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Best in Surgery

Guidelines for perioperative care in elective colorectal surgery: Enhanced Recovery After Surgery (ERAS) Society recommendations 2025

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Introduction

The group that started the Enhanced Recovery After Surgery (ERAS) Society in 2010 introduced their first consensus guideline already in 2005 to improve the care of patients undergoing major colorectal surgery. When properly implemented, care pathways based on these guidelines have been shown to reduce morbidity rates, improve recovery, shorten length of stay (LOS), and reduce

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costs after major colorectal surgery.[1] Since the publication of the first ERAS colorectal guideline, a total of 3 subsequent sets of guidelines have been published. The last update from 2018 has been cited over 2,000 times.[1] The current 2025 guideline reflects the collaborative efforts of the ERAS Society (www.erassociety.org), international experts in colorectal surgery, and contributors from various international ERAS chapters to provide an updated consensus review of perioperative care for colorectal surgery, based on the latest evidence. A notable update in this guideline is the implementation of a new, rigorous methodology, developed through prior planning by the ERAS Society.[2]

Methods

The objective of this guideline was not to simply revise the previous iteration,[1] but rather to create a de novo ERAS colorectal guideline. To ensure adherence to rigorous standards for developing new guidelines, all steps outlined in the "Recommendations from the ERAS Society for standards for the development of enhanced recovery after surgery guidelines"[2] were fully followed for 21 of 23 ERAS items. The exceptions to the grading process were the anesthetic protocol and preoperative optimization of coexisting comorbidity, as the scope of these areas was multifaceted, touching on many elements and requiring broader, more general guidance than the others.[3]

Step 1: Formation of the Guideline Development Group

The group consisted of 18 authors, including 7 colorectal surgeons, 2 colorectal nurses, 1 medical nutrition physician, 6 anesthesiologists, 1 urologist, and 1 ERAS expert pediatric surgeon. All members were experts in their respective fields and experienced in research methods and critical evaluation. In addition, 5 authors have specialized expertise in epidemiology and/or statistics.

Step 2: Establishing guideline topics and initial approach

These guidelines were created from scratch, but the topic areas from which each ERAS element was retrieved were based on prior guidelines. Each element identified from the topic areas of the previous guideline was assessed individually for appropriateness based on a new review of the evidence. New potential elements were also considered.

Step 3: Scoping the guideline and planning the literature search

The PICO (Population, Intervention, Comparator, and Outcome) framework[4] was used to help formulate clear review questions and aid in a systematic review of the evidence (Table I). All available evidence for each single ERAS intervention was captured in separate literature searches for later assessment. The search strategies were recorded to allow for repetitive search sessions and were reviewed by an independent expert. The PubMed, Embase, Cochrane, and ClinicalTrials.gov databases were used to identify relevant contributions from January 1, 2000, to December 31, 2023. From October to November 2024, rapid reviews of the literature were performed using PubMed and Google Scholar to identify recent literature within each of the topics and determine whether new data would change recommendations. The screening process for each item or question, along with the search results, was documented in a separate PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) diagrams,[5] as shown in Appendix 1 (PRISMA Item 1–23).

Table I
PICO (Population, Intervention, Comparator, and Outcome) framework

Population	Which patient population is being studied?
Intervention	Which treatment or intervention is being recommended?
Comparator	Which alternative treatments are available?
Outcome	Which end points are being studied?

Table II
GRADE (Grading of Recommendations, Assessment, Development, and Evaluation) assessment of evidence

Assigned GRADE quality	Description
High	Further research is very unlikely to change confidence in the estimate of effect
Moderate	Further research is likely to have an important impact on confidence in the estimate of effect and may change the estimate
Low	Further research is very likely to have an important impact on confidence in the estimate of effect and is likely to change the estimate
Very low	Any estimate of effect is very uncertain

Table III
GRADE (Grading of Recommendations, Assessment, Development, and Evaluation) assessment of strength of recommendations

Assigned GRADE quality	Description
Strong	Desirable effects of intervention clearly outweigh undesirable effects, or clearly do not
Weak	Trade-offs are less certain, either because of low-quality evidence or because evidence suggests that desirable and undesirable effects are closely balanced

Step 4: Analyzing the quality of evidence

All studies captured in the literature search underwent a standardized process of evaluation, regardless of study design. After evaluation, all studies robust enough for evidence assessment underwent quality assessment according to the Grading of Recommendations, Assessment, Development, and Evaluation (GRADE) approach.[6] The quality of evidence provided by the studies included in the final analysis was classified as high, moderate, low, and very low by assessing the following aspects: importance of outcomes, risk of bias, heterogeneity, indirectness, imprecision, and publication bias (Table II). The GRADE assessment was followed by a rating of the strength of the recommendation as either strong or weak based on influential factors, including the GRADE quality of the evidence (Table III). The balance between desirable and undesirable effects, certainty of evidence, and effect size were considered within a structured process of review by the entire authorship team.[7]

Step 5: Review by an independent expert

All steps in the guideline process were reviewed by an independent expert appointed by the ERAS Society (Mary Brindle).

Step 6: Resolution of disagreement and consensus generation

To address any disagreements in recommendations after the grading process, we used the Delphi[8] method to facilitate expert consensus. Evidence grading and suggested recommendations for all items were discussed within the group during 2 half-day zoom meetings, resulting in preliminary consensus (first round). In the second round, all authors revised the prefinal recommendations

stating agreement or disagreement (with reasons) for the individual items. Controversial recommendations were subjected to a formal yes/no 2-round online Delphi voting (SurveyMonkey, Google formulare) including feedback of results of the prior votings. The consensus threshold was set at >70% agreement. An additional virtual meeting was planned to discuss remaining controversies. If consensus remained unattained after this process, nonconsensual items remained in the guidelines with summary of evidence, statement of nonconsensus, and without recommendation.

The evidence and recommendations for ERAS items are presented in 3 different headings: preoperative, intraoperative, and postoperative. Table IV shows an overview of the items of each phase of the perioperative course.

ERAS items for elective colorectal surgery (malignant and nonmalignant) with or without concurrent organ resection

Preoperative ERAS items

1. Preadmission education and information

Preoperative education is a crucial component of ERAS care in colorectal surgery, but its wide variation makes comparing studies challenging.

From 3,512 publications identified in the literature search, 10 met grading criteria, including 3 moderate-quality randomized controlled trials (RCTs). One RCT[9] found that tailored information for patients with rectal cancer reduced anxiety and improved satisfaction, especially 6 months after surgery. Another RCT[10] showed that virtual reality education significantly decreased anxiety and depression, enhancing patient satisfaction. A third RCT[11] reported that targeted preoperative ERAS and stoma education shortened hospital stays from 9 to 6 days, recommending early, repeated education by nurse specialists. Seven additional low-quality studies supported the value of focused educational interventions in varied contexts.

Quality of evidence and recommendations.

Recommendation: Preadmission education and information should be provided to all patients before surgery.

Quality of evidence: Preadmission education and information.

Quality of life: Moderate evidence for reduction in anxiety. Low evidence to support improvements to quality of life.

Length of stay: Low evidence to correlate preadmission information as an independent component leading to reduction of LOS.

Recommendation grade: Strong.

2. Preoperative optimization

Preoperative optimization is complex, involving diverse interventions. It focuses on reducing risks and comorbidities before surgery while enhancing health through strategies such as alcohol cessation and physical training. Preoperative optimization can be divided into 6 key components.

Identification of high-risk patients. There are several predictive tools that have been validated in colorectal surgery to identify patients at greatest risk for adverse outcomes. The evidence for specific tools is, however, weak. The American Society of Anesthesiologists Physical Status Classification System[12] and the American College of Surgeons (ACS) National Surgical Quality Improvement Program (NSQIP) Surgical Risk Calculator[13] are the tools with the best evidence in predicting outcomes from surgery. These platforms have been widely adopted globally, suggesting feasibility and acceptability.

Quality of evidence and recommendations.

Recommendation: Predictive tools should be used to identify high-risk patients before colorectal surgery to optimize perioperative planning and preparation.

Quality of evidence: Using predictive tools.

Mortality: Very low.

Complications: Very low.

Recommendation grade: Strong.

Identification of comorbidities: Preoperative optimization and perioperative planning. Evidence supporting presurgery optimization of individual diseases in colorectal surgery is weak but emphasizes managing key comorbidities:

Cardiovascular disease[14]: Optimizing medications[15] and hemodynamic monitoring[16] may reduce adverse outcomes in ischemic heart disease and heart failure.

Chronic obstructive pulmonary disease (COPD)[17]: Addressing COPD, asthma, interstitial lung disease, and infections[18] through smoking cessation and delaying surgery for active infections is crucial.

Renal insufficiency[19]: Avoid nonsteroidal anti-inflammatory drugs (NSAIDs) and nephrotoxins and carefully manage fluids to prevent acute kidney injury (AKI).

Chronic liver disease[20]: Avoid nonessential surgeries, manage volume status, address coagulopathy, and prevent hepatotoxicity to reduce bleeding and decompensation risks.

Diabetes[21]: Preoperative screening (hemoglobin A1c [HbA1c]) and managing hyperglycemia can lower complications.

Quality of evidence and recommendations

Recommendation: Comorbidities should be optimized before surgery and identified for postoperative planning.

Quality of evidence: Optimizing comorbidities.

Mortality: Low.

Complications: Low.

Length of stay: Low.

Recommendation grade: Strong.

