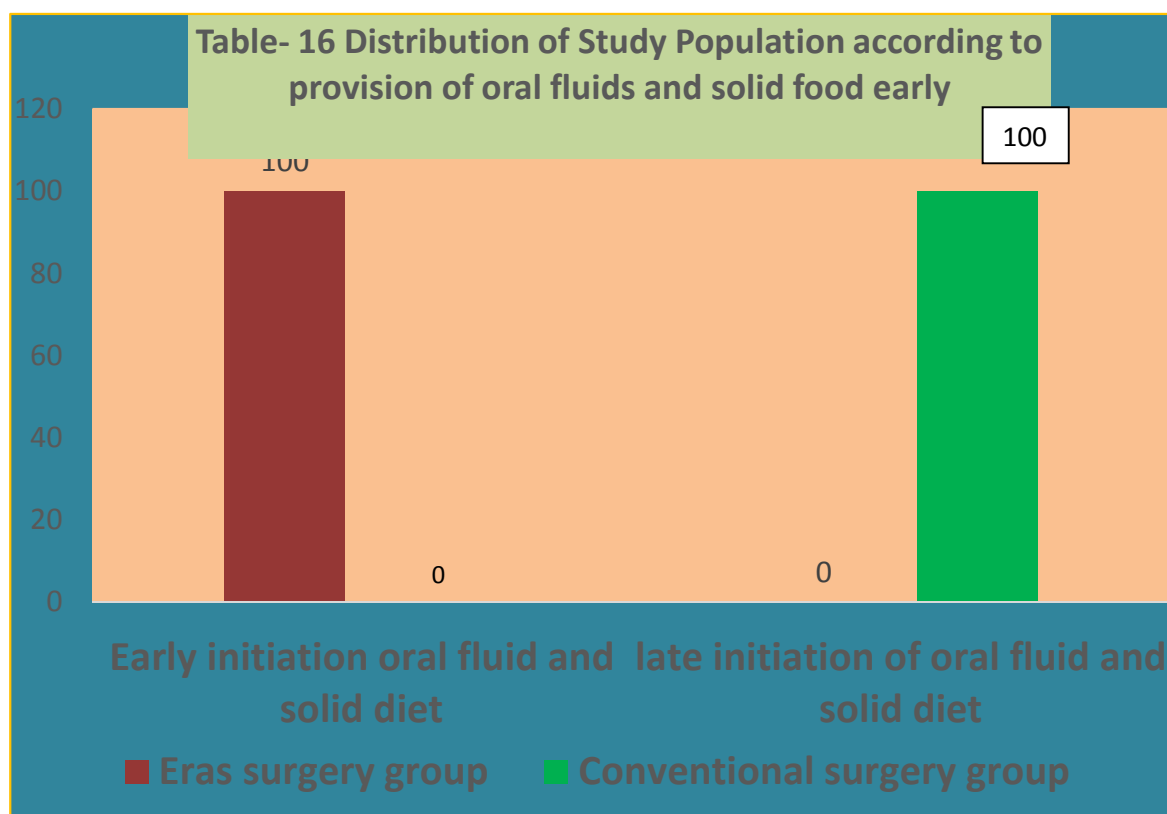


Table- 17: Distribution of Study Population according to passing flatus and faeces within day 3-4

Flatus and faeces	Eras surgery group		Conventional surgery group	
	Frequency	Percentage	Frequency	Percentage
Passed early	25	100	2	8
Passed late	0	0	23	92

All patients in Eras group had an early gut motility compared to conventional surgery group

