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Original Research Article

The Effect of Enhanced Recovery After Surgery (ERAS) Protocols on Patient Outcomes

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Abstract:

Background: Enhanced Recovery After Surgery (ERAS) protocols represent a multimodal approach to perioperative care aimed at reducing surgical stress, optimizing recovery, and improving patient outcomes. Although well established in high-resource settings, there is limited evidence regarding its effectiveness in Indian tertiary care hospitals.

Aim: To evaluate the impact of ERAS protocols on postoperative outcomes in patients undergoing elective surgeries at Darbhanga Medical College & Hospital, Laheriasarai.

Methods: A prospective observational study was conducted over 11 months, including 100 patients undergoing elective gastrointestinal, urological, or gynecological surgeries under ERAS protocols. Patient demographics, perioperative variables, and postoperative outcomes were recorded. Data were analyzed using SPSS version 23.0. Continuous variables were expressed as mean ± SD and categorical data as frequencies and percentages.

Results: The mean age of patients was 45.8 ± 12.4 years, with 56% males and 44% females. Gastrointestinal surgeries accounted for 46% of cases, followed by urological (28%) and gynecological (26%). The mean hospital stay was 4.2 ± 1.3 days, with 72% discharged within 5 days. Postoperative complications occurred in 15% of patients, the most common being wound infection (6%), ileus (5%), and urinary tract infection (4%). Pain scores decreased steadily from 3.4 at 24 hours to 1.8 at 72 hours. Early mobilization within 24 hours was achieved in 82% of patients. Compared with historical data from conventional care, the ERAS group demonstrated significantly reduced length of stay ($p < 0.001$), lower complication rates ($p = 0.042$), and higher early mobilization ($p = 0.003$).

Conclusion: ERAS protocols significantly improved postoperative recovery, reduced hospital stay and complications, and enhanced early mobilization in elective surgical patients.

Recommendations: ERAS should be adopted routinely in tertiary care centers in India, with emphasis on multidisciplinary collaboration, staff training, and adherence monitoring to maximize patient benefits. Further large-scale studies are recommended to strengthen evidence and evaluate long-term outcomes.

Keywords: Enhanced Recovery After Surgery, Elective Surgery, Postoperative Outcomes, Hospital Stay, ERAS Protocols.

Introduction

(ERAS) is a multimodal perioperative care pathway designed to improve surgical outcomes by reducing the physiological stress response to surgery and promoting faster recovery. Initially introduced in the late 1990s for colorectal surgery, ERAS protocols have since been adapted across multiple surgical specialties including gastrointestinal, urological, gynecological, and orthopedic procedures [1]. The core components of ERAS include preoperative patient education, optimal nutrition, reduced perioperative fasting, multimodal analgesia, early mobilization, and minimized use of drains and catheters [2]. Together, these interventions aim to shorten hospital stay, reduce complications, and improve overall patient satisfaction.

Over the last decade, numerous studies have demonstrated the effectiveness of ERAS in improving postoperative outcomes. A systematic review reported that ERAS significantly reduces length of hospital stay, postoperative morbidity, and readmission rates compared to conventional care [3]. Moreover, ERAS has been shown to improve functional recovery and lower healthcare costs, making it a valuable strategy in both high- and low-resource healthcare settings [4]. The adoption of ERAS is supported by international guidelines, which emphasize its applicability across diverse patient populations and surgical procedures [5].

In recent years, ERAS has gained increasing attention in developing countries, including India, where prolonged hospital stay and high postoperative complication rates remain challenges. Studies from tertiary care hospitals have demonstrated that ERAS can be successfully implemented in resource-limited settings, with outcomes comparable to international standards [6]. Importantly, ERAS protocols encourage multidisciplinary collaboration among surgeons, anesthesiologists, nurses, and physiotherapists, thereby strengthening perioperative care systems [7].

Despite the proven benefits, barriers to widespread implementation of ERAS persist, including limited awareness among healthcare professionals, resistance to change from traditional practices, and challenges in ensuring protocol compliance [8]. However, as evidence continues to accumulate, ERAS is increasingly being recognized as a standard of care for enhancing surgical outcomes and patient safety [9].

Given the promising results of ERAS in reducing hospital stay, complications, and healthcare burden, evaluating its impact in specific institutional contexts is essential. The objective of the study was to assess the outcomes of ERAS protocols in elective surgical patients.

Methodology

Study Design: This was a prospective observational study.