Alcohol cessation before surgery. Excessive alcohol use is associated with postoperative complications such as infections, cardiopulmonary issues, and bleeding.[22–24] However, evidence is weak, with uncertainties about risky alcohol levels and occasional drinking. Observational studies face bias from inconsistent assessments, underreporting, and confounding factors such as smoking and comorbidities. A review of 37 studies on alcohol use and surgery identified 8 studies robust enough for analysis, though no RCTs were available. Three large cohort studies[22–24] reported alcohol abuse prevalence of 2%–2.9%, with vague thresholds for overconsumption. Alcohol use disorder was associated with a significantly increased risk of in-hospital mortality[23,24] and postoperative delirium.[25,26] One study showed that consuming 2 or more drinks daily is associated with pneumonia, sepsis, surgical site infections (SSIs), and wound disruption.[23] Alcohol use disorder also increases hospital stay and costs.[24] A cessation intervention was effective in helping patients quit drinking.[27] However, data on optimal preoperative cessation timing and postoperative use remain lacking.

Quality of evidence and recommendations.

Recommendation: Patients with high rates of alcohol consumption should stop drinking 4 weeks before surgery.

Quality of evidence: Excessive alcohol use before surgery.

Mortality: Low.

Complications: Low.

Length of stay: Low.

Recommendation grade: Weak.

Table IV
Comparison of the preoperative, intraoperative, and postoperative ERAS items between the 2018 and 2025 guidelines*

Item	Recommendation 2025	Change versus 2018
Preoperative		
1. Preadmission information	Information is strongly recommended for all patients before surgery, with moderate evidence supporting reduced anxiety but low evidence for improving quality of life or LOS	No changes
2. Preoperative optimization		
A. Identification of high-risk patients	Predictive tools are strongly recommended for identifying high-risk patients before colorectal surgery, despite very low evidence for reducing mortality and complications	Added details on specific tools
B. Management of comorbidities	Optimizing comorbidities before surgery is strongly recommended, despite low evidence for reducing mortality, complications, and length of stay	Added details on optimizing specific comorbidities
C. Alcohol cessation	Patients with high alcohol consumption are advised to stop drinking 4 weeks before surgery, though the recommendation is weak due to low evidence for reducing mortality, complications, and length of stay	Changed from strong to weak recommendation
D. Smoking cessation	Smokers should quit and undergo behavioral intervention with nicotine replacement at least 4 weeks before surgery to reduce mortality and complications, based on moderate evidence	No changes
E. Prehabilitation	No specific prehabilitation regimen can be recommended before surgery due to moderate to low evidence with conflicting results on functional capacity, complications, and length of stay	From weak recommendation to currently no recommendation for a specific regimen
F. Anemia treatment	Routine screening and correction of anemia before surgery is strongly recommended to improve long-term survival and decrease perioperative transfusions. Preoperative IV iron supplementation and high-dose erythropoietin (EPO) are weakly recommended for anemia correction	Use of EPO added in the current guidelines
3. Preoperative nutrition	Routine nutritional screening is strongly recommended for colorectal surgery patients, whereas nutritional supplementation and oral immunonutrition may be considered for malnourished patients, though evidence is that moderate and recommendations are weak	Immunonutrition added as recommendation in the current guidelines
4. PONV prophylaxis	PONV prophylaxis with medications such as aprepitant, ramosetron, granisetron, dexamethasone, and ondansetron is strongly recommended based on high-quality evidence	New optimal formulae in the current guidelines
5. Preanesthetic sedation/anxiolytics	Moderate quality of evidence showing no benefit	No change
6. Thromboprophylaxis	Patients should receive multimodal thromboembolism prevention, including mechanical and pharmacological measures. Intraoperative intermittent pneumatic compression (IPC) and extended prophylaxis for at-risk patients. Strong recommendation	Intraoperative IPC and more liberal timing of medication in the current guidelines
7. Mechanical bowel preparation (MBP)	MBP should not be used routinely in colonic surgery but may be considered in rectal surgery with diverting stomas. If MBP is used, adding oral antibiotics is recommended	Recommendation grade regarding avoidance of MBP alone have changed from strong to weak in the current guidelines
8. Fasting and carbohydrate load	Short preoperative fasting is strongly recommended in colorectal surgery to improve insulin sensitivity and reduce PONV. Preoperative carbohydrate loading may improve insulin sensitivity but offers no clinical advantages over standard short fasting protocols	Recommendation of preoperative carbohydrate loading changed from strong to weak
9. Antibiotics and skin preparation	IV antibiotics within 60 minutes before incision, repeat for prolonged surgery or blood loss. Oral antibiotics for MBP patients. Chlorhexidine-alcohol–based preparations for skin disinfection. Insufficient evidence for antiseptic showering or shaving	High-quality evidence in favor addition of oral antibiotic decontamination with MBP in the current guidelines
10. Preoperative fluids	Patients should be encouraged to stay well-hydrated with clear fluids up to 2 hours before surgery, and any fluid or electrolyte imbalances should be corrected, based on strong evidence	No changes
Intraoperative		
11. Anesthetic protocol	Use short-acting agents, cerebral monitoring, and antiadrenergic and anti-inflammatory strategies to minimize surgical stress and enhance recovery. Avoid hypotension, use protective ventilation, and ensure complete neuromuscular block reversal with TOF monitoring	No changes
12. Normothermia	Active body surface warming is strongly recommended during surgery as it reduces surgical site infections, decreases the need for blood transfusions, and improves patient satisfaction	The evidence levels for various warming methods have been incorporated into the current guidelines
13. Intraoperative fluids	A slightly positive fluid balance on the day of surgery is weakly recommended based on moderate-quality evidence	Shift from near-zero fluid balance to slightly positive fluid balance
14. Surgical approach	Minimally invasive surgery (MIS) should be routinely performed for CRC patients and combined with ERAS protocols to reduce length of stay. Strong recommendations based on high-quality evidence	Minimal invasive surgery: standard of care

(*continued on next page*)

Table IV (*continued*)

Item	Recommendation 2025	Change versus 2018
15. Abdominal drainage	Routine abdominal drainage is not recommended after colonic or rectal resection, with strong support for colonic resection and weaker support for rectal resection based on moderate to low-quality evidence	Weaker evidence for avoiding rectal drain in the current guidelines
Postoperative		
16. Nasogastric tube (NGT)	Prophylactic NGT may be used during colorectal surgery but is not recommended postoperatively	Quality of evidence changed from high to moderate
17. Normoglycemia	Intraoperative and postoperative hyper- and hypoglycemia should be avoided through glycemic control, with strict monitoring in patients with elevated preoperative HbA1c	Preoperative HbA1c and specified postoperative blood glucose levels have been included
18. Postoperative fluids	Maintain a slightly positive postoperative fluid balance with weight gain limited to 1−2.5 kg, using balanced crystalloid solutions. Varying evidence quality and strength of recommendation	Shift from near-zero fluid balance to slightly positive fluid balance
19. Urinary drainage	Urinary catheters should be removed within 24 hours after uncomplicated minimal-invasive colonic surgery, within 48 hours after uncomplicated minimal-invasive rectal surgery	Specified interventions included in the recommendations
20. Prevention of ileus	A multimodal approach should be undertaken to minimize the development of postoperative ileus	Extensive evaluation included, return of chewing gum as recommendation
21. Postoperative analgesia	A multimodal analgesia strategy, including acetaminophen, TAP blocks, NSAIDs for colonic surgery, and intrathecal morphine, should be used after both open and MIS colorectal surgery	Use alternative analgesic's (versus epidurals) also in open surgery
22. Postoperative nutritional care	Early gut feeding within 24 hours after surgery, resumption of oral intake, and the use of oral nutritional supplements are recommended to improve recovery	Detailed evidence evaluation included. Immunonutrition added as a recommendation
23. Mobilization	Early postoperative mobilization should begin on the day of surgery, with at least 3 hours of mobilization per day from POD 1 to discharge, supported by strong recommendations despite limited evidence	Detailed evidence evaluation included. From POD 1 to discharge: 3 hours/d

CRC, colorectal cancer; *ERAS*, Enhanced Recovery After Surgery; *HbA1c*, hemoglobin A1c; *IV*, intravenous; *LOS*, length of stay; *POD*, postoperative day; *PONV*, postoperative nausea and vomiting; *TOF*, train of 4.

* Some of the previous preadmission items have been reorganized into a preoperative optimization bundle. One of these items, prehabilitation, can no longer be recommended based on current evidence. Although immunonutrition has been incorporated into the current guidelines, no specific formula can be recommended. Several items have undergone content changes, as noted under the "Change" heading. For example, because of insufficient evidence on the optimal duration of mobilization, the recommended time for postsurgery mobilization has been reduced from 6 hours per day to 3 hours per day to comply with the protocol. Recommendations from the ERAS Society for standards for the development of enhanced recovery after surgery guidelines were fully followed for 21 of 23 ERAS items. The exceptions to the grading process were the anesthetic protocol and preoperative optimization of coexisting comorbidity (2A and 2B).

Smoking cessation before surgery. A total of 57 studies were identified through the literature search, with 18 considered robust enough to be included in the evidence grading. Behavioral interventions for smoking cessation, particularly when intensive and combined with nicotine replacement therapy, are effective in promoting smoking cessation and reducing morbidity and mortality.[25] Smoking cessation less than 4 weeks before surgery however showed no difference in complications.[26] However, RCTs on smoking cessation often suffer from insufficient statistical power and participant heterogeneity.

Quality of evidence and recommendations.

Recommendation: Cigarette smokers should stop smoking and undergo behavioral intervention, with nicotine replacement, at least 4 weeks before surgery.

Quality of Evidence: Smoking cessation before surgery.

Mortality: Moderate.

Complications: Moderate.

Recommendation grade: Strong.

