

# Provincial Clinical Knowledge Topic

## *ERAS Colorectal Surgery, Adult – Inpatient*

### *V 1.1*

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**Revision History**

<b>Version</b>	<b>Date of Revision</b>	<b>Description of Revision</b>	<b>Revised By</b>
1.0	March 2018	Topic Complete	Dr. Tony MacLean
1.1	June 2019	Pre-operative Order Set, Intra-operative Guidance and Post-operative Order Set amended; updates to linked documents	Christine Fantuz

## Important Information Before You Begin

An Alberta Health Services (AHS) Provincial Clinical Knowledge Topic is the evidence-informed clinical best practice standard for a specific patient population. Enhanced recovery after surgery (ERAS) Topic content is based on recommendations from published international guidelines and other evidence, with consideration for current practices at ERAS sites and other clinical standards. Topic information strives to adhere to [Institute for Safe Medication Practices \(ISMP\)](#) safety standards, and align with provincial and national Quality and Safety initiatives and standards, e.g. [Health Quality Council Alberta \(HQCA\)](#), [Choosing Wisely](#), [Safer Healthcare Now](#), and [Accreditation Canada](#). The Topic will be reviewed periodically and updated according to best practice evidence and other clinical recommendations and guidelines.

Clinicians using this Topic should, in consultation with the patient, use independent medical judgement in the context of individual clinical circumstances to direct care.

## Guidelines

This Topic is based on the following guidance:

- 1) [Guidelines for perioperative care in elective colonic surgery: Enhanced Recovery After Surgery \(ERAS®\) Society recommendations](#)<sup>1</sup>
- 2) [Guidelines for perioperative care in elective rectal/pelvic surgery: Enhanced Recovery After Surgery \(ERAS®\) Society recommendations](#)<sup>2</sup>
- 3) [Enhanced Recovery After Surgery \(ERAS\) for gastrointestinal surgery, part 1: pathophysiological considerations](#)<sup>3</sup>
- 4) [Enhanced Recovery After Surgery \(ERAS\) for gastrointestinal surgery, part 2: consensus statement for anaesthesia practice](#)<sup>4</sup>
- 5) [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](#)<sup>5</sup>

## Keywords

- ERAS
- Enhanced recovery
- Colorectal
- Colon
- Bowel
- Surgery
- Adult

## ERAS Colorectal Surgery, Adult – Inpatient

### Rationale

International ERAS guidelines were developed to improve patient outcomes, accelerate recovery after surgery, and reduce healthcare costs. ERAS is a multimodal approach, with interventions across all stages of surgical care. Refer to [Enhanced Recovery After Surgery: A Review<sup>6</sup>](#).

The international ERAS guidelines were used in the refinement of provincial care pathways for enhancing recovery after surgery. There are AHS ERAS care pathways developed for Breast Reconstruction (not applicable outside of Foothills Medical Centre, Misericordia Community Hospital and Grey Nuns Community Hospital), Colorectal, Cystectomy, Gynecologic Oncology (not applicable outside of Foothills Medical Centre and Royal Alexandra Hospital), Liver, Major Gynecology, Major Head and Neck (not applicable outside of Foothills Medical Centre and University of Alberta Hospital), and Pancreas surgery. These care pathways are detailed in surgery-specific ERAS Topics.

Certain criteria must be met for a patient to be considered for inclusion in an ERAS care pathway. See the Rationale section in each ERAS Topic for specific surgical procedures appropriate for inclusion.

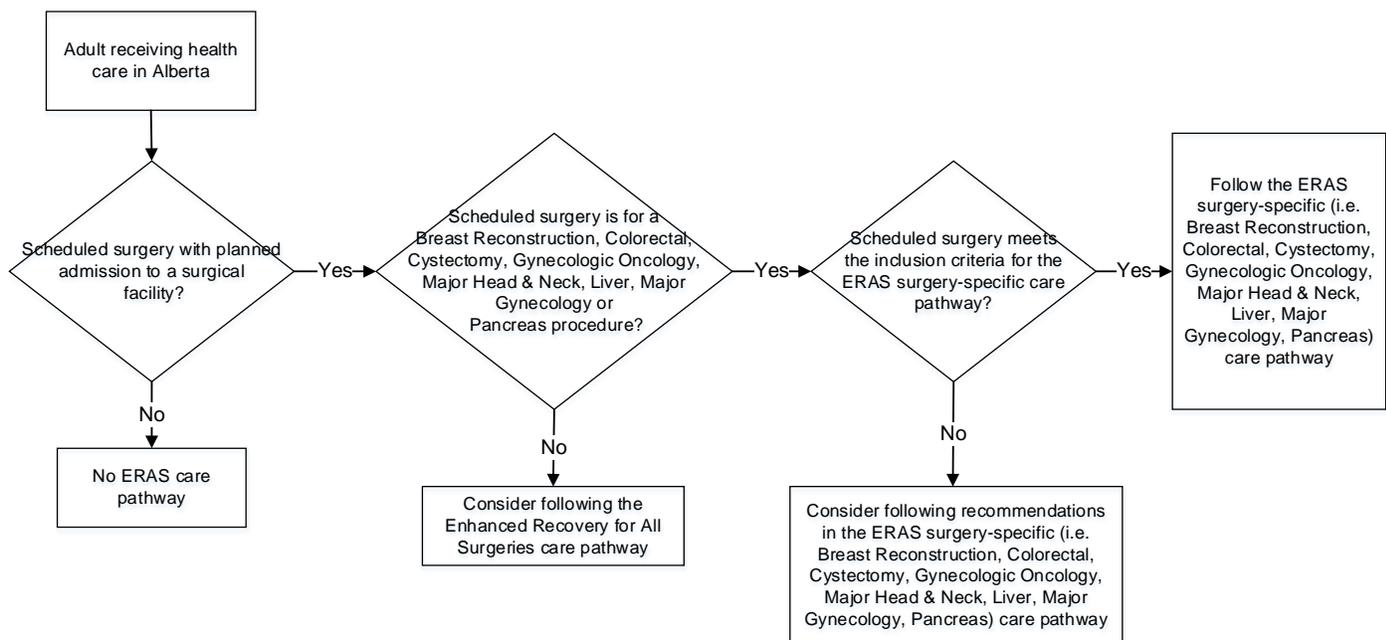
The inclusion criteria (applicable as of July 1, 2017) for the ERAS Colorectal Surgery, Adult - Inpatient care pathway are

- Adult surgical inpatient undergoing scheduled surgery within Alberta for any of the following colorectal procedures
  - Altemeier's Procedure
  - Abdominal Perineal Resection
  - Anterior Rectosigmoid Resection
  - Anterior Resection
  - Bowel Resection
  - Closure of Colostomy
  - Closure of Loop Ileostomy
  - Colostomy
  - Completion of Proctectomy - J pouch anastomosis
  - Excision of an Ileal pouch/anal anastomosis (IPPA)
  - Ileocecal Resection
  - Ileostomy
  - Low Anterior Resection
  - Left Hemicolectomy
  - Completion of Proctectomy
  - Proctocolectomy
  - Right Hemicolectomy
  - Reversal of a Hartmann's procedure
  - Small Bowel Resection
  - Sigmoidectomy
  - Subtotal Colectomy
  - Total Colectomy

- Total Abdominal Colectomy with creation of Ileostomy
- Transverse Colon Resection

While all eligible patients should be started on the ERAS Colorectal Surgery, Adult - Inpatient care pathway, individual patient care plans may need to be modified based on surgical findings or additional procedures. Colorectal surgery patients who do not meet the inclusion criteria (e.g., those undergoing hernia repair, transanal endoscopic microsurgery (TEMs), fistulotomy, hemorrhoidectomy, anal advancement flap, examination under anesthetic (EUA), EUA and insertion of a seton, any procedures that include Hyperthermic Intraperitoneal Chemotherapy (HIPEC), and procedures for acute palliative-symptom management) may still be considered for applicable recommendations in the ERAS Colorectal Surgery, Adult - Inpatient care pathway.

