

Provincial Clinical Knowledge Topic
ERAS Breast Reconstruction Surgery, Adult –
Inpatient, Ambulatory
V 1.1

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Revision History

Version	Date of Revision	Description of Revision	Revised By
1.0	March 2019	Topic Complete	See Acknowledgements
1.1	June 2019	Pre-operative Order Set 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) [Consensus Review of Optimal Perioperative Care in Breast Reconstruction: Enhanced Recovery after Surgery \(ERAS\) Society Recommendations](#)¹
- 2) [Enhanced Recovery After Surgery \(ERAS\) for gastrointestinal surgery. Part 1: pathophysiological considerations](#)²
- 3) [Enhanced Recovery After Surgery \(ERAS\) for gastrointestinal surgery. Part 2: consensus statement for anaesthesia practice](#)³

Keywords

- ERAS
- Enhanced recovery
- Breast reconstruction
- Surgery
- Adult

ERAS Breast Reconstruction Surgery, Adult – Inpatient, Ambulatory

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 Review⁴](#).

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.

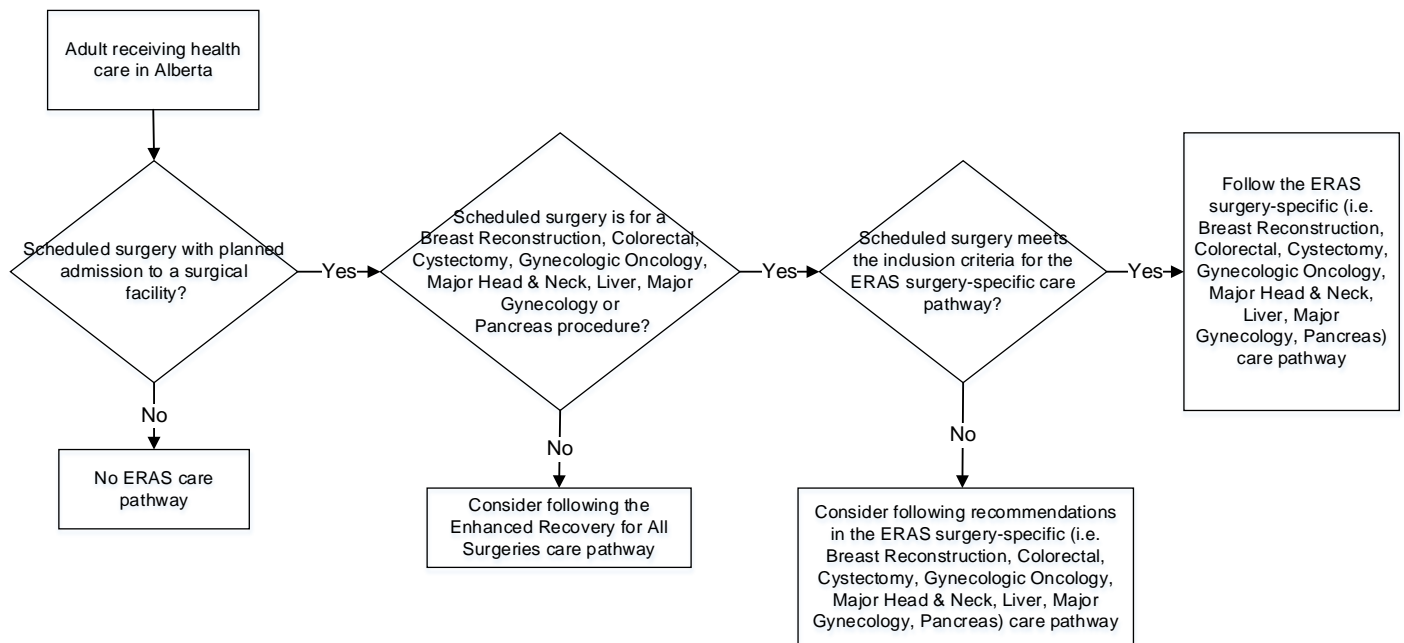
Certain criteria must be met for a patient to be considered for inclusion in an ERAS care pathway. See the Rationale section in each ERAS Topic for specific surgical procedures appropriate for inclusion.

The inclusion criteria (applicable as of June 1, 2018) for the ERAS Breast Reconstruction Surgery, Adult – Inpatient, Ambulatory care pathway are

- Adult female (biologically born) surgical patient undergoing scheduled surgery within Alberta for immediate or delayed breast reconstruction (may include any stage of the reconstruction) following unilateral or bilateral mastectomy.