Prehabilitation. Prehabilitation has gained prominence over the past decade, highlighting the need for an evidence-based approach to its implementation. However, inconsistent definitions across studies complicate evaluation. It may involve physical exercise alone or in combination with nutritional, psychological, or general optimization (multimodal) interventions. Many studies also include noncolorectal surgeries and often lack sufficient statistical power.

The literature search identified 253 prehabilitation studies, with 20 deemed robust for assessment.[27] Study designs varied: 15 focused on multimodal interventions and 5 on physical exercise. Two meta-analyses[28] found no significant impact on functional capacity, complications, or hospital LOS. One RCT[29] reported a 50% reduction in complications but no functional capacity improvement, whereas another[30] indicated better walking capacity at 4 and 8 weeks postoperatively.

Furthermore, 4 studies showed significantly improved physical capacity,[31–34] but others showed no benefit. Five studies reported reduced complications,[32,34–37] whereas 5 found none.[28,30,32,38,39] Only 2 of 6 studies on LOS[31,40] reported significant improvement.

Quality of evidence and recommendations.

Recommendation: No recommendation can be made for a specific prehabilitation regimen.

Quality of evidence: Prehabilitation before surgery.

Functional capacity: Moderate evidence demonstrating conflicting results.

Complications: Low evidence demonstrating conflicting results.

Length of stay: Low evidence demonstrating conflicting results.

Anemia treatment. Anemia affects 30%−67% of colorectal surgery patients and is linked to worse overall survival (hazard ratio: 1.56; 95% confidence interval [CI]: 1.30−1.88; $P < .001$) and disease-free survival. Although its role as a cause or marker of advanced disease remains unclear, its negative impact is evident. Transfusions further worsen tumor outcomes, underscoring the importance of preoperative anemia correction.[41] Evidence supporting iron correction includes RCTs, meta-analyses, and a population-based cohort study.

RCTs, meta-analyses, and a cohort study support iron correction. The IVICA trial[42] found intravenous (IV) iron more effective than

oral iron for anemia correction before colorectal surgery, though both showed high short-term anemia rates and no difference in transfusions. Long-term correction improved survival regardless of supplementation route.[43] Talboom et al[44] confirmed IV iron's superiority, significant after 30 days, indicating that 2 weeks is insufficient. Rapid correction and reduced transfusion needs were achieved with erythropoietin (EPO) (300 IU) within 10 days.[45]

One large meta-analysis showed that IV iron led to greater hemoglobin increases (mean difference, 0.57 g/dL; 95% CI: 0.50−0.64 g/dL) and reduced transfusion risk but increased infection risk without affecting mortality or LOS.[46] A 2019 update of a Cochrane review in surgical patients found that IV iron improved anemia correction but did not affect transfusions or outcomes.[47] Similarly, a systematic review of 10 studies demonstrated that IV iron was more effective in correcting anemia.[48] Devon et al[49] found EPO improved hematological parameters but did not reduce transfusions or improve outcomes. Folate and vitamin B12, while not consistently studied, are low-risk, cost-effective additions to preoperative anemia management.

Quality of evidence and recommendations.

Recommendation: All patients should undergo routine screening and correction of anemia.

Quality of evidence for preoperative anemia screening and correction of anemia:

Improved long-term survival: Moderate.
No difference in complications: Moderate.
No difference in symptoms delaying discharge: Moderate.
No difference in LOS: Low.
Decreased rate of perioperative transfusions: Moderate.

Recommendation grade: Strong.

Quality of evidence and recommendations.

Recommendation: Preoperative IV iron supplementation should be considered for patients with anemia to correct hemoglobin and hematocrit before surgery, reduce transfusion needs, and potentially improve long-term survival.

Quality of evidence for IV versus per os iron supplementation.

Increased long-term survival: Low.
Increased rate of infectious complications: Moderate.
No change in symptoms delaying discharge: Moderate.
No change in LOS: Moderate.
Decreased rate of perioperative transfusions: Moderate.

Recommendation grade: Weak.

Quality of evidence and recommendations.

Recommendation: For severe anemia or limited time before surgery, high-dose EPO (300 IU/kg) with iron should be used as an alternative to iron alone, enabling faster anemia correction and reducing transfusion needs. Reserve transfusions for refractory severe anemia.

Quality of evidence for EPO and preoperative transfusions.

No change in mortality: Moderate.
No change in complications: Moderate.
No change in symptoms delaying discharge: Low-moderate.
No change in LOS: Low-moderate.
Decrease of perioperative transfusions: Moderate.

Recommendation grade: Weak.

3. Preoperative nutritional care

Malnutrition increases postoperative morbidity, mortality, recovery time, and LOS.[50] Preoperative malnutrition screening is vital to identify and address nutritional deficits.[51] Validated screening tools enable timely nutritional support (oral, enteral, and parenteral).[52] However, selecting the most appropriate tool can be challenging, depending on the patient's condition, pathology, and type of surgery.[53] A recent meta-analysis found that the Malnutrition Universal Screening Tool had the highest specificity (89%) and sensitivity (86%) for detecting malnutrition.[54] However, the European Society for Clinical Nutrition and Metabolism endorses several screening tools including Subjective Global Assessment and Nutritional Risk Score 2002.[55] Nutritional support for malnourished patients should begin 7−10 days before elective surgery, ideally through the enteral route.[31,55] Oral nutritional supplements (ONS) can provide 500 kcal/d[31] with targets of 25 kcal/kg/d and 1.2−1.5 g/kg/d of protein.[55] Nutritional treatment should be part of a multimodal prehabilitation plan.[33,56] Immunonutrition may reduce infectious complications in oncological surgery by modulating the immune response.[57,58]

Quality of evidence and recommendations.

Recommendations: Patients undergoing colorectal surgery should undergo routine nutritional screening using a validated tool to detect malnutrition.

Quality of evidence: Low.

Recommendation grade: Strong.

Quality of evidence and recommendations.

Recommendation: Malnourished patients or at risk for malnutrition should benefit from nutritional and protein (>1.2 g/kg/d) supplementation (oral > enteral > parenteral) for at least 7−10 days.

Quality of evidence: Moderate.

Recommendation grade: Weak.

Quality of evidence and recommendations.

Recommendation: Oral immunonutrition for 5−7 days before surgery could be considered in patients undergoing colorectal cancer (CRC) surgery.

Quality of evidence: Moderate.

Recommendation grade: Weak.

4. PONV prophylaxis

Preventing and managing postoperative nausea and vomiting (PONV) is crucial in colorectal ERAS programs, as it affects over 30% of patients, impairing comfort, recovery, and outcomes. PONV is influenced by many other areas of perioperative care, such as opioid use, anesthesia, mobility, and gastrointestinal (GI) recovery.[59,60] Risk factors include fluid imbalances, poor nutrition, wound complications, and modifiable elements such as antiemetics, opioid use, nasogastric tube (NGT) drainage, and anesthesia techniques. Longer surgeries and laparoscopic procedures also increase PONV risk. Of 1156 studies, 19 were robust enough for GRADING, supporting recommendations. Several meta-analyses have evaluated pharmacologic strategies to prevent PONV, with the most robust data coming from a 2020 Cochrane network meta-analysis (NMA) including 97,516 randomized patients.[61] This analysis compared single- and multidrug regimens, providing high-certainty evidence for the effectiveness of 5 medications—aprepitant, ramosetron, granisetron, dexamethasone, and ondansetron—in reducing postoperative vomiting, with moderate-certainty evidence for others. Although the evidence supports strong recommendations for these medications, potential side effects must be considered. The benefits are likely greatest in patients at high risk for PONV.

Quality of evidence and recommendations

Recommendation: PONV prophylaxis using medications such as dexamethasone, ondansetron, granisetron, ramosetron, and aprepitant aprepitant should be undertaken.

Quality of evidence: High.

Recommendation grade: Strong.

5. Preanesthetic sedation/anxiolytics

Studies show little benefit for routine use of anxiolytic premedication. A 2009 meta-analysis of low-quality studies found no effect on outcomes such as time to mobilization or hospital discharge in adults but noted potential temporary psychomotor impairment.[62] In contrast, an NMA of 188 studies with 13,769 subjects provided high-quality evidence that preoperative analgesia significantly reduces opioid use and PONV.[63]

Quality of evidence and recommendations.

Recommendation: No use of anxiolytic premedication.

Quality of evidence: Moderate quality of evidence showing no benefit.

Recommendation grade: Weak.

6. Prophylaxis against thromboembolism

Acute venous thromboembolism (VTE) remains a significant risk after colorectal surgery, with rates of 2%–2.5% despite thromboprophylaxis (TP) and improved surgical techniques.[64]

Primary prevention is a core ERAS element, emphasizing risk assessment, timely TP initiation, and continuity into the postdischarge phase.[65] Of 113 studies reviewed, 24 were robust enough for grading: 17 examined pharmacological TP (P-TP), 4 mechanical TP (M-TP), and 3 VTE risks in colorectal surgery, including laparoscopic versus open techniques. A meta-analysis of 804,300 patients showed lower VTE rates with P-TP (odds ratio [OR]: 0.42; 95% CI: 0.28–0.63; $P < .00001$), with enoxaparin outperforming other agents, but higher bleeding risks.[66] Nine studies found that extended P-TP significantly reduced VTE after major surgeries without increasing bleeding risks.[67–75] Rivaroxaban reduced symptomatic and ultrasound-detected VTE by 74% (OR: 0.26; 95% CI: 0.07–0.94; $P = .032$) when used after enoxaparin.[67]

Two studies[76,77] showed no difference in VTE risk between preoperative or early postoperative P-TP but reported higher bleeding rates with pre–skin-closure administration.

