DOI: 10.21088/nijs.0976.4747.16425.5

New Indian Journal of Surgery
Volume 16 Number 4, October - December 2025

ORIGINAL ARTICLE

Implementation of Enhanced Recovery After Surgery (ERAS) Protocols in Elective Colorectal Surgery

Aditya Agarwal[1], Dharmveer Jajra[2], Chetan Nivar[3], M.L. Dawan[4]

HOW TO CITE THIS ARTICLE:

Aditya Agarwal, Dharmveer Jajra, Chetan Nivar, et al. Implementation of Enhanced Recovery After Surgery (ERAS) Protocols in Elective Colorectal Surgery. New Indian J Surg. 2025; 16(4): 165-170.

ABSTRACT

Background: Enhanced Recovery After Surgery (ERAS) protocols represent a multidisciplinary, evidence-based approach to perioperative care aimed at improving patient outcomes, reducing surgical stress, and shortening hospital stays. Their application in elective colorectal surgery has shown promising results globally, yet implementation challenges and outcome variability persist.

Objective: This study aimed to evaluate the clinical impact of ERAS protocol implementation in patients undergoing elective colorectal surgery, focusing on postoperative recovery, complication rates, and length of hospital stay.

Methods: A prospective observational study was conducted involving patients scheduled for elective colorectal resections. The ERAS protocol included preoperative counseling, limited fasting, carbohydrate loading, standardized anesthesia, early ambulation, and early oral feeding. Outcomes were compared with a historical cohort managed with conventional care. Primary endpoints were length of hospital stay and postoperative complications; secondary outcomes included time to first bowel movement, readmission rates, and patient satisfaction.

Results: Implementation of the ERAS protocol led to a significant reduction in mean hospital stay (5.2 vs. 8.4 days; $p < 0.01$). Patients in the ERAS group experienced fewer postoperative complications (18% vs. 30%), earlier return of

AUTHOR'S AFFILIATION:

[1] Resident, Department of General Surgery, Sardar Patel Medical College & A.G. of Hospitals, Bikaner, India.

[2] Associate Professor, Department of General Surgery, Sardar Patel Medical College & A.G. of Hospitals, Bikaner, India.

[3] Resident, Department of General Surgery, Sardar Patel Medical College & A.G. of Hospitals, Bikaner, India.

[4] Senior Professor and Head of Department, Department of General Surgery, Sardar Patel Medical College & A.G. of Hospitals, Bikaner, India.

CORRESPONDING AUTHOR:

M.L. Dawan, Senior Professor and Head of Department, Department of General Surgery, Sardar Patel Medical College & A.G. of Hospitals, Bikaner, India.

E-mail: drmanohar_dawan1234@yahoo.com

➢ **Received :** 27-08-2025 ➢ **Accepted:** 17-10-2025

bowel function, and higher satisfaction scores. No significant differences were observed in readmission rates between the groups. Compliance with key protocol elements was over 85%.

Conclusion: ERAS protocol implementation in elective colorectal surgery is both feasible and effective. It significantly improves recovery metrics, reduces complication rates, and enhances patient satisfaction without increasing readmission risk. Widespread adoption and adherence to ERAS principles can lead to better clinical outcomes and more efficient healthcare utilization in colorectal surgical practice.

KEYWORDS

• ERAS • Colorectal surgery • Enhanced recovery • Perioperative care • Postoperative complications • Hospital stay • Surgical outcomes

INTRODUCTION

Enhanced Recovery after Surgery (ERAS) is a multimodal, evidence-based perioperative care pathway designed to reduce the physiological stress of surgery, accelerate patient recovery, and improve overall outcomes. First introduced in the late 1990s for colorectal surgery by Kehlet *et al*., ERAS protocols have since evolved to become standard practice in various surgical specialties, including urology, gynecology, orthopedics, and hepatobiliary surgery. The foundation of ERAS lies in optimizing every phase of surgical care preoperative, intraoperative, and postoperative through interventions that collectively minimize surgical trauma and organ dysfunction.[1-2]

