Colectomy Pathway v1.1: **Table of Contents**

Stop and **Review**

Inclusion Criteria

- Surgery for total abdominal colectomy, ileoanal pull-through, diverting ileostomy reconnect, or ileocecectomy

Exclusion Criteria

- None

Colectomy Care

Appendix

Colectomy Pathway v1.1: **Pre-Clinic, Intake**

Stop and **Review**

Inclusion Criteria

- Surgery for total abdominal colectomy, ileoanal pull-through, diverting ileostomy reconnect, or ileocecectomy

Exclusion Criteria

- None

Where is patient at time of consult to surgery?

Inpatient → To Pre-Op, Consult and Prepare for Surgery Phase

Outpatient

Pre-Clinic, Intake

Attending Surgeon

- Receives initial consult (physician-to-physician)
- Confirms diagnosis and assigns pre-clinic work and Enhanced Recovery Pathway (ERP) introduction
- Communicates anticipated plan to Clinic RN, General Surgery Schedulers

Clinic RN/MA

- For patient without direct physician-to-physician referral, identify and confirm inclusion criteria are met and review with surgeon
- For patients with confirmed indication for surgery
  - Assign pre-clinic patient workflow
  - Provide initial materials ***to prepare for initial clinic appointment***
  - Invite family to ERP introduction. Set expectations regarding completion of review of materials prior to initial clinic appointment
  - Assign diagnosis-specific educational materials
  - Monitor dashboard for patient/family completion/understanding

General Surgery Schedulers

- Schedule initial surgeon consult
- Schedule nutrition consult

Patient/Family/Caregiver

- Complete pre-clinic workflow (ERP)

To Pre-Op, Consult and Prepare for Surgery Phase

Patient Education

- Enhanced Recovery After Surgery (PE3475)
- Deep Breathing (PE727)
- Progressive Muscle Relaxation (PE2253)
- Before Surgery Checklist (PE459)
- Bowel Cleanout using Golytely (PE702)
- Hibiclens Bathing and Antibiotic Ointment Instructions (PE611)
- Pregnancy Testing (PE846)
- Scar Care (PE2043)
- If alternating acetaminophen/ibuprofen: Pain Medicine after Surgery (PE1251)
- Acute pain (PE503)
- Nutrition for Your Child with an Ostomy or Rectal Pouch (PE1498)
- Using Foods to Help In Bowel Management (PE2915)
- Foods to Offer When Your Child Has Loose Bowel Movements or Diarrhea (PE1321)

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Last Updated: June 2023
Next Expected Review: November 2026

For questions concerning this pathway, contact:
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Colectomy Pathway v1.1:
Pre-Op, Consult and Prepare for Surgery

Stop and **Review**

Inclusion Criteria

- Surgery for total abdominal colectomy, ileoanal pull-through, diverting ileostomy reconnect, or ileocecectomy

Exclusion Criteria

- None

From Pre-Clinic, Intake Phase

Surgery Clinic or Inpatient Initial Visit (Templated Colectomy Pre-procedure Order Set)

- **Surgeon**
  - Confirm diagnosis, identify and address referring provider question and expectations, identify and address patient/parent question/expectations
  - Review medical history and current nutrition status (Pre-habilitation, optimize readiness for surgery)
    - Refer to PASS/Patch Clinic
    - Refer for Nutrition evaluation, optimization, and pre-operative education for post-operative expectations and care and education regarding impact of surgery on absorption, stooling patterns, and hydration
  - If surgery is indicated
    - Identify ERP module(s) to assign, write orders, and *review* modules assigned to individual patient
    - If ostomy naïve and an ostomy is planned, introduce pre-operative APP training and post-operative teach-back on post-operative day 3
    - Complete Consent for Surgery
    - Complete initial History and Physical, complete Epic consult note
      - Assess and document thrombosis risk GOC: Venous Thromboembolism (VTE) Prophylaxis for Hospitalized Patients – Determining Risk and Treatment 13843 (*for SCH only*)
    - If inpatient: communicate plan to APP and schedulers
    - Sign orders
- **Clinic RN**
  - Review and complete ERP checklist with Surgeon
  - Provide Enhanced Recovery After Surgery (PE3475) to patient/parent/caregiver
  - Review assigned ERP modules and invite patient/parent/caregiver to ERP teaching module; *make plan for patients without technology access*. Emphasize importance of completing assigned modules prior to scheduling surgery. Provide clinic RN contact information if additional clarification is desired
    - Print education materials if requested
    - Consider Odessa Brown Clinic Mindfulness classes and resources
    - Teach pre-operative Carbohydrate Load (see exclusions) and Perioperative Services NPO Standards P&P 10855 (*for SCH only)*, including cancellation for violations on day of surgery
  - If an ostomy is planned, assign pre-APP patient workflow and schedule an appointment with General Surgery APP for ostomy care and simulation. Emphasize requirement to complete pre-simulation education module. See standardized introduction