M-TP studies[78–81] showed a 67% reduction in deep vein thrombosis (DVT) with graduated compression stockings (OR: 0.26; 95% CI: 0.13–0.53).[80] Intraoperative intermittent pneumatic compression (IPC) reduced DVT by 91% on day 1 postoperatively (OR: 0.09; 95% CI: 0.01–0.72) but had no effect by day 7.[81] Combining IPC and P-TP reduced pulmonary embolism and DVT.[78] A meta-analysis found no significant difference in VTE rates between laparoscopic (0.8%) and open (1.3%) CRC surgery.[82]

Quality of evidence and recommendations.

Recommendation: Colorectal patients should receive multimodal thromboembolism prevention using both mechanical and pharmacological modalities.[78,81]

Quality of evidence: High.

Recommendation grade: Strong.

Quality of evidence and recommendations.

Recommendation: Colorectal patients at risk should have graduated compression stockings applied until complete mobilization (>6 hours out of bed).[80]

Quality of evidence: Moderate.

Recommendation grade: Strong.

Quality of evidence and recommendations.

Recommendation: Colorectal patients should have IPC applied intraoperatively.[78,79,81] Continue IPC postoperatively if P-TP initiation is delayed or contraindicated.

Quality of evidence: High.

Recommendation grade: Strong.

Quality of evidence and recommendations.

Recommendation: Colorectal patients at risk should receive -TP, with low-molecular-weight heparin or unfractionated heparin[66,83,84] starting preoperatively to within 24 hours postoperatively

Quality of evidence: High (P-TP). Moderate (Timing)

Recommendation grade: Strong.

Quality of evidence and recommendations.

Recommendation: Colorectal patients at risk should receive P-TP until 4 weeks after surgery (extended P-TP).[67–75]

Quality of evidence: High.

Recommendation grade: Strong.

Quality of evidence and recommendations.

Recommendations: Consider transitioning to direct-acting oral anticoagulants after 7 days of subcutaneous heparins to improve postdischarge compliance with extended P-TP.[67]

Quality of evidence: Moderate.

Recommendation grade: Strong.

7. Bowel preparation

The previous ERAS guidelines[1] for elective colorectal surgery found no benefit to using mechanical bowel preparation (MBP) alone with systemic antibiotic prophylaxis due to risks of dehydration, electrolyte disturbance, and discomfort.[85] However, some RCTs suggest that combining MBP with oral antibiotics (OA) is preferable to MBP alone when MBP is used. Of 1,430 publications found in the literature search, 29 were found to be robust enough for grading.

A meta-analysis of 23 RCTs and 13 observational studies comparing MBP with no MBP found no significant differences in outcomes, including anastomotic leaks (OR: 0.90, 95% CI: 0.74–1.10), SSI (OR: 0.99, 95% CI: 0.80–1.24), intra-abdominal collections (OR: 0.86, 95% CI: 0.63–1.17), mortality, reoperation, or LOS.[86] A subanalysis found similar outcomes between MBP and rectal enemas.[86] Enemas or MBP may still be used in rectal surgery or when involving diverting stomas to avoid residual stool in the diverted colon.

Earlier meta-analyses linked MBP to significantly higher (5.6% vs 2.8%) anastomotic leak rates[87] and slightly increased infection and reoperation rates.[88] Combining OA, systemic antibiotics, and MBP remains debated. US retrospective cohort and large database studies indicate reduced morbidity with OA and systemic antibiotics, with or without MBP.[89,90] A meta-analysis confirmed reduced anastomotic leaks when intravenous antibiotics and OA were combined, but no significant difference in outcomes with MBP in the absence of intravenous antibiotics and OA.[91,92]

Systemic antibiotics alone were shown to reduce SSI compared with OA alone in a meta-analysis of 23 RCTs and 8 cohort studies.[93] An NMA of 48 studies found both MBP with OA and OA alone effective for SSI prevention.[94] Observational data from ACS NSQIP (40,446 patients) found OA alone protective against SSI, anastomotic leaks, ileus, and major morbidity, with no added benefit from combining OA with MBP.[95]

Quality of evidence and recommendations.

Recommendation: MBP should not be used routinely in colonic surgery but may be considered in rectal surgery with diverting stomas. If MBP is used, adding OA is recommended (systemic antibiotics should be used for all cases).

Quality of evidence. Avoidance of MBP alone: High.

Advantage of combined MBP and OA preparation versus MBP alone: High.

Recommendation grade. Avoidance of MBP alone: Weak.

Use of combined MBP and OA preparation (if MBP is used): Strong.

8. Preoperative fasting and carbohydrate loading

Short preoperative fasting and carbohydrate loading (CHO) are often mistakenly treated as one topic. Key questions are whether short fasting is safe and beneficial and whether CHO improves glucose homeostasis, comfort, and outcomes.

Short preoperative fasting. A review of 189 studies identified 13 high-quality studies after grading, none specifically on short preoperative fasting for colorectal patients.

One RCT comparing 2-hour fasting with overnight fasting showed reduced hunger and thirst in the intervention group, with no differences in gastric volume or pH.[96] A 3-arm RCT found both CHO and placebo superior to fasting for subjective well-being.[97]

Two high-quality meta-analyses stand out. One, analyzing 24 studies with 2,306 patients, found fasting comparable to CHO or placebo in complications, PONV, and insulin sensitivity.[98] Another, including 58 studies with 4,936 patients, identified 5 treatment groups and noted slightly higher postoperative infection rates in fasting patients but few other differences.[99]

A large Dutch cohort study of 76,451 patients confirmed that short preoperative fasting is feasible and safe, and reduces hunger, thirst, PONV, and antiemetic use.[100]

Quality of evidence and recommendations.

Recommendation: Short preoperative fasting (solids for 6 hours, clear liquids for 2 hours before anesthesia) is recommended over overnight fasting in colorectal surgery to improve insulin sensitivity, reduce PONV, and possibly shorten LOS.

Quality of evidence: Short preoperative fasting.

Complications (no difference): Moderate.

Reduced symptoms delaying discharge: Moderate.

LOS: Low-moderate.

Reduced insulin resistance: Moderate.

Recommendation grade: Strong.

Preoperative carbohydrate loading. A literature search identified 139 studies, with 18 retained for quality grading. One well-powered RCT[101] compared CHO (438 patients) versus placebo (442 patients) in major abdominal surgery. CHO reduced postoperative insulin use but increased nausea, with no differences in infections or LOS. Two additional RCTs found no significant benefits of CHO over placebo for hunger, thirst, fatigue, or LOS.[97,102] Other RCTs showed inconsistent findings, often not favoring CHO. CHO also significantly increased blood glucose for 6 hours in diabetic patients.[103]

Three key meta-analyses are notable. Ricci et al[98] reported minor benefits of CHO for PONV, glucose homeostasis, and LOS. Tong et al[99] found improved insulin sensitivity but no clinical outcome differences. Lu et al,[104] analyzing 12 RCTs in colorectal patients, found no benefits for glucose homeostasis or complications but a modest reduction in time to first flatus/stool and LOS. The clinical relevance of these findings, given the limited study quality, is debatable.

Despite heterogeneous and low-quality evidence, preoperative CHO loading likely improves glucose homeostasis, but clinical benefits remain unclear.

Quality of evidence and recommendations.

Recommendation: Preoperative CHO (2 hours before anesthesia) could be used to improve insulin sensitivity but offers no advantage in comfort or clinical outcomes over standard short fasting protocols.

Quality of evidence: Preoperative CHO.

Complications (no difference): Moderate-high.

Symptoms delaying discharge (no difference): Moderate.

LOS: Low-moderate.

Reduced insulin resistance: Moderate.

Recommendation grade: Weak.

9. Antibiotic prophylaxis and skin preparation

Antibiotic prophylaxis. Numerous meta-analyses, NMAs, and RCTs support clear recommendations for antibiotic prophylaxis to reduce SSIs. IV antibiotics, typically a cephalosporin with metronidazole, should be administered within 60 minutes before incision, with no benefit from standard repeated doses unless surgery is prolonged or significant blood loss occurs.[105,106] In case of prolonged surgery or significant blood loss, it is advisable to repeat IV antibiotics. Routine postoperative antibiotics are not recommended. Many NMAs and meta-analyses compared different treatment strategies with or without OA and MBP. The addition of OA to preoperative IV antibiotics remains debated. Studies show that OA combined with IV antibiotics during MBP significantly reduce SSIs (relative risk [RR]: 0.52, 95% CI: 0.39–0.69, $P < .001$;[107] OR: 0.62, 95% CI: 0.51–0.77, $P < .00001$).[108] Only 1 NMA found standard care with OA reduced leakage rates compared with placebo (RR: 0.18, 95% CI: 0.05–0.61).[109]

Seven NMAs[92,94,110–114] and 10 meta-analyses[107,108,115–122] examined anastomotic leakage, with NMAs finding no significant differences. Some meta-analyses reported a benefit, but this was mainly for adding OA during MBP.[107,108] Regarding intra-abdominal abscesses, only 1 NMA showed a significant reduction with OA added to IV antibiotics (OR: 0.59, 95% CI: 0.38–0.93).[92]

Most NMAs and meta-analyses found no impact of OA on postoperative ileus, urinary infections, LOS, readmissions, reoperations, or mortality.[92,107,110,111,113,117–121] However, OA reduced cardiorespiratory complications, either alone (OR: 0.47, 95% CI: 0.19–0.99) or with MBP (OR: 0.58, 95% CI: 0.33–0.99) compared with MBP alone.[110] NMA did not find a clear difference in *Clostridium difficile* infection rates between different strategies.[92,119,121,123]

Quality of evidence and recommendations.