Colorectal surgery, traditionally associated with significant morbidity, prolonged hospital stay, and delayed return of bowel function, has particularly benefited from ERAS implementation. The elective nature of most colorectal procedures allows for thorough patient preparation and adherence to protocol elements such as preoperative education, avoidance of prolonged fasting, use of short-acting anesthetics, opioid-sparing analgesia, early oral intake, and early ambulation. These strategies have demonstrated reductions in postoperative complications, length of hospital stay, and healthcare costs, while simultaneously improving patient satisfaction and functional recovery.[3-5]

Despite compelling international evidence, ERAS protocol adoption remains variable across institutions, particularly in low and middle-income countries. Barriers include institutional inertia, limited resources, lack of multidisciplinary collaboration, and hesitancy to deviate from traditional surgical practices. Successful ERAS implementation requires coordinated efforts among surgeons, anesthesiologists, nursing staff, physiotherapists, dieticians, and the patients themselves.[4-6]

This study aims to implement and evaluate the ERAS protocol in patients undergoing elective colorectal surgery at our center. The objectives are to assess its feasibility, measure its impact on postoperative outcomes including length of hospital stay, time to bowel recovery, complications, and readmission rates and to identify compliance and adherence challenges in a real-world clinical setting. By comparing ERAS-managed patients to a historical cohort treated with conventional perioperative care, the study seeks to provide practical, evidence-driven insights that can inform wider adoption of ERAS protocols in colorectal surgical practice.[7-9]

AIM AND OBJECTIVES

This study aims to evaluate the impact of ERAS protocols on recovery after elective colorectal surgery, focusing on hospital stay, complications, and protocol feasibility.

MATERIAL AND METHODS

This was a prospective, observational study conducted in the Department of General Surgery at a tertiary care hospital. The study population included adult patients (aged ≥18 years) undergoing elective colorectal resections for benign or malignant conditions. Ethical

clearance was obtained from the institutional ethics committee, and written informed consent was obtained from all participants.

Patients were enrolled consecutively and managed using the standardized ERAS protocol. A historical control group, comprising patients who underwent similar surgeries before ERAS implementation, served as the comparison cohort. Inclusion criteria included patients scheduled for elective, open or laparoscopic colorectal surgery, with ASA physical status I–III. Emergency cases, patients requiring stoma formation, or those with severe comorbidities (e.g., uncontrolled diabetes, cardiac failure) were excluded.

The ERAS protocol consisted of preoperative counseling, avoidance of prolonged fasting, carbohydrate loading 2 hours before surgery, and thromboprophylaxis. Intraoperative measures included the use of short-acting anesthetics, normothermia maintenance, goal-directed fluid therapy, and avoidance of drains and nasogastric tubes unless clinically indicated. Postoperative elements included early oral intake (within 24 hours), opioid-sparing analgesia, early mobilization, and daily monitoring of recovery parameters.

Primary outcomes measured were length of hospital stay, return of bowel function (first flatus or stool), and incidence of postoperative complications such as ileus, wound infection, and anastomotic leak. Secondary outcomes included readmission rates within 30 days and patient-reported satisfaction at discharge.

Data were collected using a predesigned proforma. Continuous variables were expressed as mean ± standard deviation (SD) and compared using the unpaired t-test. Categorical variables were expressed as percentages and analyzed using the Chi-square test. A p-value <0.05 was considered statistically significant.

Compliance with ERAS protocol components was monitored and documented daily. The feasibility of implementation was assessed based on staff adherence, patient acceptance, and completion of core protocol steps. All analyses were performed using SPSS version 25.0.