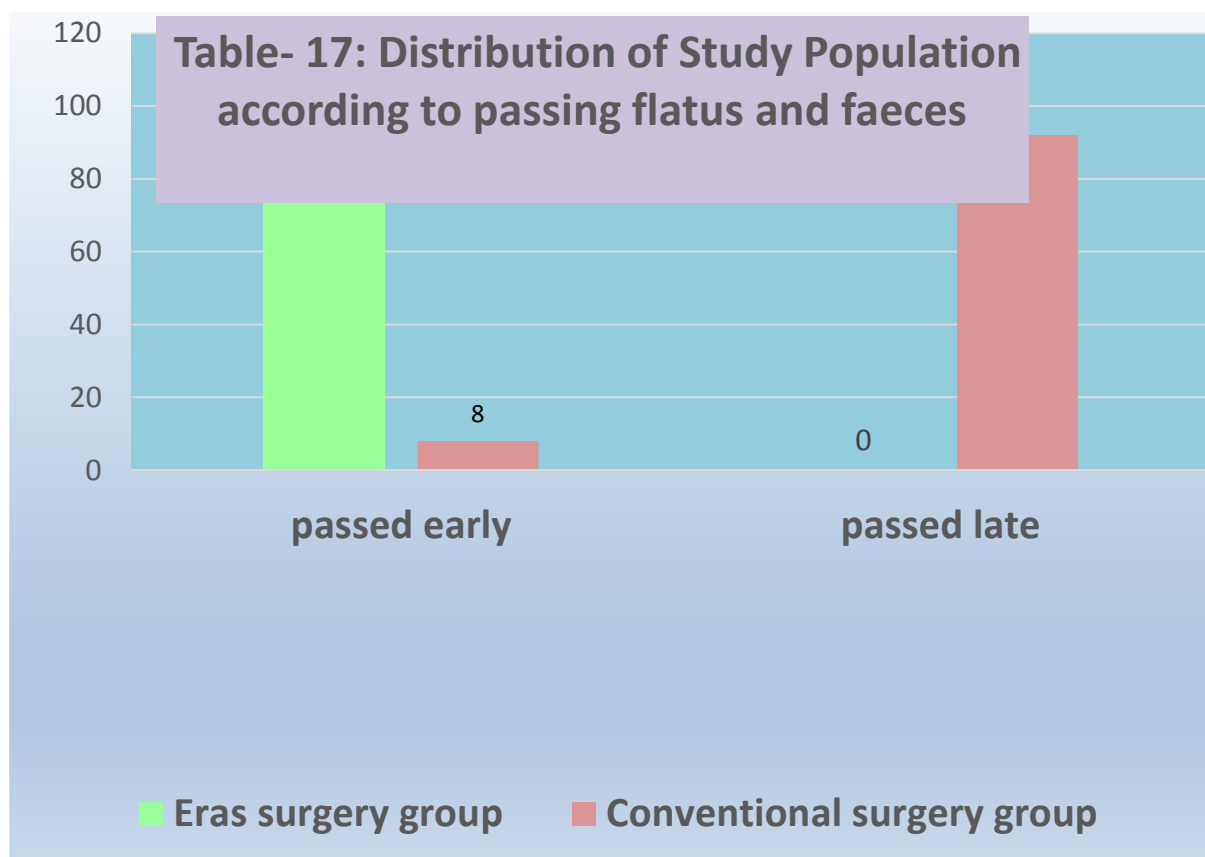


Table- 18 Distribution of Study Population according to tolerance of solid food when given early within day 3-4 □

Solid food tolerance	Eras surgery group		Conventional surgery group	
	Frequency	Percentage	Frequency	Percentage
Able to tolerate	25	100	2	8
Not able to tolerate	0	0	23	92

All patients in Eras group had better tolerance to solid foods compared to conventional surgery group.

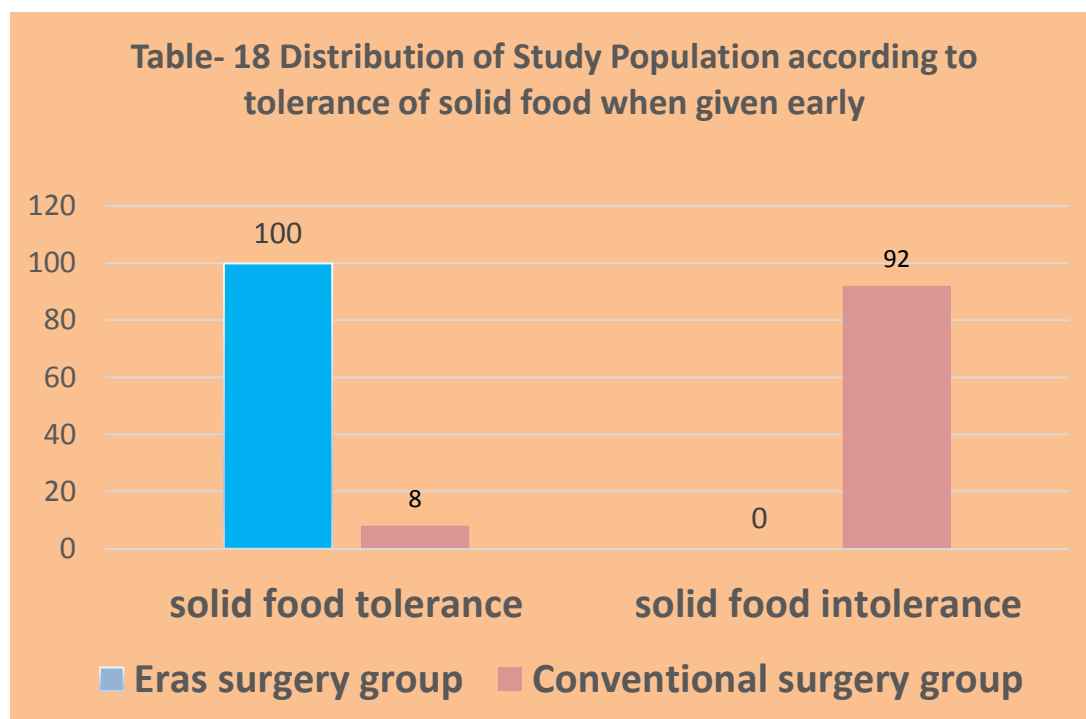


Table- 19 Distribution of Study Population according to discharge within four days/ decreased duration of hospital stay

discharge	Eras surgery group		Conventional surgery group	
	Frequency	Percentage	Frequency	Percentage
Within 4 days	25	100	1	4
More than 4 days	0	0	24	96

All the patients in eras group were fit to be discharged within four days of surgery while only 4% of the conventional surgery group was fit to be discharged within four days

