Agency for Healthcare Research and Quality
Advancing Excellence in Health Care

NATIONAL GUIDELINE CLEARINGHOUSE

General

Guideline Title

Clinical practice guidelines for enhanced recovery after colon and rectal surgery from the American Society of Colon and Rectal Surgeons and Society of American Gastrointestinal and Endoscopic Surgeons.

Bibliographic Source(s)

Carmichael JC, Keller DS, Baldini G, Bordeianou L, Weiss E, Lee L, Boutros M, McClane J, Feldman LS, Steele SR. Clinical practice guidelines for enhanced recovery after colon and rectal surgery from the American Society of Colon and Rectal Surgeons and Society of American Gastrointestinal and Endoscopic Surgeons. Dis Colon Rectum. 2017 Aug;60(8):761-84. [371 references] PubMed

Guideline Status

This is the current release of the guideline.

This guideline meets NGC's 2013 (revised) inclusion criteria.

NEATS Assessment

National Guideline Clearinghouse (NGC) has assessed this guideline's adherence to standards of trustworthiness, derived from the Institute of Medicine's report Clinical Practice Guidelines We Can Trust.

= Poor = Fair = Good = Very Good = Excellent

Assessment	Standard of Trustworthiness
YES	Disclosure of Guideline Funding Source
	Disclosure and Management of Financial Conflict of Interests
	Guideline Development Group Composition
YES	Multidisciplinary Group

UNKNOWN	Methodologist Involvement
▮▯▯▯▯	Patient and Public Perspectives
	Use of a Systematic Review of Evidence
▮▮▮▮▮	Search Strategy
▮▮▮▮▯	Study Selection
▮▮▮▮▯	Synthesis of Evidence
	Evidence Foundations for and Rating Strength of Recommendations
▮▮▮▮▯	Grading the Quality or Strength of Evidence
▮▮▮▮▮	Benefits and Harms of Recommendations
▮▮▮▮▮	Evidence Summary Supporting Recommendations
▮▮▮▮▮	Rating the Strength of Recommendations
▮▮▮▮▮	**Specific and Unambiguous Articulation of Recommendations**
▮▯▯▯▯	**External Review**
▮▯▯▯▯	**Updating**

Recommendations

Major Recommendations

The levels of evidence and the grades of recommendations (1A-2C) are defined at the end of the "Major Recommendations" field.

Preoperative Interventions

Preadmission Counseling

A preoperative discussion of milestones and discharge criteria should typically be performed with the patient before surgery. Grade of Recommendation: Strong recommendation based on low-quality evidence, 1C.
Ileostomy education, marking, and counseling on dehydration avoidance should be included in the preoperative setting. Grade of Recommendation: Strong recommendation based on moderate-quality evidence, 1B.

Preadmission Nutrition and Bowel Preparation

A clear liquid diet may be continued <2 hours before general anesthesia. Grade of Recommendation: Strong recommendation based on high-quality evidence, 1A.
Carbohydrate loading should be encouraged before surgery in nondiabetic patients. Grade of Recommendation: Weak recommendation based on moderate-quality evidence, 2B.
Mechanical bowel preparation plus oral antibiotic bowel preparation before colorectal surgery is the

preferred preparation and is associated with reduced complication rates. Grade of Recommendation: Weak recommendation based on moderate-quality evidence, 2B.

Preadmission Optimization

Prehabilitation before elective surgery may be considered for patients undergoing elective colorectal surgery with multiple comorbidities or significant deconditioning. Grade of Recommendation: Weak recommendation based on moderate-quality evidence, 2B.

Preadmission Orders

Preset orders should be used as a part of the enhanced care pathway. Grade of Recommendation: Weak recommendation based on low-quality evidence, 2C.

Perioperative Interventions

Surgical Site Infection

A bundle of measures should be in place to reduce surgical site infection. Grade of Recommendation: Strong recommendation based on moderate-quality evidence, 1B.

