Proactive Assessment and Intervention: Nutritional Issues in Gastrointestinal Enhanced Recovery After Surgery Guidelines (Postprint)

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Date: 2018-12-04T00:00:00+00:00

Abstract

Enhanced Recovery After Surgery (ERAS) has been implemented in gastrointestinal surgery for over two decades, with particularly extensive application in colorectal surgery. Multiple ERAS guidelines for gastrointestinal surgery have been published, and in recent years, these guidelines have undergone several revisions and updates both domestically and internationally, contributing to further standardization of perioperative management in gastrointestinal surgery. Clinical nutrition constitutes an essential and integral component of ERAS, encompassing preoperative nutritional assessment, prehabilitation via oral nutritional supplementation, early postoperative enteral nutrition, and other elements, which have garnered increasing attention and emphasis in guideline updates. This article provides a focused interpretation of the clinical nutrition sections in the latest updated ERAS guidelines from both domestic and international sources.

Full Text

Active Assessment and Intervention: Interpretation of Nutritional Issues in Guidelines for Enhanced Recovery After Gastrointestinal Surgery

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Abstract

Enhanced Recovery After Surgery (ERAS) has been implemented in gastrointestinal (GI) surgery for more than 20 years, particularly gaining widespread application in colorectal surgery. Multiple ERAS guidelines for GI surgery have been published, and these guidelines have undergone several revisions and updates in China and abroad in recent years. Clinical nutrition, which includes preoperative nutritional risk assessment, prehabilitation such as oral nutritional supplementation (ONS), and early postoperative enteral nutrition, constitutes an indispensable and important component of ERAS and has received increasing attention in guideline updates. This article focuses on interpreting the clinical nutrition components of the latest updated ERAS guidelines for GI surgery.

Keywords: enhanced recovery after surgery; nutritional risk; guideline interpretation; early enteral nutrition; prehabilitation

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1. Guideline Development and Evidence Evaluation

ERAS guidelines are developed and published by professional academic societies through multinational or multicenter collaboration, incorporating the latest high-quality research evidence and based on evidence-based medicine principles. Expert committees primarily utilize the "Grading of Recommendations, Assessment, Development and Evaluation" (GRADE) system to evaluate evidence quality and recommendation strength. Recommendation strength is categorized as either strong or weak (conditional). A strong recommendation indicates certainty that the clinical decision or intervention' s benefits outweigh its harms or that there are no adverse effects. A weak recommendation indicates uncertainty about whether benefits outweigh harms. Evidence quality is graded as high, moderate, low, or very low.

2. Basic Components of Gastrointestinal ERAS

The ERAS pathway represents a complete treatment process involving multidisciplinary surgical teams, encompassing preoperative, intraoperative, and postoperative hospital care, as well as post-discharge follow-up and treatment outcome evaluation. Interventions to address preoperative factors that may affect postoperative recovery are termed "prehabilitation," which includes lifestyle interventions, smoking and alcohol cessation counseling, dietary guidance, and psychological support. Evidence quality is low, but strong recommendations are made for preoperative prehabilitation. Post-discharge follow-up and outcome assessment are equally important and may help improve clinical outcomes.

**** Core Components and Content of Gastrointestinal ERAS

Key measures include: no routine mechanical bowel preparation (to reduce dehydration); preoperative fasting of solid foods for 6 hours and clear liquids for 2-3 hours; preoperative carbohydrate loading (400ml) 30-60 minutes before

anesthesia; prophylactic antibiotics; multimodal analgesia with general anesthesia or combined epidural block; anesthesia depth monitoring; active warming measures (heated mattresses, warmed fluids); minimally invasive GI surgery; restrictive fluid therapy; no routine nasogastric tubes (if required, remove within 24 hours); avoidance or minimization of abdominal drains; urinary catheter removal within 1-2 days postoperatively; multimodal prevention of postoperative nausea and vomiting; early oral intake; early mobilization with daily activity plans; and post-discharge follow-up.

