

Awareness, Knowledge, and Implementation of Enhanced Recovery After Surgery (ERAS) Protocols Among Healthcare Professionals in a Tertiary Care Hospital: A questionnaire-based study

Neha Chajgotra¹, Neha Sharma², Rajesh Angral^{3*}, Anshuman M Chander⁴

^{1,2,3}Department of Anaesthesia & Critical care, Government Medical College, Kathua, Jammu and Kashmir, India

⁴Department of General Surgery, Government Medical College, Kathua, Jammu and Kashmir, India

ABSTRACT

Background: Enhanced Recovery After Surgery (ERAS) protocols constitute multidisciplinary, evidence-based perioperative care pathways aimed at optimizing postoperative outcomes, reducing complications, and shortening hospital stay. This study seeks to assess the level of awareness, knowledge, and implementation of ERAS protocols among healthcare professionals in a tertiary care hospital.

Methods: A cross-sectional, questionnaire-based study was conducted among 320 healthcare professionals including surgeons, anaesthesiologists, junior doctors, nurses, and technicians. The validated questionnaire evaluated demographic characteristics, awareness, knowledge, implementation practices, perceived barriers, and educational needs related to ERAS protocols. Data were analyzed using descriptive statistics and chi-square tests, with $p < 0.05$ considered statistically significant.

Results: Only 25.9% of participants had received formal ERAS training, and 29.7% were aware of ERAS principles, while adequate knowledge and active implementation were limited to 22.5% and 14.1%, respectively. Surgeons and anaesthesiologists demonstrated higher awareness and practice implementation compared to junior doctors and nursing staff ($p < 0.05$). The most frequently applied components were preoperative counselling (41.3%) and early oral feeding (40.3%), whereas carbohydrate loading (23.8%) and multimodal analgesia (31.6%) were less adopted. Common barriers included lack of knowledge (53.4%), insufficient resources (49.4%), and colleague resistance (44.4%). However, 84.4% expressed interest in receiving further ERAS training, with workshops being the preferred format.

Conclusion: The study reveals that while ERAS awareness exists among healthcare providers, knowledge and implementation remain inadequate. Targeted multidisciplinary education, institutional support, and standardized ERAS protocols are essential to bridge the knowledge-practice gap and improve perioperative patient outcomes.

Keywords: Enhanced recovery after surgery, Awareness, Implementation, Healthcare professionals, Perioperative care

DOI:

10.55489/njmr.160220261243

*Corresponding author:

Dr. Rajesh Angral

Email: rajeshangral73@gmail.com

Date of Submission: 09/11/2025

Date of Acceptance: 19/01/2026

Date of Publication: 01/04/2026

Funding Support:

None Declare

Conflict of Interest:

The authors have declared that no conflict of interest exists.

How to cite this article:

Chajgotra N, Sharma N, Angral R, Chander AM. Awareness, Knowledge, and Implementation of Enhanced Recovery After Surgery (ERAS) Protocols Among Healthcare Professionals in a Tertiary Care Hospital: A questionnaire-based study. Natl J Med Res 2026;16(02):52-57. DOI: 10.55489/njmr.160220261243

Copy Right: The Authors retain the copyrights of this article, with first publication rights granted to Medsci Publications.

License Term: Creative Commons Attribution-Share Alike (CC BY-SA) 4.0

Publisher: Medsci Publications [www.medscipublications.com]

ISSN: 2249 4995

Official website: www.njmr.in

INTRODUCTION

Enhanced Recovery After Surgery (ERAS) is a multimodal, evidence-based perioperative care pathway designed to minimize surgical stress, optimize physiological function, and expedite postoperative recovery. Introduced by Kehlet in the 1990s, the ERAS concept has revolutionized surgical care by emphasizing patient-centered and multidisciplinary approaches that span the preoperative, intraoperative, and postoperative phases of surgical management. The key principles of ERAS protocols include preoperative counseling, early mobilization, minimally invasive surgical techniques, optimal pain control, early enteral nutrition, and avoidance of prolonged fasting. The integration of these elements results in reduced postoperative morbidity, shorter hospital stays, and improved patient satisfaction.[1]