Pain Control

A multimodal, opioid-sparing, pain management plan should be used and implemented before the induction of anesthesia. Grade of Recommendation: Strong recommendation based on moderate-quality evidence, 1B.
Thoracic epidural analgesia is recommended for open colorectal surgery, but not for routine use in laparoscopic colorectal surgery. Grade of Recommendation: Strong recommendation based on moderate-quality evidence, 1B.

Perioperative Nausea and Vomiting (PONV)

Antiemetic prophylaxis should be guided by preoperative screening for risk factors for postoperative nausea/vomiting. Grade of Recommendation: Strong recommendation based on moderate-quality evidence, 2B.
Preemptive, multimodal antiemetic prophylaxis should be used in all at-risk patients to reduce PONV. Grade of Recommendation: Strong recommendation based on high-quality evidence, 1A.

Intraoperative Fluid Management

Maintenance infusion of crystalloids should be tailored to avoid excess fluid administration and volume overload. Grade of Recommendation: Strong recommendation based on moderate-quality evidence, 1B.
Balanced chloride-restricted crystalloid solutions should be used as maintenance infusion in patients undergoing colorectal surgery. Grade of Recommendation: Strong recommendation based on low-quality evidence, 1C.
In high-risk patients and in patients undergoing major colorectal surgery associated with significant intravascular losses, the use of goal-directed fluid therapy is recommended. Grade of Recommendation: Strong recommendation based on moderate-quality evidence, 1B.

Surgical Approach

A minimally invasive surgical approach should be used whenever the expertise is available and appropriate. Grade of Recommendation: Strong recommendation based on high-quality evidence, 1A.
The routine use of intra-abdominal drains and nasogastric tubes for colorectal surgery should be avoided. Grade of Recommendation: Strong recommendation based on moderate-quality evidence, 1B.

Postoperative Interventions

Patient Mobilization

Early and progressive patient mobilization is associated with shorter length of stay. Grade of Recommendation: Strong recommendation based on low-quality evidence, 1C.

Ileus Prevention

Patients should be offered a regular diet immediately after elective colorectal surgery. Grade of Recommendation: Strong recommendation based on moderate-quality evidence, 1B.
Sham feeding (i.e., chewing sugar-free gum for ≥10 minutes 3 to 4 times per day) after colorectal surgery is safe, results in small improvements in gastrointestinal (GI) recovery, and may be associated with a reduction in the length of hospital stay. Grade of Recommendation: Strong recommendation based on high-quality evidence, 1B.
Alvimopan is recommended to hasten recovery after open colorectal surgery, although its use in minimally invasive surgery remains less clear. Grade of Recommendation: Strong recommendation based on moderate-quality evidence, 1B.

Postoperative Fluid Management

Intravenous fluids should be discontinued in the early postoperative period after recovery room discharge. Grade of Recommendation: Strong recommendation based on moderate-quality evidence, 1B.

Urinary Catheters

Urinary catheters should be removed within 24 hours of elective colonic or upper rectal resection when not involving a vesicular fistula, irrespective of thoracic epidural analgesia (TEA) use. Grade of Recommendation: Strong recommendation based on moderate-quality evidence, 1B.
Urinary catheters should be removed within 48 hours of midrectal/lower rectal resections. Grade of Recommendation: Strong recommendation based on moderate-quality evidence, 1B.