Recommendations: IV antibiotic prophylaxis must be administered within 60 minutes before incision as a single dose for all colorectal surgery patients and repeated in case of prolonged surgery or significant blood loss. It is recommended for patients receiving MBP to add OA. Standard postoperative antibiotics are not recommended.

Quality of evidence.

Intravenous antibiotic prophylaxis: High.

Addition of OA decontamination alone: Low.

Addition of OA decontamination with MBP: High.

Recommendation grade.

Intravenous antibiotic prophylaxis: Strong.

OA decontamination alone: Weak.

Addition of OA decontamination with MBP: Strong.

Skin preparation. The ideal skin preparation agent for reducing postoperative SSIs remains debated. A meta-analysis of 5,031 patients found chlorhexidine to be more effective than povidone-iodine in reducing SSIs (OR: 0.68, 95% CI: 0.50–0.94).[124] Another meta-analysis of 13 RCTs (6,997 patients) showed lower SSI rates

with preoperative chlorhexidine.[125] A meta-analysis of 9,000 patients on intraoperative wound irrigation showed significantly reduced SSIs (OR: 0.54, 95% CI: 0.42−0.69), where antibiotic solutions were found to be most effective.[126] Routine hair removal does not reduce SSIs but is recommended when necessary with clippers rather than razors.[127] Evidence does not support preoperative antiseptic showers or adhesive drapes.[128]

Quality of evidence and recommendations.

Recommendation: For colorectal surgery, chlorhexidine preparations for skin disinfection should be used. There is insufficient evidence to support measures such as antiseptic showering, routine shaving, or adhesive incise sheets.

Quality of evidence.

Chlorhexidine skin preparation: High.

Advanced measures for skin decontamination: Low.

Recommendation grade.

Chlorhexidine skin preparation: Strong.

Advanced measures for skin decontamination: Weak.

10. Preoperative fluids

Text: See “Intraoperative fluids.”

Quality of evidence and recommendation.

Recommendations: Patients should be encouraged to remain well hydrated by drinking clear fluids up to 2 hours before going to the operating room. Any preoperative fluid and electrolyte excesses or deficits should be corrected.

Quality of evidence: Moderate.

Recommendation grade: Strong.

Intraoperative ERAS items

11. Standard anesthetic protocol

The main goal of a standard anesthetic protocol in ERAS programs is to reduce surgical stress and promote faster recovery. Current evidence does not favor inhalational anesthetics over total intravenous anesthesia (TIVA) with propofol, but TIVA reduces postoperative cognitive dysfunction in the elderly and enhances cognitive performance,[129] possibly due to propofol's anti-inflammatory effects.[124] TIVA also lowers PONV and emergence delirium, and improves recovery scores.[129,130] TIVA may reduce cancer recurrence and immunosuppression, whereas inhalational agents might have the opposite effect,[131,132] though evidence for oncological outcomes is insufficient.[133]

If volatile-based anesthesia is used, then Sevoflurane with oxygen is preferred for intubated patients, rather than with nitrous oxide.[134] Nitrous oxide is avoided due to risks such as delayed bowel recovery and increased infection.[135,136] Environmental concerns are also phasing out desflurane and nitrous oxide.[137] Using processed electroencephalography to tailor anesthesia depth reduces adverse effects such as hypotension, delirium, and cognitive dysfunction, particularly in high-risk patients.[138,139] Neuraxial blocks, especially spinal blocks with intrathecal morphine, offer lower failure rates, reduce hypotension, and improve recovery.[140,141] Anti-inflammatory strategies such as dexamethasone, lidocaine, and dexmedetomidine are beneficial. High-dose dexamethasone (1 mg/kg) reduces inflammation, complications, and 90-day mortality.[142,143] Lidocaine reduces LOS, ileus, and delirium.[144] Dexmedetomidine helps reduce inflammation and delirium, though it may cause bradycardia and hypotension.[145]

Muscle relaxation is crucial for laparoscopic and robotic surgeries to reduce pneumoperitoneum effects on cardiac and renal function, and postoperative pain.[146,147] Neuromuscular monitoring and reversal with agents such as sugammadex remain underused.[148]

Quality of evidence and recommendations.

Recommendation: Use short-acting agents, tailored depth of anesthesia with cerebral function monitoring, and antiadrenergic and anti-inflammatory strategies to reduce surgical stress and enhance recovery. Hypotension avoidance and protective ventilation should also be routine.

Quality of evidence.

Short-acting anesthetics: Low.

Recommendation grade: Strong.

Quality of evidence and recommendations.

Recommendations: Cerebral monitoring should tailor anesthesia depth using pEEG or raw EEG analysis to prevent adverse hemodynamics, cognitive dysfunction, delirium, and awareness.

Quality of evidence: High.

Recommendation grade: Strong.

Quality of evidence and recommendations.

Recommendation: Use antiadrenergic and anti-inflammatory strategies to reduce the surgical stress response without delaying recovery.

Quality of evidence: Low.

Recommendation grade: Strong.

Quality of evidence and recommendations.

Recommendation: Avoid hypotension and use protective ventilation strategies.

Quality of evidence: Moderate/high.

Recommendation grade: Strong.

Quality of evidence and recommendations.

Recommendation: Reduce intra-abdominal pressure via deep neuromuscular block during robotic or laparoscopic surgery.

Quality of evidence: Low.

Recommendation grade: Weak.

Quality of evidence and recommendations.

Recommendation: Use quantitative neuromuscular monitoring and complete reversal of neuromuscular block (train-of-four ratio $\geq$0.9).

Quality of evidence: High.

Recommendation grade: Strong.

12. Normothermia

Maintaining intraoperative normothermia is crucial during major surgery to reduce risks such as infections, coagulopathy, transfusion needs, shivering, increased oxygen consumption, cardiac complications, prolonged LOS, and higher costs.[149,150] Of 364 studies identified in the literature, 19 were deemed robust enough for grading. In a systematic review of 54 articles (3,976 patients), the prevention of hypothermia using active surface rewarming was associated with decreased rates of SSIs, reduced blood transfusions, and improved patient satisfaction.[151] Hypothermia prevention should include underbody warming blankets[152] and warmed, humidified CO_2 for open surgeries.[153] The effectiveness of prewarming remains uncertain,[154,155] but IV warming during goal-directed therapy may be beneficial.[156]

Quality of evidence and recommendations.

Recommendation: Use of active body surface warming should be performed during surgery.

Quality of evidence:
Active body surface warming
Reduced rates of SSIs (high quality of evidence).
Reduced blood transfusion (moderate quality of evidence).
Improved patient satisfaction (moderate quality of evidence).
Underbody blankets
Compared to overbody blankets (moderate quality of evidence).
Other
Prewarming (limited evidence).
Warmed-humidified carbon dioxide (limited evidence).
Recommendation grade: Active body surface warming: Strong.

13. Intraoperative fluids

Perioperative fluid overload and dehydration are associated with significant adverse outcomes, including SSI, respiratory complications, and renal failure. Recommendations for fluid management are based on high-quality,[157–159] moderate-quality,[160–168] and low/very-low-quality studies[169–191] (Table VII).

Fluid therapy should aim for a slightly positive balance on the day of surgery,[158] avoiding excessive weight gain (>2.5 kg).[171] Restricting IV fluids to near-zero balance likely increases the risk of AKI,[158,163] renal replacement therapy[158] and SSI,[158] and potentially mortality, with limited evidence for reducing morbidity[160,171,181] and shortening LOS.[181] Excessive (>2.7–3 L) or restricted (<900 mL) fluid intake may also prolong LOS.[169,184] It is doubtful whether goal-directed fluid therapy (GDFT)/goal-directed hemodynamic therapy (GDHT) is beneficial.

Hemodynamic optimization, targeting cardiac output measures, probably reduces postoperative morbidity,[159,161,162,165,166,174,180,183,185,186] particularly in high-risk patients.[159,162,174,186] Benefits in moderate-risk patients are seen with protocols including inotropes, vasopressors, or specific cardiac output targets.[186] GDFT/GDHT may reduce mortality, especially in high-risk patients,[164,176,179,186] high-risk surgeries,[164] or when using pulmonary artery catheter, cardiac index, or oxygen delivery as targets, though less so within ERAS programs.[186] GDFT/GDHT may shorten LOS[164,168,174,175,182,188,192] and improve bowel recovery, particularly in ERAS settings,[166] but benefits vary based on patient risk and protocols.

Quality of evidence and recommendations.
Recommendation: Consider keeping a slightly positive fluid balance for patients on the day of surgery.
Quality of evidence: Slightly positive fluid balance day 0: Moderate.
Recommendation grade: Slightly positive fluid balance day 0: Weak.

14. Surgical approach

Minimally invasive surgery (MIS) for both colonic and rectal resections is well-established and standard of care in many countries. Although the use of robotic surgery is increasing, evidence supporting superiority of robotic surgery is lacking. In the current literature search, 29 of 79 publications on MIS approaches were found robust enough for grading.

High quality of evidence. The COLOR II RCT showed that laparoscopic surgery led to shorter LOS, faster bowel recovery, and less need for epidural analgesia than open surgery, with similar rates of complications and mortality.[193] The LAFA study[194] found that laparoscopic surgery reduced postoperative LOS, morbidity, and recovery times compared with open surgery.