While all eligible patients should be started on the ERAS Breast Reconstruction Surgery, Adult – Inpatient, Ambulatory care pathway, individual patient care plans may need to be modified based on surgical findings or additional procedures. Breast Reconstruction surgery patients who do not meet the inclusion criteria may still be considered for applicable recommendations in the ERAS Breast Reconstruction Surgery, Adult – Inpatient, Ambulatory care pathway.

Figure #1 ERASAlberta 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
- balanced fluid management
- surgical site drains may be used but should be removed as early as clinically appropriate
- mobilization soon after surgery
- stimulation of gut motility
- offer of food and drinks soon after surgery with appropriate nutritional supplements

ERAS Breast Reconstruction Surgery, Adult – Inpatient, Ambulatory: Recommendations

ERASAlberta recommendations are based on published international ERAS guidelines and other evidence, with consideration for current practices at ERAS sites and other clinical standards. ERAS[®] Society recommendations are from the Table of Recommendations within [ERAS[®] Society Guidelines](#). The GRADE⁵ methodology was used to determine quality of evidence and strength of recommendation for each ERAS[®] 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

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

- **ERAS[®] Society Recommendation:** Patients should receive detailed preoperative counselling.
- **ERAS[®] Society Recommendation - Quality of Evidence:** Moderate
- **ERAS[®] Society Recommendation - Strength of Recommendation:** Strong

Pre-operative optimization

ERASAlberta Recommendation: Same as the ERAS[®] 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 care of a qualified healthcare professional.

- **ERAS[®] Society Recommendation:** For daily smokers, 1 month of abstinence before surgery is beneficial. For patients who are obese, weight reduction to achieve a body mass index (BMI) ≤ 30 kg/m² before surgery is beneficial. For alcohol abusers, 1 month of abstinence before surgery is beneficial. For appropriate groups, referral should be made to resources for these behavior changes.
- **ERAS[®] Society Recommendation - Quality of Evidence:** Smoking (Moderate), Alcohol (Low), Obesity (High)
- **ERAS[®] Society Recommendation - Strength of Recommendation:** Smoking (Strong), Alcohol (Strong), Obesity (Strong)

Perforator flap planning

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

- **ERAS® Society Recommendation:** If preoperative perforator mapping is required, computed tomographic angiography (CTA) is recommended.
- **ERAS® Society Recommendation - Quality of Evidence:** Moderate
- **ERAS® Society Recommendation - Strength of Recommendation:** Strong

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](#)⁶. 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:** Preoperative fasting should be minimized and patients should be allowed to drink clear fluids up to 2 hours before surgery. Preoperative maltodextrin-based drinks should be given to patients 2 hours before surgery.
- **ERAS® Society Recommendation - Quality of Evidence:** Preoperative fasting minimized (Moderate), Carbohydrate loading (Low)
- **ERAS® Society Recommendation - Strength of Recommendation:** Preoperative fasting minimized (Strong), Carbohydrate loading (Strong)

Pre-anesthetic medication

ERASAlberta Recommendation: Patients should not routinely receive long acting sedative medication before surgery because it delays immediate post-operative recovery.

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

Pre-operative and intra-operative analgesia

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

- **ERAS® Society Recommendation:** Women should receive multimodal analgesia to mitigate pain.
- **ERAS® Society Recommendation - Quality of Evidence:** Moderate
- **ERAS® Society Recommendation - Strength of Recommendation:** Strong

Venous thromboembolism prophylaxis

ERASAlberta Recommendation: Same as the ERAS® Society recommendation below with the following additions: extended prophylaxis with low molecular weight heparin (LMWH) should

be given for up to 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: Sequential compression device (SCD) should be used as the mechanical method.

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

- **ERAS[®] Society Recommendation:** Patients should be assessed for venous thromboembolism risk. Unless contraindicated, and balanced by the risk of bleeding, patients at a higher risk should receive low-molecular-weight heparin or unfractionated heparin until ambulatory or discharged. Mechanical methods should be added.
- **ERAS[®] Society Recommendation - Quality of Evidence:** Moderate
- **ERAS[®] Society Recommendation - Strength of Recommendation:** Strong

Antimicrobial prophylaxis and skin preparation

ERASAlberta Recommendation: Same as the ERAS[®] Society recommendation below with antibiotic provision as per [AHS Recommended Drug Regimens for Surgical Prophylaxis in Adult Patients](#).