Visit(s) Prior to Surgery

Ostomy Teaching

Patient/Family/Caregiver

- Must complete ostomy training assignments prior to appointment

Clinic APP

- Address any questions or incomplete modules from pre-clinic training
- Provide face-to-face ostomy training on mannequin and patient
- Schedule inpatient postoperative day 3 teach back and set expectations for that appointment

Dietitian

- Assess nutrition risk
- Nutrition education on constipating foods, utilization of antimotility medications, and fiber supplements
- Perform pre-operative assessment of nutrition status and readiness for surgery. Makes a plan with the surgeon if pre-operative intervention is required

Pre-Anesthesia APP

- Review medical comorbidities and optimization prior to surgery
- Ensure plan is in place for thromboembolism prophylaxis and regional anesthesia
- Coordinate first case of day scheduling for patients per protocol

Child Life

- If needed; assess for psychosocial stressors and needs, provide support as appropriate

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To Peri-Op, Day of Surgery Phase

Last Updated: June 2023
Next Expected Review: November 2026

For questions concerning this pathway, contact:
EnhancedRecoveryPathway@seattlechildrens.org

If you are a patient with questions contact your medical provider, Medical Disclaimer

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Colectomy Pathway v1.1: **Peri-Op, Day of Surgery**

Stop and **Review**

Inclusion Criteria

- Surgery for total abdominal colectomy, ileoanal pull-through, diverting ileostomy reconnect, or ileocecectomy

Exclusion Criteria

- None

From Pre-Op, Consult and Prepare for Surgery Phase

Operating Room

Child Life

- If needed; assess for psychosocial stressors and needs, provide support as appropriate

Antibiotic Prophylaxis

- Per P&P Surgical Antimicrobial Prophylaxis 10999 (*for SCH only*)
- Initiate Surgical Site Infection Prevention Pathway

Normothermia

- Target 36º-38ºC
- Blankets, room warm, forced air immediately post-induction (off only for prep/drape)

Postoperative Nausea/Vomiting (PONV) Prophylaxis

Suggest minimum 2, at provider discretion

- Dexamethasone IV
- Ondansetron IV
- Propofol IV infusion
- Diphenhydramine IV
- Propofol or promethazine as an alternative in PACU

Venous Thromboembolism Prophylaxis

- Follow GOC: Venous Thromboembolism (VTE) Prophylaxis for Hospitalized Patients – Determining Risk and Treatment 13843 (*for SCH only*)

Anesthesia and Analgesia

- Regional anesthesia
  - TAP/QL block: Colectomy, Robotic ileoanal pull-through, double barrel ostomy, ileocecectomy
  - Epidural: ileoanal pull-though (open), divided ostomy
- Minimize opioids (max 0.3 mg/kg morphine IV equivalents)
- If steroid dependent: use stress dose
- Consider multimodal adjuvants
  - Acetaminophen IV early in the case if not already taken preop
  - If no anticoagulation: ketorolac IV at completion of case
  - Dexmedetomidine IV bolus early in case
  - (+/-) Ketamine IV by infusion or intermittent bolus

Fluids

- Target euvolemia, consider limiting IV fluids to 6 mL/kg/hr

Tubes and Drains

- Intraoperative NG tube per surgeon discretion, no routine NG tube postoperatively
- Intraoperative Foley catheter and drains per surgeon discretion, no routine use postoperatively, evaluate for removal at the end of the case
- Label all catheters clearly before leaving OR

PACU

- PONV medications PRN
- Continue regional catheters if appropriate
- If regional catheters, pain team to manage medications

Go to Post-Op to Discharge Phase

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Last Updated: June 2023
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Colectomy Pathway v1.1: **Post-op to Discharge**