Moderate quality of evidence. The COREAN trial reported faster bowel recovery and lower morphine use for laparoscopic surgery after neoadjuvant chemoradiotherapy compared with open surgery.[195]

Low quality of evidence. One meta-analysis[196] found that robotic surgery reduced time to a soft diet compared with laparoscopy but showed no other significant differences. Two RCTs reported better outcomes for robotic surgery in total mesorectal excision (TME) and abdominoperineal (APR) resections but had notable quality issues. The REAL RCT[197] found fewer complications, faster recovery, and shorter LOS with robotic versus laparoscopic TME. Another RCT[198] reported fewer complications, conversions, and readmissions, as well as shorter LOS, for robotic APR compared with laparoscopic APR. However, limited evidence of significant benefits and the high costs of robotic surgery prevent a clear recommendation for or against its use.

Quality of evidence and recommendations.
Recommendation: MIS should be routinely performed for patients with CRC if expertise is available and in the absence of contraindications.
Quality of evidence: High.
Recommendation grade: Strong.

Quality of evidence and recommendations.
Recommendation: MIS should be combined with ERAS protocols to shorten total LOS after colectomy.
Quality of evidence: High.
Recommendation grade: Strong.

15. Abdominal drains

Drains in colorectal surgery aim to remove fluid and detect leaks, and are often used in infraperitoneal cases. However, evidence shows that they do not prevent dehiscence or sepsis and may increase SSIs and LOS.[199] In Asia, transanal drains are sometimes used instead of diverting stomas for leak prevention in low rectal surgery.

Of 350 studies reviewed, 12 were robust enough for analysis. Two meta-analyses[200,201] found drains ineffective for preventing leaks or infections, whereas others[202–204] reported no outcome differences in rectal surgeries. A large cohort study associated drains with higher SSIs and delayed discharge.[199] Evidence on transanal drains is mixed. One RCT[205] found fewer leaks and shorter LOS, but another[206] showed no difference. Meta-analyses[207,208] found similar leak rates but suggested that transanal drains may be as effective as diverting stomas. Further research is needed for definitive recommendations in low rectal cancer cases.

Quality of evidence and recommendations.
Recommendation: Routine abdominal drainage after colonic resection is not recommended.
Quality of evidence: Moderate.
Recommendation grade: Strong.

Quality of evidence and recommendations.
Recommendation: Routine abdominal drainage after rectal resection is not recommended.
Quality of evidence: Low-moderate.
Recommendation grade: Weak.

Postoperative items

16. Nasogastric tube

NGT decompresses the stomach during colorectal surgery and aids in exposure, especially in MIS procedures. However, studies

show that postoperative use of an NGT to relieve gastric distension or prevent vomiting is ineffective and is associated with increased pulmonary complications and patient discomfort.[209]

Since the 2010 Cochrane review,[210] which covered various NGT and abdominal surgeries, few studies have focused specifically on elective colorectal surgery. This review[210] showed that avoiding an NGT after surgery shortened the time to flatus and reduced pulmonary complications, although vomiting was more common without an NGT. A 2005 meta-analysis[211] reported faster flatus time without NGT, but no difference in pulmonary complications.

A 2011 meta-analysis specific to colorectal surgery found lower rates of pulmonary complications without NGT, but with more vomiting and reinsertions.[212] One RCT in rectal surgery showed faster diet tolerance and earlier removal of drains and catheters when the NGT was removed early.[213] A recent meta-analysis[214] on early versus late oral feeding after colorectal surgery found higher NGT reinsertion rates with early feeding but shorter LOS and fewer complications.

Quality of evidence and recommendations.

Recommendation: Prophylactic NGT can be used during colorectal surgery.

Quality of evidence: Low.

Recommendation grade: Weak.

Quality of evidence and recommendations.

Recommendation: Prophylactic NGT is not recommended after colorectal surgery.

Quality of evidence: Moderate.

Recommendation grade: Strong.

Quality of evidence and recommendations.

Recommendation: In patients with vomiting, NGT should be reinserted.

Quality of evidence: Very low.

Recommendation grade: Strong.

17. Normoglycemia

Most evidence on intraoperative glycemia targets derives from high-risk patients and procedures with a wide heterogeneity of glycemia targets.[215,216] For nondiabetic patients outside the intensive care unit setting, moderate-level evidence revealed not only a decreased risk of postoperative morbidity/mortality including SSI but also an increased risk of postoperative hypoglycemia, notably in overly tight glycemia control regimens (<110 mg/dL).[217,218] There is a lack of high-quality evidence guiding management of nondiabetic patients with elevated preoperative HbA1c levels. However, the increased risk of postoperative hyperglycemia in these patients warrants close perioperative glucose monitoring.[21,219,220] The ward setting of elective colorectal surgery patients warrants looser glycemic control targets to decrease the risk of hypoglycemia with potentially deleterious consequences. A target level of 140–180 mg/dL (7.7–10.0 mmol/L) appears most appropriate in this setting.[221–223]

Quality of evidence and recommendations.

Recommendation: Intraoperative hyper- and hypoglycemia should be avoided by intraoperative glycemic control targeting normoglycemia, with careful monitoring of postoperative hypoglycemia.

Quality of evidence: Moderate.

Recommendation grade: Strong.

Quality of evidence and recommendations.

Recommendation: In the setting of a preoperative elevated HbA1c, postoperative blood glucose should be tested 6 times per day.

Quality of evidence: Low.

Recommendation grade: Weak.

Quality of evidence and recommendations.

Recommendation: Postoperative hyper- and hypoglycemia should be avoided targeting levels of 140–180 mg/dL (7.8–10.0 mmol/L).

Quality of evidence: moderate.

Recommendation grade: Strong.

18. Postoperative fluids

Summary text: See “Intraoperative fluids.”

Quality of evidence and recommendation.

Recommendations: Maintain a slightly positive postoperative fluid balance[158] and avoid weight gain >2.5 kg.[171] Use balanced crystalloid solutions for maintenance and avoid sodium- and chloride-rich solutions (eg, NaCl 0.9%) for loss replacement, opting for balanced solutions instead.

Quality of evidence. Slightly positive fluid balance and weight gain <1–2.5 kg: Moderate.

Balance crystalloids for maintenance needs: Low/very low.

Balanced salt solutions instead of NaCl 0.9% saline: Low/very low.

Recommendation grade. Slightly positive fluid balance and weight gain <1–2.5 kg: Should be routinely indicated: Strong.

Balance crystalloids for maintenance needs: Should be routinely indicated: Weak.

NaCl 0.9% (saline): Should be avoided (except in specific circumstances such as hypochloremia and metabolic alkalosis): Weak.

19. Urinary drainage

A literature search identified 141 studies on colorectal surgery and urinary catheterization, with 16 considered robust for evidence assessment. Urinary catheters are routinely used in elective colorectal surgery to drain the bladder and monitor output but can hinder mobility and cause discomfort. The optimal timing for removal remains debated, balancing the risks of urinary retention and infection.[224] Risk factors for retention include male sex, advanced age, rectal surgery, and epidural analgesia.[225,226] Although prophylactic α-antagonists have been suggested to prevent retention, their effectiveness in colorectal surgery is unproven.[227,228]

Quality of evidence and recommendations.

Recommendation: Urinary catheter should be removed within 24 hours in uncomplicated minimal-invasive colectomies (without epidural analgesia) (no evidence specific to right hemicolectomy).[6,7]

Quality of evidence: Low to moderate.

Recommendation grade: Strong.

Quality of evidence and recommendations.

Recommendation: The urinary catheter should be removed within 48 hours in uncomplicated minimal-invasive rectal surgeries, if there are no risk factors for urinary retention.[229–234]

Quality of evidence: Low moderate.

Recommendation grade: Weak.

Table V
Intervention versus postoperative paralytic ileus*

Intervention	Efficacy in preventing ileus	Quality of evidence	Recommendation
Goal-directed fluid therapy	Not effective	High	Should not be used to prevent ileus (strong)
Early oral feeding	Effective in reducing time to solid diet tolerance and time to flatus	Moderate	Can be used (moderate)
Epidural analgesia	Effective in reducing to flatus and stool	Moderate	Can be used (moderate)
Mechanical bowel preparation	Not effective in reducing the incidence of ileus	Moderate	Should not be used to prevent ileus (moderate)
Probiotic	Effective (reduced ileus by 87%)	Moderate	Can be used (moderate)
Selective opioid antagonists	Effective (reduced ileus by 32%)	Moderate	Can be used (moderate)
Chewing gum	Effective (reduced ileus by 45%, shortened time to flatus and stool)	Moderate	Can be used (moderate)
Prucalopride	Effective in laparoscopic surgery	Moderate	Can be used (moderate)
Low-intensity transcutaneous auricular vagal stimulation	Effective in reducing ileus (6.25% vs 20%)	Moderate	Can be used (moderate)
Transcutaneous electrical acupoint stimulation	Effective (reduced ileus by 32%) and shortened time to flatus	Moderate	Can be used (moderate)
Simulant and osmotic laxatives	Effective (reduced ileus 22% vs 38%) and shortened GI-2 time	Moderate	Can be used (moderate)
Isoperistaltic and antiperistaltic technique	Not effective	Moderate	No preference (moderate)
Methylnaltrexone	Not effective in either dose	Moderate	Should not be used to prevent ileus (moderate)
Ketorolac	Effective (shortened time to flatus and first bowel movement)	Moderate	Can be used (moderate)
Coffee	Effective (shorten time to first bowel movement and reduce ileus 58%)	Low	May be used (weak)
Oral antibiotic	Not effective in reducing ileus (6.3% vs 5.8%)	Low	Should not be used to prevent ileus (weak)
Acupuncture	Effective (shortened time to flatus, first defecation)	Low	May be used (weak)
Noninvasive vagus nerve stimulation	Effective (shortened time to flatus but not to first defecation)	Low	May be used (weak)
Posterior tibial nerve stimulation	No effective in the ITT analysis	Low	Should not be used to prevent ileus (weak)
Simo decoction and acupuncture	Effective (shortened time to flatus, first defecation)	Low	May be used (weak)
Lidocaine	Not effective in 1 RCT Effective in reducing ileus by 68% in a meta-analysis of RCTs	Low	May be used to prevent ileus (weak)
Choline citrate	No effective	Low	Should not be used to prevent ileus (weak)
Bisacodyl	Effective in shortening time to GI-3 but not time to flatus	Low	May be used to prevent ileus (weak)
Dexamethasone	Effective in reducing ileus by 54% and shortening time to flatus	Very low	May be used to prevent ileus (weak)

GI, gastrointestinal; *ITT*, intention to treat analysis; *RCT*, randomized controlled trial.
* The table summarizes the efficacy of various interventions in preventing ileus, along with the quality of evidence and corresponding recommendations. The interventions are categorized by their effectiveness in reducing the incidence or duration of ileus, with the quality of evidence reflecting the strength of the studies supporting each intervention. Recommendations are provided based on the quality of evidence, with guidance on whether each intervention should be used, avoided, or considered for use in clinical practice.