- **ERAS[®] Society Recommendation:** Chlorhexidine skin preparation should be performed and intravenous antibiotics covering common skin organisms should be given within 1 hour of incision.
- **ERAS[®] Society Recommendation - Quality of Evidence:** Moderate
- **ERAS[®] Society Recommendation - Strength of Recommendation:** Strong

Prevention of post-operative nausea and vomiting (PONV)

ERASAlberta Recommendation: All patients need to be pre-operatively assessed for risk⁷ and provided with perioperative PONV prophylaxis accordingly. A multimodal approach to PONV prophylaxis should be adopted in all high risk patients.⁸

- **ERAS[®] Society Recommendation:** Women should receive preoperative and intraoperative medications to mitigate postoperative nausea and vomiting.
- **ERAS[®] Society Recommendation - Quality of Evidence:** Moderate
- **ERAS[®] Society Recommendation - Strength of Recommendation:** 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[®] Society Recommendation:** General anesthesia with total intravenous anesthesia (TIVA) is recommended.
- **ERAS[®] Society Recommendation - Quality of Evidence:** Moderate
- **ERAS[®] Society Recommendation - Strength of Recommendation:** Strong

Prevention of intra-operative hypothermia

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

- **ERAS[®] Society Recommendation:** Preoperative and intraoperative measures, such as forced air, to prevent hypothermia should be instituted. Temperature monitoring is required to ensure the patient's body temperature is maintained above 36°C.
- **ERAS[®] Society Recommendation - Quality of Evidence:** Moderate
- **ERAS[®] Society Recommendation - Strength of Recommendation:** Strong

Perioperative fluid management

ERASAlberta Recommendation: Same as the ERAS[®] Society recommendation below with the following addition: 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.

Note: Normal saline is sodium chloride 0.9%.

- **ERAS[®] Society Recommendation:** Overresuscitation or underresuscitation of fluids should be avoided and water and electrolyte balance should be maintained. Goal-directed therapy is a useful method of achieving these goals. Balanced crystalloid solutions, rather than saline, is recommended. Vasopressors are recommended to support fluid management and do not negatively affect free flaps.
- **ERAS[®] Society Recommendation - Quality of Evidence:** Moderate
- **ERAS[®] Society Recommendation - Strength of Recommendation:** Strong

Surgical site drains

ERASAlberta Recommendation: Site surgical drains may be clinically indicated but the use of prophylactic surgical site drains should be avoided. All drains should be removed when not clinically indicated to avoid further complications.

- **ERAS[®] Society Recommendation:** None
- **ERAS[®] Society Recommendation - Quality of Evidence:** N/A
- **ERAS[®] Society Recommendation - Strength of Recommendation:** N/A

Urinary drainage

ERASAlberta Recommendation: If a urinary catheter is required for post-operative bladder drainage, it should be used for a short period, preferably less than 24 hours post-operatively.

- **ERAS[®] Society Recommendation:** None.
- **ERAS[®] Society Recommendation - Quality of Evidence:** N/A
- **ERAS[®] Society Recommendation - Strength of Recommendation:** N/A

Prevention of post-operative ileus

ERASAlberta Recommendation: A multimodal approach to optimizing gut function may involve gum chewing and oral magnesium.

- **ERAS[®] Society Recommendation:** None
- **ERAS[®] Society Recommendation - Quality of Evidence:** N/A
- **ERAS[®] Society Recommendation - Strength of Recommendation:** N/A

Post-operative analgesia

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

- **ERAS[®] Society Recommendation:** Multimodal postoperative pain management regimens are opioid-sparing and should be used.
- **ERAS[®] Society Recommendation - Quality of Evidence:** High
- **ERAS[®] Society Recommendation - Strength of Recommendation:** Strong

Post-operative glucose control

ERASAlberta Recommendation: ERAS elements that reduce metabolic stress should be employed to reduce insulin resistance and the development of hyperglycemia. Insulin therapy to maintain normoglycemia is recommended, if applicable.

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:** None
- **ERAS[®] Society Recommendation - Quality of Evidence:** N/A
- **ERAS[®] Society Recommendation - Strength of Recommendation:** N/A

Post-operative nutritional care

ERASAlberta Recommendation: Same as the ERAS[®] Society recommendation below with the following addition: oral nutritional supplements (ONS) should be used to supplement total caloric and protein intake.

Note: Nutrition intake should be initiated post-operatively as soon as possible.

- **ERAS[®] Society Recommendation:** Patients should be encouraged to take fluids and food orally as soon as possible, preferably within 24 hours after surgery.
- **ERAS[®] Society Recommendation - Quality of Evidence:** Moderate
- **ERAS[®] Society Recommendation - Strength of Recommendation:** Strong

Post-operative flap monitoring

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

- **ERAS[®] Society Recommendation:** Flap monitoring within the first 72 hours should occur frequently. Clinical evaluation is sufficient for monitoring, with implantable Doppler devices recommended in cases of buried flaps.
- **ERAS[®] Society Recommendation - Quality of Evidence:** Moderate
- **ERAS[®] Society Recommendation - Strength of Recommendation:** Strong

