
Preparing the Patient for Enhanced Recovery After Surgery

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As is detailed elsewhere in this issue, enhanced recovery pathways integrate evidence-based best practices across the spectrum of perioperative care. Although interventions in the operating room and in the postoperative ward are important for improving postoperative outcomes in enhanced recovery after surgery (ERAS[®]) pathways, an ERAS[®] approach for preoperative care is equally important for achieving optimal outcomes. This review will describe current recommendations for preparing patients for surgery within an ERAS[®] program.

■ Preadmission Education and Counseling

Regardless of the type of surgery, all ERAS[®] guidelines recommend preadmission counseling and education.^{1–10} These efforts may reduce anxiety, improve recovery, enhance wound healing, and decrease hospital length of stay (LOS). A variety of approaches are acceptable, including personal counseling, printed materials, and electronic media, alone or in combination. Whatever approach is used, it should consist of detailed information about the surgical procedure, anesthesia, and expected course of recovery. The latter is especially important, as information regarding the importance of patient participation in early mobilization and feeding, pulmonary toilet, and pain control may improve compliance and, thus, outcomes. Studies supporting this intervention appeared as far back as the 1960s.¹¹

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■ Preoperative Optimization

Prehabilitation

Prehabilitation (PREHAB) is the concept that recovery should begin before surgery. The aim is to increase physiological and functional reserve through preoperative physical conditioning.¹² The theory is attractive, as decreased physiological and functional reserve are associated with poor outcomes. For example, in a large study utilizing the National Surgical Quality Improvement Program (NSQIP) database analyzing 232,352 patients, increasing frailty (ie, decreasing physiological and functional reserve) was independently associated with increased rates of complications and 30-day mortality, and with increased hospital LOS.¹³ A recent systematic review addressed the utility of PREHAB to improve postoperative cardiorespiratory function and outcomes.¹⁴ Eight studies of low-to-medium quality examining the effects of PREHAB on cardiothoracic, colon, orthopedic, and vascular surgery were included in the review. There was considerable heterogeneity among the studies and limited evidence that PREHAB improves outcomes. Therefore, PREHAB is not recommended in any current ERAS[®] guideline.¹⁻¹⁰ A number of RCTs are currently addressing this issue and may provide additional perspective on the utility of PREHAB.¹⁵

Smoking Cessation

In addition to the long-term consequences of tobacco use, current smokers are at increased risk for perioperative wound and pulmonary complications.^{16,17} To reduce this risk, at least 1 month of abstinence is required.^{17,18} Surgery is associated with an increased incidence of spontaneous smoking cessation and may represent a time when patients are more receptive to messages regarding the importance of quitting.^{19,20} A variety of approaches are effective to assist patients in smoking cessation.²¹ Further, perioperative interventions may result in long-term smoking cessation.²²⁻²⁴

Abstinence from Alcohol

Alcohol abuse is associated with an increased risk of postoperative cardiopulmonary, wound, and bleeding complications, and there is evidence that 1 month of abstinence reduces postoperative morbidity.^{25,26} Therefore, ERAS[®] guidelines strongly recommend 4 weeks of preoperative abstinence for alcohol abusers.¹⁻¹⁰

■ Mechanical Bowel Preparation

Beginning in the early 1970s, mechanical bowel preparation (MBP) plus oral antibiotics was routinely used before elective abdominal

surgery.²⁷ The goal was to reduce colonic bacterial load and the likelihood of infectious complications because of spillage of bowel contents. However, MBP actually may increase the likelihood of spillage.²⁸

MBP is uncomfortable for patients.²⁹ It also contributes to preoperative dehydration³⁰ and may increase the need for perioperative intravenous fluid administration, in conflict with the ERAS[®] approach of minimizing intravenous fluids. Further, MBP has been associated with prolonged ileus after colon surgery.²⁹ A Cochrane review of this subject, which included 5805 patients, found no differences in anastomotic leakage, wound infection, or the need for reoperation, regardless of whether patients received MBP vs. no MBP, or MBP vs. rectal enema alone.³¹ On the basis of this, ERAS[®] guidelines recommend against MBP before elective abdominal surgery.¹⁻⁹

However, recent evidence conflicts with this recommendation. In a study utilizing the NSQIP database and including 8442 patients receiving MBP with antibiotics, MBP without antibiotics, or no preparation, MBP with antibiotics was independently associated with reduced incidences of surgical site infection (SSI) [odds ratio (OR) = 0.40; 95% confidence interval (CI), 0.31-0.53], anastomotic leak (OR = 0.57; 95% CI, 0.35-0.94), and postoperative ileus (OR = 0.71; 95% CI, 0.56-0.90) compared with no MBP at all. MBP without antibiotics was not associated with decreased rates of SSI, anastomotic leak, or ileus.³²

A recent meta-analysis of seven randomized controlled trials with a total of 1769 patients undergoing elective colorectal surgery found that oral systemic antibiotics plus MBP reduced the incidence of total and incisional surgical site infection compared with systemic antibiotics alone or MBP alone (total: 7.2% vs. 16.0%, $P < 0.00001$; incisional: 4.6% vs. 12.1%, $P < 0.00001$).³³ Thus, ERAS[®] guidelines with regard to the use of MBP may need to be revisited in the future.