Quality of evidence and recommendations.

Recommendation: Urinary catheters may be removed after 2 days for patients with epidural catheters (open surgery).[235]

Quality of evidence: Low to moderate.

Recommendation grade: Weak.

Quality of evidence and recommendations.

Recommendation: The use of α-agonists to prevent urinary retention after removal of urinary catheter cannot be recommended.[227,228]

Quality of evidence: Low to moderate.

Recommendation grade: Weak.

Quality of evidence and recommendations.

Recommendation: Transurethral urinary drainage should be considered rather than suprapubic urinary drainage in rectal surgeries, unless prolonged catheterization is expected.[236,237]

Quality of evidence: Low to moderate.

Recommendation grade: Weak.

20. Prevention of ileus

Postoperative paralytic ileus (POI) is a common complication after colorectal surgery, characterized by delayed bowel motility that prevents the passage of food and gas, leading to symptoms such as bloating, pain, nausea, and vomiting. This condition prolongs LOS, increases patient discomfort, and elevates health care costs. Although usually self-limiting, prolonged POI can cause significant morbidity, including increased risk of infections and slower recovery times. The current literature search on prevention of POI found 103 studies, 34 of which were robust enough for grading and resulted in the following recommendations (Table V).

Table VI
Postoperative analgesia*

Intervention	Effect on postoperative pain	Quality of evidence	Recommendation
Acetaminophen	Opioid sparing effect, improves pain control and decreases ileus	High	Should be used (strong)
TAP blocks (laparoscopic or US guided)	Highly effective at reducing postoperative pain and opioid consumption No difference between laparoscopic approach or US guided	High	Should be used (strong)
Epidural analgesia	Not superior to other locoregional analgesic techniques and carries a longer length of stay	Moderate	Should not be used in minimally invasive surgery (strong) Not recommended in open surgery if other regional technique/wall blocks can be used (moderate)
Quality of evidence and recommendations.			
Quadratus lumborum block	Not effective at reducing postoperative pain or opioid consumption[1-3]	High	Not recommended (moderate)
ESP block	Reduces opioid consumption and pain scores in laparoscopic surgery	Low	Only recommended if TAP block not performed (weak)
Selective opioid antagonists	Lower postoperative ileus occurrence	Very low	Not recommended
Intravenous lidocaine	Reduced time to first bowel movement and LOS, pain reduction clinically irrelevant	Moderate	Could be used to improve gut recovery if no neuraxial/regional technique or wound infiltration was used
Intrathecal morphine	Reduction of opioid consumption and pain scores 24 hours after surgery	Moderate	Recommended, could be used (moderate)
Continuous wound infusion	Reduces postoperative pain, opioid consumption, and time to first bowel movement in laparotomies	Limited	Could be used if no regional block/ neuraxial performed
NSAIDs/Cox-2 specific inhibitors	Highly effective at reducing postoperative opioid consumption, lower pain scores, and improve GI recovery. Contradictory evidence on risk of anastomotic leak (selective versus nonselective, colonic versus rectal surgery)	Moderate	Recommended in colonic surgery, not recommended in rectal surgery due to increased risk of anastomotic leak Nonselective NSAIDs should not be used (higher risk of anastomotic leak)
Gabapentinoids	Opioid sparing in the first 48 hours, unclear on the clinical impact. Increased risk of respiratory complications	Low	Not routinely recommended (moderate)
Intraperitoneal lidocaine	Effective	Low	Not recommended unless no locoregional technique is used/ intravenous lidocaine
Multimodal analgesia	Reduction in opioid consumption	Moderate	Multimodal analgesia should be used to reduce postoperative opioid consumption (strong)
Rectus abdominis sheath	Reduced postoperative pain scores and opioid consumption[4]	Very low	Could be used in laparotomy surgeries if TAP block or epidural not performed

ESP, erector spinae plane nerve block; *GI*, gastrointestinal; *LOS*, length of stay; *NSAID*, nonsteroidal anti-inflammatory drug; *TAP*, transversus abdominis plane.
* The table presents various interventions for managing postoperative pain, their effects, the quality of evidence supporting each, and the corresponding recommendations. The interventions are categorized by their effectiveness in reducing pain, opioid consumption, or improving gastrointestinal recovery. The quality of evidence reflects the strength of the available studies, and the recommendations indicate whether each intervention should be used, avoided, or considered under specific circumstances based on current evidence.

The various aspects of multimodal treatments found to decrease postoperative ileus include early oral feeding,[238] epidural analgesia,[238] selective opioid antagonists,[239] probiotics,[240] chewing gum,[241] prucalopride,[242] low-intensity transcutaneous auricular vagal stimulation,[243] transcutaneous electrical acupoint stimulation,[244] simulant and osmotic laxatives,[245] ketorolac,[246] coffee,[247] acupuncture,[248] noninvasive vagus nerve stimulation,[249] simo decoction and acupuncture,[250] lidocaine,[251] bisacodyl,[252] and dexamethasone.[239] Measures that did not prove effective in preventing ileus include GDFT,[253] MBP,[121] methylnaltrexone,[109] oral antibiotics,[254] posterior tibial nerve stimulation,[255] and choline citrate.[256]

Quality of evidence and recommendations.

Recommendation: A multimodal approach should be undertaken to minimize the development of postoperative ileus.

Quality of evidence. *High:* Multimodal prevention of ileus.

Moderate: Early oral feeding, epidural analgesia, probiotics, selective opioid antagonists (alvimopan), chewing gum, prucalopride, low-intensity transcutaneous auricular vagal stimulation, transcutaneous electrical acupoint stimulation, simulant and osmotic laxatives, and ketorolac.

Low: Coffee, Oral antibiotics, acupuncture, noninvasive vagus nerve stimulation, posterior tibial nerve stimulation, simo decoction, lidocaine, choline citrate, bisacodyl, and dexamethasone.

Recommendation grade: Strong

21. Postoperative analgesia

Effective postoperative analgesia is essential for pain relief, stress reduction, and recovery. It improves comfort, supports mobility, and lowers the risk of complications such as deep vein thrombosis, respiratory issues, and chronic pain. Of 1,988 publications identified, 34 were deemed robust for evidence grading, as summarized in Table VI.

Quality of evidence and recommendations.

Quality of evidence.

High: Avoid thoracic epidural anesthesia (TEA) in MIS; prefer morphine spinals or transversus abdominis plane (TAP) blocks over TEA.[140,257–265]

Table VII
Perioperative fluids*

Intervention	Efficacy/harm	Quality of evidence	Recommendation
Restricting IV fluids on the day of surgery targeting a near-zero fluid balance	Increased risk of AKI	Strong	Should be avoided routinely (strong)
	Increased risk of SSI	Moderate	Could be avoided routinely (moderate)
	Increased mortality	Limited	Doubtful if avoided routinely (weak)
	Reduced morbidity	Limited/insufficient	Doubtful if indicated routinely (weak) Should not be indicated (weak)
	Increased morbidity	Insufficient	Should be avoided (weak)
	Shortened LOS	Insufficient	Should not be indicated (weak)
	Improved recovery of bowel function	Insufficient	Should not be indicated (weak)
Excessive fluid administration (>2.7–3 L) and restriction (<900 mL) the day of surgery	Associated with harm and prolonged hospital stay	Limited	Should not be indicated to improve outcomes (weak)
GDFT/GDHT	Decreased morbidity	Limited	Doubtful if indicated routinely (weak)
	• High-risk patients	Moderate	Could be indicated routinely (moderate)
	• Moderate-risk patients	Limited	Doubtful if indicated routinely (weak)
	• Fluids + inotropes and/or vasopressors	Limited	Doubtful if indicated routinely (weak)
	Standard of care	Insufficient	Should not be indicated (weak)
	Decreased mortality	Limited	Doubtful if indicated routinely (weak)
	• High-risk patients (mortality >10%)	Limited	Doubtful if indicated routinely (weak)
	• High-risk surgery	Limited	Doubtful if indicated routinely (weak)
	• PAC, CI, and/or DO2	Insufficient	Should not be indicated (weak)
	• Standard of care	Insufficient	Should not be indicated (weak)
	Shortened LOHS	Limited	Doubtful if indicated routinely (weak)
	• Standard of care	Limited	Doubtful if indicated routinely (weak)
	Prolonged LOHS	Insufficient	Should be avoided (weak)
	Improved recovery of bowel function	Limited	Doubtful if indicated routinely (weak)
	• ERAS care	Limited	Doubtful if indicated routinely (weak)
	• Standard of care	Insufficient	Should not be indicated (weak)
	• Fluids + inotropes	Insufficient	Should not be indicated (weak)

AKI, acute kidney injury; *CI*, cardiac index; *DO2*, oxygen delivery; *ERAS*, Enhanced Recovery After Surgery; *GDFT*, goal-directed fluid therapy; *GDHT*, goal-directed hemodynamic therapy; *LOHS*, length of hospital stay; *PAC*, pulmonary artery catheter; *SSI*, surgical site infection.