**Figure #1 ERAS Alberta Care Pathway Inclusion Flowchart**



## Goals of Management

The goals of clinical management for enhancing the recovery of adult patients after scheduled surgery are to

1. Decrease
  - surgical care length of stay (acute and total) with no increase in readmissions or use of emergency, specialty or primary care related to the post-surgical care
  - surgical complications delaying discharge
  - serious surgical complications including reoperations
2. Increase

- positive surgical care experiences for patients and families, and providers
- compliance with ERAS recommendations

This can be achieved by engaging patients and families, clinicians and staff in a multidisciplinary evidence-informed ERAS care pathway focused on

- patient preparation that includes pre-operative optimization, an explanation of the surgical procedure, as well as post-operative expectations and goals to maximize patient participation in their surgical care journey
- pre-operative fasting and carbohydrate loading following national anesthesia guidelines
- appropriate prophylaxis to prevent or reduce surgical complications including venous thromboembolism (VTE), surgical site infections, nausea and vomiting
- multimodal, opioid-sparing analgesic approaches to improve the management of perioperative pain, nausea and vomiting
- management of physiological surgical stress response
- maintenance of normothermia
- minimally invasive surgical approaches
- balanced fluid management
- avoidance of, or early removal of drains and tubes
- mobilization soon after surgery
- stimulation of gut motility
- offer of food and drinks soon after surgery with appropriate nutritional supplements

## ERAS Colorectal Surgery, Adult – Inpatient: Recommendations

ERAS Alberta recommendations are based on published international ERAS guidelines and other evidence, with consideration for current practices at ERAS sites and other clinical standards. ERAS<sup>®</sup> Society recommendations are from the Table of Recommendations within [ERAS<sup>®</sup> Society Guidelines](#). The GRADE<sup>7</sup> methodology was used to determine quality of evidence and strength of recommendation for each ERAS<sup>®</sup> Society recommendation.

Note: Careful consideration should be taken with elderly and/or frail patients, particularly in the area of medication management.

### **Pre-operative information, education and counselling**

**ERAS Alberta Recommendation:** Same as the ERAS<sup>®</sup> Society recommendation below.

- **ERAS<sup>®</sup> Society Recommendation:** Patients should routinely receive dedicated preoperative counselling (regarding activity, drains/tubes/lines, and expectations regarding hospital discharge). Additional education for the marking and management of stomas for rectal surgery only.
- **ERAS<sup>®</sup> Society Recommendation - Quality of Evidence:** Colon Surgery (Low); Rectal Surgery (Low)
- **ERAS<sup>®</sup> Society Recommendation - Strength of Recommendation:** Colon Surgery (Strong); Rectal Surgery (Strong)

### **Pre-operative optimization**

**ERASAlberta Recommendation:** Same as the ERAS<sup>®</sup> Society recommendation below with the following additions: anemia should be actively identified, investigated, and corrected pre-operatively. Patients should be screened for nutritional status including weight loss within the previous 6 months. All patients at nutrition risk need an assessment to confirm malnutrition. If a patient is malnourished, an in-depth nutrition assessment, along with treatment, is required by a registered dietitian.

Note: Alcohol abusers refers to patients with alcohol dependency. Patients with alcohol dependency should wean consumption under the recommendation of a qualified healthcare professional.

- **ERAS<sup>®</sup> Society Recommendation:** Preoperative general medical optimization is necessary before surgery. Smoking should be stopped four weeks before surgery. Alcohol consumption especially for alcohol abusers should be stopped four weeks before surgery. Increasing exercise preoperatively may be of benefit. Preoperative nutritional support should be considered for malnourished patients.
- **ERAS<sup>®</sup> Society Recommendation - Quality of Evidence:** Colon Surgery: Optimization (Not available); Smoking cessation (High), Alcohol cessation (Low); Rectal Surgery: Medical optimization (Moderate), Pre-habilitation (Very Low), Smoking cessation (Moderate), Excess alcohol cessation (Low)
- **ERAS<sup>®</sup> Society Recommendation - Strength of Recommendation:** Colon Surgery: Optimization (Not available); Smoking and Alcohol cessation (Strong); Rectal Surgery: Medical optimization (Strong), Pre-habilitation (No), Smoking cessation (Strong), Excess alcohol cessation (Strong)

#### **Pre-operative bowel preparation**

**ERASAlberta Recommendation:** Current evidence supports that if mechanical bowel preparation (MBP) is to be used, it should be in combination with pre-operative oral antibiotics to minimize peri-operative infectious complications.

- **ERAS<sup>®</sup> Society Recommendation:** Mechanical bowel preparation (MBP) should not be used routinely in colonic surgery. In general, MBP should not be used in pelvic surgery. However, when a diverting ileostomy is planned, MBP may be necessary (although this needs to be studied further).
- **ERAS<sup>®</sup> Society Recommendation - Quality of Evidence:** Colon Surgery (High); Rectal Surgery: Anterior resection - no MBP (High), Total mesorectal excision (TME) with diverting stoma – use MBP (Low)
- **ERAS<sup>®</sup> Society Recommendation - Strength of Recommendation:** Colon Surgery (Strong); Rectal Surgery: Anterior resection (Strong), TME with diverting stoma (Weak)

#### **Pre-operative fasting and carbohydrate load treatment**

**ERASAlberta Recommendation:** Before scheduled procedures, the minimum duration of pre-operative fasting should be 8 hours after a meal that includes meat, fried or fatty foods, 6 hours after a light meal (such as toast and a clear fluid), and 2 hours after clear fluids as per the [Canadian Anesthesiologists' Society Guidelines to the Practice of Anesthesia - Revised Edition 2019](#)<sup>8</sup>. Carbohydrate load treatment should occur between 2 and 3 hours prior to the administration of anesthesia.

Note: The AHS Provincial Clinical Knowledge Topic: [Perioperative Management of Patients with Diabetes Mellitus, Adult – Inpatient](#) provides recommendations for patients with diabetes mellitus.

- **ERAS® Society Recommendation:** Clear fluids should be allowed up to 2 hours and solids up to 6 hours prior to induction of anesthesia. Preoperative oral carbohydrate treatment should be used routinely and administered to all non-diabetic patients. In diabetic patients carbohydrate treatment can be given along with the diabetic medication.
- **ERAS® Society Recommendation - Quality of Evidence:** Colon Surgery: Solids and fluids (Moderate), Carbohydrate loading overall (Low), Carbohydrate loading in diabetic patients (Very Low); Rectal Surgery: Solids and fluids (Moderate), Carbohydrate loading - reduced preoperative insulin resistance (Moderate), Carbohydrate loading - improved clinical outcomes (Low)
- **ERAS® Society Recommendation - Strength of Recommendation:** Colon Surgery: Fasting guidelines (Strong), Preoperative carbohydrate drinks (Strong), Preoperative carbohydrate drinks in diabetic patients (Weak); Rectal Surgery: Solids and fluids (Strong), Carbohydrate loading - reduced preoperative insulin resistance (Strong)

#### **Pre-anesthetic medication**

**ERASAlberta Recommendation:** Patients should not routinely receive long acting sedative medication before surgery.

- **ERAS® Society Recommendation:** Patients should not routinely receive long or short acting sedative medication before surgery because it delays immediate postoperative recovery. No advantages in using long-acting benzodiazepines. Short-acting benzodiazepines can be used in young patients before potentially painful interventions (insertion of spinal or epidural, arterial catheter), but they should not be used in the elderly (age >60 years).
- **ERAS® Society Recommendation - Quality of Evidence:** Colon Surgery (High); Rectal Surgery (Moderate)
- **ERAS® Society Recommendation - Strength of Recommendation:** Colon Surgery (Strong); Rectal Surgery (Strong)

#### **Venous thromboembolism prophylaxis**

**ERASAlberta Recommendation:** Patients should have a sequential compression device (SCD) applied, and receive pre-operative or intra-operative pharmacological prophylaxis with heparin. Extended prophylaxis with low molecular weight heparin (LMWH) should be given for an additional 28 days post-discharge to patients with cancer or other patients with increased risk of venous thromboembolism (VTE). Risk assessment is required in accordance with the AHS-Wide Policy Suite – Venous Thromboembolism Prophylaxis ([Policy](#) and [Guideline](#)).

Note: Refer to the AHS Provincial Clinical Knowledge Topic: [VTE Prophylaxis, Adult – Inpatient](#) (link to be added once available).

- **ERAS® Society Recommendation:** Patients should wear well-fitting compression stockings, have intermittent pneumatic compression, and receive pharmacological prophylaxis with LMWH. Extended prophylaxis for 28 days should be given to patients with colorectal cancer or other patients with increased risk of VTE.

- **ERAS<sup>®</sup> Society Recommendation - Quality of Evidence:** Colon Surgery (High); Rectal Surgery (High)
- **ERAS<sup>®</sup> Society Recommendation - Strength of Recommendation:** Colon Surgery (Strong); Rectal Surgery (Strong)

#### **Antimicrobial prophylaxis and skin preparation**

**ERASAlberta Recommendation:** As per [AHS Recommended Drug Regimens for Surgical Prophylaxis in Adult Patients](#), routine prophylaxis using intravenous antibiotics should be given within 60 minutes prior to incision. Additional doses should be given during prolonged operations according to the half-life of the drug used. Surgical site skin preparation with chlorhexidine-alcohol should be used prior to incision.