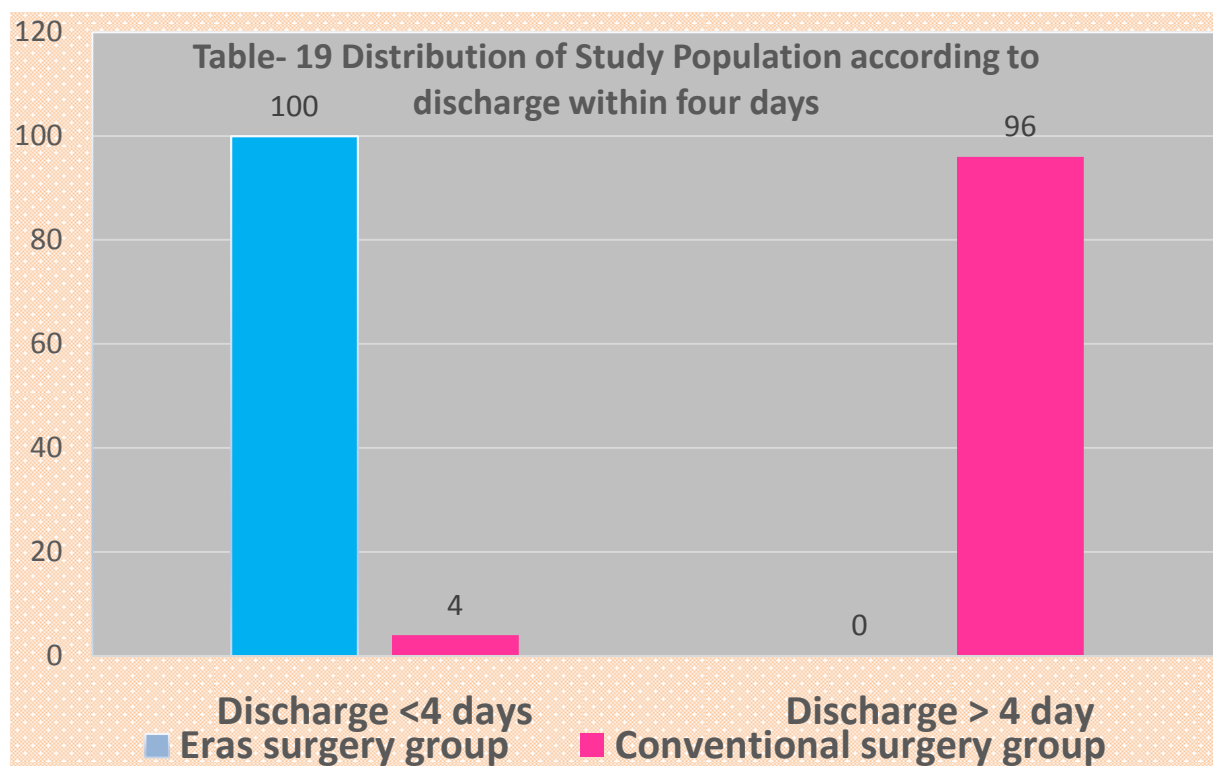


Table- 20 Distribution of Study Population according to readmission within 30 days

Readmission within 30 days	Eras surgery group		Conventional surgery group		Chisquare Value	Sig
	Frequency	Percentage	Frequency	Percentage		
Yes	2	8	17	68	19.1	0.00001
No	23	92	8	32		

Only 8% in eras group needed readmission while 68% in conventional group needed readmission. The results are statistically significant

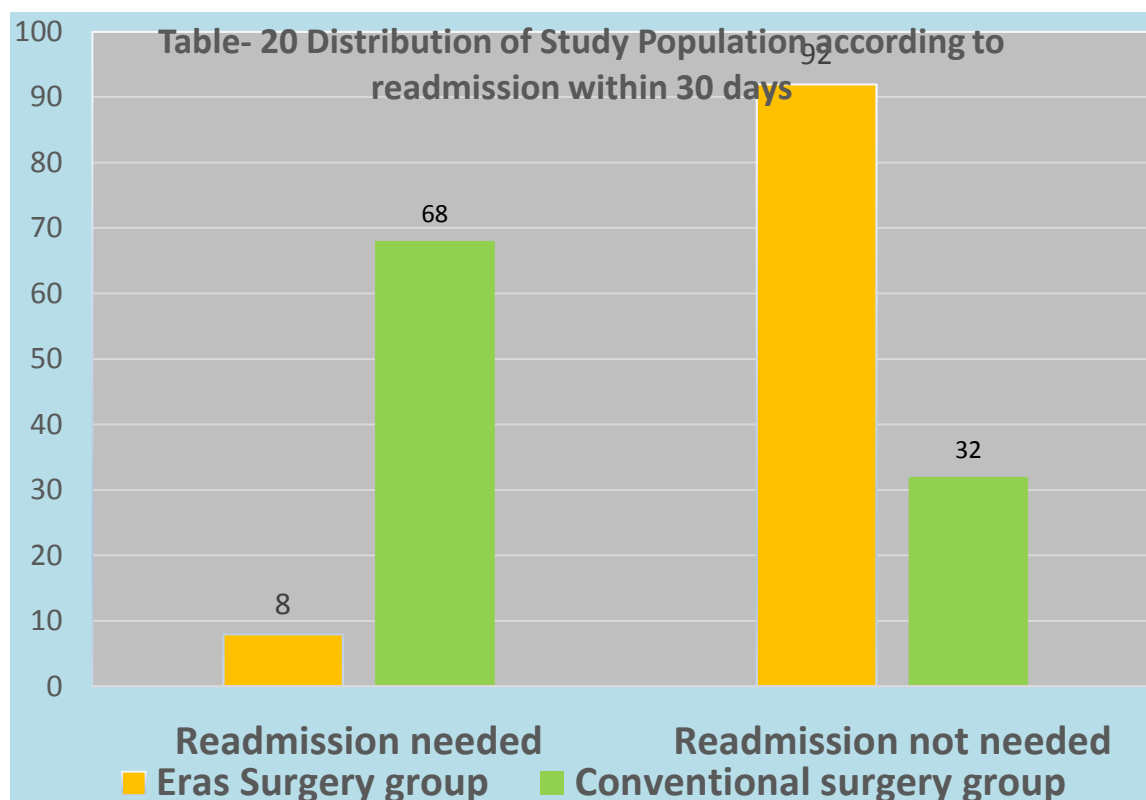
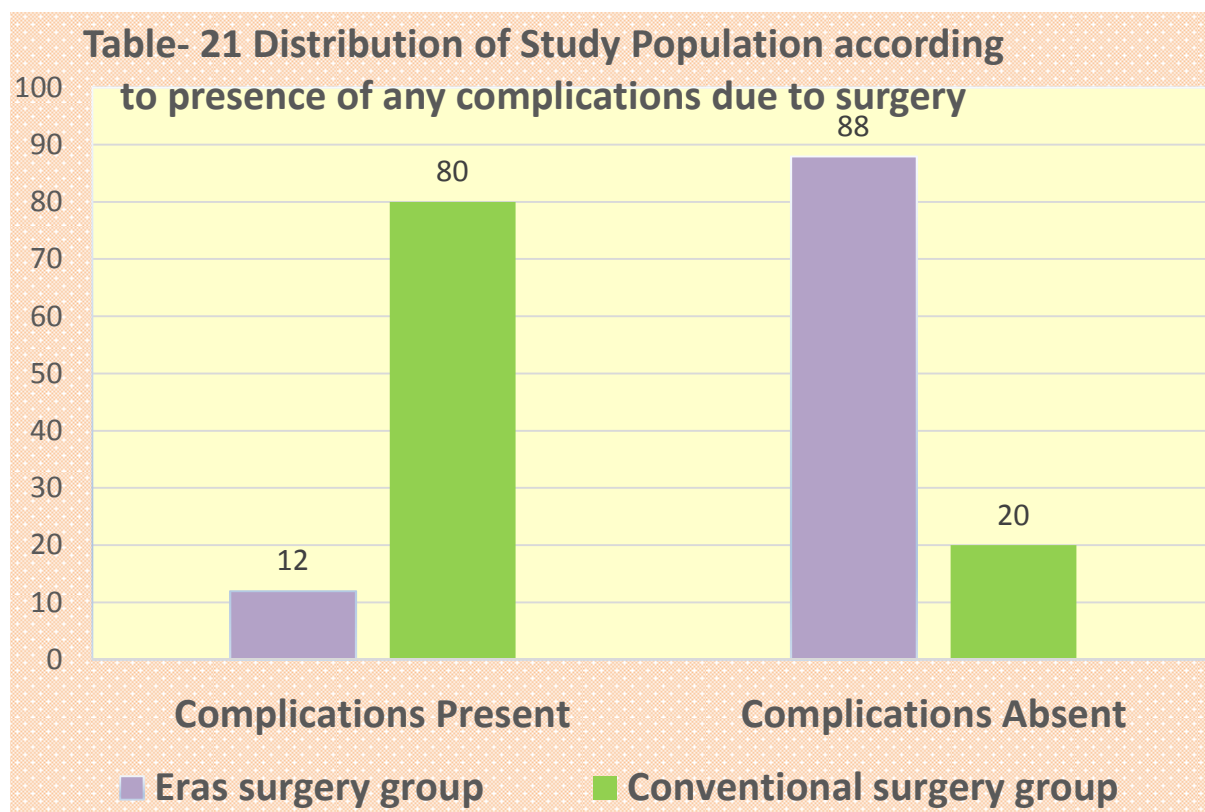