Definitions:

The Grading of Recommendations Assessment, Development and Evaluation (GRADE) System–Grading Recommendations[a]

	Description	Benefit vs Risk and Burdens	Methodological Quality of Supporting Evidence	Implications
1A	Strong recommendation, high-quality evidence	Benefits clearly outweigh risk and burdens or vice versa	RCTs without important limitations or overwhelming evidence from observational studies	Strong recommendation, can apply to most patients in most circumstances without reservation
1B	Strong recommendation, moderate-quality evidence	Benefits clearly outweigh risk and burdens or vice versa	RCTs with important limitations (inconsistent results, methodological flaws, indirect or imprecise) or exceptionally strong evidence from observational studies	Strong recommendation, can apply to most patients in most circumstances without reservation
1C	Strong recommendation, low- or very-low-quality evidence	Benefits clearly outweigh risk and burdens or vice versa	Observational studies or case series	Strong recommendation but may change when higher quality evidence becomes available
2A	Weak recommendation, high-quality evidence	Benefits closely balanced with risks and burdens	RCTs without important limitations or overwhelming evidence from observational studies	Weak recommendation, best action may differ depending on circumstances or

	Description	Benefit vs Risk and Burdens	Methodological Quality of Supporting Evidence	Implications
2B	Weak recommendations, moderate-quality evidence	Benefits closely balanced with risks and burdens	RCTs with important limitations (inconsistent results, methodological flaws, indirect or imprecise) or exceptionally strong evidence from observational studies	Weak recommendation, best action may differ depending on circumstances or patients' or societal values
2C	Weak recommendation, low- or very-low-quality evidence	Uncertainty in the estimates of benefits, risks and burden; benefits, risk, and burden may be closely balanced	Observational studies or case series	Very weak recommendations, other alternatives may be equally reasonable

RCT = randomized controlled trial.

[a]Adapted from Guyatt G, Gutterman D, Baumann MH, et al. Grading strength of recommendations and quality of evidence in clinical guidelines: report from an American College of Chest Physicians Task Force. Chest. 2006;129:174–181. Used with permission.

Clinical Algorithm(s)

None provided

Scope

Disease/Condition(s)

Conditions requiring colorectal surgery

Guideline Category

Counseling

Management

Treatment

Clinical Specialty

Colon and Rectal Surgery

Gastroenterology

Internal Medicine

Intended Users

Advanced Practice Nurses

Health Care Providers

Nurses

Patients

Physician Assistants

Physicians

Guideline Objective(s)

- To evaluate the strength of evidence in support of measures to improve patient recovery after elective colon and rectal resections
- To evaluate the evidence behind enhanced recovery protocols (ERPs) for colorectal surgery

Target Population

Patients undergoing elective colorectal surgery

Interventions and Practices Considered

1. Preoperative interventions
    - Preadmission counseling
    - Preadmission nutrition and bowel preparation
    - Preadmission optimization (prehabilitation)
    - Preset orders as part of the enhanced care pathway
2. Perioperative interventions
    - Care bundle to reduce surgical site infection
    - Pain control (i.e., multimodal, opioid-sparing, pain management plan)
    - Thoracic epidural analgesia
    - Preemptive, multimodal antiemetic prophylaxis
    - Intraoperative fluid management
    - Consideration of surgical approach
    - Routine use of intra-abdominal drains and nasogastric tubes (considered but not recommended)
3. Postoperative interventions
    - Early and progressive patient mobilization
    - Ileus prevention (i.e., diet, sham feeding, alvimopan)
    - Postoperative fluid management (discontinuation of intravenous fluids)
    - Urinary catheter removal

Major Outcomes Considered

- Nausea
- Pain at rest
- Return of bowel function
- Wound healing
- Hospital discharge/length of stay
- Postoperative complications
- Oncologic outcomes
- Reoperation rate
- Readmission rate
- Cost
- Patient satisfaction

Methodology

Methods Used to Collect/Select the Evidence

Hand-searches of Published Literature (Primary Sources)

Searches of Electronic Databases

Description of Methods Used to Collect/Select the Evidence

The details of specific search strategies, including search terms, inclusion criteria, exclusion criteria, total number of studies identified, and tables of evidence for each statement, are available in the supplements, but all of the search strategies involved an organized search of MEDLINE, PubMed, EMBASE and the Cochrane Database of Collected Reviews using a variety of key word combinations (for details on key words and search strategies see Supplementary Document 1 [see the "Availability of Companion Documents" field). Systematic searches were conducted from 1990 to March 2016 and were restricted to English-language articles. Directed searches of the embedded references from the primary articles were also performed in certain circumstances. Prospective randomized controlled trials (RCTs) and meta-analyses were given preference in developing these guidelines.