Stop and **Review**

Inclusion Criteria

- Surgery for total abdominal colectomy, ileoanal pull-through, diverting ileostomy reconnect, or ileocecectomy

Exclusion Criteria

- None

From Peri-Op, Day of Surgery Phase

Therapy (SUR Post-procedure Order Set)

Analgesia

- Scheduled acetaminophen
- If no anticoagulation: scheduled ibuprofen
- Minimize opioid medications, max 0.3 mg/kg/day morphine IV equivalents. Order opioids only as a PRN breakthrough pain (not scheduled)
- If PCA
  - Managed by primary team
- If epidural
  - Managed by pain service and neuro checks per epidural opiate order set
  - Consider changing to PCA at postop day 5 if not taking oral opiates
- When tolerating oral intake, convert to oral pain medicines and remove epidural or discontinue PCA

PONV prophylaxis

- Ondansetron IV
- Diphenhydramine IV
- Consider escalation to pain service for administration of other options (dexamethasone, propofol, promethazine)

Venous Thromboembolism Prophylaxis

- Follow GOC: Venous Thromboembolism (VTE) Prophylaxis for Hospitalized Patients – Determining Risk and Treatment 13843 (*for SCH only*)

GI-Specific Medications

- Crohn's: when taking adequate PO, start metronidazole
- GI consult to discuss chronic medications and weaning (e.g. steroids)

Diet

- Ice chips/clear liquids POD #0 (only clinically indicated restrictions unless patient has trouble swallowing)
- Regular diet POD #1 (only clinically indicated restrictions unless patient has trouble swallowing)
- Age 4 and older and no concern for aspiration: chew gum or suck on hard candy for enteral stimulation. Follow age-appropriate aspiration avoidance guidelines

Activity

- Out of bed POD #0 (at least to chair). Parent/caregiver assist
- Ambulation as soon as able. PT consult if necessary

Fluids

- Discontinue maintenance fluids by POD #2 for patients tolerating PO intake

Tubes and drains

- Discontinue JP drains by POD #4
- Remove Urinary Foley catheter as soon as clinically appropriate

Call provider for urine output <1 mL/kg/hr

- Check HR, BP, cardiac output
- Consider: age, surgery complexity, 3rd spacing, Foley patency
- Consider NS bolus, may repeat in 4 hours
- If no improvement consider physical exam and lytes x1

Bedside RN

- Ostomy teaching, coordinated with APP
- Wound care: change dressings as needed

Radiology

- Do not order imaging routinely. May consider abdomen 1V in case of suspected NG tube migration or bowel obstruction

APP

- For non-elective surgery, assign ostomy education and provide ostomy kit and teaching
- POD #3 Ostomy teach-back (for new ostomy and revised ostomy cases)

Dietitian

- Instruct on nutrition for ostomy or rectal pouch

Child Life

- If needed; assess for psychosocial stressors and needs, provide support as appropriate

Discharge Criteria

- No fever
- Able to ambulate
- Tolerating age-appropriate ordered diet
- Pain adequately controlled
- If ostomy: adequate PO intake to match output, ostomy checklist completed
- Prescriptions ordered and ready
  - If steroids, taper plan per GI service
  - Minimize opioids, use acetaminophen. NSAIDs contraindicated.
  - Consider probiotics, fiber per Nutrition, anti-diarrheals
  - For Crohn's patients, metronidazole until return visit with GI

Follow-up Clinic Appointment

- With surgery in 2-3 weeks
- With GI and nutrition
  - Crohn's: 1-2 months
  - UC: after final operation (ileostomy takedown)

Discharge Instructions

- Ostomy (PE745)
- Colectomy (PE940)
- Acetaminophen (PE1305)
- Foods to Offer When Your Child Has Loose Bowel Movements or Diarrhea (PE1321)
- Nutrition For Your Child With An Ostomy Or Rectal Pouch (PE1498)

To Post-Discharge Phase

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Last Updated: June 2023
Next Expected Review: November 2026

For questions concerning this pathway, contact:
EnhancedRecoveryPathway@seattlechildrens.org

Colectomy Pathway v1.1: **Post-Discharge**

Stop and **Review**

Inclusion Criteria

- Surgery for total abdominal colectomy, ileoanal pull-through, diverting ileostomy reconnect, or ileocecectomy