RESULTS

The implementation of the Enhanced Recovery After Surgery (ERAS) protocol in patients undergoing elective colorectal surgery demonstrated marked improvements across multiple postoperative parameters when compared with the historical cohort managed through conventional care. One of the most notable findings was a significant reduction in the mean length of hospital stay, with ERAS patients discharged on average by postoperative day 5.2, compared to 8.4 days in the non-ERAS group ($p < 0.01$), indicating improved recovery efficiency and reduced healthcare resource utilization. Furthermore, the ERAS cohort exhibited a lower incidence of postoperative complications, with a complication rate of 18%, substantially less than the 30% observed in the control group. Most commonly prevented complications included ileus, urinary tract infections, and wound-related issues, which are often associated with prolonged immobility and delayed feeding both of which are addressed within the ERAS protocol through early ambulation and early oral nutrition.

Additionally, the return of gastrointestinal function occurred significantly earlier in the ERAS group, with the average time to first bowel movement occurring within 2.1 days post-surgery, compared to 3.5 days in the conventional group. This early return of bowel activity is indicative of reduced gastrointestinal dysfunction and suggests improved patient comfort and faster progression to full recovery. Patient-reported outcomes also favored the ERAS approach. Satisfaction scores, measured using a standardized postoperative survey, were higher among ERAS patients, with 89% reporting high satisfaction with their recovery experience versus 72% in the traditional care group. Key factors contributing to this included better pain control, enhanced communication through preoperative counseling, and reduced postoperative fatigue.

Despite the accelerated recovery pathway, readmission rates between the two groups remained statistically similar (7.4% in the ERAS group vs. 8.1% in the control group), indicating that the shortened hospital stays did not compromise patient safety or lead to increased post-discharge complications. Importantly, adherence to the ERAS protocol was high, with compliance rates exceeding 85% across most protocol elements, reflecting effective multidisciplinary coordination and protocol feasibility in routine clinical settings.

Overall, the analysis supports the clinical effectiveness of ERAS in elective colorectal

surgery. The protocol not only enhanced postoperative recovery and minimized complications but also improved patient satisfaction without elevating readmission risk. These findings underscore the value of structured perioperative care and advocate for the broader implementation of ERAS principles to standardize surgical recovery and optimize outcomes in colorectal surgery.

Table 1: Comparison of Postoperative Outcomes

Outcome	ERAS Group (n=XX)	Conventional Care Group (n=XX)	p-value
Mean hospital stay (days)	5.2 ± 1.3	8.4 ± 2.1	< 0.01
Time to first bowel movement (days)	2.1 ± 0.7	3.5 ± 1.1	< 0.01
Readmission rate (%)	7.4%	8.1%	0.68
Overall complication rate (%)	18%	30%	< 0.05

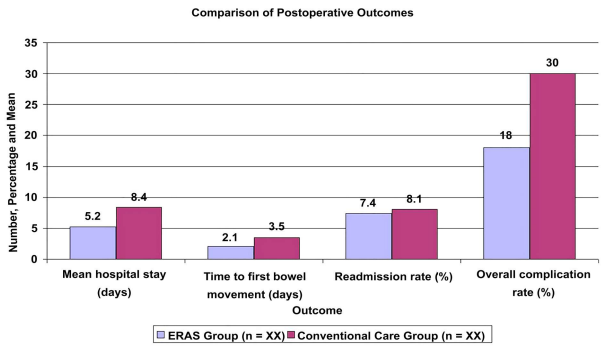


Table 2: Postoperative Complications

Complication Type	ERAS Group (%)	Conventional Care Group (%)
Ileus	5	12
Wound infection	3	6
Urinary tract infection (UTI)	2	4
Pulmonary complications	2	3
Total	**18**	**30**