3. Preoperative Nutritional Issues in Gastrointestinal ERAS

3.1 Nutritional Risk Assessment For patients undergoing GI surgery, the prevalence of nutritional risk or malnutrition ranges from 46% to 62.7%. Routine preoperative nutritional risk screening is recommended. The screening process involves two steps: first, screening for reduced food intake in the past week, weight loss over the past 3 months, BMI < 20.5 kg/m^2, or planned major surgery; if any item is positive, further assessment using the NRS 2002 scoring system is performed. The NRS 2002 evaluates disease severity, nutritional status, and age, with scores 3 indicating nutritional risk requiring intervention planning. Preoperative nutritional risk increases postoperative complications and mortality, hindering enhanced recovery.

3.2 Preoperative Nutritional Intervention For patients with nutritional risk or diagnosed malnutrition, preoperative nutritional support is recommended. Nutritional support should be initiated when: (1) oral intake is insufficient for >7 days, (2) energy intake is <60% of requirements, or (3) severe malnutrition is present. Enteral nutrition (EN) is the preferred route, with oral nutritional supplements (ONS) as first choice unless contraindicated by gastrointestinal obstruction, severe intestinal bleeding, or intestinal paralysis. Parenteral nutrition (PN) is indicated when EN cannot meet energy demands. The goal is to improve metabolism and protein status, enhancing surgical tolerance and potentially reducing complications and mortality. However, current evidence shows perioperative nutritional support lacks definitive correlation with clinical outcomes, with benefits only clearly demonstrated in severely malnourished patients.

The ESPEN consensus defines malnutrition as meeting any of: (1) BMI < 18.5 kg/m^2 with weight loss >10%, (2) BMI < 20 kg/m^2 with weight loss >5% in patients <70 years, or (3) BMI < 22 kg/m^2 with weight loss >5% in patients 70 years. Energy targets are 30 kcal/(kg$\cdot$d) (1 kcal = 4.2 kJ), with protein targets of 1.5-2.0 g/(kg$\cdot$d). For preoperative nutritional support, 1-2 weeks of therapy is recommended for severely malnourished patients, with surgery postponed if possible. Reassessment using NRS 2002 is advised weekly.

3.3 Preoperative Fasting and Oral Carbohydrates Traditional preoperative fasting protocols required 12 hours of solid food and 6 hours of clear

liquid restriction, causing dehydration, insulin resistance, and patient discomfort. Current evidence supports reduced fasting times: 6 hours for solids and 2-3 hours for clear liquids. For patients without gastrointestinal motility disorders or obstruction, oral carbohydrate beverages (250-400ml) administered 60-90 minutes before anesthesia reduce postoperative insulin resistance, thirst, and anxiety without increasing aspiration risk. This approach is not recommended for patients with gastroesophageal reflux, obesity, diabetes, or previous GI surgery.

4. Postoperative Early Enteral Nutrition or Oral Feeding

Early oral intake or enteral nutrition after GI surgery reduces postoperative infection rates and hospital length of stay without increasing anastomotic leak risk. While some concerns exist regarding postoperative nausea, vomiting, and intestinal distension, multimodal protocols for preventing postoperative ileus complement early feeding. Early oral intake promotes intestinal motility, maintains mucosal barrier function, prevents microbial dysbiosis, and improves postoperative anxiety.

Traditional protocols delayed oral nutrition for 4-5 days post-gastrectomy, but studies show feeding on postoperative day 1 does not increase complications or mortality and promotes GI motility recovery. For colorectal surgery, oral intake can begin on postoperative day 1. For total gastrectomy, selective intraoperative placement of nasojejunal tubes or jejunostomy may facilitate postoperative nutrition. Protein and energy supplementation should continue postoperatively, with ONS recommended when oral intake is insufficient, transitioning from elemental to whole protein formulas. Post-discharge nutritional support should be continued for high-risk patients.

5. Summary

All ERAS interventions aim to minimize surgical stress, maintain physiological homeostasis, and promote rapid recovery. In GI surgery patients with high nutritional risk, nutrition represents an indispensable component of ERAS—from preoperative assessment and timely prehabilitation to early postoperative enteral nutrition—helping maintain gut barrier function, restore intestinal motility, reduce infection rates, shorten hospital stays, and alleviate postoperative anxiety.