Exclusion Criteria

- None

From Post-Op to Discharge Phase

Follow-up

Patient/Caregiver

- Continue medications as prescribed
  - Weaning pain meds
  - Anticoagulation if prescribed
  - Antibiotics, if prescribed
  - GI medications and weaning plan
- Ambulation at least 3 times daily
- Confirm follow-up appointments 2-4 weeks from discharge
  - Surgery – Surgeon and APP follow-up and ostomy care
  - Gastroenterology
  - Nutrition
  - Hematology if anticoagulation prescribed
  - Physical Therapy if indicated
- Manage and submit patient logs, if assigned

Discharge Planner

- Ensure follow-up appointments are scheduled with all services

Clinic RN

- Monitor post-discharge patient workflow and facilitate appointment and clinical troubleshooting

Dietitian

- Optimize calories and stool consistency, address probiotics

General Surgery APP

- Keep post-operative ostomy teaching/check-in to ensure social continence and skin integrity
- Provide contact information and troubleshooting resources

Surgeon

- Perform post-op check-in face-to-face or telemed when appropriate

Patient Education

- Enhanced Recovery After Surgery (PE3475)
- Deep Breathing (PE727)
- Progressive Muscle Relaxation (PE2253)
- Scar Care (PE2043)
- If alternating acetaminophen/ibuprofen, Pain Medicine after Surgery (PE1251)
- Acute pain (PE503)
- Nutrition for Your Child with an Ostomy or Rectal Pouch (PE1498)
- Foods to Offer When Your Child Has Loose Bowel Movements or Diarrhea (PE1321)
- Using Foods to Help In Bowel Management (PE2915)
- Food Intake Record (PE703)
- Ostomy Log (PE3492)

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Enhanced Recovery Modules

- Discuss the operation and minimally invasive surgical techniques when indicated/feasible
- Deep Breathing/Relaxation
- Mechanical Bowel Preparation for surgery: clarify continuation of current regimen with/without addition of formal prep. In addition, set time/type of pre-operative diet orders (e.g. clears starting at 12:00 day prior to surgery)
- Antibiotic Bowel Decontamination
- Pre-operative Carbohydrate Load
- Pre-operative Tylenol pre-load
- Post-operative expectations: Early diet, gum/hard candy. Nutrition partnership for diet and supplement recommendations

Return to Pre-Op

Carbohydrate Load

Drink clear carbohydrate liquid completed up to 2 hours prior to procedure

Use these: apple juice, white grape juice, Gatorade, Powerade, Pedialyte, ClearFast

How much
- 9 years old or younger: 2 to 8 ounces
- 10 years old or older: 8 to 16 ounces

Contraindications
- Not for patients with type 1 or 2 diabetes, morbid obesity (BMI>40 or >35 with metabolic effects), short gut syndrome, ketogenic diet, gastrointestinal dysmotility (i.e. gastroparesis)

Drinks to avoid
- No sugar-free or low sugar drinks (no “G2”)
- No red-colored drinks
- No drinks or juice with pulp (such as orange juice)
- No smoothies or shakes

Return to Pre-Op

Child Life

Child life specialists are members of the healthcare team who work directly with patients and families to help reduce anxiety and adjust to the hospital experience.

Consider consulting a child life specialist when a child or teen:
- Has a medical procedure that is challenging for patient
- Shows significant changes in behavior or play leading up to surgery
- Experiences long or repeated hospital stays
- Needs help understanding what is going on
- Has a difficult time coping with hospitalization or medical needs

Child life interventions include the following:

Pre-Op, Consult and Prepare for Surgery
- Explain a diagnosis or treatment in words that children and adolescents can understand
- Create a coping plan with patients to use leading up to surgery

Peri-Op, Surgery
- Provide procedural support during medical procedures (PIV placement, anesthesia induction)

Post-op to Discharge
- Support non-pharmaceutical post-op pain management skills
- Use therapeutic play and medical play to help patients process medical procedures
- Provide self-expression opportunities in hospital environment

Return to Pre-Op **Return to Peri-Op** **Return to Post-Op**

Evidence Summary

We identified the most recently published systematic reviews of bundled enhanced recovery programs in adults. Neurosurgery, cardiac surgery, and solid organ transplant surgeries were excluded. Thirteen systematic reviews were included, which used randomized-controlled trials or cohort studies to evaluate patient outcomes. Overall, patients who received enhanced recovery bundles had similar or improved outcomes compared to usual care.