- **ERAS<sup>®</sup> Society Recommendation:** Routine prophylaxis using intravenous antibiotics should be given 30 to 60 minutes before initiating surgery in a single dose. Additional doses should be given during prolonged operations according to half-life of the drug used. A recent randomized control trial has shown that skin preparation with a scrub of chlorhexidine-alcohol is superior to povidone-iodine in preventing surgical-site infections<sup>9</sup>. Preparation with chlorhexidine-alcohol should be used.
- **ERAS<sup>®</sup> Society Recommendation - Quality of Evidence:** Colon Surgery (High); Rectal Surgery: Antimicrobial prophylaxis (High), Chlorhexidine-alcohol skin preparation (Moderate)
- **ERAS<sup>®</sup> Society Recommendation - Strength of Recommendation:** Colon Surgery (Strong); Rectal Surgery: Antimicrobial prophylaxis (Strong), Skin preparation (Strong), Chlorhexidine-alcohol skin preparation (Weak)

#### **Prevention of post-operative nausea and vomiting (PONV)**

**ERASAlberta Recommendation:** All patients need to be pre-operatively assessed for risk<sup>10</sup> and provided with perioperative PONV prophylaxis accordingly. A multimodal approach to PONV prophylaxis should be adopted in all high risk patients.<sup>11</sup>

- **ERAS<sup>®</sup> Society Recommendation:** A multimodal approach to PONV prophylaxis should be adopted in all patients with  $\geq 2$  risk factors undergoing major colorectal surgery. If PONV is present, treatment should be given using a multimodal approach.
- **ERAS<sup>®</sup> Society Recommendation - Quality of Evidence:** Colon Surgery (Low); Rectal Surgery: High risk patients (High), All patients (Low)
- **ERAS<sup>®</sup> Society Recommendation - Strength of Recommendation:** Colon Surgery (Strong); Rectal Surgery (Strong)

#### **Standard anesthetic protocol**

**ERASAlberta Recommendation:** Emphasis is placed on using short acting anesthetic agents with consideration for the use of total intravenous anesthesia (TIVA) instead of inhalation anesthetic. Opioids should be used sparingly and if needed, short acting opioids are recommended.

- **ERAS<sup>®</sup> Society Recommendation:** To attenuate the surgical stress response, intraoperative maintenance of adequate hemodynamic control, central and peripheral oxygenation, muscle relaxation, depth of anesthesia, and appropriate analgesia is strongly recommended. A standard anesthetic protocol allowing rapid awakening should

be given. The anesthetist should control fluid therapy, analgesia and hemodynamic changes to reduce the metabolic stress response. Open surgery: mid-thoracic epidural blocks using local anesthetics and low dose opioids. Laparoscopic surgery: spinal analgesia or morphine patient controlled analgesia (PCA) is an alternative to epidural anesthesia.

- **ERAS® Society Recommendation - Quality of Evidence:** Colon Surgery: Rapid awakening (Low), Reduce stress response (Moderate), Open surgery (High), Laparoscopic surgery (Low); Rectal Surgery: Epidural (Moderate), IV Lidocaine (Low), Remifentanil (Low), High oxygen concentration (High)
- **ERAS® Society Recommendation - Strength of Recommendation:** Colon Surgery (Strong); Rectal Surgery: Epidural (Strong), IV Lidocaine (Weak), Remifentanil (Strong), High oxygen concentration (Strong)

### **Prevention of intra-operative hypothermia**

**ERASAlberta Recommendation:** Same as the ERAS® Society recommendation below.

- **ERAS® Society Recommendation:** Intraoperative maintenance of normothermia with a suitable warming device and warmed intravenous fluids should be used routinely to keep body temperature >36°C. Attempts should be made to avoid hypothermia because it increases the risk of perioperative complications.
- **ERAS® Society Recommendation - Quality of Evidence:** Colon Surgery (High); Rectal Surgery (High)
- **ERAS® Society Recommendation - Strength of Recommendation:** Colon Surgery (Strong); Rectal Surgery (Strong)

### **Perioperative fluid management**

**ERASAlberta Recommendation:** Very restrictive or liberal fluid regimes should be avoided in favor of euvolemia. The use of advanced hemodynamic monitoring to facilitate individualized fluid therapy during the perioperative period should be considered, especially for high risk patients and patients for which significant intravascular volume loss is anticipated. Balanced crystalloid solutions are preferred to sodium chloride 0.9%. The enteral route for fluid post-operatively should be used as early as possible, and intravenous fluids should be discontinued as soon as clinically appropriate.

- **ERAS® Society Recommendation:** Patients should receive intraoperative fluids (colloids and crystalloids) guided by flow measurements to optimize cardiac output. Fluid balance should be optimized by targeting cardiac output and avoiding overhydration. Targeted fluid therapy using the esophageal Doppler system is recommended. Vasopressors should be considered for intra- and postoperative management of epidural-induced hypotension provided the patient is normovolemic. The enteral route for fluid postoperatively should be used as early as possible, and intravenous fluids should be discontinued as soon as is practicable.
- **ERAS® Society Recommendation - Quality of Evidence:** Colon Surgery: Balanced crystalloids (High), Flow measurement in open surgery (High), Flow measurement in other patients (Moderate), Vasopressors (High), Early enteral route (High); Rectal Surgery (Moderate)
- **ERAS® Society Recommendation - Strength of Recommendation:** Colon Surgery (Strong); Rectal Surgery (Strong)

### Minimally invasive surgery

**ERASAlberta Recommendation:** Minimally invasive surgery (MIS) is recommended for appropriate patients when expertise and resources are available.

- **ERAS<sup>®</sup> Society Recommendation:** Laparoscopic surgery for colonic resections is recommended if the expertise is available. With proven safety and at least equivocal disease-specific outcomes, laparoscopic proctectomy and proctocolectomy for benign disease can be carried out by an experienced surgeon within an ERAS protocol with the goals of reduced perioperative stress (manifested by decreased postoperative ileus), decreased length of stay in hospital (LOSH), and fewer overall complications. Laparoscopic resection of rectal cancer is currently not generally recommended outside of a trial setting (or specialized centre with ongoing audit) until equivalent oncologic outcomes are proven.
- **ERAS<sup>®</sup> Society Recommendation - Quality of Evidence:** Colon Surgery: Oncology (High), Morbidity (Low), Recovery/LOSH (Moderate); Rectal Surgery: Laparoscopic resection of benign disease (Low), Laparoscopic resection of rectal cancer (Moderate)
- **ERAS<sup>®</sup> Society Recommendation - Strength of Recommendation:** Colon Surgery (Strong); Rectal Surgery (Strong)

### Nasogastric intubation

**ERASAlberta Recommendation:** Same as the ERAS<sup>®</sup> Society recommendation below.

- **ERAS<sup>®</sup> Society Recommendation:** Postoperative nasogastric tubes should not be used routinely. Nasogastric tubes inserted during surgery should be removed before reversal of anaesthesia.
- **ERAS<sup>®</sup> Society Recommendation - Quality of Evidence:** Colon Surgery (High); Rectal Surgery (High)
- **ERAS<sup>®</sup> Society Recommendation - Strength of Recommendation:** Colon Surgery (Strong); Rectal Surgery (Strong)

### Surgical site drains

**ERASAlberta Recommendation:** Same as the ERAS<sup>®</sup> Society recommendation below.

- **ERAS<sup>®</sup> Society Recommendation:** Routine drainage is discouraged because it is an unsupported intervention that is likely to impair mobilization.
- **ERAS<sup>®</sup> Society Recommendation - Quality of Evidence:** Colon Surgery (High); Rectal Surgery (Low)
- **ERAS<sup>®</sup> Society Recommendation - Strength of Recommendation:** Colon Surgery (Strong); Rectal Surgery (Weak)

### Urinary drainage

**ERASAlberta Recommendation:** Urinary catheter removal should be considered upon completion of procedure, if appropriate. If required for post-operative bladder drainage, it should be used for a short period only, and removal within 1 to 2 days is recommended. The urinary catheter should be removed regardless of the usage or duration of thoracic epidural analgesia (TEA).

- **ERAS<sup>®</sup> Society Recommendation:** Routine transurethral bladder drainage for 1 to 2 days is recommended. The bladder catheter can be removed regardless of the usage or duration of TEA. After pelvic surgery with a low estimated risk of postoperative urinary retention, the transurethral bladder catheter may be safely removed on postoperative day 1, even if epidural analgesia is used. In patients with an increased risk of prolonged postoperative urinary retention, placement of a suprapubic catheter is recommended.
- **ERAS<sup>®</sup> Society Recommendation - Quality of Evidence:** Colon Surgery (Low); Rectal Surgery: Transurethral catheter (Low), Suprapubic prolonged catheterization (Low)
- **ERAS<sup>®</sup> Society Recommendation - Strength of Recommendation:** Colon Surgery: Routine bladder drainage (Strong), Early removal if epidural used (Weak); Rectal Surgery: Transurethral catheter (Weak), Suprapubic prolonged catheterization (Weak)

### Prevention of post-operative ileus

**ERASAlberta Recommendation:** Same as the ERAS<sup>®</sup> Society recommendation below with the following exception: thoracic epidural analgesia (TEA) **or** laparoscopic surgery should be utilized in colonic surgery if possible.