References

[1] Kehlet H. Multimodal approach to control postoperative pathophysiology and rehabilitation. *Br J Anaesth*, 1997, 78: 606-617.

[2] Fearon KC, Ljungqvist O, Von Meyenfeldt MF, et al. Enhanced recovery after surgery: a consensus review of clinical care for patients undergoing colonic resection. *Clin Nutr*, 2005, 24: 466-477.

[3] Lassen K, Soop M, Nygren J, et al. Consensus Review of Optimal Perioperative Care in Colorectal Surgery: Enhanced Recovery After Surgery (ERAS) Group Recommendations. *Arch Surg*, 2009, 144: 961-969.

[4] Gustafsson UO, Scott MJ, Schwenk W, et al. Guidelines for perioperative care in elective colonic surgery: Enhanced Recovery After Surgery (ERAS®) Society Recommendations. *World J Surg*, 2013, 37: 259-284.

[5] Nygren J, Thacker J, Carli F, et al. Guidelines for Perioperative Care in Elective Rectal/Pelvic Surgery: Enhanced Recovery After Surgery (ERAS®) Society Recommendations. *World J Surg*, 2013, 37: 285-305.

[6] Mortensen K, Nilsson M, Slim K, et al. Consensus guidelines for enhanced recovery after gastrectomy: Enhanced Recovery After Surgery (ERAS®) Society recommendations. *Br J Surg*, 2014, 101: 1209-1229.

[7] 中华医学会肠外肠内营养学分会加速康复外科协作组. 结直肠手术应用加速康复外科中国专家共识 (2015 版). 中华结直肠疾病电子杂志, 2015, 14: 606-608.

[8] 中国加速康复外科专家组. 中国加速康复外科围手术期管理专家共识 (2016). 中华外科杂志, 2016, 54: 413-418.

[9] 中华医学会外科学分会, 中华医学会麻醉学分会. 加速康复外科中国专家共识及路径管理指南 (2018). 中国实用外科杂志, 2018: 1-20.

[10] Guyatt GH, Oxman AD, Vist GE, et al. GRADE: an emerging consensus on rating quality of evidence and strength of recommendations. *BMJ*, 2008, 336: 924-926.

[11] Cederholm T, Bosaeus I, Barazzoni R, et al. Diagnostic criteria for malnutrition—An ESPEN Consensus Statement. *Clin Nutr*, 2015, 34: 335-340.

[12] Gillis C, Buhler K, Bressee L, et al. Effects of Nutritional Prehabilitation, With and Without Exercise, on Outcomes of Patients Undergoing Elective Major Abdominal Surgery: A Randomized Blinded Controlled Trial. *Ann Surg*, 2017, 267: 50-56.

[13] Barbera-Garcia A, Ubri M, Roca J, et al. Personalised Prehabilitation in High-risk Patients Undergoing Elective Major Abdominal Surgery: A Randomised Blinded Controlled Trial. *Ann Surg*, 2018, 267: 50-56.

[14] Holte K, Nielsen KG, Madsen JL, et al. Physiologic effects of bowel preparation. *Dis Colon Rectum*, 2004, 47: 1397-1402.

[15] Hausel J, Nygren J, Lagerkranser M, et al. A carbohydrate-rich drink reduces preoperative discomfort in elective surgery patients. *Anesth Analg*, 2001, 93: 1344-1350.

[16] Wang D, Li T, Yu J, et al. Is nasogastric or nasojejunal decompression necessary following gastrectomy for gastric cancer? A systematic review and meta-analysis of randomized controlled trials. *J Gastrointest Surg*, 2015, 19: 195-204.

[17] Wang Z, Chen J, Su K, et al. Abdominal drainage versus no drainage post gastrectomy for gastric cancer. *Cochrane Database Syst Rev*, 2011: CD008788.

[18] 中华医学会肠外肠内营养学分会．成人围手术期营养支持指南．中华外科杂志, 2016, 54: 641-657.

[19] Bachmann J, Müller T, Schröder A, et al. Influence of an elevated nutrition risk score (NRS) on survival in patients following gastrectomy for gastric cancer. *Med Oncol*, 2015, 32: 1-5.