Successful implementation of ERAS protocols requires a coordinated effort among all members of the surgical care team including surgeons, anesthesiologists, nurses, technicians, and other allied healthcare staff. However, studies have consistently shown that the level of awareness, knowledge, and practical implementation of ERAS varies widely among healthcare professionals. Lack of formal training, resistance to change from conventional practices, and institutional barriers remain major challenges in achieving uniform ERAS adoption across healthcare settings. This variation in understanding and application of ERAS guidelines may limit the full realization of its clinical and economic benefits.[2]

Although ERAS has been widely studied and implemented in high-income countries, evidence from lower-middle-income countries (LMICs) including India, remains limited. Systematic reviews evaluating ERAS in LMICs highlight the small number of implementation-focused studies and significant heterogeneity in study design and outcomes, underscoring the need for high-quality, context-specific data to better understand setting-specific barriers and facilitators to ERAS adoption.[3] Furthermore, specialty-specific global surveys have shown that uptake of ERAS elements is particularly low in regions composed of LMICs, indicating a gap between guideline recommendations and real-world practice.[4] In India, although ERAS principles are increasingly recognized in tertiary care institutions, their integration into routine surgical practice remains inconsistent. National survey data suggest a clear disparity between awareness and actual implementation of ERAS protocols, influenced by professional role, availability of structured training, and institutional support systems.[5] Surgeons and anesthesiologists generally demonstrate greater familiarity with ERAS concepts, whereas nursing and technical staff often have limited exposure, highlighting important multidisciplinary knowledge and implementation gaps. Existing Indian studies are largely specialty-specific or outcome-oriented and do not comprehensively evaluate provider-level awareness, perceived barriers, and institutional constraints unique to resource-limited settings.[6] Therefore, systematically assessing ERAS

awareness, knowledge, implementation practices, and perceived barriers among diverse healthcare professionals is a crucial first step toward designing targeted educational strategies and strengthening institutional frameworks to support effective ERAS implementation in LMIC contexts.[3]

This questionnaire-based study was conducted among healthcare professionals in a tertiary care hospital to assess their awareness and knowledge of ERAS protocols, evaluate the extent of ERAS implementation in routine clinical practice, and identify perceived barriers and educational needs influencing effective adoption of ERAS principles. Findings from this research will provide insight into current practices and inform strategies to enhance the dissemination and standardization of ERAS within the hospital setting. Ultimately, improving knowledge and compliance with ERAS principles among healthcare professionals can significantly improve patient outcomes, reduce postoperative complications, and contribute to more efficient utilization of healthcare resources.[7]

MATERIALS AND METHODS

The present study was designed as a descriptive, cross-sectional, questionnaire-based investigation conducted in the Department of Surgery and its affiliated units of a tertiary care teaching hospital. The study population comprised healthcare professionals, including surgeons, anesthesiologists, junior doctors, nurses, and technicians working across various surgical departments. Data were collected through a structured, pre-validated questionnaire administered in both printed and digital formats, with participation being entirely voluntary. The study was conducted over a four-month period from June to September 2025. Ethical clearance was obtained from the Institutional Ethics Committee (No. IEC/GMCK/38 dated 28/05/2025) prior to commencement of the study.

Sample Size: A total of 320 healthcare professionals were enrolled using convenience sampling.

Inclusion Criteria: Healthcare professionals (surgeons, anesthesiologists, junior doctors, nurses, and technicians) involved in perioperative patient care and willing to provide informed consent and complete the questionnaire were included in the study.

Exclusion Criteria: Administrative staff or personnel not directly involved in patient care were excluded. Incomplete or inconsistent questionnaire responses (Questionnaires with substantial missing data or internally inconsistent responses were excluded during data cleaning. Inconsistency was defined as discordant responses to related items or invalid multiple selections in single-choice questions. Total of 30 responses were excluded).

Procedure and Methodology: After obtaining ethical committee approval, a structured questionnaire was developed and validated by subject experts. Healthcare

professionals were divided into 2 groups. Group A includes surgeon and anaesthesiologist and Group B includes other cadres (junior doctors, nurses, technicians) The questionnaire was developed after a review of relevant literature on ERAS awareness and implementation studies and underwent content validation by a panel of subject experts. Face and content validity were assessed to ensure clarity, relevance, and comprehensiveness of the items. A pilot study was conducted prior to the main survey on participants who were not included in the final analysis to test feasibility and comprehension, and necessary modifications were made accordingly. Internal consistency reliability was assessed during pilot testing, and the questionnaire demonstrated acceptable consistency for exploratory survey research. The questionnaire comprised sections on:

Demographic details - profession, specialization, and years of experience.