Table- 21 Distribution of Study Population according to presence of any complications due to surgery(Clavien-Dindo classification)

Complications of surgery	Eras surgery group		Conventional surgery group		Chisquare Value	sig
	Frequency	Percentage	Frequency	Percentage		
Yes	3	12	20	80	23.269	0.000
No	22	88	5	20		

Complication rate in eras surgery group is 12% compared to 80 % in conventional group and the results are statistically significant.



Distribution of study population based on the type of diagnosis

Diagnosis	Eras surgery group		Conventional surgery group	
	Frequency	Percentage	Frequency	Percentage
Ascending colon growth	1	4	2	8
CA ascending colon	1	4	0	0
CA Descending colon	1	4	0	0
CA head of pancreas	1	4	1	4
CA hepatic flexure	1	4	2	8
CA rectum	5	20	2	8
CA right colon	1	4	0	0
CA rectum	1	4	0	0
Illeal GIST	1	4	1	4
Ileal stricture	1	4	0	0
Ileal TB	0	0	1	4
Ileocaecal TB with ileal stricture	2	8	2	8
Ileocolic intussuption	1	4	1	4
Jejunojejunal intussuption	1	4	1	4
Mucocele of appendix	1	4	2	8

Multiple splenic hydatid cyst	1	4	0	0
Neuro endocrine tumour rectosigmoid	1	4	1	4
Periampullary carcinoma	0	0	1	4
Pseudocyst of pancreas	1	4	1	4
S/P colostomy for sigmoid colon	1	4	0	0
Splenic flexure growth	1	4	1	4
Subacute intestinal obstruction	1	4	1	4
Rectosigmoid growth	0	0	1	4
Recurrent splenic abscess	0	0	1	4
Sigmoid volvulus	0	0	1	
TB abdomen	0	0	1	4
Multiple jejunal GIST	0	0	1	4

Distribution of study population according to complications after surgery(clavin- dindo classification)

Grading	complications	Eras surgery group		Conventional surgery group	
		Frequency	Percentage	Frequency	Percentage
	No complications	22	88	5	20
1	Wound gaping , superficial SSI	1	4	6	24
3a	deep SSI	1	4	3	12
1	ILEUS	0	0	4	16
2	EC FISTULA	0	0	0	0
2	DVT	0	0	0	0
2	PNEUMONAI/LRI	0	0	5	20
3b	OTHERS- BILE LEAK, STOMA PROLAPSE, BURST ABDOMEN, PANCREATITIS	1	4	2	8

Distribution of study population according to reasons for readmission

Complications	Eras surgery group		Conventional surgery group	
	Frequency	Percentage	Frequency	Percentage
Wound gaping , superficial SSI	1	50	5	31.25
deep SSI	1	50	2	12.5
ILEUS	0	0	1	6.25
EC FISTULA	0	0	2	12.5
DVT	0	0	1	6.25
PNEUMONAI/LRI	0	0	1	6.25
OTHERS- BILE LEAK, STOMA PROLAPSE, BURST ABDOMEN, PANCREATITIS	0	0	4	25
Total	2	100	16	100

Grade	
1	<p>Any deviation from the normal postoperative course without the need for pharmacological treatment or surgical, endoscopic and radiological interventions.</p> <p>Acceptable therapeutic regimens are: drugs as antiemetics, antipyretics, analgetics, diuretics and electrolytes and physiotherapy.</p> <p>This grade also includes wound infections opened at the bedside.</p>
2	<p>Requiring pharmacological treatment with drugs other than such allowed for grade I complications. Blood transfusions, antibiotics and total parenteral nutrition are also included.</p>
3	<p>Requiring surgical, endoscopic or radiological intervention</p>
3a	<p>Intervention under regional/local anesthesia</p>
3b	<p>Intervention under general anesthesia</p>
4	<p>Life-threatening complication requiring intensive care/intensive care unit management</p>
4a	<p>Single organ dysfunction</p>
4b	<p>Multi-organ dysfunction</p>
5	<p>Patient demise</p>

Clavien-Dindo grading system for the classification of surgical complications

LIMITATIONS OF THIS STUDY

1. Preoperative carbohydrate loading was not given due to cost factor.
2. Some patient did not follow up after discharge. So postop audit for every patient was not possible.