Note: Alvimopan is not available in Canada.

- **ERAS<sup>®</sup> Society Recommendation:** Mid-thoracic epidural analgesia and laparoscopic surgery should be utilized in colonic surgery if possible. Fluid overload and nasogastric decompression should be avoided. Chewing gum can be recommended, whereas oral magnesium and alvimopan may be included. A multimodal approach to optimizing gut function after rectal resection should involve chewing gum and oral laxatives.
- **ERAS<sup>®</sup> Society Recommendation - Quality of Evidence:** Colon Surgery: Thoracic epidural and laparoscopy (High), Chewing gum (Moderate), Oral magnesium, Alvimopan (Low); Rectal Surgery: Chewing gum (Moderate), Oral laxatives (Low)
- **ERAS<sup>®</sup> Society Recommendation - Strength of Recommendation:** Colon Surgery: Thoracic epidural, fluid overload, nasogastric decompression, chewing gum, alvimopan (Strong), Oral magnesium (Weak); Rectal Surgery: Chewing gum (Strong), Oral laxatives (Weak)

### Post-operative analgesia

**ERASAlberta Recommendation:** The use of multimodal opioid-sparing strategies is recommended. Appropriately placed thoracic epidural analgesia (TEA) using local anesthetics and low dose opioids should be considered for open surgery.

- **ERAS<sup>®</sup> Society Recommendation:** Open surgery: Thoracic epidural analgesia (TEA) using low-dose local anesthetic and opioids. Laparoscopic surgery: An alternative to TEA is a carefully administered spinal analgesia with a low dose, long-acting opioid TEA. TEA is recommended for open rectal surgery for 48 to 72 hours in view of the superior quality of pain relief compared with systemic opioids. Intravenous (IV) administration of lidocaine has also been shown to provide satisfactory analgesia, but the evidence in rectal surgery is lacking. If a laparoscopic approach is used, epidural or intravenous lidocaine, in the context of ERAS, provides adequate pain relief and no difference in the duration of length of stay in hospital (LOSH) and return of bowel function. Rectal pain can be of neuropathic origin, and needs to be treated with multimodal analgesic methods. There is limited evidence for the routine use of wound catheters and continuous transversus abdominis plane (TAP) blocks in rectal surgery.

- **ERAS<sup>®</sup> Society Recommendation - Quality of Evidence:** Colon Surgery: TEA open surgery (High), Local anesthetic and opioid (Moderate), TEA not mandatory in laparoscopic surgery (Moderate); Rectal Surgery: Epidural for open surgery (High), Epidural for laparoscopy (Low), IV lidocaine (Moderate), Wound infiltration and TAP blocks (Low)
- **ERAS<sup>®</sup> Society Recommendation - Strength of Recommendation:** Colon Surgery (Strong); Rectal Surgery: Epidural for open surgery (Strong), Epidural for laparoscopy (Weak), IV lidocaine (Weak), Wound infiltration and TAP blocks (Weak)

### **Post-operative glucose control**

**ERASAlberta Recommendation:** Same as the ERAS<sup>®</sup> Society recommendation below.

Note: The AHS Provincial Clinical Knowledge Topic: [Perioperative Management of Patients with Diabetes Mellitus, Adult – Inpatient](#) provides recommendations for patients with diabetes mellitus.

- **ERAS<sup>®</sup> Society Recommendation:** Hyperglycemia is a risk factor for complications and should therefore be avoided. Several interventions in the ERAS protocol affect insulin action/resistance, thereby improving glycemic control with no risk of causing hypoglycemia. For ward-based patients, insulin should be used judiciously to maintain blood glucose as low as feasible with the available resources. Maintenance of perioperative blood sugar levels within an expert-defined range results in better outcomes. Therefore, insulin resistance and hyperglycemia should be avoided using stress-reducing measures or if already established by active treatment. The level of glycemia to target for intervention at the ward level remains uncertain, and is dependent upon local safety aspects.
- **ERAS<sup>®</sup> Society Recommendation - Quality of Evidence:** Colon Surgery: Using stress-reducing elements of ERAS to minimize hyperglycemia (Low), Insulin treatment in the Intensive Care Unit (ICU) (Moderate), Glycemic control in ward setting (Low); Rectal Surgery: Use stress-reducing measures (Moderate), Level of glycemia for insulin treatment (Low)
- **ERAS<sup>®</sup> Society Recommendation - Strength of Recommendation:** Colon Surgery: Using stress-reducing elements of ERAS to minimize hyperglycemia (Strong), Insulin treatment in ICU - severe hyperglycemia (Strong), Insulin treatment in ICU - mild hyperglycemia (Weak), Insulin treatment in ward setting (Weak); Rectal Surgery: Use of stress-reducing treatments (Strong), Insulin treatment (non-diabetics) at the ward level (Weak)

### **Post-operative nutritional care**

**ERASAlberta Recommendation:** Same as the ERAS<sup>®</sup> Society recommendation below with the following exception: ERASAlberta recommends a Post-Surgical Transition Diet.

- **ERAS<sup>®</sup> Society Recommendation:** Patients should be screened for nutritional status and if at risk of under nutrition given active nutritional support. Perioperative fasting should be minimized. Postoperatively patients should be encouraged to take normal food as soon as lucid after surgery. In addition to normal food intake, patients should be offered oral nutrition supplements (ONS) to maintain adequate intake of protein and energy. An oral ad libitum diet is recommended 4 hours after rectal surgery.

- **ERAS<sup>®</sup> Society Recommendation - Quality of Evidence:** Colon Surgery: Postoperative early enteral feeding - safety (High), Improved recovery and reduction of morbidity (Low), Perioperative ONS – well-fed patient (Low), Perioperative ONS – malnourished patient (Low), Immunonutrition (IN) (Low) Rectal Surgery: Early oral intake (Moderate), ONS (Low)
- **ERAS<sup>®</sup> Society Recommendation - Strength of Recommendation:** Colon Surgery: Postoperative early feeding and perioperative ONS (Strong), IN could be considered in open colonic resections (Weak); Rectal Surgery: Early oral intake (Strong), ONS (Strong)

### Early mobilization

**ERASAlberta Recommendation:** Same as the ERAS<sup>®</sup> Society recommendation below.

Note: Mobilization to start the evening of post-operative day 0.

- **ERAS<sup>®</sup> Society Recommendation:** Prolonged immobilization increases the risk of pneumonia, insulin resistance and muscle weakness. Patients should therefore be mobilized. Patients should be nursed in an environment that encourages independence and mobilization. A care plan that facilitates patients being out of bed for 2 hours on the day of surgery and 6 hours thereafter is recommended
- **ERAS<sup>®</sup> Society Recommendation - Quality of Evidence:** Colon Surgery (Low); Rectal Surgery (Low)
- **ERAS<sup>®</sup> Society Recommendation - Strength of Recommendation:** Colon Surgery (Strong); Rectal Surgery (Strong)

### Audit outcomes and compliance

**ERASAlberta Recommendation:** A systematic audit is essential to determine clinical outcomes and measure overall compliance with clinical recommendations. Reporting on patient experience and functional recovery using validated tools may also be useful. Using more evidence-based elements of perioperative care from an ERAS guideline are likely to improve outcomes further.

- **ERAS<sup>®</sup> Society Recommendation:** None
- **ERAS<sup>®</sup> Society Recommendation - Quality of Evidence:** N/A
- **ERAS<sup>®</sup> Society Recommendation - Strength of Recommendation:** N/A

### **Clinical Decision Support**

The ERAS Colorectal Surgery, Adult - Inpatient Topic is intended to guide clinicians in enhancing surgical care for all patients who meet the inclusion criteria for the ERAS care pathway. The ERAS clinical knowledge and patient information contained within this Topic are intended to be used as a comprehensive package applied to a surgical care population. All recommendations should be applied to all eligible patients. The anticipated benefits of care management are reduced if the care pathway is applied selectively.