Awareness - familiarity with the concept of ERAS, source of knowledge, and formal training.

Knowledge - identification of ERAS components, such as preoperative counseling, early mobilization, and minimal invasive techniques.

Implementation and barriers - degree of involvement in ERAS application and perceived challenges (e.g., lack of knowledge, resistance from colleagues, or resource limitations).

Perceptions and educational needs - belief in ERAS benefits and interest in further training through workshops or seminars.

Questionnaires: The questionnaire was distributed both electronically (via institutional email) and manually. Responses were collected anonymously to ensure unbiased feedback.

Sample Processing: Completed questionnaires were reviewed for completeness and accuracy. Data were compiled, coded, and entered into MS Excel for analysis.

Statistical Methods: Descriptive statistics were applied using SPSS version 26.0. Categorical data such as

awareness and implementation rates were expressed as frequencies and percentages. Comparative analysis between professional categories was done using the Chi-square test, with $p < 0.05$ considered statistically significant.

Data Collection: Of the 350 questionnaires distributed, 320 valid responses were received, yielding a response rate of approximately 91%. The data were stratified by professional category to assess intergroup variations. Anonymized results were used solely for academic analysis and publication purposes.

RESULTS

The study included 320 healthcare professionals with an average professional experience of 7.4 ± 5.8 years. Only 25.9% (95% CI 21.4-31.0) of participants reported having received formal training in ERAS protocols, which was significantly lower than the expected 50% benchmark ($p < 0.001$). Institutional implementation of ERAS protocols was present in 43.4% (38.1-48.8) of workplaces ($p = 0.019$). Overall awareness of ERAS was limited to 29.7% (24.9-34.9) of respondents ($p < 0.001$), while adequate theoretical knowledge was noted in 22.5% (18.3-27.4) ($p < 0.001$). Only 14.1% (10.7-18.3) reported routinely implementing ERAS components in daily practice ($p < 0.001$) (table 1).

Comparison across cadres demonstrated significant differences in ERAS understanding and utilization. Awareness was highest among anaesthesiologists (40.0%) and surgeons (38.7%), followed by junior doctors (30.5%) and nurses/technicians (20.0%) ($p = 0.024$). A similar trend was observed for adequate knowledge - 36.7% of anaesthesiologists and 30.7% of surgeons showed sound knowledge compared with 20.0% of junior doctors and 15.5% of nursing/technical staff ($p = 0.020$). Implementation levels mirrored these gradients, being most pronounced among anaesthesiologists (30.0%) and surgeons (25.3%), while junior doctors (5.7%) and nurses/technicians (10.0%) lagged considerably behind ($p < 0.001$) (table 2).

Table 1: Overall cohort profile of the participants (n = 320)

Measure	n / Mean	% / SD	95% CI	p-value
Age (years), Mean (SD)	42.85	10.16	-	-
Years in profession, Mean (SD)	7.4	5.8	-	-
Any prior formal ERAS training (Yes)	83	25.9%	21.4%-31.0%	<0.001
ERAS in workplace (Yes)	139	43.4%	38.1%-48.8%	0.019
Awareness of ERAS (Yes)	95	29.7%	24.9%-34.9%	<0.001
Adequate knowledge of ERAS (Yes)	72	22.5%	18.3%-27.4%	<0.001
Active implementation of ERAS (Yes)	45	14.1%	10.7%-18.3%	<0.001

Table 2: Awareness and knowledge of professional cadre (n = 320)

Outcome	Nurses/Tech (n=110) N (%)	Junior doctors (n=105) N (%)	Surgeons (n=75) N (%)	Anesthesiologists (n=30) N (%)	p-value
Awareness (Yes)	22 (20.0)	32 (30.5)	29 (38.7)	12 (40.0)	0.024
Adequate knowledge (Yes)	17 (15.5)	21 (20.0)	23 (30.7)	11 (36.7)	0.020
Active implementation (Yes)	11 (10.0)	6 (5.7)	19 (25.3)	9 (30.0)	<0.001

Table 3: Extent of implementation of ERAS components (overall and by clinician group) (n=320)