■ Preoperative Fasting

For decades, fasting after midnight was the standard of care before surgery. This was thought to reduce the risk of pulmonary aspiration by ensuring an empty stomach. However, that practice was not based on any meaningful evidence and persists despite data suggesting that prolonged fasting is associated with delayed recovery and poorer outcomes.³⁴ Prolonged fasting increases perioperative insulin resistance and discomfort after abdominal surgery.^{35,36} In addition, when compared with allowing patients to freely consume clear liquids up until 2 hours before surgery, fasting after midnight results in neither lower amounts of gastric content nor increased gastric pH.^{37,38} Body habitus does not seem to influence gastric emptying, nor does uncomplicated type-II diabetes mellitus.³⁹⁻⁴¹ Although there is no definitive evidence that gastric emptying of liquids is delayed in patients

Table 1. Summary of the American Society of Anesthesiologists Practice Guidelines for Perioperative Fasting⁴³

Ingested Material	Minimum Fasting Period (h)
Clear liquids (eg, water, fruit juice without pulp, carbonated beverages, carbohydrate-rich nutritional drinks, clear tea or black coffee)	2
Breast milk	4
Infant formula and nonhuman milk	6
Light meal (eg, toast and clear liquids)	6
Fried foods, fatty foods, or meat	Additional time (eg, ≥ 8) may be needed

Clear liquids are encouraged up to 2 hours before surgery.

Adapted from Practice Guidelines for Preoperative Fasting and the Use of Pharmacologic Agents to Reduce the Risk of Pulmonary Aspiration. Application to Healthy Patients Undergoing Elective Procedures. An Updated Report by the American Society of Anesthesiologists Task Force on Preoperative Fasting and the Use of Pharmacologic Agents to Reduce the Risk of Pulmonary Aspiration.⁴³ Adaptations are themselves works protected by copyright. So in order to publish this adaptation, authorization must be obtained both from the owner of the copyright in the original work and from the owner of copyright in the translation or adaptation.

with diabetic neuropathy, gastric emptying of solids is thought to be delayed in this population.⁴² The American Society of Anesthesiologists and other international organizations now recommend intake of clear fluids until 2 hours before surgery and refraining from solid food for at least 6 hours before surgery (See Table 1).^{35,43–45}

■ Dietary Preparation

Oral Immunonutrition

Surgery alters immune function and evokes an inflammatory response.⁴⁶ Preoperative enteral diets containing high levels of arginine, glutamine, nucleotides, and omega-3 fatty acids have been investigated as a way to modulate postoperative alterations in immune and inflammatory behavior.^{11,47–49} In the context of non-ERAS[®] care, many studies show a benefit from immunonutrition with regard to a reduction in complications and LOS.^{50,51} However, the results are not consistent. An ongoing RCT may provide more clarity on this issue.⁵²

Carbohydrate Treatment

The surgical stress response induces a catabolic state.⁴⁶ Provision of a carbohydrate-rich drink 2–3 hours before surgery places patients in a metabolically fed state.⁷ It reduces postoperative nitrogen and protein losses, helps to maintain lean body mass and muscle strength, and decreases insulin resistance.^{53–58} In addition, carbohydrate treatment reduces preoperative thirst, hunger, and anxiety.^{38,59} In major abdominal surgery, preoperative carbohydrate loading is associated with

reductions in LOS, but not in complications.^{60–62} Its benefit for more minor surgery is less clear. In an RCT including 94 patients undergoing laparoscopic cholecystectomy, carbohydrate loading did not confer any benefits.⁶³ Its use in diabetic patients has not been well studied. Further study is needed to determine patients and procedures for which this procedure is most appropriate.

■ Premedication

The incidence of preoperative anxiety may be as high as 80%.⁶⁴ Pharmacological preoperative sedation is the traditional method for providing relief. However, this approach has disadvantages. First, the absorption and efficacy of oral anxiolytics are unpredictable. Second, they are associated with prolonged impairment in psychomotor function and can impair patients' capacity to meet recovery milestones.⁶⁵ In the context of an ERAS[®] program, this is significant because it may impede the ability to ambulate, eat, and drink, all important parts of these pathways. Therefore, routine pharmacological anxiolysis, especially with long-acting agents, is not recommended. A variety of nonpharmacological interventions, including a preoperative visit with an anesthesiologist and music chosen by the patient are effective in reducing preoperative anxiety.^{66,67} In addition, some ERAS[®] components are themselves effective anxiolytics. These include preoperative education and counseling,

Table 2. Summary of ERAS Preoperative Guidelines

Recommendation	Type of Surgery	Strength of Evidence	ERAS Recommendation Grade
Preadmission education and counseling	All	Low	Strong
Prehabilitation	All	Very low	No
Smoking cessation	All	High	Strong
Abstinence from alcohol	All	Low	Strong
No mechanical bowel preparation	All	High	Strong
Preoperative fasting	All	Moderate	Strong
Carbohydrate treatment	Major abdominal, head and neck	Low-moderate	Strong-nondiabetic patients; weak-diabetic patients
Immunonutrition	All	Low	Weak
No routine preanesthetic premedication	All	High	Strong

Preoperative interventions endorsed by ERAS guidelines. Although current guidelines cover a wide range of surgical procedures, the recommendations are generally consistent.^{1–10} ERAS indicates enhanced recovery after surgery.

avoiding prolonged starvation times, and preoperative carbohydrate loading.^{7,59}

■ Conclusions

ERAS[®] pathways encompass the entire perioperative period. Preoperative components of ERAS[®] are vital to the success of these programs (Table 2). Individually, they have been demonstrated to improve outcome. In addition, they engage patients in their care and recovery. Although many of the interventions are well established, others require further study to clarify their role in improving postoperative outcomes.

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