DISCUSSIONS

Males and females are equally distributed in both groups. The results are statistically significant (table 1). There is an equal representation in each group and the results are statistically significant (table 2) and There is no significant difference in mean between two population (table 3)

Both the groups are similar in proportion of males and females and also more or less equal proportion in both groups at different age group classification. The mean age of both groups are also more or less similar. In all the three tables, the P value is more than 0.05 (above significance). This implies that both the groups are similar in age and sex composition and hence there was no selection bias in both the group. In other words the sampling technique followed was appropriate and there is no bias in selection of patients into any of the group.

All the patients in Eras group were given preadmission counselling while all the patients in the conventional group were not given preadmission counselling (table 4).

Pre bowel preparation was given to only 4% of the ERAS group while 88% in the conventional group received pre bowel preparation (table 5).

All the patients in ERAS group were given preoperative antibiotics while only 16% in conventional group got preoperative antibiotics (table 6)

All the patients in ERAS group were given Thoracic epidural anaesthesia while all the patients in the conventional group were not given Thoracic epidural Anaesthesia.

Whole eras study group were given intraoperative correction of hypothermia, while none in conventional group received hypothermia correction

In both groups 88% of study population NG was inserted (secured in place)

All patients in the ERAS group had a small incision while only 8 % of the study population had small incision

36% of ERAS group had intraoperative drain placement while 92 % of the conventional group had intra operative drain

All the patients in the ERAS group mobilized an earlier stage. None of the patients in conventional group mobilized early

Thromboprophylaxis was provided for 96% of ERAS study population while none in conventional group received thromboprophylaxis

Non Opioid analgesia was provided to all the patients in ERAS group while no one in conventional group received non opioid analgesia

NG tube and urinary catheter was removed within two days in around 92% of ERAS group population while in conventional group it was removed as usual.

All ERAS group participants were given early oral fluids and food Vs none in conventional group were started on early oral fluid and solid diet

All patients in ERAS group had an early gut motility compared to conventional surgery group. ERAS group patient passed flatus and stools within 3-4 days of surgery

All patients in Eras group had better tolerance to solid foods compared to conventional surgery group

All the patients in ERAS group were fit to be discharged within four days of surgery while only 4% of the conventional surgery group was fit to be discharged within four days

None in ERAS group needed readmission while 68% in conventional group needed readmission.

Complication rate in ERAS surgery group is 12% compared to 80 % in conventional group and the results are statistically significant.

Duration of hospital stay and peri-operative morbidity and complication rate are key determinants of cost. Gastrointestinal surgery is associated with postoperative pain, paralytic ileus, reduced pulmonary function and loss of muscle mass and function, all of which may contribute to postoperative

morbidity and need for prolonged hospital stay. ERAS aims to reduce these postoperative complications by preserving the normal preoperative physiology.

NG tube was removed early and oral foods and fluids were started within two days of surgery in majority of patients(92%) in eras group compared to conventional group. And patients were also mobilized very early in ERAS group , which are associated with early return of bowel functions.. Hence they were fit to get discharged within four days compared to conventional group, so duration of hospitalization is less in ERAS group, than conventional care group which had longer duration of hospital stay of around 96%, More over the complication rate is too less and the readmission rate is only 8% in eras group compared to 68% in conventional group. Early optimal analgesia and early mobilization with physiotherapy are means of improving pulmonary function. Our patients received dedicated chest physiotherapy and were given and taught how to administer a PEEP bottle which has been shown to reduce pulmonary atelectasis, none of the patient following eras protocol developed pulmonary complications, but 5 of the patients who received conventional postop care developed pneumonia which accounts for 20%, and 6.25% of patient who underwent conventional postop care required readmission for the same reason.

So the morbidity is also less in ERAS group, Hence considering all these reason we can very well infer that ERAS PROTOCOL is better to conventional postoperative care and can be recommended to all gastrointestinal surgeries including colorectal surgery so that we can save

more time and money (duration of hospital stay, treating complications, readmission). More over hence there is less complications and less readmissions patients feel psychologically better and the fear of surgery and hence unnecessary delay of procedure because of fear of complications of surgery can be minimized

CONCLUSION

This comparative study shows that ENHANCED RECOVERY PROGRAMMES can be successfully implemented with significant shorter hospital stay without any increase in postoperative complications, and decreased morbidity rate, furthermore enhanced recovery programmes can be used not only in colorectal surgeries but also can be implemented in other elective gastrointestinal surgeries.

BIBLIOGRAPHY

1. Manual of Fast Track Recovery for Colorectal Surgery. 2012:1-15.
2. Sabiston textbook of surgery volume 2
3. Kehlet, H; Dahl J. Prevention of surgical stress and postoperative organ dysfunction. *Lancet* 2003;362:1921-1928
4. Kehlet H. Multimodal approach to control postoperative pathophysiology and rehabilitation. *Br J Anaesth.* 1997;78:606-617
5. Kehlet H. Fast-track surgery - An update on physiological care principles to enhance recovery. *Langenbeck's Arch Surg.* 2011:585-590.
6. Tovar EA, Roethe RA, Weissig MD, Lloyd RE, Patel GR. One-day admission for lung lobectomy: An incidental result of a clinical pathway. *Ann Thorac Surg.* 1998;(65):803-806.
7. Podore T. Infrarenal aortic surgery with a 3-day hospital stay: a report of success with a clinical pathway. *J Vasc Surg.* 1999;(29):787-792.
8. Nicholson a., Lowe MC, Parker J, Lewis SR, Alderson P, Smith a. F. Systematic review and meta-analysis of enhanced recovery programmes in surgical patients. *Br J Surg.* 2014;101(3):172-188.
9. King PM, Blazeby JM, Ewings P, et al. The influence of an enhanced recovery programme on clinical outcomes, costs and quality of life after surgery for colorectal cancer. *Color Dis.* 2006;(8):506-513.