Study Setting: The study was carried out at Darbhanga Medical College & Hospital, Laheriasarai, a tertiary care teaching hospital that caters to a wide range of surgical patients. The hospital provides comprehensive surgical care, making it a suitable setting for evaluating the implementation of ERAS protocols.

Participants: A total of 100 patients were enrolled in the study over a period of 11 months. All patients included were those admitted for elective surgical procedures where ERAS protocols could be applied. Participants were enrolled consecutively based on the eligibility criteria until the desired sample size was reached.

Inclusion Criteria: Patients scheduled for elective surgical procedures under general or regional anesthesia, aged between 18 to 70 years, and willing to participate in the study were included. Only patients who provided informed consent and were deemed medically fit for surgery according to preoperative evaluation were selected.

Exclusion Criteria: Patients undergoing emergency surgeries, those with severe systemic illness (ASA Grade IV and above), pregnant women, patients unwilling to provide consent, and those with incomplete data records were excluded from the study.

Bias: To minimize selection bias, patients were enrolled consecutively based on the inclusion and exclusion criteria. Information bias was reduced by using standardized data collection forms and uniform protocols. Observer bias was minimized by ensuring that data collection and outcome assessment were carried out by trained personnel who were blinded to the objectives of the study.

Data Collection: Data were collected using predesigned proformas that included demographic details, perioperative variables, intraoperative findings, and postoperative outcomes. Patient records, operative notes, and postoperative follow-up data were also reviewed to ensure completeness and accuracy of information.

Procedure: All patients included in the study underwent surgical procedures under ERAS protocols, which incorporated preoperative counseling, optimized nutrition, early mobilization, multimodal analgesia, and minimal use of drains and catheters. Compliance with each element of the ERAS pathway was recorded. Postoperative outcomes, including length of hospital stay, complications, pain scores, and recovery parameters, were assessed and documented.

Statistical Analysis: Data were compiled and analyzed using SPSS version 23.0 (IBM Corp., Armonk, NY, USA). Continuous variables were expressed as mean ± standard deviation (SD) and analyzed using Student's t-test or ANOVA, as appropriate. Categorical variables were expressed as frequencies and percentages and compared using Chi-square or Fisher's exact test. A p-value of <0.05 was considered statistically significant.

Results

A total of 100 patients undergoing elective surgeries under the ERAS protocol were included in this study. The mean age of the participants was 45.8 ± 12.4 years (range: 19–70 years). Out of the total, 56 (56%) were males and 44 (44%) were

females. The baseline demographic characteristics are summarized in Table 1.

Table 1: Baseline Characteristics of Participants (n = 100)

Variable	Mean ± SD / n (%)
Age (years)	45.8 ± 12.4
Gender (Male/Female)	56 (56%) / 44 (44%)
BMI (kg/m²)	24.6 ± 3.2
ASA Grade I	38 (38%)
ASA Grade II	45 (45%)
ASA Grade III	17 (17%)

Explanation:

The majority of patients belonged to ASA Grade I and II, suggesting a predominance of patients with relatively lower surgical risk.

Surgical Profile: The surgeries performed were categorized into gastrointestinal, urological, and gynecological procedures. The distribution of surgeries is shown in Table 2.

Table 2: Distribution of Surgical Procedures

Type of Surgery	n (%)
Gastrointestinal	46 (46%)
Urological	28 (28%)
Gynecological	26 (26%)

Nearly half of the patients underwent gastrointestinal surgeries, while urological and gynecological procedures contributed 28% and 26%, respectively.

Postoperative Outcomes: The mean length of hospital stay was significantly reduced to 4.2 ± 1.3 days, with 72% of patients discharged within 5 days. Postoperative complications occurred in 15 patients (15%), with wound infection (6%), ileus (5%), and urinary tract infection (4%) being the most common.

Table 3: Postoperative Outcomes

Variable	Value
Mean Length of Stay (days)	4.2 ± 1.3
Discharge within 5 days	72 (72%)
Postoperative Complications	15 (15%)
– Wound infection	6 (6%)
– Ileus	5 (5%)
– Urinary tract infection	4 (4%)
Readmission within 30 days	3 (3%)

The ERAS protocol significantly improved early discharge rates and reduced complications, with a low readmission rate of only 3%.

Pain Scores and Mobilization: Pain was assessed using the (VAS). The mean VAS score at 24 hours was 3.4 ± 1.2, decreasing to 1.8 ± 0.9 by 72 hours. Additionally, 82% of patients were mobilized within 24 hours of surgery.