Clinical decision support tools relevant to the ERAS Colorectal Surgery, Adult - Inpatient care pathway include the following

[AHS Pre-Operative Fasting and Carbohydrate Loading Prior to Surgical Interventions - Adults Guideline](#)

[AHS Recommended Drug Regimens for Surgical Prophylaxis in Adult Patients](#)

[AHS Safe Surgery Checklist](#)

[AHS Use of Aprepitant \(Emend®\) for Prevention of Postoperative Nausea and Vomiting \(PONV\) in Adults](#)

[AHS Venous Thromboembolism Prophylaxis Guideline](#)

AHS VTE Prophylaxis Weight-Band Table – *please see AHS internal website*

[Bugs & Drugs](#)

[Canadian Anesthesiologists' Society Guidelines to the Practice of Anesthesia - Revised Edition 2019<sup>8</sup>](#)

[Canadian Nutrition Screening Tool \(CNST\)](#)

[Choosing Wisely Canada: Drop the Pre-Op Toolkit](#)

[Choosing Wisely Canada: Recommendations and Resources, by Specialty](#)

[Consensus Guidelines for the Management of Postoperative Nausea and Vomiting<sup>11</sup>](#)

[Eating and Drinking Before Surgery: Patient Instructions](#)

Other important clinical information relevant to the ERAS Colorectal Surgery, Adult - Inpatient care pathway can be found in [References](#) and [Additional Information](#).

## ERAS Colorectal Surgery, Adult – Inpatient Pre-operative Order Set

### Order Set Components

**Order Set Keywords:** ERAS, Colorectal, Pre-admission, Pre-operative, Surgery

### Before Day of Procedure

#### Patient Teaching

- Teach: provide ERAS material and discuss perioperative patient goals
  - [Your Surgery Journey – Patient Guide](#)

Refer to [AHS Pre-Operative Fasting and Carbohydrate Loading Prior to Surgical Interventions - Adults Guideline](#). Refer to [MyHealth.Alberta.ca](#) for specific patient instructions.

- Teach: Eating and Drinking Before Surgery: Patient Instructions – *Non-Diabetic*

#### OR

Choose ONE:

- Teach: Eating and Drinking Before Surgery: Patient Instructions – *Non-Diabetic, Fasting Only*
- Teach: Eating and Drinking Before Surgery: Patient Instructions - *Non-Diabetic, With Bowel Prep*
- Teach: Eating and Drinking Before Surgery: Patient Instructions – *Non-Diabetic, With Bowel Prep, Fasting Only*
- Teach: Eating and Drinking Before Surgery: Patient Instructions - *Diabetic*
- Teach: Eating and Drinking Before Surgery: Patient Instructions – *Diabetic, With Bowel Prep*
  
- Instruct patient to hold \_\_\_\_\_ medication(s) \_\_\_\_\_ days prior to scheduled surgery

**Consults and Referrals**

- Physician: Anesthesia
- Physician: Internal Medicine
- Nurse Specialized in Wound, Ostomy and Continence (NSWOC)
- Screen for nutrition risk: use [Canadian Nutrition Screening Tool \(CNST\)](#)
  - Refer to Registered Dietitian if CNST score equals 2 Yes answers

**Laboratory Investigations**

- Complete Blood Count (CBC) with differential
- PT INR
- PTT
  
- Albumin
- ALP
- ALT
- AST
- Bilirubin Total
- Creatinine/eGFR
- Electrolytes (Na, K, Cl, CO<sub>2</sub>)
- Hemoglobin A1C: if not performed within last 3 months
- Total Protein

**Tumour Markers**

- CEA
  
- Type and Screen

**Diagnostic Investigations**

- GR Chest, 2 Projections (Chest X-Ray PA and Lateral)
- Electrocardiogram

**Bowel Preparation**

- No bowel preparation
  - Prescription provided to patient for Bowel Preparation with Oral Antibiotics
- Bowel Preparation Options
- polyethylene glycol/electrolytes 4 L PO the day prior to surgery as per instructions

- PICO-SALAX<sup>®</sup> (contains 2 packets) and 4 bisacodyl tablets as per instructions
- Bi-PegLyte<sup>®</sup> Prep Kit (contains 2 packets of polyethylene glycol 3350 and electrolytes, and 3 bisacodyl tablets) the day prior to surgery as per instructions

#### Oral Antibiotic Option

*Neomycin is a compounded product that is not routinely available from all community pharmacies. Community pharmacies may require a few business days to obtain neomycin or may refer the patient to a compounding pharmacy. AHS is unable to assist in obtaining this medication for outpatient or inpatient use.*

- neomycin 1 g PO at 1300, 1500 and 2000 hours the day prior to surgery **and** metronidazole 1 g PO at 1300, 1500 and 2000 hours the day prior to surgery
- Prescription provided to patient for phosphate enema the evening prior to surgery
- phosphate enema 130 mL RECTALLY the morning of surgery

## Day of Procedure

### Patient Care

*Discuss Goals of Care with patient/Alternate Decision-Maker and complete or update Goals of Care Designation. Refer to AHS Provincial Clinical Knowledge Topic: [Advance Care Planning and Goals of Care Designations, All Ages – All Locations](#).*

- Apply sequential compression device (SCD)
- Apply forced-air warming device

### Monitoring

- Vital Signs: AM of surgery
- Weight: AM of surgery
- Blood Glucose Monitoring Point of Care Testing (POCT): AM of surgery

### Diet/Nutrition

*Refer to [AHS Pre-Operative Fasting and Carbohydrate Loading Prior to Surgical Interventions - Adults Guideline](#).*

*The minimum duration of pre-operative fasting prior to the administration of anesthesia should be 8 hours after a meal that includes meat or fried or fatty foods, 6 hours after a light meal (such as toast and a clear fluid), 2 hours after clear fluids.<sup>8</sup>*

#### **Pre-operative eating and drinking**

- Clinical Communication: Final snack 8 hours prior to scheduled surgery  
**OR** regular diet until bowel preparation initiated
- Clinical Communication: Clear fluids until 3 hours prior to scheduled surgery
- NPO 2 hours prior to scheduled surgery

*Refer to AHS Provincial Clinical Knowledge Topic: [Perioperative Management of Patients with Diabetes Mellitus, Adult – Inpatient](#). The recommendation is to avoid carbohydrate loading<sup>4</sup> patients with diabetes mellitus until prospective trials have been completed.*

***Clinicians should use independent medical judgement in the context of individual clinical circumstances and delete the following order if required.***

#### **Pre-operative carbohydrate loading**

- Clear apple juice or cranberry cocktail (*refer to [Appendix A](#)*) 500 mL PO 3 hours prior to scheduled surgery. Must be consumed by 2 hours prior to scheduled surgery

- If patient's admission is greater than 3 hours prior to scheduled surgery, provide carbohydrate load

- Assess and document last consumption of food and fluids (including carbohydrate load)

### **Bowel Preparation**

- Assess and document bowel preparation

### **Intravenous Therapy**

- Intravenous Cannula: insert intra-operatively
- Intravenous Cannula: insert pre-operatively, apply saline lock

### **Medications**

#### **VTE Prophylaxis**

Refer to AHS Provincial Clinical Knowledge Topic: VTE Prophylaxis, Adult – Inpatient (link to be added once available). Refer to [AHS Venous Thromboembolism Prophylaxis Guideline](#).

- heparin 5000 units SUBCUTANEOUSLY once pre-operatively

#### **Antibiotic Prophylaxis**

Antibiotics should be given within 60 minutes prior to incision.

*For Elective Small Intestine, Non-obstructed procedures:*

Choose ONE option:

Option 1:

- ceFAZolin 2 g IV once pre-operatively

Option 2 if patient has ceFAZolin allergy or severe non-IgE mediated reaction to any  $\beta$ -lactam:

- gentamicin (1.5 mg/kg) \_\_\_\_\_ mg IV once pre-operatively

**AND**

- clindamycin 600 mg IV once pre-operatively

*For Elective Colorectal and Anal procedures:*

Choose ONE option:

Option 1:

- ceFAZolin 2 g IV once pre-operatively

**AND**

- metronidazole 500 mg IV once pre-operatively

Option 2 if patient has ceFAZolin allergy or severe non-IgE mediated reaction to any  $\beta$ -lactam:

- gentamicin (1.5 mg/kg) \_\_\_\_\_ mg IV once pre-operatively

**AND**

- clindamycin 600 mg IV once pre-operatively

Option 3 if patient has ceFAZolin allergy or severe non-IgE mediated reaction to any  $\beta$ -lactam:

- gentamicin (1.5 mg/kg) \_\_\_\_\_ mg IV once pre-operatively

**AND**

- metronidazole 500 mg IV once pre-operatively

### Analgesics

*Consider dose reduction if patient is elderly.*

- acetaminophen 975 to 1000 mg PO once pre-operatively, to be given 1 hour prior to surgery. Maximum of 4000 mg acetaminophen in 24 hours from all sources
- gabapentin 300 mg PO once pre-operatively, to be given 1 hour prior to surgery