Improved outcomes with enhanced recovery

- Reduce length of stay in colorectal, cystectomy, esophageal, gastric, liver, lung, ortho-arthroplasty, pancreatic, pancreaticoduodenectomy, laproscopic GI/prostate/solid organ by 1.2 to 4.4 days *[(Greer 2018, Wessels 2020, Triantafyllou 2020, Lee 2020, Noba 2020, Deng 2018, Ji 2018, Cao 2019, Li 2018)]*. Reduction in LOS of 2 days was not statistically significant in lung surgery *[Level of Evidence: +2 low certainty (Li 2017)].*
  - Reduce time to first oral intake in gastric surgery by 2 days *(+2 low certainty; Lee 2020).*
  - Reduce time to first flatus in esophageal and gastric surgery by 0.5 to 5 days *[+2 low certainty (Triantafyllou 2020, Lee 2020)].*
  - Reduce time to defecation in cystectomy, esophageal, and gastric surgery by 1 to 1.4 days *[+2 low to +3 moderate certainty (Wessels 2020, Triantafyllou 2020, Lee 2020)].*
- Reduce overall complications by 11% to 35% in cystectomy, liver, ortho-arthroplasty, pancreatic, colorecta, esophageal, lung, and laparoscopic surgeries *[+2 low to +4 high certainty (Noba 2020, Deng 2018, Ji 2018, Greer 2018, Triantafyllou 2020, Li 2017, Li 2018)].* Reduction of 11% was not statistically significant in gastric *[+1 very low certainty (Wessels 2020)].*
  - Reduce pulmonary complications in esophageal, gastric, and lung surgery by 50% to 63% *[+2 low to +3 moderate certainty (Triantafyllou 2020, Lee 2020, Li 2017)].*
  - Reduce anastomotic leak in esophageal surgery by 37% [(95% CI: 0% to 60%; *+3 moderate certainty (Triantafyllou 2020)]* but no difference in gastric or pancreaticoduodenectomy *[+1 very low to +3 moderate certainty (Lee 2020, Cao 2019)].*
  - Reduce surgical site infection in pancreatic and pancreaticoduodenectomy by 27% to 33% *[(+2 low certainty; Ji 2018, Cao 2019)]* but no difference in colorectal or gastric surgery *[+2 low to +3 moderate certainty (Greer 2018, Lee 2020)].*

No difference

- No difference in mortality in colorectal, esophageal, liver, lung, ortho-arthroplasty, pancreatic, pancreaticoduodenectomy *[+1 very low to +4 high certainty (Greer 2018, Triantafyllou 2020, Noba 2020, Li 2017, Deng 2018, Ji 2018, Cao 2019)].*
- No difference in readmission rate in 8 of 9 surgeries including colorectal, cystectomy, esophageal, liver, ortho-arthroplasty, pancreatic, pancreaticoduodenectomy, laparoscopic *[+1 very low to +4 high certainty (Greer 2018, Wessels 2020, Triantafyllou 2020, Noba 2020, Deng 2018, Ji 2018, Cao 2019, Li 2018)]*. Readmission rate was 2.4 times higher in gastric surgery, with an excess of 2.4 readmissions per 100 patients *[+3 moderate certainty (Lee 2020)].*
- No difference in cardiac complications for esophageal and lung surgery *[+3 moderate to +4 high certainty (Triantafyllou 2020, Li 2017)].*

Summary of Version Changes

- **Post Operative Management of Ileoanal Pull-Through Surgery Pathway Version 1.0 (9/12/2011):** Go live. Retired 7/29/2015.
- **Enhanced Recovery Pathway (ERP) Version 1.0 (11/1/2021):** Go live. Implemented a bundle of interventions designed to minimize opioids, accelerate return of bowel function, and reduce the risk of hospital acquired conditions. The interventions span the entire patient journey: beginning preoperatively, then on the day of surgery, and into the postoperative period.
- **Version 1.0 (2/23/2023):** Go live. Added mindfulness resources and specific workflow for colectomy including stages of care (intake and postoperative home), ostomy education, regional anesthesia, avoidance of non-steroidal anti-inflammatory drugs if on anticoagulation, prevention of venous thromboembolism, and nutrition. To morphine equivalents, IV added. Euvolemia defined as limiting IV fluids to 6 mL/kg/hr. Medication dosages reviewed and approved by the Pharmacy and Therapeutics Committee on 2/21/2023.
- **Version 1.1 (6/30/2023):** Updated broken links to patient and family education in Pre-Clinic Intake and Post-Discharge phases.