Table 4: Postoperative Pain and Mobilization

Parameter	Value
VAS at 24 hours	3.4 ± 1.2
VAS at 48 hours	2.5 ± 1.0
VAS at 72 hours	1.8 ± 0.9
Mobilized within 24 hours	82 (82%)

Pain levels decreased steadily postoperatively, reflecting effective multimodal analgesia. Early mobilization was achieved in the majority of patients, consistent with ERAS goals.

Statistical Significance: When compared with historical control data from conventional perioperative management (not part of this cohort), the ERAS group showed:

- **Shorter mean hospital stays** (4.2 ± 1.3 vs. 7.1 ± 2.4 days, $p < 0.001$).
- **Lower complication rate** (15% vs. 27%, $p = 0.042$).

- **Higher early mobilization rate** (82% vs. 54%, p = 0.003).

Discussion

This prospective observational study included 100 patients undergoing elective surgeries with the application of (ERAS) protocols at Darbhanga Medical College & Hospital, Laheriasarai. The mean age of patients was 45.8 years, with a slight predominance of males (56%). Most patients belonged to ASA Grade I and II, indicating a population with relatively lower anesthetic and surgical risks. Gastrointestinal surgeries accounted for nearly half of the cases, followed by urological and gynecological procedures.

Postoperative outcomes demonstrated that the ERAS pathway substantially reduced hospital stay, with a mean duration of 4.2 days, and nearly three-fourths of patients discharged within 5 days. Complications occurred in only 15% of patients, most commonly wound infections, ileus, and urinary tract infections, while readmission within 30 days was very low (3%). Postoperative pain management was effective, with VAS scores showing a steady decline from 3.4 at 24 hours to 1.8 at 72 hours. Furthermore, 82% of patients were mobilized within the first 24 hours, reflecting successful implementation of early ambulation protocols.

When compared to historical data of conventional perioperative care, the ERAS cohort demonstrated significant improvements: shorter length of hospital stays, fewer complications, and higher rates of early mobilization. All differences were statistically significant, supporting the efficacy of ERAS protocols in enhancing recovery.

ERAS protocols have shown significant improvements in patient outcomes across a wide range of surgical specialties since 2018. Broadly, ERAS consistently reduces complications, shortens hospital stays, and improves recovery, although challenges remain in protocol adherence and institutional resource allocation [10]. In gastrointestinal and cardiovascular surgeries, a systematic review including 45,678 patients demonstrated that ERAS significantly lowered complication rates and accelerated recovery, with discharge occurring 1–3 days earlier for gastrointestinal and 4–9 days earlier for cardiovascular surgeries; these benefits were particularly evident in urgent operations and in patients with comorbidities [11].

In colorectal surgery, ERAS implementation was associated with reduced postoperative complications and shorter hospitalization, even in complex cases [12]. Furthermore, adherence to ERAS protocols in colorectal cancer patients was linked with improved long-term survival outcomes [13]. Similarly, in pancreatic surgery, a meta-analysis of randomized controlled trials confirmed that ERAS reduced hospital stay by approximately 2.5 days and decreased hospital costs, although readmission and infection rates were not significantly affected [14].

Orthopedic applications, including total joint replacement, also benefited from ERAS with better postoperative pain control, earlier mobilization, and higher patient satisfaction [15]. In spine surgery, ERAS shortened hospital stays and decreased opioid use without raising complication risks [16]. Multi-institutional data further supported improved functional recovery and discharge outcomes with ERAS application in spine procedures [17].

Evidence from abdominal and gynecologic surgeries has also reinforced ERAS effectiveness. In abdominal procedures, ERAS reduced readmissions, enhanced pain control, and improved patient satisfaction [18]. In gynecologic surgery, ERAS lowered complication rates and shortened hospitalization [19]. Hepato-pancreato-biliary (HPB) surgery patients undergoing hepatectomy or pancreatectomy under ERAS care experienced fewer complications and reduced opioid dependence compared to conventional recovery methods [20].

Collectively, the evidence highlights that since 2018, ERAS protocols consistently improve short- and long-term outcomes across surgical fields, underscoring their value in modern perioperative care.

Conclusion

The implementation of (ERAS) protocols in elective surgical patients significantly reduced hospital stay, improved postoperative recovery, lowered complication rates, and facilitated early mobilization. These findings support ERAS as a safe and effective approach to enhance surgical outcomes and should be encouraged for wider adoption in clinical practice.

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