*Use caution if patient has renal impairment, is at high risk of acute kidney injury, or increased risk of anastomotic leak especially when low rectal anastomosis is anticipated.*

- ibuprofen 400 mg PO once pre-operatively, to be given 1 hour prior to surgery

### OR

*Use caution if patient has renal impairment, is at high risk of acute kidney injury, or increased risk of anastomotic leak especially when low rectal anastomosis is anticipated. If patient has proven history of ulcers or complicated perforation, obstruction, or major bleeding choose celecoxib:*

- celecoxib 400 mg PO once pre-operatively, to be given 1 hour prior to surgery

### Antiemetics

*If patient has 3 or 4 of the following risk factors for post-operative nausea and vomiting (PONV)<sup>8</sup>*

- female gender
- non-smoker
- history of PONV or motion sickness
- post-operative use of opioids

**AND** patient meets one of the following criteria

- High risk of developing PONV within 24 hours after surgery AND history of being refractory to other antiemetic treatments
- Risk of medical sequelae of vomiting (i.e. jaw wiring, neurosurgery, upper gastrointestinal surgery)

*Choose aprepitant:*

- aprepitant 80 mg PO once pre-operatively, to be given 1 hour prior to surgery

### Glycemic Management Medications

*Refer to AHS Provincial Clinical Knowledge Topic: [Perioperative Management of Patients with Diabetes Mellitus, Adult – Inpatient](#).*

## ERAS Colorectal Surgery, Adult – Inpatient Intra-operative Guidance

### Normothermia

- Operating Room temperature at least 20°C
- Monitor patient's temperature intra-operatively
- Use forced-air warming device for all procedures lasting longer than 30 minutes to achieve/maintain a temperature between 36°C to 38°C throughout the perioperative period
- Use fluid warmers for procedures in which greater than 1 litre fluid is expected to be administered

### Post-operative Nausea and Vomiting (PONV) Prophylaxis

- Provide multimodal prophylaxis with consideration to patient’s PONV risk score and administration of pre-operative PONV prophylaxis<sup>11</sup>

### **Pain Management**

- Consider the use of regional anesthesia (transversus abdominis plane [TAP] block or rectus sheath block) or thoracic epidural analgesia (TEA) if applicable, and discuss decision with surgical team
- Use opioids sparingly. If needed, short acting opioids are recommended. Long acting opioids should be avoided. Patients with pre-operative chronic pain may require additional assessment based on their Best Possible Medication History (BPMH). Consider non-opioid analgesia or appropriate opioid-sparing adjuncts

### **Additional Guidance**

- Consider the use of total intravenous anesthesia (TIVA) instead of inhalation anesthetic
- Avoid routine nasogastric intubation
- Fluid therapy goal is to maintain euvolemia. If appropriate, use goal-directed fluid management to guide fluid therapy especially for high risk patients and for patients undergoing surgery with significant intravascular volume losses anticipated
- Avoid use of prophylactic surgical site drains
- Remove indwelling urinary catheter, if applicable, upon completion of procedure or as soon as clinically indicated

## **ERAS Colorectal Surgery, Adult – Inpatient Post-operative Orders Set**

### **Order Set Components**

**Order Set Keywords:** ERAS, Colorectal, Post-operative, Surgery

### **Admit, Transfer, Discharge**

- Anticipated Date of Discharge: \_\_\_\_\_

### **Patient Care**

*Discuss Goals of Care with patient/Alternate Decision-Maker and update Goals of Care Designation, if applicable. Refer to AHS Provincial Clinical Knowledge Topic: [Advance Care Planning and Goals of Care Designations, All Ages – All Locations](#).*

- Sequential compression device (SCD): discontinue when ambulating well

### **Monitoring**

- Vital Signs: assess as per local institutional practices
- Opioid Monitoring: monitor as per local institutional practices
- Pain Score and Nausea Score: assess at least every 4 hours x 3 days **and then** every 8 hours
- Blood Glucose Monitoring Point of Care Testing (POCT): QID

### **Activity**

- Activity as tolerated
- Post-operative day (POD) 0: stand at bedside, up in chair, walk to doorway and back; activity goal is 2 hours

- POD 1: up in chair each meal, ambulate at least 3 times daily; activity goal is 4 hours
- POD 2 until discharge: up in chair each meal, ambulate at least 3 times daily; activity goal is 6 hours
- Notify physiotherapist if pre-operative mobility concerns or if patient requires more than one-person assist

### Intake and Output

- Intake and Output: assess every 8 hours x 4 days, include strict oral intake

Choose ONE:

- Indwelling Urinary Catheter: remove on POD 1 in AM
- Indwelling Urinary Catheter: remove on POD 2 in AM for low anterior resection and abdominoperineal resection
- In and Out Urinary Catheter: insert PRN for urinary retention once indwelling urinary catheter removed
- Indwelling Urinary Catheter: insert if in and out urinary catheter is required twice. Notify most responsible health practitioner
- Weight: assess daily x 3 days, start on POD 1
- Active Suction Drain(s): reprime every 8 hours and PRN, record output

### Diet/Nutrition

- Clinical Communication: offer patient oral fluids; intake goal 500 mL on POD 0
- Post-Surgical Transition Diet: start on POD 0
- Regular Diet: start on POD 2
- Regular Diabetic - Adult Diet: start on POD 2
- Low Fiber Diet: start on POD 2
- Low Fiber Diabetic - Adult Diet: start on POD 2

### Protein/Calorie Dense Oral Nutritional Supplements

*Appropriate when patient is on any type of oral diet including Gluten-free and Diabetic – Adult. Suitable for lactose intolerance but NOT appropriate for dairy allergy. Achieve a supplement intake of 300 kcal/day on POD 0 and 600 kcal/day on POD 1 until discharge.*

- Ensure Protein Max: 90 mL PO 3 times daily, start on POD 0 **and then** 90 mL PO 5 times daily, start on POD 1 until discharge

### Wound Care

- Surgical Incisions: assess every 8 hours and PRN
- Wound Dressing Instructions: \_\_\_\_\_
- Active Surgical Drain(s) Care: assess and change dressing daily and PRN

### Respiratory Care

- Incentive Spirometry: perform every 1 hour while awake
- Oxygen Therapy: titrate to saturation, maintain SpO<sub>2</sub> greater than 92%
- Head of Bed: elevate to at least 30 degrees while patient on opioids or epidural

### Laboratory Investigations

- Complete Blood Count (CBC) with differential on POD 1 in AM and POD 3 in AM

*If patient is receiving VTE prophylaxis choose repeat CBC with differential:*

- Complete Blood Count (CBC) with differential, start on POD 1 in AM and repeat every 3 days x 5 times
- Creatinine on POD 1 in AM and POD 3 in AM
- Electrolytes (Na, K, Cl, CO<sub>2</sub>) on POD 1 in AM and POD 3 in AM
- Magnesium (Mg) on POD 1 in AM and POD 3 in AM

### **Intravenous Therapy**

- sodium chloride 0.9% lock when patient tolerating oral fluid intake
- lactated ringer's infusion IV at 60 mL/hour if patient **not** tolerating oral fluid intake, lock when patient tolerating oral fluid intake
- potassium chloride 20 mmol in dextrose 5% (D5W) – sodium chloride 0.45% infusion IV at 60 mL/hour if patient **not** tolerating oral fluid intake, lock when patient tolerating oral fluid intake

### **Medications**

#### **VTE Prophylaxis**

*Refer to AHS Provincial Clinical Knowledge Topic: VTE Prophylaxis, Adult – Acute Care (link to be added once available). Refer to AHS VTE Prophylaxis Weight-Band Table (see AHS internal website) if patient has reduced renal function or is less than 40 kg or greater than 100 kg.*

*If patient is at increased risk of VTE (refer to [AHS Venous Thromboembolism Prophylaxis Guideline](#)) consider extended prophylaxis (up to 4 weeks post-discharge) with low molecular weight heparin (LMWH).*

*Choose ONE:*

- tinzaparin 4500 units SUBCUTANEOUSLY once daily at \_\_\_\_\_ hours (hh mm), start on POD \_\_\_\_\_ until discharge
- tinzaparin 4500 units SUBCUTANEOUSLY once daily at \_\_\_\_\_ hours (hh mm), start on POD \_\_\_\_\_ and extend therapy for 28 days
- Teach LMWH self-injection in preparation for discharge

#### **Antilulcer Agents and Acid Suppressants**

- pantoprazole EC tab 40 mg PO daily before breakfast until discharge
- ranitidine 150 mg PO BID until discharge

#### **Bowel Stimulation**

- Chew gum 3 times daily (minimum 30 minutes each time), as tolerated

*Choose ONE:*

- magnesium gluconate 1000 mg PO BID, start on POD 1 and discontinue after first bowel movement
- magnesium hydroxide 30 mL PO BID, start on POD 1 and discontinue after first bowel movement