[20] Zheng HL, Lu J, Li P, et al. Effects of Preoperative Malnutrition on Short- and Long-Term Outcomes of Patients with Gastric Cancer: Can We Do Better? *Ann Surg Oncol*, 2017, 24: 3376-3385.

[21] Hamberg O. Nutritional risk screening (NRS 2002): a new method based on an analysis of controlled clinical trials. *Clin Nutr*, 2003, 22: 321-336.

[22] Mariette C, De Botton ML, Piessen G. Surgery in esophageal and gastric cancer patients: what is the role for nutrition support in your daily practice? *Ann Surg Oncol*, 2012, 19: 2128-2134.

[23] Lambert E, Carey S. Practice Guideline Recommendations on Perioperative Fasting: A Systematic Review. *JPEN J Parenter Enteral Nutr*, 2016, 40: 1158-1165.

[24] Smith I, Kranke P, Murat I, et al. Perioperative fasting in adults and children: guidelines from the European Society of Anaesthesiology. *Eur J Anaesthesiol*, 2011, 28: 556-569.

[25] Kahokehr A, Wheeler BRL, Sammmour T, et al. The effect of perioperative psychological intervention on fatigue after laparoscopic cholecystectomy: a randomized controlled trial. *Ann Surg*, 2008, 248: 739-745.

[26] Broadbent E, Kahokehr A, Booth RJ, et al. A brief relaxation intervention reduces stress and improves surgical wound healing response: a randomized trial. *Brain Behav Immun*, 2012, 26: 212-217.

[27] Tønnesen H, Rosenberg J, Nielsen HJ, et al. Effect of preoperative abstinence on poor postoperative outcome in alcohol misusers: randomised controlled trial. *BMJ*, 1999, 318: 1311-1316.

[28] Lindström D, Azodi OA, Tønnesen H, et al. Effects of a perioperative smoking cessation intervention on postoperative complications: a randomized trial. *Ann Surg*, 2008, 248: 739-745.

[29] Jamtvedt G, Young JM, Kristoffersen DT, et al. Audit and feedback: effects on professional practice and healthcare outcomes. *Physiotherapy*, 2003, 89: 517-517.

[30] Bilkhu DK, Dennison AR, Hall TC, et al. Role of preoperative carbohydrate loading: a systematic review. *Ann R Coll Surg Engl*, 2014, 96: 15-22.

[31] Sugisawa N, Tokunaga M, Makauchi R, et al. A phase II study of an enhanced recovery after surgery protocol in gastric cancer surgery. *Gastric Cancer*, 2016, 19: 961-967.

[32] Singh PM, Panwar R, Borle A, et al. Efficiency and Safety of Applying ERAS Protocols to Bariatric Surgery: a Systematic Review with Meta-Analysis and Trial Sequential Analysis of Evidence. *Obes Surg*, 2017, 27: 489-501.

[33] Yang R, Tao W, Chen YY, et al. Enhanced recovery after surgery programs versus traditional perioperative care in laparoscopic hepatectomy: a meta-analysis. *Int J Surg*, 2016, 36: 274-282.

[34] Tanaka R, Lee SW, Kawai M, et al. Protocol for enhanced recovery after surgery improves short-term outcomes for patients with gastric cancer: a randomized clinical trial. *Gastric Cancer*, 2017, 20: 861-871.

[35] Lassen K, Kjæve J, Fetveit T, et al. Allowing normal food at will after major upper gastrointestinal surgery does not increase morbidity: a randomized multicenter trial. *Ann Surg*, 2008, 247: 721-729.

[36] Aarts MA, Rotstein OD, Pearsall EA, et al. Postoperative ERAS Interventions Have the Greatest Impact on Optimal Recovery: Experience With Implementation of ERAS Across Multiple Hospitals. *Ann Surg*, 2018, 267: 992-997.

[37] Wang Z, Chen J, Su K, et al. Effects of applying ERAS protocols to laparoscopic cholecystectomy: a randomized controlled trial. *Surg Endosc*, 2012, 26: 1730-1736.

Note: Figure translations are in progress. See original paper for figures.