10. Roulin D, Donadini A, Gander S, et al. Cost-effectiveness of the implementation of an enhanced recovery protocol for colorectal surgery. *Br J Surg*. Vol ; 2013:1108-1114.
11. Lassen K, Soop M, Nygren J, et al. Consensus review of optimal perioperative care in colorectal surgery: Enhanced Recovery After Surgery (ERAS) Group recommendations. *Arch Surg*. 2009;144(10):961-969.
12. Kiecolt-Glaser JK, Page GG, Marucha PT, MacCallum RC, Glaser R. Psychological influences on surgical recovery: perspectives from psychoneuroimmunology. *Am Psychol*.1998;53(11):1209-1218.
13. Halaszynski TM, Juda R, Silverman DG. Optimizing postoperative outcomes with efficient preoperative assessment and management. *Crit Care Med*. 2004; 32(4)(suppl):S76-S86.
14. Forster AJ, Clark HD, Menard A, et al. Effect of a nurse team coordinator on outcomes for hospitalized medicine patients. *Am J Med*. 2005;118(10):1148-1153.
15. Jung B, Paahlman L, Nyström P-O, Nilsson E; Mechanical Bowel Preparation Study Group. Multicentre randomized clinical trial of mechanical bowel preparation in elective colonic resection. *Br J Surg*. 2007;94(6):689-695.

16. Contant CM, Hop WC, van't Sant HP, et al. Mechanical bowel preparation for elective colorectal surgery: a multicentre randomised trial. *Lancet*. 2007; 370(9605):2112-2117.
17. Bucher P, Gervaz P, Soravia C, Mermillod B, Erne M, Morel P. Randomized clinical trial of mechanical bowel preparation vs no preparation before elective leftsided colorectal surgery. *Br J Surg*. 2005;92(4):409-414.
18. Ram E, Sherman Y, Weil R, Vishne T, Kravarusic D, Dreznik Z. Is mechanical bowel preparation mandatory for elective colon surgery? a prospective randomized study. *Arch Surg*. 2005;140(3):285-288.
19. Nygren J, Thorell A, Ljungqvist O. Preoperative oral carbohydrate nutrition: an update. *Curr Opin Clin Nutr Metab Care*. 2001;4(4):255-259.
20. Noblett SE, Watson DS, Huong H, Davison B, Hainsworth PJ, Horgan AF. Pre-operative oral carbohydrate loading in colorectal surgery: a randomized controlled trial. *Colorectal Dis*. 2006;8(7):563-569
21. Smith AF, Pittaway AJ. Premedication for anxiety in adult day surgery [update of: *Cochrane Database Syst Rev*. 2000;(3):CD002192]. *Cochrane Database Syst Rev*. 2003;(1):CD002192.
38. Smith AF, Pittaway AJ. Premedication for anxiety in adult day surgery. *Cochrane Database Syst Rev*. 2000;(3):CD002192.

22. Clagett GP, Anderson FA Jr, Geerts W, et al. Prevention of venous thromboembolism. *Chest*. 1998;114(5)(suppl):531S-560S.
23. Wille-Jørgensen P, Rasmussen MS, Andersen BR, Borly L. Heparins and mechanical methods for thromboprophylaxis in colorectal surgery [update of: *Cochrane Database Syst Rev*. 2001;(3):CD001217]. *Cochrane Database Syst Rev*. 2003;(4):CD001217.
24. Collins R, Scrimgeour A, Yusuf S, Peto R. Reduction in fatal pulmonary embolism and venous thrombosis by perioperative administration of subcutaneous heparin: overview of results of randomized trials in general, orthopedic, and urologic surgery. *N Engl J Med*. 1988;318(18):1162-1173.
25. Clagett GP, Reisch JS. Prevention of venous thromboembolism in general surgical patients: results of meta-analysis. *Ann Surg*. 1988;208(2):227-240.
26. Song F, Glenny AM. Antimicrobial prophylaxis in colorectal surgery: a systematic review of randomized controlled trials. *Br J Surg*. 1998;85(9):1232-1241.
27. Bratzler DW, Houck PM; Surgical Infection Prevention Guidelines Writers Workgroup; Antimicrobial prophylaxis for surgery: an advisory statement from the National Surgical Infection Prevention Project. *Clin Infect Dis*. 2004;38(12):1706-1715.

28. Nelson R, Edwards S, Tse B. Prophylactic nasogastric decompression after abdominal surgery [update of: *Cochrane Database Syst Rev.* 2005;(1):CD004929]. *Cochrane Database Syst Rev.* 2007;(3):CD004929
29. Karliczek A, Jesus EC, Matos D, Castro AA, Atallah AN, Wiggers T. Drainage or nondrainage in elective colorectal anastomosis: a systematic review and meta-analysis. *Colorectal Dis.* 006;8(4):259-265.
30. Jesus EC, Karliczek A, Matos D, Castro AA, Atallah AN. Prophylactic anastomotic drainage for colorectal surgery. *Cochrane Database Syst Rev.* 2004; (4):CD002100.
31. McPhail MJ, Abu-Hilal M, Johnson CD. A meta-analysis comparing suprapubic and transurethral catheterization for bladder drainage after abdominal surgery. *Br J Surg.* 2006;93(9):1038-1044.
32. Andersen HK, Lewis SJ, Thomas S. Early enteral nutrition within 24h of colorectal surgery vs later commencement of feeding for postoperative complications. *Cochrane Database Syst Rev.* 2006;(4):CD004080.
33. Lewis SJ, Egger M, Sylvester PA, Thomas S. Early enteral feeding vs “nil by mouth” after gastrointestinal surgery: systematic review and meta-analysis of controlled trials. *BMJ.* 2001;323(7316):773-776.