Number of Source Documents

After all of the searches were complete, a total of 12,483 citations had been identified for title/abstract review, and 764 articles were selected for extensive review and placed into evidence tables.

Methods Used to Assess the Quality and Strength of the Evidence

Weighting According to a Rating Scheme (Scheme Given)

Rating Scheme for the Strength of the Evidence

See the "Rating Scheme for the Strength of the Recommendations" field.

Methods Used to Analyze the Evidence

Review of Published Meta-Analyses

Systematic Review with Evidence Tables

Description of the Methods Used to Analyze the Evidence

Articles were selected for extensive review and placed into evidence tables with ranking of the evidence based on quality of the research by 2 independent reviewers (see Tables S1–S14 in the Supplemental Tables [see the "Availability of Companion Documents" field]).

Methods Used to Formulate the Recommendations

Expert Consensus

Description of Methods Used to Formulate the Recommendations

These guidelines were built following a standardized algorithm for the creation of all of the American

Society of Colon and Rectal Surgeons and Society of American Gastrointestinal and Endoscopic Surgeons' clinical practice guidelines, which included: search for existing guidelines, formulation of key questions, a systematic review of the literature, selection and appraisal of the quality of the evidence, development of clear recommendations, and drafting of the guideline.

The final grade of recommendation was performed using the modified Grading of Recommendations Assessment, Development and Evaluation (GRADE) system outlined previously by the American College of Chest Physicians (see Table 1 in the original guideline document).

Rating Scheme for the Strength of the Recommendations

The Grading of Recommendations Assessment, Development and Evaluation (GRADE) System–Grading Recommendations[a]

	Description	Benefit vs Risk and Burdens	Methodological Quality of Supporting Evidence	Implications
1A	Strong recommendation, high-quality evidence	Benefits clearly outweigh risk and burdens or vice versa	RCTs without important limitations or overwhelming evidence from observational studies	Strong recommendation, can apply to most patients in most circumstances without reservation
1B	Strong recommendation, moderate-quality evidence	Benefits clearly outweigh risk and burdens or vice versa	RCTs with important limitations (inconsistent results, methodological flaws, indirect or imprecise) or exceptionally strong evidence from observational studies	Strong recommendation, can apply to most patients in most circumstances without reservation
1C	Strong recommendation, low- or very-low-quality evidence	Benefits clearly outweigh risk and burdens or vice versa	Observational studies or case series	Strong recommendation but may change when higher quality evidence becomes available
2A	Weak recommendation, high-quality evidence	Benefits closely balanced with risks and burdens	RCTs without important limitations or overwhelming evidence from observational studies	Weak recommendation, best action may differ depending on circumstances or patients' or societal values
2B	Weak recommendations, moderate-quality evidence	Benefits closely balanced with risks and burdens	RCTs with important limitations (inconsistent results, methodological flaws, indirect or imprecise) or exceptionally strong evidence from observational studies	Weak recommendation, best action may differ depending on circumstances or patients' or societal values
2C	Weak recommendation, low- or very-low-quality evidence	Uncertainty in the estimates of benefits, risks and burden; benefits, risk, and burden may be closely balanced	Observational studies or case series	Very weak recommendations, other alternatives may be equally reasonable

RCT = randomized controlled trial.

[a]Adapted from Guyatt G, Gutterman D, Baumann MH, et al. Grading strength of recommendations and quality of evidence in clinical guidelines: report from an American College of Chest Physicians Task Force. Chest. 2006;129:174–181. Used with permission.

Cost Analysis

Published cost analyses were reviewed.