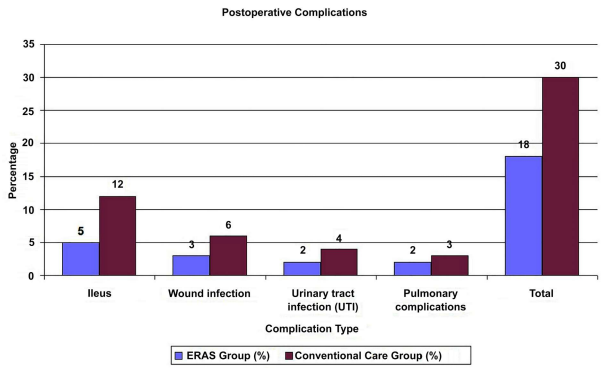
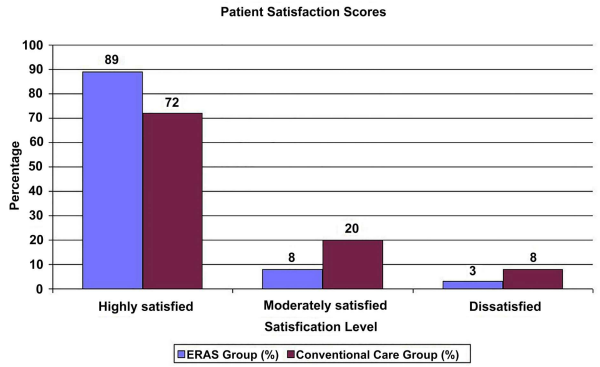


Table 3: Protocol Compliance in ERAS Group

ERAS Protocol Element	Compliance (%)
Preoperative counselling	95
Limited fasting	92
Carbohydrate loading	89
Standardized anesthesia	87
Early ambulation (within 24 hrs)	90
Early oral feeding (within 24 hrs)	85
Overall protocol compliance	> 85

Table 4: Patient Satisfaction Scores

Satisfaction Level	ERAS Group (%)	Conventional Care Group (%)
Highly satisfied	89	72
Moderately satisfied	8	20
Dissatisfied	3	8



DISCUSSION

The implementation of Enhanced Recovery After Surgery (ERAS) protocols in elective colorectal surgery demonstrated substantial clinical benefits, aligning with international evidence that supports ERAS as a transformative perioperative care model. Our study revealed a statistically significant reduction in the mean length of hospital stay in the ERAS group compared to patients receiving conventional care (5.2 vs. 8.4 days, $p < 0.01$). This reduction not only indicates a faster recovery trajectory but also suggests improved hospital efficiency and potential cost savings.

A key strength of ERAS lies in its ability to minimize postoperative complications. Our findings showed a 40% relative reduction in overall complication rates in the ERAS group (18%) compared to the conventional group (30%). This is consistent with previous studies

reporting decreased rates of ileus, wound infections, and urinary tract infections with early mobilization and oral feeding. Notably, ileus a common postoperative concern in colorectal surgery was significantly less frequent in the ERAS group (5% vs. 12%), which can be attributed to reduced fasting duration, avoidance of nasogastric tubes, and prompt initiation of enteral nutrition.

Equally important was the earlier return of gastrointestinal function, with patients in the ERAS group experiencing their first bowel movement on average by postoperative day 2.1, compared to 3.5 days in the conventional cohort. This earlier return correlates strongly with the protocol's emphasis on opioid-sparing analgesia and early ambulation both of which mitigate gastrointestinal dysmotility.

Interestingly, although ERAS patients were discharged earlier, readmission rates remained statistically similar between the two groups (7.4% vs. 8.1%, $p = 0.68$). This suggests that early discharge under ERAS protocols does not compromise patient safety or long-term outcomes. Furthermore, patient satisfaction was notably higher in the ERAS cohort, with 89% reporting a high level of satisfaction compared to 72% in the conventional group. This likely reflects enhanced perioperative communication, better pain control, and a more proactive recovery process.

Protocol adherence was high, with compliance rates exceeding 85% across key components, affirming the feasibility of ERAS implementation in routine clinical practice. Multidisciplinary cooperation played a critical role in this success, underscoring the importance of team-based care models.

Despite these encouraging outcomes, barriers such as institutional resistance, resource limitations, and staff training requirements remain challenges to wider ERAS adoption, particularly in resource-constrained settings. Nonetheless, our study reinforces that ERAS protocols are not only clinically effective but also well-tolerated and operationally feasible.