ERAS component (Often/Always)	Overall yes n (%) [95% CI]	Group A yes/no	Group B yes/no	p-value
Preoperative counselling	132 (41.3%) [36.0-46.7]	56 / 105	76 / 215	0.002
No prolonged fasting (≤ 2 h clears)	108 (33.8%) [28.8-39.1]	38 / 105	70 / 215	0.52
Preop carbohydrate drink (2-3 h)	76 (23.8%) [19.4-28.7]	31 / 105	45 / 215	0.090
Multimodal/opioid-sparing analgesia	101 (31.6%) [26.7-36.8]	44 / 105	57 / 215	0.005
Early mobilization (POD 0-1)	115 (35.9%) [30.9-41.3]	39 / 105	76 / 215	0.75
Early oral intake (≤ 24 h)	129 (40.3%) [35.1-45.8]	52 / 105	77 / 215	0.019

Table 4: Reported barriers for effective ERAS adoption (n = 320)

Barrier	Overall n (%) [95% CI]	Group A yes / no	Group B yes / no	p-value
Lack of knowledge	171 (53.4%) [48.0-58.8]	41 / 105	130 / 215	<0.001
Resistance from colleagues	142 (44.4%) [39.0-49.9]	38 / 105	104 / 215	0.039
Insufficient resources	158 (49.4%) [44.0-54.8]	43 / 105	115 / 215	0.035
Time constraints	117 (36.6%) [31.5-41.9]	49 / 105	68 / 215	0.009
Unclear/fragmented protocols	133 (41.6%) [36.3-47.0]	35 / 105	98 / 215	0.037
Few/no regular MDT meetings	121 (37.8%) [32.7-43.2]	29 / 105	92 / 215	0.009

Table 5: Educational needs and preferred formats (n = 320)

Item	Overall n (%) [95% CI]	p-value
Wants ERAS training (any format)	270 (84.4%) [80.0-87.9]	<0.001
Workshops	201 (62.8%) [57.4-67.9]	<0.001
Seminars	143 (44.7%) [39.3-50.2]	0.057
Online self-paced modules	167 (52.2%) [46.7-57.6]	0.434
Pocket guidelines/cards	118 (36.9%) [31.8-42.3]	<0.001
Audit & feedback mentorship	96 (30.0%) [25.2-35.2]	<0.001

When assessing specific ERAS elements, the frequency of consistent application remained low to moderate. The most frequently practiced components were preoperative counselling (41.3%) and early oral feeding within 24 hours (40.3%), while avoidance of prolonged fasting (33.8%), early mobilization (35.9%), and multimodal or opioid-sparing analgesia (31.6%) were reported less consistently. Preoperative carbohydrate loading was the least implemented element at 23.8%. Group comparisons revealed that surgeons and anaesthesiologists (Group A) were significantly more compliant than other cadres (Group B) for preoperative counselling ($p = 0.002$), multimodal analgesia ($p = 0.005$), and early oral feeding ($p = 0.019$) (table 3).

Among perceived barriers to ERAS implementation, lack of knowledge (53.4%), insufficient resources (49.4%), and resistance from colleagues (44.4%) were the most frequently cited. Time constraints (36.6%), unclear or fragmented protocols (41.6%), and lack of regular multidisciplinary team (MDT) meetings (37.8%) were also common. Statistically, Group A professionals reported significantly fewer issues with knowledge deficits, resistance, and resource shortages ($p < 0.05$), while time-related challenges were higher in this group ($p < 0.009$) (table 4).

Regarding educational preferences, an overwhelming 84.4% (80.0-87.9) of participants expressed willingness to receive ERAS training ($p < 0.001$). Workshops (62.8%) were the most preferred format, followed by online modules (52.2%) and seminars (44.7%), whereas pocket

guideline cards (36.9%) and audit-feedback mentorship (30.0%) received less preference (table 5).

DISCUSSION

In this 320-participant cohort, formal ERAS training (25.9%), self-reported awareness (29.7%), adequate knowledge (22.5%), and routine implementation (14.1%) were all substantially below a 50% benchmark (Table 1). Similar deficits in training exposure and awareness have been consistently reported across institutions where ERAS programs are in early phases of adoption curve or lack structured institutional support [8,9]. Contemporary literature emphasizes that despite strong evidence supporting ERAS, translation into routine practice remains inconsistent, particularly in resource-limited settings [10]. Mixed methods and survey-based evidences identify training deficits, resource constraints, and cultural resistance to change as major barriers to implement ERAS protocols, similar to our findings in Table 4 (knowledge deficits 53.4%, insufficient resources 49.4%, and collegial resistance 44.4%). Large-scale implementation studies highlight that the convergence of institutional resources, provider knowledge, leadership engagement, and multidisciplinary buy-in is central to effective ERAS translation [11,12]. Without these foundational elements, ERAS adoption tends to remain fragmented and clinician-dependent rather than protocol-driven.