34. Han-Geurts IJ, Hop WC, Kok NF, Lim A, Brouwer KJ, Jeekel J. Randomized clinical trial of the impact of early enteral feeding on postoperative ileus and recovery. *Br J Surg.* 2007;94(5):555-561.
35. Kehlet H, Wilmore DW. Multimodal strategies to improve surgical outcome. *Am J Surg.* 2002;183(6):630-641
36. Neville a., Lee L, Antonescu I, et al. Systematic review of outcomes used to evaluate enhanced recovery after surgery. *Br J Surg.* 2014;101(3):159
37. Adamina M, Kehlet H, Tomlinson GA, Senagore AJ, Delaney CP. Enhanced recovery pathways optimize health outcomes and resource utilization: A meta-analysis of randomized controlled trials in colorectal surgery. *Surgery.* 2011:830-840.
38. Basse L, Raskov HH, Hjort Jakobsen D, et al. Accelerated postoperative recovery programme after colonic resection improves physical performance, pulmonary function and body composition. *Br J Surg.* 2002;(89):446-453.
39. Bradshaw BGG, Liu SS, Thirlby RC. Standardized perioperative care protocols and reduced length of stay after colon surgery. *J Am Coll Surg.* 1998;(186):501-506.
40. Anderson ADG, McNaught CE, MacFie J, Tring I, Barker P, Mitchell CJ. Randomized clinical trial of multimodal optimization and standard perioperative surgical care. *Br J Surg.* 2003;(90):1497-1504.

Past History:

Personal History :

Treatment History:

Examination :

General Examination – Conscious / hydration / PR / BP / RR / Pallor /

Icterus / Cyanosis / Clubbing / Lymphnode / Pedal Edema

Per Abdomen :

Inspection – Shape / Skin / Visible Swelling / Hernial Oriface /

movement with respiration

Palpation- temperature/tenderness/guarding/rigidity

percussion- liver dullness/shifting dullness

auscultation- bs/bruit

per rectal-

external genitalia

systemic examination- CVS/RS/CNS

INVESTIGATIONS

CBC/RFT/S.ELECTROLYTES/S.AMYLASE

XRAYCHEST P/A VIEW/XRAY ABDOMEN ERECT/USG

ABDOMEN WITH PELVIS/CECT ABDOMEN WITH PELVIS/MRI

MANAGEMENT

SURGERY DONE-

POSTOP FOLLOW UP

DISCHARGE

AUDIT.

PATIENT CONSENT FORM

STUDY TITLE: - COMPARATIVE STUDY BETWEEN ENHANCED RECOVERY AFTER SURGERY(ERAS) VERSUS CONVENTIONAL POSTOPERATIVE CARE IN GASTROINTESTINAL SURGERIES IN COIMBATORE MEDICAL COLLEGE & HOSPITAL

STUDY CENTRE: Coimbatore Medical College Hospital, Coimbatore.

PARTICIPANT NAME:

AGE/SEX:

I.P. NO :

I confirm that I have understood the purpose of treatment and procedure for the above study. I have the opportunity to ask the question and all my questions and doubts have been answered to my satisfaction.

I have been explained about the possible complications that may occur during the interventional procedure. I understand that my participation in the study is voluntary and that I am free to withdraw at any time without giving any reason.

I understand that the investigator, regulatory authorities and the ethics committee will not need my permission to look at my health records both in respect to the current study and any further research that may be conducted in relation to it, even if I withdraw from the study. I understand that my identity will not be revealed in any information released to third parties or published, unless as required under the law. I agree not to restrict the use of any data or results that arise from the study.

I hereby consent to participate in this study of, **COMPARATIVE STUDY BETWEEN ENHANCED RECOVERY AFTER SURGERY(ERAS) VERSUS CONVENTIONAL POSTOPERATIVE CARE IN GASTROINTESTINAL SURGERIES IN COIMBATORE MEDICAL COLLEGE & HOSPITAL**

Date:

Signature of the patient & Name

Place:

Signature of the investigator & Name

ஒப்புதல் படிவம்

நோயாளியின் பெயர்:

பாலினம் :

வயது :

பெற்றோர் பெயர் :

முகவரி :

அரசு கோவை மருத்துவக் கல்லூரியில் பொதுமருத்துவ துறையில் பட்ட மேற்படிப்பு பயிலும் மருத்துவர் வி.வித்யா அவர்கள் மேற்கொள்ளும் ஆய்வில் செய்முறை மற்றும் அனைத்து விளக்கங்களையும் கேட்டுக் கொண்டு எனது சந்தேகங்களை தெரிவுபடுத்திக் கொண்டேன் என்பதை தெரிவித்துக் கொள்கிறேன்.

இந்த ஆய்வில் நான் முழு சம்மதத்துடனும், சுயசிந்தனையுடனும் கலந்து கொள்ள சம்மதிக்கிறேன்.

இந்த ஆய்வில் என்னைப் பற்றிய அனைத்து விவரங்கள் பாதுகாக்கப்படுவதுடன் இதன் முடிவுகள் ஆய்விதழில் வெளியிடப்படுவதில் ஆட்சேபனை இல்லை என்பதை தெரிவித்துக்கொள்கிறேன். எந்த நேரத்திலும் இந்த ஆய்விலிருந்து நான் விலகிக் கொள்ள எனக்கு உரிமை உண்டு என்பதையும் அறிவேன்.