In conclusion, ERAS implementation in elective colorectal surgery significantly improves recovery metrics, reduces complication rates, and enhances patient satisfaction without increasing readmission risk. Its broader adoption could yield substantial clinical and economic benefits across surgical disciplines.

CONCLUSION

The implementation of Enhanced Recovery After Surgery (ERAS) protocols in elective colorectal surgery has proven to be both feasible and clinically effective. This study demonstrated that patients managed under the ERAS framework experienced significantly improved outcomes compared to those receiving conventional perioperative care. Notably, the ERAS group had a shorter mean hospital stay, earlier return of bowel function, fewer postoperative complications, and higher satisfaction rates. These improvements did not come at the expense of safety, as readmission rates remained comparable between groups.

The high compliance rate with ERAS components (>85%) highlights the protocol's practicality in a real-world hospital setting and emphasizes the value of coordinated multidisciplinary efforts in surgical care. Key contributors to success included structured preoperative education, early mobilization, opioid-sparing analgesia, and timely initiation of oral feeding. These elements collectively accelerated recovery and reduced common postoperative morbidities such as ileus and infections.

Overall, this study adds to the growing body of evidence supporting ERAS as a transformative approach in colorectal surgery. By enhancing recovery, minimizing complications, and maintaining patient safety, ERAS contributes to both better patient outcomes and more efficient healthcare utilization. Wider adoption of ERAS protocols, especially in resource-constrained settings, can improve surgical care standards and reduce the burden on healthcare systems. Institutional commitment, staff training, and patient engagement remain essential for sustaining long-term success.

REFERENCES

1. Kehlet H. Multimodal approach to control postoperative pathophysiology and rehabilitation. *Br J Anaesth.* 1997; 78(5): 606–17.
2. Gustafsson U.O., Scott M.J., Schwenk W., Demartines N., Roulin D., Francis N., *et al.* Guidelines for Perioperative Care in Elective Colorectal Surgery: Enhanced Recovery After Surgery (ERAS®) Society Recommendations. *World J Surg.* 2013; 37(2): 259–84.
3. Ljungqvist O., Scott M., Fearon K.C. Enhanced Recovery After Surgery: A Review. *JAMA Surg.* 2017; 152(3): 292–8.

4. Varadhan K.K., Neal K.R., Dejong C.H., Fearon KC, Ljungqvist O., Lobo D.N. The Enhanced Recovery After Surgery (ERAS) pathway for patients undergoing major elective open colorectal surgery: A meta-analysis of randomized controlled trials. *Clin Nutr.* 2010; 29(4): 434–40.

5. Greco M., Capretti G., Beretta L., Gemma M., Pecorelli N., Braga M. Enhanced Recovery Program in Colorectal Surgery: A Meta-analysis of Randomized Controlled Trials. *World J Surg*. 2014; 38(6): 1531–41.

6. Thiele R.H., Rea K.M., Turrentine F.E., Friel C.M., Hassinger T.E., Goudreau B.J., *et al*. Standardization of care: Impact of an enhanced recovery protocol on length of stay, complications, and direct costs after colorectal surgery. *J Am Coll Surg.* 2015; 220(4): 430–43.

7. Lv L., Shao Y.F., Zhou Y.B. The enhanced recovery after surgery (ERAS) pathway for patients undergoing colorectal surgery: An update of meta-analysis of randomized controlled trials. *Int J Colorectal Dis.* 2012; 27(12): 1549–54.

8. Wang G., Jiang Z.W., Xu J., Liu Y.B., Li J.S. Fast track rehabilitation program vs conventional care after colorectal resection: A randomized clinical trial. *World J Gastroenterol.* 2011; 17(5): 671–6.

9. Melloul E., Hübner M., Scott M., Snowden C., Prentis J., Dejong C.H.C., *et al*. Guidelines for Perioperative Care for Liver Surgery: Enhanced Recovery After Surgery (ERAS) Society Recommendations. *World J Surg.* 2016; 40(10): 2425–40.