Cadre-wise gradients as depicted in Table 2, showed anaesthesiologists and surgeons lead in ERAS awareness and knowledge (≈ 30 -40%) and, more importantly, in ac-

tive implementation (30.0% and 25.3% respectively), while junior doctors and nurses/technicians show substantially lower engagement ($\approx 6-10\%$). Comparable cadre differentials have been described in nurse-focused knowledge, attitude and practice studies, where baseline awareness and attitudes toward ERAS are generally acceptable, yet translation into consistent bedside practice remains limited in the absence of structured empowerment and clear institutional protocols. These observations underscore the necessity of cadre-tailored education and shared governance mechanisms that enable bedside teams not merely to be informed, but to actively operationalize ERAS elements in routine practice [13].

Granular component uptake shown in Table 3 is consistent with the qualitative findings of Wang D et al, which further clarifies the practice gap [14]. Components with lower logistical friction and high face validity like preoperative counseling (41.3%) and early oral intake ≤ 24 h (40.3%), were adopted more often, while “system-dependent” items (multimodal/opioid-sparing analgesia 31.6%; carbohydrate drinks 23.8%; avoidance of prolonged fasting 33.8%) lagged behind. Similar trends have been documented in qualitative and multicenter studies, which identify protocol complexity, workflow disruption, and interdepartmental coordination as key limiting factors [14,12]. Notably, low uptake of multimodal analgesia persists despite robust guideline endorsement and growing anaesthesia-led evidence supporting opioid-sparing strategies within ERAS pathways [15].

Two elements deserve specific comment. First, preoperative carbohydrate loading showed the lowest compliance (23.8%), consistent with reports citing entrenched fasting traditions, supply limitations, and uncertainty regarding patient selection as persistent barriers [16,10]. Likewise, avoidance of prolonged fasting achieved only modest uptake, highlighting the need for institutional policy revisions and standardized preoperative checklists. Updated ERAS Society guidelines continue to emphasize both practices as high-impact, evidence-based interventions linked to improved metabolic stability and faster recovery, making them ideal targets for early-quality-improvement initiatives [17].

Barrier profiling (Table 4) revealed that lack of knowledge, insufficient resources, unclear protocols, and suboptimal multidisciplinary coordination were common across cadres. Similar barrier constellations have been described in LMIC-focused systematic reviews, which advocate phased ERAS implementation, locally adapted care bundles, and oversight by a dedicated ERAS committee to enhance sustainability [3,12]. Surgeons and anaesthesiologists reported fewer knowledge and resource barriers but greater time constraints, reflecting role-specific workload pressures- a pattern also described in global implementation analyses [11].

The educational demand identified in this study was substantial, with 84.4% of participants expressing interest in ERAS training (Table 5). Workshops were the pre-

ferred format, followed by online modules, aligning with evidence that blended, education-driven ERAS implantation strategies significantly improve protocol compliance and clinical outcomes [18]. International experience suggests that integrating such training with audit-feedback mechanisms, standardized order sets, and regular MDT meetings accelerates adoption and normalizes ERAS practices across institutions [19,20].

LIMITATIONS

Reliance on self-administered questionnaires may have introduced response bias or overestimation of knowledge and practice levels.

The study design assessed awareness and practices at a single time point, without evaluating temporal improvements or intervention effects.

Although sample distribution included various cadres, the smaller number of anaesthesiologists compared to nurses and junior doctors could have influenced comparative outcomes.

The study did not include observational audits or outcome-based metrics to validate the actual implementation of ERAS components in practice.

The use of convenience sampling and conduct of the study in a single tertiary care institution may limit external validity and generalization of the findings to other healthcare settings.

CONCLUSION

The present questionnaire-based study among 320 healthcare professionals highlights a significant gap between awareness and actual implementation of ERAS protocols in a tertiary care hospital. Although a moderate proportion of respondents were aware of ERAS principles, only a minority demonstrated adequate knowledge or incorporated these protocols routinely into clinical practice. Surgeons and anaesthesiologists exhibited higher levels of familiarity and adherence compared to nurses and junior doctors, indicating the influence of role-specific exposure and training. Major barriers included lack of formal education, inadequate institutional resources, and insufficient multidisciplinary coordination. These findings underscore the urgent need for structured ERAS training programs, interprofessional collaboration, and hospital-level policy support to promote standardized perioperative care and optimize patient outcomes.