Approval & Citation

Approved by the CSW Colectomy Pathway team for February 23, 2023, go-live

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Retrieval Website: https://www.seattlechildrens.org/pdf/colectomy-pathway.pdf

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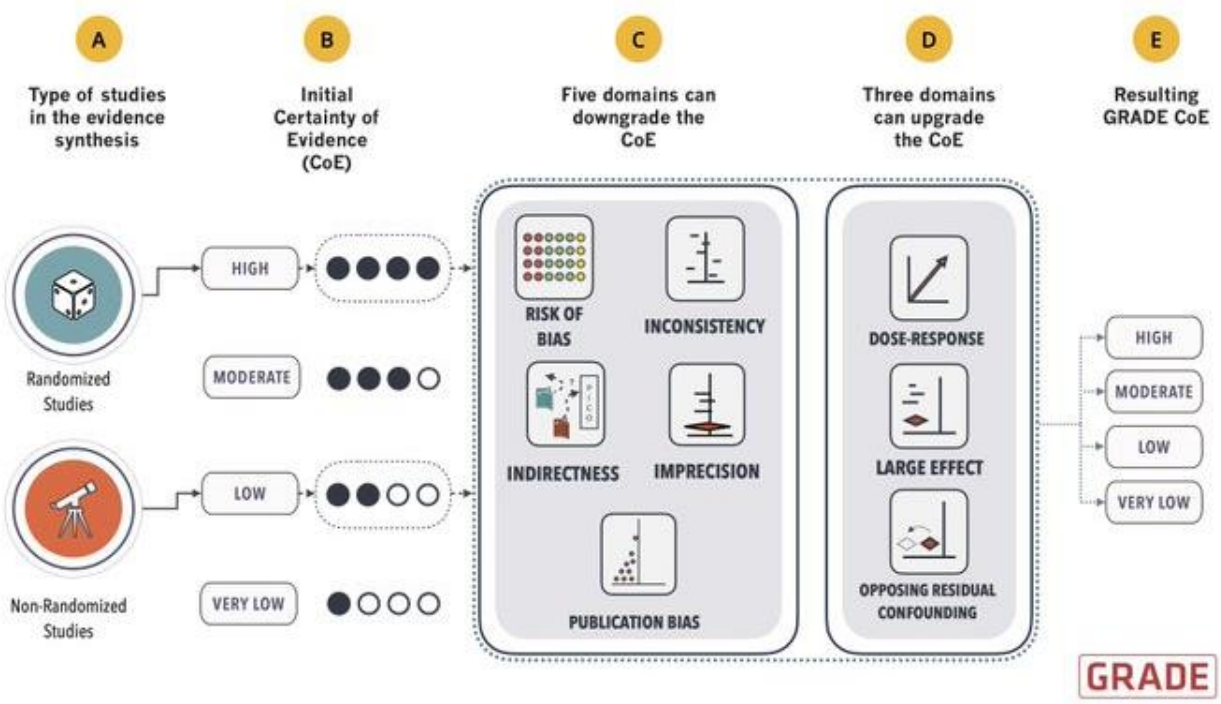
Evidence Ratings

This pathway was developed through local consensus based on published evidence and expert opinion as part of Clinical Standard Work at Seattle Children's. Pathway teams include representatives from Medical, Subspecialty, and/or Surgical Services, Nursing, Pharmacy, Clinical Effectiveness, and other services as appropriate.

When possible, we used the GRADE method of rating evidence quality. Evidence is first assessed as to whether it is from randomized trial or cohort studies. The rating is then adjusted in the following manner (from: Guyatt G et al. J Clin Epidemiol. 2011;4:383-94, Hultcrantz M et al. J Clin Epidemiol. 2017;87:4-13.):



Source: Carlos Cuello

Certainty of Evidence

✪✪✪✪ High: The authors have a lot of confidence that the true effect is similar to the estimated effect
✪✪✪○ Moderate: The authors believe that the true effect is probably close to the estimated effect
✪✪○○ Low: The true effect might be markedly different from the estimated effect
✪○○○ Very low: The true effect is probably markedly different from the estimated effect
Guideline: Recommendation is from a published guideline that used methodology deemed acceptable by the team
Expert Opinion: Based on available evidence that does not meet GRADE criteria (for example, case-control studies)

Bibliography

Literature Search Methods

A literature search was conducted in March 2020 to target synthesized literature on enhanced recovery programs from 2010 to current and limited to English. The search was executed in Ovid Medline, Embase, Cochrane Database of Systematic Reviews (CDSR) and Turning Research into Practice (TRIP) databases.