* The table summarizes the efficacy, potential harms, quality of evidence, and corresponding recommendations for various interventions related to fluid management during surgery. Each intervention is evaluated for its impact on postoperative outcomes such as mortality, morbidity, recovery, and length of stay (LOS). The quality of evidence indicates the strength of the available research, whereas the recommendations suggest whether the intervention should be routinely applied, avoided, or considered under specific circumstances. Recommendations are classified as strong, moderate, or weak, reflecting the confidence in their effectiveness and safety based on current evidence.

Moderate: TEA (T5-11) is not superior to TAP, erector spinae plane (ESP) nerve block, or rectus sheath blocks and increases LOS.[257,259,260,265–271] Alternatives include IV/intraperitoneal lidocaine or continuous wound infusion.[192,268,272–274] Use local anesthetics in truncal blocks (TAP, ESP, and rectus sheath), alone or with morphine spinals.[140,259,265,275] If locoregional techniques are unfeasible, consider wound infiltration, intraperitoneal local anesthetics, or IV lidocaine. TAP blocks can be ultrasound or laparoscopically guided.[276–278] NSAIDs reduce opioid use but may increase the risk of anastomotic leaks; selective NSAIDs are preferred.[279,280]

Low or insufficient: Insufficient evidence supports using fentanyl for analgesic induction during anesthesia termination or rectal blocks in minimally invasive rectal surgery. TEA provides few advantages in open surgery, and the optimal analgesia after TEA removal or other locoregional techniques remains unclear. Evidence does not strongly support paracetamol, NSAIDs, or opioid patient-controlled analgesia use. Nonopioid multimodal analgesia, including acetaminophen, is as effective as opioid patient-controlled analgesia and helps reduce opioid use.[281,282] Gabapentinoids lower opioid use but may increase postoperative respiratory risks.[283,284] The μ-opioid receptor antagonist alvimopan may reduce postoperative ileus, whereas the effects of naloxon hydrocloride (Targiniq) are uncertain.[285]

Quality of evidence and recommendations.

Recommendation: A multimodal analgesia strategy after both open and MIS colorectal surgery should be used. Analgesic approaches can include acetaminophen and TAP blocks with NSAID use for colonic surgery and consideration of intrathecal morphine.

Quality of evidence: Moderate.
Recommendation grade: Strong.
Recommendation: TEA should not be used in MIS.
Quality of evidence: High.
Recommendation grade: Strong.

Quality of evidence and recommendations.

Recommendation: Thoracic epidural analgesia should be considered in patients undergoing open colorectal surgery.
Quality of evidence: Low.
Recommendation grade: Weak.

22. Postoperative nutritional care

Gut feeding, oral or enteral, is preferred over parenteral nutrition for patients with a functional GI tract.[55] Early oral diet resumption after lower GI surgery is generally safe within enhanced recovery pathways, though evidence quality is low.[286] ONS increase nutrient intake and support recovery from surgical stress.[55,287–289] Malnourished patients should receive enteral or parenteral nutrition within 24 hours after surgery when oral feeding is not feasible, meeting energy (25 kcal/kg/d) and protein (1.5 g/kg/d) needs.[287,290] For cytoreductive surgery and hyperthermic intraperitoneal chemotherapy, preemptive parenteral support may be needed for 7 postoperative days.[291] Parenteral nutrition is essential when the gut is nonfunctional or inaccessible.[292,293] Specialized nutrition for malnourished, frail, and elderly patients up to 7 days after surgery can reduce morbidity, mortality, and hospital stay.[287,294,295] Severely malnourished patients should continue ONS and physical activity after discharge to prevent muscle loss and sarcopenia, with variable intervention durations.[31] Postoperative immunonutrition may lower infection rates, especially SSIs.[296,297]

Quality of evidence and recommendations.

Recommendation: Early gut feeding should be started, preferably with ONS, within 24 hours after surgery to enhance nutrient intake, shorten hospital stay, and restore gut function.

Quality of Evidence: Low.

Recommendation grade: Strong.

Quality of evidence and recommendations.

Recommendation: Oral intake should be resumed within hours after colorectal surgery.

Quality of Evidence: Moderate.

Recommendation grade: Strong.

Quality of evidence and recommendations.

Recommendation: ONS should be provided (at least 500 kcal) alongside regular food for the first 3–5 days after colorectal surgery to meet energy and protein targets.

Quality of Evidence: Low.

Recommendation grade: Weak.

Quality of evidence and recommendations.

Recommendation: Patients with malnutrition should continue ONS (at least 500 kcal), together with exercise, for at least 2–3 months (8–12 weeks) after surgery to reduce muscle mass loss.

Quality of Evidence: Moderate.

Recommendation grade: Strong.

Quality of evidence and recommendations.

Recommendation: After discharge, patients with malnutrition should continue with ONS for at least 10 days.

Quality of Evidence: Low.

Recommendation grade: Strong.

Quality of evidence and recommendations.

Recommendation: Daily monitoring of nutritional intake should be performed routinely after colorectal surgery to identify patients with insufficient intake and to prevent nutritional decline.

Quality of Evidence: Low to moderate.

Recommendation grade: Strong.

Quality of evidence and recommendations.

Recommendation: Specialized nutrition therapy, whether enteral or parenteral when indicated, should be given within 24 hours to patients with malnutrition or (expected) insufficient intake by postoperative day (POD) 5.

Quality of Evidence: Low.

Recommendation grade: Strong.

Quality of evidence and recommendations.

Recommendation: Immunonutrition should be given up to 7 days after surgery to reduce postoperative infectious complications.

Quality of Evidence: Moderate.

Recommendation grade: Weak.

23. Mobilization

Early mobilization after abdominal surgery is a key part of perioperative care, but evidence for specific interventions is limited. Guidelines recommending over 6 hours of daily mobilization are challenging to implement. A literature search identified 372 studies on postoperative mobilization, with 14 considered robust enough for assessment. Data from the highest-ranked RCT[298] showed no improvement in physical capacity with greater adherence to mobilization protocols. Mobilizing within 30 minutes of post-anesthesia care unit arrival, followed by intervals every 30 minutes, did not improve physical activity.[299]

One RCT[300] found that perioperative breathing exercises reduced pulmonary complications in elderly patients, but another[301] showed no difference with more frequent exercises. A meta-analysis also found no effect of early mobilization on postoperative complications.[302]

The LAFA study[194] showed that early mobilization for 3 hours daily reduced LOS, a proxy for functional capacity and complications. Step count feedback or visual tools may aid mobilization, and at least 3 hours of daily mobilization appears beneficial.

Qualityof evidence and recommendations.

Recommendation: Early postoperative mobilization should ideally start on the day of surgery.

Quality of evidence: Mobilization or physiotherapy the day of surgery. (First mobilizing the patient in a sitting position, thereafter out of bed for 2 × 30 minutes.)

Improving functional capacity: No evidence.

Reduction of complications: No evidence.

Shorter LOS: No evidence.

Recommendation grade: Strong.

Quality of evidence and recommendations.

Recommendation: Mobilization for at least 3 hours per day from POD 1 to discharge.

Quality of evidence: Mobilization for at least 3 hours per day from POD 1 to discharge.

Improving functional capacity: Very low.

Reduction of complications: Very Low.

Shorter LOS: Moderate.

Recommendation grade: Strong.

Comment/discussion

The latest guidelines from the ERAS society for perioperative care in elective colorectal surgery mark the fifth edition since the first publication in 2005.[303] With the continuous expansion of evidence in perioperative medicine, frequent updates are essential to maintain up-to-date knowledge and practice among health care professionals involved in surgical patient care. These new guidelines were developed de novo using a more stringent methodology, including a comprehensive assessment of each study underpinning the evidence and recommendations. Therefore, any modifications to the protocol must be viewed as appropriate.

Although prior evidence supports the overall ERAS protocol in reducing morbidity, enhancing recovery, and shortening LOS after major colorectal surgery,[304–306] this edition includes a more thorough evaluation of individual components within the protocol. Although the guidelines are grounded in formal criteria for assessing the evidence behind perioperative care, it must be acknowledged that grading this evidence is both complex and challenging. In some areas, the evidence may be limited, which does not necessarily indicate a lack of effect or that one approach is inferior to another. As a result, a strong recommendation coupled with low evidence may appear contradictory. However, this must be understood in the broader context of medical practice, where the evidence supporting ERAS components aligns with common standards in medicine today.

A recurring issue in ERAS programs is determining which protocol elements are most critical for surgical outcomes. Some may argue that only a few are necessary, but there is no simple, evidence-based answer. Different units may begin at varying levels of perioperative care; as they integrate additional elements, outcomes often improve. What is clear, however, is that greater

adherence to the full ERAS protocol is associated with improved short-term outcomes[304,307] and may also enhance long-term survival.[308] Therefore, the guidelines include all components that could impact outcomes, whether large or small.

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Review statement

Steven Wexner and Emile Sameh are members of Surgery's Executive Board and did not have any involvement in the review, editorial decision, or approval of this manuscript.

Supplementary Materials

Supplementary material associated with this article can be found, in the online version, at [https://doi.org/10.1016/j.surg.2025.109397].

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