#### **Analgesics**

*Consider non-opioid analgesia or appropriate opioid-sparing multimodal analgesia. If needed, short acting opioids are recommended. Long acting opioids should be avoided.*

- Follow Anesthesia/Acute Pain Service orders for continuous regional epidural, nerve block therapy and/or patient controlled analgesia (PCA)

- Follow Surgery orders for patient controlled analgesia (PCA)

### Prophylaxis Analgesics

*Consider dose reduction if patient is elderly.*

- acetaminophen 975 to 1000 mg PO every 6 hours x 48 hours **and then** acetaminophen 975 to 1000 mg PO every 6 hours PRN for pain.  
Maximum of 4000 mg acetaminophen in 24 hours from all sources

*Use caution if patient has renal impairment, is at high risk of acute kidney injury, or increased risk of anastomotic leak especially when low rectal anastomosis is anticipated.*

*Choose ONE:*

- ibuprofen 400 mg PO every 6 hours x 48 hours **and then** ibuprofen 400 mg PO every 6 hours PRN for pain

*If eGFR is greater than 30 mL/minute and patient has no epidural choose celecoxib:*

- celecoxib 200 mg PO BID for 48 hours **and then** celecoxib 200 mg PO BID PRN for pain

- ketorolac 10 mg IV every 8 hours x 48 hours

*If patient had open surgery without an epidural, long acting opioids may assist with pain control. Consider using only short acting opioids or the lowest possible dose of long acting opioid if patient is elderly or opiate-naive.*

- Other \_\_\_\_\_

### PRN Oral Opioids (for pain not controlled by non-opioid analgesia)

*Consider dose reduction if patient is elderly or opiate-naive.*

- oxyCODONE 5 to 10 mg PO every 4 hours PRN for pain not controlled by non-opioid analgesia

### PRN Parenteral Opioids (for pain not controlled by oral opioids or oral analgesia is contraindicated)

*Consider dose reduction if patient is elderly or opiate-naive.*

*Choose ONE:*

- morphine 1 to 10 mg IV/SUBCUTANEOUSLY every 4 hours PRN for pain not controlled by oral opioids
- HYDROMORPHONE 0.5 to 2 mg IV/SUBCUTANEOUSLY every 4 hours PRN for pain not controlled by oral opioids

## Antiemetics<sup>11</sup>

### Prophylaxis Antiemetics

*Consider dose reduction if patient is elderly or has reduced renal function.*

*Choose BOTH:*

- ondansetron 8 mg PO/NG (or ODT if difficulty swallowing or active vomiting with no IV access) every 8 hours x 48 hours **and then** ondansetron 4 mg PO/NG every 8 hours PRN
- ondansetron 4 mg IV every 8 hours x 48 hours **and then** ondansetron 4 mg IV every 8 hours PRN if oral dose is **not** tolerated

### **PRN Antiemetics**

*Consider dose reduction if patient is elderly or has reduced renal function.*

- metoclopramide 10 mg PO/NG/IV/IM every 6 hours PRN
- dimenhydrinate 25 to 50 mg PO/IV/IM every 4 hours PRN

### **Glycemic Management Medications**

Refer to AHS Provincial Clinical Knowledge Topic: [Perioperative Management of Patients with Diabetes Mellitus, Adult – Inpatient](#).

### **Patient Teaching**

- Teach: ostomy self-management

### **Consults and Referrals**

- Nurse Specialized in Wound, Ostomy and Continence (NSWOC)
- Physiotherapy
- Registered Dietitian
- Social Work
- Transition Services

## **Rural Considerations**

The ERAS clinical knowledge and patient information contained within each Topic are intended to be used as a comprehensive package to maximize the anticipated benefits of care management. Considerations for application of ERAS care pathways (developed for Breast Reconstruction, Colorectal, Cystectomy, Gynecologic Oncology, Liver, Major Gynecology, Major Head and Neck, and Pancreas surgery) in rural surgical facilities within Alberta include

- Surgical procedure criteria must be met (see the Rationale section in each ERAS Topic).
  - Adult patients scheduled for Breast Reconstruction, Colorectal, Cystectomy, Gynecologic Oncology, Liver, Major Gynecology, Major Head and Neck, or Pancreas surgery who do not meet the inclusion criteria for the ERAS care pathway may still be considered for applicable recommendations of that pathway (see the Recommendations section in each ERAS Topic)
  - Adult patients scheduled for any other type of surgery may be considered for the Enhanced Recovery for All Surgeries, Adult – Inpatient, Ambulatory care pathway
- Clinical expertise (e.g., surgeon, anesthesia and nursing), clinical support services (e.g., nutrition services, pharmacy, physiotherapy, laboratory, diagnostic imaging), and additional resources (e.g., medications, nutritional supplements, sequential compression devices, active warming devices) are available for the duration of clinical care from admission to discharge (see the Recommendations section in each ERAS Topic)
  - There must also be site physician and operations leadership, a site team focused on learning and collaboration, and processes and resources to audit outcomes and compliance

## **Disposition Planning**

### **Discharge**

Prior to patient discharge from the ERAS care pathway, the following should be considered

- Patient is medically stable
- Patient is functioning close to or at pre-operative level for activities of daily living
- Patient is passing gas or stool
- Patient is tolerating solid food
- Patient's pain is well controlled on oral analgesia
- Patient's nausea is well controlled with no vomiting
- Patient's incisions and/or wounds are healing and managed with appropriate wound care products
- Patient is able to self-catheterize, if appropriate
- Patient is able to manage drains, ostomy, and/or self-injection, if appropriate
  
- Discharge medication list and prescription(s) have been provided to patient
- Discharge teaching is complete and a copy has been provided to patient
- Transition Services/Home Care Services have been arranged, if required
- Wound care/negative-pressure wound therapy supplies have been arranged, if required
  
- Patient has been referred to the following education resources
  - [Your Surgery Journey – Patient Guide](#)
  - MyHealth.Alberta.ca
    - [Patient Care Webpages](#) including After Surgery and [Incision Care After Surgery](#)
    - [Patient Care Handouts](#) including Before and After Surgery - Adult - [What to Expect at Home](#)
    - [Patient Care Videos](#) including Before and After Surgery – [Preventing Problems After Surgery](#)

**Outpatient follow-up**

- If applicable, patient to have staples removed in 7 to 10 days by family physician or in surgeon's clinic
- Patient to follow up with family physician or surgeon in 4 to 6 weeks

**Analytics**

**Outcome Measure #1**

<b>Name of Measure</b>	ERASAlberta coverage rate
<b>Definition</b>	Number of surgeries performed that were verified ERAS surgeries divided by the total surgeries performed that were eligible ERAS surgeries, multiplied by 100. Calculated provincially, by zone, by site.
<b>Rationale</b>	Intended to measure the ability of ERASAlberta to provide enhanced recovery after surgery.

**Outcome Measure #2**

<b>Name of Measure</b>	ERASAlberta length of stay (LOS) rates
<b>Definition</b>	Number of surgeries performed that were verified ERAS surgeries and resulted in <ul style="list-style-type: none"> <li>• acute LOS less than or equal to acute LOS benchmark</li> <li>• ICU LOS less than or equal to ICU LOS benchmark</li> </ul>

	<ul style="list-style-type: none"> <li>• readmission LOS less than or equal to readmission LOS benchmark</li> <li>• total LOS less than or equal to total LOS benchmark</li> </ul> <p>divided by the total surgeries performed that were verified ERAS surgeries, multiplied by 100. Calculated provincially, by zone, by site.</p>
<b>Rationale</b>	Demonstrates how ERAS impacts patient care by decreasing post-operative complications and accelerating recovery, thereby allowing for earlier discharge.

### Outcome Measure #3

<b>Name of Measure</b>	ERASAlberta readmission rate
<b>Definition</b>	Number of surgeries performed that were verified ERAS surgeries and resulted in greater than or equal to 1 unplanned readmission to acute care within 30 days of discharge date divided by the total surgeries performed that were verified ERAS surgeries, multiplied by 100. Calculated provincially, by zone, by site.
<b>Rationale</b>	Demonstrates how ERAS impacts patient care by decreasing post-operative complications and accelerating recovery, thereby reducing the risk of readmission.

### Outcome Measure #4

<b>Name of Measure</b>	ERASAlberta compliance rates
<b>Definition</b>	<p>Number of surgeries performed that were verified ERAS surgeries in which specific</p> <ul style="list-style-type: none"> <li>• ERAS pre-operative care</li> <li>• ERAS intra-operative care</li> <li>• ERAS post-operative care</li> </ul> <p>was provided in compliance with ERASAlberta recommendations divided by the total surgeries performed that were verified ERAS surgeries, multiplied by 100. Calculated by site.</p>
<b>Rationale</b>	Compliance with ERASAlberta recommendations is an indicator of the appropriateness of the ERAS care pathway in achieving desired patient outcomes.