Method of Guideline Validation

Internal Peer Review

Description of Method of Guideline Validation

Members of the Society of American Gastrointestinal and Endoscopic Surgeons (SAGES) and American Society of Colon and Rectal Surgeons (ASCRS) Practice Guidelines Committee worked in joint production of these guidelines from inception to final publication. Final recommendations were approved by each society's committee and executive council.

Evidence Supporting the Recommendations

Type of Evidence Supporting the Recommendations

The type of supporting evidence is identified and graded for each recommendation (see the "Major Recommendations" field).

Benefits/Harms of Implementing the Guideline Recommendations

Potential Benefits

A 2011 Cochrane review found that enhanced recovery protocols (ERPs) were associated with a reduction in overall complications and length of stay when compared with conventional perioperative patient management. Subsequent studies have shown that ERPs are associated with reduced healthcare costs and improved patient satisfaction. ERPs are also associated with improved outcomes regardless of whether patients undergo laparoscopic or open surgery. Studies have also shown that ERPs cannot simply be implemented and forgotten but require a continued audit process in place to guide compliance and to continue to improve quality.

Refer to the original guideline document for benefits associated with specific interventions.

Potential Harms

- Experimental and observational clinical studies have shown that nonsteroidal anti-inflammatory drugs (NSAIDs) may increase the risk of anastomotic leakage.
- Systemic perioperative gabapentinoids, ketamine, and α2-agonists have also been administered to improve analgesia and reduce systemic opioid consumption and postoperative hyperalgesia, but psychotropic adverse effects, dizziness, and sedation may impair immediate recovery. Moreover, the optimal gabapentinoids regimen (dose, timing, and duration of administration) still needs to be determined.
- Trials and meta-analyses have shown that thoracic epidural analgesia (TEA) has no impact on or may even delay hospital discharge in laparoscopic surgery. This delay is probably related to the higher incidence of hypotension and urinary tract infections requiring additional postoperative care.

- With early oral feeding, providers must be cognizant that the risk of vomiting increases.

Qualifying Statements

Qualifying Statements

This clinical practice guideline is based on the best available evidence. These guidelines are inclusive and not prescriptive. Their purpose is to provide information on which decisions can be made rather than to dictate a specific form of treatment. These guidelines are intended for the use of all practitioners, healthcare workers, and patients who desire information about the management of the conditions addressed by the topics covered in these guidelines. It should be recognized that these guidelines should not be deemed inclusive of all proper methods of care or exclusive of methods of care reasonably directed toward obtaining the same results. The ultimate judgment regarding the propriety of any specific procedure must be made by the physician in light of all of the circumstances presented by the individual patient.

Implementation of the Guideline

Description of Implementation Strategy

An implementation strategy was not provided.

Implementation Tools

Resources

For information about availability, see the *Availability of Companion Documents* and *Patient Resources* fields below.

Institute of Medicine (IOM) National Healthcare Quality Report Categories

IOM Care Need

Getting Better

IOM Domain

Effectiveness

Patient-centeredness

Identifying Information and Availability

Bibliographic Source(s)

Carmichael JC, Keller DS, Baldini G, Bordeianou L, Weiss E, Lee L, Boutros M, McClane J, Feldman LS, Steele SR. Clinical practice guidelines for enhanced recovery after colon and rectal surgery from the American Society of Colon and Rectal Surgeons and Society of American Gastrointestinal and Endoscopic Surgeons. Dis Colon Rectum. 2017 Aug;60(8):761-84. [371 references] PubMed

Adaptation

Not applicable: The guideline was not adapted from another source.

Date Released

2017 Aug

Guideline Developer(s)

American Society of Colon and Rectal Surgeons - Medical Specialty Society

Society of American Gastrointestinal and Endoscopic Surgeons - Medical Specialty Society

Source(s) of Funding

The funding bodies (American Society of Colon and Rectal Surgeons [ASCRS] and Society of American Gastrointestinal and Endoscopic Surgeons [SAGES]) did not influence the content of this work and no other specific funding was received from other entities.