Individual Author’s Contribution: **NC** and **RA** contributed comprehensively to the study, being involved in study conception, study design, data collection, data analysis and interpretation, as well as manuscript preparation. **NS** participated in the study design, data collection, data analysis and interpretation, and manuscript preparation, but was not involved in the initial conception of the

study. **AMC** contributed to the study design, data collection, and manuscript preparation; however, he was not involved in study conception or data analysis and interpretation.

Availability of data: The data that support the findings of this study are available from the corresponding author on reasonable request.

Declaration of Non-use of generative AI Tools: This article was prepared without the use of generative AI tools for content creation, analysis, or data generation. All findings and interpretations are based solely on the authors' independent work and expertise.

REFERENCES

- Nyundo M, Gasakure M, Muhawenayo E, Kayondo K, Banguti P, Twagirumukiza JD, et al. Introducing enhanced recovery after surgery (ERAS) program in Rwanda: a step-by-step approach from KAP study to protocol development and preliminary implementation. *BMC Surg.* 2025 Apr 23;25(1):173. DOI: <https://doi.org/10.1186/s12893-025-02909-6> PMID:40269829 PMCID:PMC12016112
- Lovegrove J, Tobiano G, Chaboyer W, Carlini J, Liang R, Addy K et al. Clinicians' perceptions of "enhanced recovery after surgery" (ERAS) protocols to improve patient safety in surgery: a national survey from Australia. *Patient Saf Surg.* 2024 May 23;18(1):18. DOI: <https://doi.org/10.1186/s13037-024-00397-w> PMID:38783341 PMCID:PMC1119013
- Riad AM, Barry A, Knight SR, Arbaugh CJ, Haque PD, Weiser TG et al. Perioperative optimisation in low- and middle-income countries (LMICs): A systematic review and meta-analysis of enhanced recovery after surgery (ERAS). *J Glob Health.* 2023 Oct 3;13:04114. DOI: <https://doi.org/10.7189/jogh.13.04114> PMID:37787105 PMCID:PMC10546475
- ESCP Enhanced Recovery Collaborating Group. An international assessment of the adoption of enhanced recovery after surgery (ERAS®) principles across colorectal units in 2019-2020. *Colorectal Dis.* 2021 Nov;23(11):2980-2987. DOI: <https://doi.org/10.1111/codi.15863> PMID:34365718
- Singh R, Gupta A, Gupta N, Kumar V. Enhanced recovery after surgery (ERAS): Are anaesthesiologists prepared for the paradigm shift in perioperative care? A prospective cross-sectional survey in India. *Indian J Anaesth.* 2021 Sep;65(Suppl 3):S127-S138. DOI: https://doi.org/10.4103/ija.IJA_122_21 PMID:34703058 PMCID:PMC8500193
- Gourav KPP, Arya VK, Gandhi KA, Singh H, Puri GD, Thingnam SKS. A Study of Various Barriers in Implementing "Enhanced Recovery After Cardiac Surgery (ERACS)" Program in Indian Setup. *Ann Card Anaesth.* 2025 Oct 1;28(4):459-471. DOI: https://doi.org/10.4103/aca.aca_93_25 PMID:41081690 PMCID:PMC12591288
- Ljungqvist O, Scott M, Fearon KC. Enhanced Recovery After Surgery: A Review. *JAMA Surg.* 2017 Mar 1;152(3):292-298. DOI: <https://doi.org/10.1001/jamasurg.2016.4952> PMID:28097305
- Rosyidah R, Dewanto A, Hapsari ED, Widyastuti Y. Health Professionals Perception of Enhanced Recovery After Surgery: A Scoping Review. *J Perianesth Nurs.* 2022 Dec;37(6):956-960. DOI: <https://doi.org/10.1016/j.jopan.2022.02.004> PMID:35680549