## References

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10. Apfel CC, Greim CA, Haubitza I, et al. A risk score to predict the probability of postoperative vomiting in adults. *Acta Anaesthesiol Scand.* 1998; 42(5): 495-501
11. Gan TJ, Diemunsch P, Habib AS, et al. Consensus Guidelines for the Management of Postoperative Nausea and Vomiting. *Anesth Analg.* 2014; 118(1): 85-113. doi: 10.1213/ANE.0000000000000002

## Additional Information

AHS Enhanced Recovery after Surgery (ERAS)

[www.ahs.ca/ERAS](http://www.ahs.ca/ERAS)

AHS Knowledge Resource Service ERAS Subject Guide: Surgery Subject Guide

<https://krs.libguides.com/surgery/eras>

AHS Pre-Operative Fasting and Carbohydrate Loading Prior to Surgical Interventions - Adults Guideline

<https://extranet.ahsnet.ca/teams/policydocuments/1/clp-ahs-preop-fasting-carb-load-hcs-237-01.pdf>

AHS Provincial Clinical Knowledge Topic: *Advance Care Planning and Goals of Care Designations, All Ages – All Locations*

<https://extranet.ahsnet.ca/teams/policydocuments/1/klink/et-klink-ckv-advance-care-planning-goals-of-care-designations-all-ages-all-locations.pdf>

The AHS Provincial Clinical Knowledge Topic: *Perioperative Management of Patients with Diabetes Mellitus, Adult – Inpatient*

<https://extranet.ahsnet.ca/teams/policydocuments/1/klink/et-klink-ckv-perioperative-diabetes-guidelines-adult-inpatient.pdf>

AHS Provincial Clinical Knowledge Topic: *VTE Prophylaxis, Adult – Inpatient*  
(link to be added once available)

AHS Recommended Drug Regimens for Surgical Prophylaxis in Adult Patients

<https://www.albertahealthservices.ca/assets/info/hp/as/if-hp-as-surgical-prophylaxis.pdf>

AHS Safe Surgery Checklist

<http://www.albertahealthservices.ca/assets/about/scn/ahs-scn-surg-ssc-checklist.pdf>

AHS Safe Surgery Checklist Policy

<https://extranet.ahsnet.ca/teams/policydocuments/1/clp-safe-surgery-checklist-ps-04-policy.pdf>

AHS Use of Aprepitant (Emend<sup>®</sup>) for Prevention of Postoperative Nausea and Vomiting (PONV) in Adults

<https://www.albertahealthservices.ca/assets/Infofor/hp/if-hp-phys-aprepitant-emend-ponv-summary-statement.pdf>

AHS Venous Thromboembolism Prophylaxis Guideline

<https://extranet.ahsnet.ca/teams/policydocuments/1/clp-venous-thromboembolism-prophylaxis-ps-09-01-guideline.pdf>

AHS Venous Thromboembolism Prophylaxis Policy

<https://extranet.ahsnet.ca/teams/policydocuments/1/clp-venous-thromboembolism-prophylaxis-ps-09-policy.pdf>

AHS Weight-Band Dosing for Subcutaneous Tinzaparin or Enoxaparin for Venous Thromboembolism (VTE) Prophylaxis in Acute Care Adult Inpatients  
(please see AHS VTE Prophylaxis Weight-Band Table on the AHS internal website)

Bugs & Drugs

<http://www.bugsanddrugs.org>

Canadian Nutrition Screening Tool (CNST)

<http://nutritioncareincanada.ca/sites/default/uploads/files/CNST.pdf>

Choosing Wisely Canada: Drop the Pre-Op Toolkit

<https://choosingwiselycanada.org/perspective/preop-toolkit/>

Choosing Wisely Canada Recommendations and Resources, by Specialty

<https://choosingwiselycanada.org/recommendations/>

Eating and Drinking Before Surgery: Patient Instructions

<https://myhealth.alberta.ca/alberta/Pages/Your-Surgery-Resources.aspx>

MyHealth.Alberta.ca Health Information and Tools, Patient Care Handouts

<https://myhealth.alberta.ca/health/aftercareinformation/Pages/default.aspx>

MyHealth.Alberta.ca Health Information and Tools, Surgery – Incision Care After Surgery

<https://myhealth.alberta.ca/health/pages/conditions.aspx?Hwid=tc4128spec>

MyHealth.Alberta.ca Health Information and Tools, Surgery – What to Expect

<https://myhealth.alberta.ca/health/Pages/conditions.aspx?hwid=tw9795>

MyHealth.Alberta.ca Patient Care Videos including Before and After Surgery: ERAS – Your Surgery Journey (videos 1 – 14)

<https://myhealth.alberta.ca/Alberta/Pages/learning-surgery-journey-video-series.aspx>

Safer Healthcare Now! Prevent Surgical Site Infections

<http://www.patientsafetyinstitute.ca/en/toolsResources/Documents/Interventions/Surgical%20Site%20Infection/SSI%20Getting%20Started%20Kit.pdf>

## Appendix A – ERAS Nutrition Working Group Consensus: Juice as Carbohydrate Loading Products

Drawing from the best practices around the world, ERAS has been implemented in Alberta to enhance perioperative patient care, support patient recovery and reduce health care costs. Carbohydrate (CHO) loading is one of about 24 ERAS protocol elements and is an integral part of the preoperative care process<sup>1, 2</sup>. The main purpose is to attenuate postoperative insulin resistance, which contributes to negative nitrogen balance, leading to muscle mass loss and reduced muscle strength.<sup>1-6</sup> In addition, CHO loading hinders preoperative stress, hunger and thirst in surgical patients.<sup>1, 2, 7, 8</sup> According to ERAS guidelines, CHO loading involves ingestion of clear fluids that contain complex CHOs, mostly of maltodextrins. These products have been extensively researched and are recommended for preoperative use by the ERAS guidelines.<sup>9-19</sup>

ERAS and The European Society of Anaesthesiology Guidelines recommend the ingestion of CHO-rich beverages that are specifically developed for preoperative consumption up to two hours before surgery.<sup>1, 2, 9-20</sup> No specific guidelines are given regarding the type and/or brand of products to be used; however, it is suggested that not all CHOs are safe.<sup>20</sup> Gastric emptying is the major concern preoperatively, therefore beverages with lower osmolality assumed to be safer for preoperative consumption.<sup>21</sup> In addition, it was suggested that the insulin response to the beverage should reach 60  $\mu$ IU/mL to achieve appropriate fed state that is believed to improve postoperative insulin resistance.<sup>2, 21</sup> All research that has been done involve only commercial products. The preoperative CHO loading product most often studied is Nutricia Preop® that contains 12.5% CHO from maltodextrin and has low osmolality (260 mOsm/kg H<sub>2</sub>O) to induce faster gastric emptying.<sup>22</sup> Nutricia Preop®, is in liquid form and is only available in Europe.<sup>22</sup>

PREcovery™ is a new CHO-containing product commercially available in Canada that contains 12.5% CHO from maltodextrin and has low osmolality (114 mOsmol/kgH<sub>2</sub>O).<sup>23</sup> Although it is a potential commercial product that can be used for ERAS, more studies are needed to explore the effectiveness of PREcovery™. As well, this product is in powder form and needs to be mixed with 400 mL of water<sup>23</sup>, which may lessen the practicality of using this product for ERAS. Decisions will need to be made on access and availability of the product, who will prepare the product, the process of preparing this product for patient safety and who will cover the product's cost.

Because of the limited availability and research of commercial CHO-containing products in Canada, the ERAS Nutrition Working Group (WG) continues to recommend the use of apple juice and cranberry cocktail juice. Although there are no published studies on the safety of juice as a preoperative CHO-loading product, no adverse effects have been reported on using juice for this purpose since ERAS was first implemented in Alberta in 2013. As well, based on an ERAS nutrition and environmental scan, Canadian sites using juice as the ERAS preoperative CHO-loading product reported no adverse effects.

The ERAS Nutrition WG recommendation continues to be based on the following criteria: availability, palatability, clinical considerations, volume needed, ease and process of administration, cost of product, infection control and simplicity (for patient use and nurses and physicians to discuss with and teach patients). Juice meets most of the beverage criteria as it is conveniently available and palatable, can be used at home or in hospital for minimal cost compared to CHO-containing products, is already pre-packaged, simple to consume, and easy for physicians and health professionals to discuss with and teach patient as part of ERAS preoperative teaching. However, this WG's consensus may be updated once new research and products that meet the criteria are available.

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