Guideline Committee

Society of American Gastrointestinal and Endoscopic Surgeons (SAGES) Surgical Multimodal Accelerated Recovery Trajectory Enhanced Recovery Task Force Guidelines Committee

American Society of Colon and Rectal Surgeons (ASCRS) Practice Guidelines Committee

Composition of Group That Authored the Guideline

Authors: Joseph C. Carmichael, MD, Department of Surgery, University of California, Irvine School of Medicine, Irvine, California; Deborah S. Keller, MS, MD, Department of Surgery, Baylor University Medical Center, Dallas, Texas; Gabriele Baldini, MD, Department of Anesthesiology, McGill University, Montreal, Quebec, Canada; Liliana Bordeianou, MD, Department of Surgery, Massachusetts General Hospital, Harvard Medical School, Boston, Massachusetts; Eric Weiss, MD, Department of Colorectal Surgery, Cleveland Clinic Florida, Westin, Florida; Lawrence Lee, MD, PhD, Department of Surgery, McGill University, Montreal, Quebec, Canada; Marylise Boutros, MD, Department of Surgery, McGill University, Montreal, Quebec, Canada; James McClane, MD, Norwalk Hospital, Western Connecticut Medical Group, Norwalk, Connecticut; Liane S. Feldman, MD, Department of Surgery, McGill University, Montreal, Quebec, Canada; Scott R. Steele, MD, Department of Colorectal Surgery, Cleveland Clinic, Cleveland, Ohio

Financial Disclosures/Conflicts of Interest

The funding bodies (American Society of Colon and Rectal Surgeons [ASCRS] and Society of American Gastrointestinal and Endoscopic Surgeons [SAGES]) did not influence the content of this work and no other specific funding was received from other entities. Dr Keller is a member of the Pacira Pharmaceuticals speaker's bureau, and her institution has received unrestricted educational grants from

Pacira. Dr Feldman has received grant support from Medtronic and Merck. Dr Carmichael's institution has received unrestricted educational grant support for his work with Medtronic and Johnson & Johnson.

Guideline Status

This is the current release of the guideline.

This guideline meets NGC's 2013 (revised) inclusion criteria.

Guideline Availability

Available from the American Society of Colon and Rectal Surgeons Web site .

Availability of Companion Documents

The supplemental tables and literature search strategies are available from the Diseases of the Colon and Rectum Journal Web site .

Patient Resources

None available

NGC Status

This NGC summary was completed by ECRI Institute on October 10, 2017. The information was verified by the guideline developer on October 19, 2017.

This NEATS assessment was completed by ECRI Institute on September 7, 2017. The information was verified by the guideline developer on October 19, 2017.

Copyright Statement

This NGC summary is based on the original guideline, which is subject to the guideline developer's copyright restrictions.

Disclaimer

NGC Disclaimer

The National Guideline Clearinghouseâ„¢ (NGC) does not develop, produce, approve, or endorse the guidelines represented on this site.

All guidelines summarized by NGC and hosted on our site are produced under the auspices of medical specialty societies, relevant professional associations, public or private organizations, other government agencies, health care organizations or plans, and similar entities.

Guidelines represented on the NGC Web site are submitted by guideline developers, and are screened solely to determine that they meet the NGC Inclusion Criteria.

NGC, AHRQ, and its contractor ECRI Institute make no warranties concerning the content or clinical efficacy or effectiveness of the clinical practice guidelines and related materials represented on this site.

Moreover, the views and opinions of developers or authors of guidelines represented on this site do not necessarily state or reflect those of NGC, AHRQ, or its contractor ECRI Institute, and inclusion or hosting of guidelines in NGC may not be used for advertising or commercial endorsement purposes.

Readers with questions regarding guideline content are directed to contact the guideline developer.