- Sauro KM, Smith C, Ibadin S, Thomas A, Ganshorn H, Bakunda L, et al. Enhanced Recovery After Surgery Guidelines and Hospital Length of Stay, Readmission, Complications, and Mortality: A Meta-Analysis of Randomized Clinical Trials. *JAMA Netw Open.* 2024 Jun 3;7(6):e2417310. DOI: <https://doi.org/10.1001/jamanetworkopen.2024.17310> PMID:38888922 PMCID: PMC11195621
- Kehlet H, Joshi GP. Enhanced Recovery After Surgery: Current Controversies and Concerns. *Anesth Analg.* 2017 Dec;125(6):2154-2155. DOI: <https://doi.org/10.1213/ANE.0000000000002231> PMID:29190219
- Lam JY, Howlett A, McLuckie D, Stephen LM, Else SDN, Jones A et al. Developing implementation strategies to adopt Enhanced Recovery After Surgery (ERAS®) guidelines. *BJS Open.* 2021 Mar 5;5(2):zraa011. DOI: <https://doi.org/10.1093/bjsopen/zraa011> PMID:33688958 PMCID:PMC7944851
- Pearsall EA, McLeod RS. Enhanced Recovery After Surgery: Implementation Strategies, Barriers and Facilitators. *Surg Clin North Am.* 2018 Dec;98(6):1201-1210. DOI: <https://doi.org/10.1016/j.suc.2018.07.007> PMID:30390852
- Seow-En I, Wu J, Yang LWY, Tan JSQ, Seah AWH, Foo FJ et al. Results of a colorectal enhanced recovery after surgery (ERAS) programme and a qualitative analysis of healthcare workers' perspectives. *Asian J Surg.* 2021 Jan;44(1):307-312. DOI: <https://doi.org/10.1016/j.asjsur.2020.07.020> PMID:32863145
- Wang D, Liu Z, Zhou J, Liu Z, Chen X, Cao L et al. Barriers to implementation of enhanced recovery after surgery (ERAS) by a multidisciplinary team in China: a multicentre qualitative study. *BMJ Open.* 2022 Mar 14;12(3):e053687. DOI: <https://doi.org/10.1136/bmjopen-2021-053687> PMID:35288383 PMCID:PMC8921855
- Dunknan WJ, Manning MW. Enhanced Recovery After Surgery and Multimodal Strategies for Analgesia. *Surg Clin North Am.* 2018 Dec;98(6):1171-1184. DOI: <https://doi.org/10.1016/j.suc.2018.07.005> PMID:30390850
- Ljungqvist O, de Boer HD, Balfour A, Fawcett WJ, Lobo DN, Nelson G, et al. Opportunities and Challenges for the Next Phase of Enhanced Recovery After Surgery: A Review. *JAMA Surg.* 2021 Aug 1;156(8):775-784. DOI: <https://doi.org/10.1001/jamasurg.2021.0586>. Erratum in: *JAMA Surg.* 2021 Aug 1;156(8):800. DOI: <https://doi.org/10.1001/jamasurg.2021.2579>. PMID: 33881466
- Grant MC, Engelman DT. Enhanced recovery after surgery: overarching themes of the ERAS® Society Guidelines & Consensus Statements for Adult Specialty Surgery. *Perioper Med (Lond).* 2025;14(1):120. Published 2025 Oct 30. DOI: <https://doi.org/10.1186/s13741-025-00590-0> PMID:41168801 PMCID:PMC12577217
- Pisarska M, Pędziwiatr M, Malczak P, Major P, Ochendusko S, Zub-Pokrowiecka A et al. Do we really need the full compliance with ERAS protocol in laparoscopic colorectal surgery? A prospective cohort study. *Int J Surg.* 2016 Dec;36(Pt A):377-382. DOI: <https://doi.org/10.1016/j.ijisu.2016.11.088> PMID:27876677
- Gustafsson UO, Scott MJ, Hubner M, Nygren J, Demartines N, Francis N et al. Guidelines for Perioperative Care in Elective Colorectal Surgery: Enhanced Recovery After Surgery (ERAS®) Society Recommendations: 2018. *World J Surg.* 2019 Mar;43(3):659-695. DOI: <https://doi.org/10.1007/s00268-018-4844-y> PMID:30426190
- Gramlich LM, Sheppard CE, Wasylak T, Gilmour LE, Ljungqvist O, Basualdo-Hammond C et al. Implementation of Enhanced Recovery After Surgery: a strategy to transform surgical care across a health system. *Implement Sci.* 2017 May 19;12(1):67. DOI: <https://doi.org/10.1186/s13012-017-0597-5> PMID:28526041 PMCID:PMC5438526