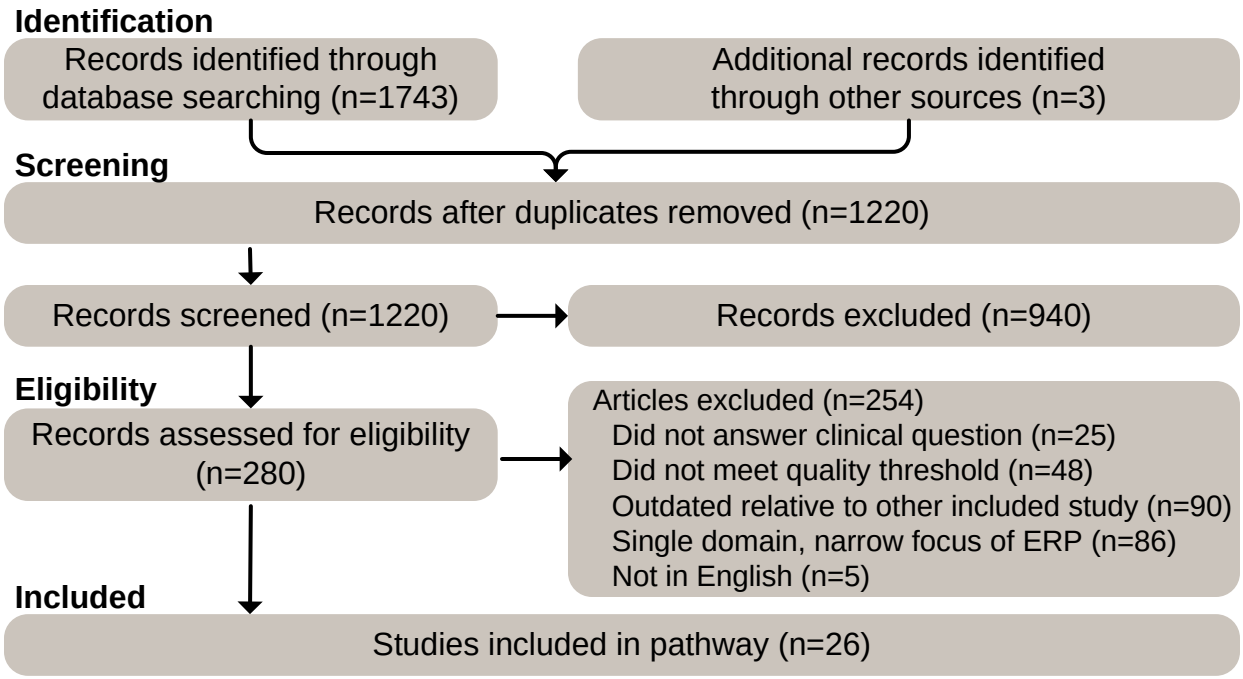
Screening and data extraction were completed using DistillerSR (Evidence Partners, Ottawa, Canada). Two reviewers independently screened abstracts and included guidelines and systematic reviews that addressed enhanced recovery after surgery programs. One reviewer screened full text and extracted data and a second reviewer quality checked the results. Differences were resolved by consensus.

Literature Search Results

The searches of the 4 databases retrieved 1743 records. Our searches of other resources including the bibliographies of included articles identified 3 additional records that appeared to meet the inclusion criteria.

Once duplicates had been removed, we had a total of 1220 records. We excluded 940 records based on titles and abstracts. We obtained the full text of the remaining 280 records and excluded 254.

We have included a total of 26 studies. The flow diagram summarizes the study selection process. In addition, 5 primary pediatric studies obtained outside the structured search parameters (added from the bibliography of an included systematic review), are listed under Additional References.



Flow diagram adapted from Moher D et al. BMJ 2009;339:bmj.b2535

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