இடம் :

தேதி :

கையொப்பம் / ரேகை

KEY TO MASTER CHART

Group 1	-	Patient's Following ERAS Protocol
Group 2	-	Patient's Following Conventional Post operative care
R&A	-	Resection and Anastamosis
SSI	-	Surgical Site Infection
NA	-	Not Applicable
EC fistula	-	Entero Cutaneous Fistula
DVT	-	Deep vein thrombosis
LRI	-	Lower Respiratory tract infection

SL NO.	NAME	AGE	IP NO.	GROUP	DIAGNOSIS	PROCEDURE DONE	PRE-ADMISSION COUNSELLING	PREOP BOWEL PREPARATION	PREOP ANTIBIOTIC PROPHYLAXIS	THORACIC EPIDURAL ANALGESIA	PX OF HYPOTHERMIA	NG TUBE & URINARY CATH INSERTION	SHORT INCISION	INTRAOP DRAIN	EARLY MOBILIZATION	THROMBOPROPHYL AXIS	NONOPIATE ANALGESIA	NG TUBE & FOLEYS REMOVAL/DRAIN REMOVAL	POST OP D.	ORAL FLUIDS/SOLID FOOD	POST OP DAY	PASSING FLATUS/FECES	TOLERATING SOLID DIET	DISCHARGE WITHIN 4 DAYS	READMISSION WITHIN 30 DAYS	COMPLICATIONS	REASON FOR READMISSION
1	VIJAYKUMAR	46/M	11450	1	CA RIGHT COLON	EXTENDED R HEMICOLECTOMY	YES	NO	YES	YES	YES	YES	YES	NO	YES	YES	YES	YES	YES	YES	YES	YES	YES	NO	NO	NA	
2	MANI	66/M	12345	1	ILEAL GIST	D-LAP WITH R&A	YES	NO	YES	YES	YES	YES	YES	NO	YES	YES	YES	YES	YES	YES	YES	YES	YES	NO	MIN WOUND INFECTION	NA	
3	BALAMURUGAN	47/M	23415	1	ILEOCECAL TB WITH ILEAL STRICTURE	ILEOTRANSVERSE ANASTOMOSIS	YES	NO	YES	YES	YES	NO	YES	NO	YES	YES	YES	NO	YES	YES	YES	YES	YES	NO	NO	NA	
4	RADHIKA	59/F	12564	1	ASCENDING COLON GROWTH	R HEMICOLECTOMY	YES	NO	YES	YES	YES	YES	YES	NO	YES	YES	YES	YES	YES	YES	YES	YES	YES	NO	NO	NA	
5	BACHANSARM	25/M	13456	1	MULTIPLE SPLENIC HYDATID CYST	SPLENECTOMY	YES	NO	YES	YES	YES	NO	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	NO	NO	NA	
6	KANDASAMY	45/M	24346	1	PSEUDOCYST OF PANCREAS	CYSTOGASTROSTOMY	YES	NO	YES	YES	YES	YES	YES	YES	YES	YES	YES	NO	YES	YES	YES	YES	YES	NO	NO	NA	
7	VIGNESH	40/M	13456	1	ILEOCECAL TB WITH ILEAL STRICTURE	R HEMICOLECTOMY	YES	NO	YES	YES	YES	NO	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	NO	NO	NA	
8	BHAGHAT	45/M	24567	1	CA HEPATIC FLRXURE	EXTENDED R HEMICOLECTOMY	YES	NO	YES	YES	YES	YES	YES	NO	YES	YES	YES	YES	YES	YES	YES	YES	YES	NO	NO	NA	
9	RAMASAMY	57/M	12534	1	CA RECTUM	LOW ANTERIOR RESECTION	YES	NO	YES	YES	YES	YES	YES	NO	YES	YES	YES	YES	YES	YES	YES	YES	YES	NO	NO	NA	
10	THANGAI	67/F	24563	1	CA ASCENDING COLON	R HEMICOLECTOMY	YES	NO	YES	YES	YES	YES	YES	NO	YES	YES	YES	YES	YES	YES	YES	YES	YES	NO	NO	NA	
11	PALANISAMY	62/M	12543	1	MUCOCELE OF APPENDIX	R HEMICOLECTOMY	YES	NO	YES	YES	YES	YES	YES	NO	YES	YES	YES	YES	YES	YES	YES	YES	YES	NO	NO	NA	
12	NATCHIAMMAL	45/F	29807	1	JEJUNOJEJUNAL INTUSUSCEPTION	REDUCTION WITH R&A	YES	NO	YES	YES	YES	YES	YES	NO	YES	YES	YES	YES	YES	YES	YES	YES	YES	NO	NO	NA	
13	PRABHU	49/M	25645	1	CARCINOMA RECTUM	ULTRA LOW ANTERIOR RESECTION	YES	NO	YES	YES	YES	YES	YES	NO	YES	YES	YES	YES	YES	YES	YES	YES	YES	NO	NO	NA	
14	RASHIK	16/M	19876	1	S/P COLOSTOMY FOR SIGMOID COLON PERF	COLOSTOMY REVERSAL WITH RECTOSIG ANASTAMOSIS	YES	NO	YES	YES	YES	YES	YES	NO	YES	YES	YES	YES	YES	YES	YES	YES	YES	NO	NO	NA	
15	THANGAMANI	45/F	134562	1	CA RECTUM	ULTRA LOW ANTERIOR RESECTION	YES	NO	YES	YES	YES	YES	YES	NO	YES	YES	YES	YES	YES	YES	YES	YES	YES	NO	NO	NA	
16	RADIKA	35/F	13425	1	CA RECTUM	D-LAP WITH LOW ANT. RESECTION	YES	NO	YES	YES	YES	YES	YES	NO	YES	YES	YES	YES	YES	YES	YES	YES	YES	NO	NO	NA	
17	SHANTHALINGAM	57/M	28667	1	SPLENIC FLEXURE GROWTH	LEFT HEMICOLECTOMY	YES	NO	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	NO	NO	NA	
18	SUBRAMANI	62/M	10986	1	CA RECTUM	TRANSANAL SUBMUCOSAL EXCISION	YES	NO	YES	YES	YES	YES	YES	NO	YES	YES	YES	YES	YES	YES	YES	YES	YES	NO	NO	NA	