Post-operative wound management

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

- **ERAS[®] Society Recommendation:** For incisional closure, conventional sutures are recommended. Complex wounds following skin necrosis are treatable with debridement and negative-pressure wound therapy (NPWT).
- **ERAS[®] Society Recommendation - Quality of Evidence:** Sutures (High), NPWT (Moderate)
- **ERAS[®] Society Recommendation - Strength of Recommendation:** Strong

Early mobilization

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

- **ERAS[®] Society Recommendation:** Patients should be mobilized within the first 24 hours after surgery.
- **ERAS[®] Society Recommendation - Quality of Evidence:** Moderate
- **ERAS[®] Society Recommendation - Strength of Recommendation:** Strong

Post-discharge home support and physiotherapy

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

- **ERAS[®] Society Recommendation:** Early physiotherapy, supervised exercise programs, and other supportive care initiatives should be instituted after discharge.
- **ERAS[®] Society Recommendation - Quality of Evidence:** Moderate
- **ERAS[®] Society Recommendation - Strength of Recommendation:** 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[®] Society Recommendation:** None
- **ERAS[®] Society Recommendation - Quality of Evidence:** N/A
- **ERAS[®] Society Recommendation - Strength of Recommendation:** N/A

Clinical Decision Support

The ERAS Breast Reconstruction Surgery, Adult – Inpatient, Ambulatory 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 Breast Reconstruction Surgery, Adult 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 2019⁶](#)

[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 Vomiting⁹](#)

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

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

ERAS Breast Reconstruction Surgery, Adult – Inpatient, Ambulatory Pre-operative Order Set

Order Set Components

Order Set Keywords: ERAS, Breast Reconstruction, 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 - *Diabetic*
- Instruct patient to hold _____ medication(s) _____ days prior to scheduled surgery

Consults and Referrals

- Physician: Anesthesia
- Physician: Internal Medicine
- Physician: Oncology
- 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
- Creatinine/eGFR
- Electrolytes (Na, K, Cl, CO₂)
- Hemoglobin A1C: if not performed within last 3 months
- Type and Screen
- Red Blood Cells on Standby Request: _____ units Red Blood Cells

Diagnostic Investigations

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

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
- Urine Test, Pregnancy 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.⁷

Pre-operative eating and drinking

- Clinical Communication: Final snack 8 hours prior to scheduled surgery
- 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 loading⁴ 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)

Intravenous Therapy

- Intravenous Cannula: insert intra-operatively

Medications

VTE Prophylaxis

Refer to AHS Provincial Clinical Knowledge Topic: [VTE Prophylaxis, Adult – Acute Care](#) (link to be added once available). For tinzaparin 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.

Choose ONE:

- tinzaparin 3500 units SUBCUTANEOUSLY once pre-operatively
- heparin 5000 units SUBCUTANEOUSLY once pre-operatively

Antibiotic Prophylaxis

Antibiotics should be given within 60 minutes prior to incision.

Choose ONE option:

Option 1:

- ceFAZolin 2 g IV once pre-operatively

If MRSA colonization/past infection,

ADD

- vancomycin (15 mg/kg) _____ mg IV once pre-operatively

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

- vancomycin (15 mg/kg) _____ mg IV once pre-operatively

OR

- clindamycin 600 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

Choose ONE:

Use caution if patient has renal impairment or is at high risk of acute kidney injury.

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

Use caution if patient has renal impairment or is at high risk of acute kidney injury. 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)⁸

- 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 Breast Reconstruction Surgery, Adult – Inpatient, Ambulatory 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 prophylaxis⁹

Pain Management

- Consider the use of regional anesthesia (transversus abdominis plane [TAP] block, rectus sheath block, or paravertebral block)
- 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
- 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
- Use surgical site drains judiciously
- Remove indwelling urinary catheter, if applicable, upon completion of procedure or as soon as clinically indicated

ERAS Breast Reconstruction Surgery, Adult – Inpatient, Ambulatory Post-operative Order Set

Order Set Components

Order Set Keywords: ERAS, Breast Reconstruction, 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
- Apply breast binder
- Apply abdominal binder

Monitoring

- Vital Signs: assess as per local institutional practices

For patients with Breast Free Flap:

- Vital Signs: assess
 - Every 1 hour x 24 hours, **and then**
 - Every 2 hours x 24 hours, **and then**
 - Every 4 hours until discharge
- 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
- Breast Free Flap Site: assess colour, temperature, pulses (Doppler signal), capillary refill
 - Every 1 hour x 24 hours, **and then**
 - Every 2 hours x 24 hours, **and then**
 - Every 4 hours until discharge
 - Notify physician if any decreased circulation and/or Doppler signal changes
- Breast Non-Free Flap Site (pedicled): assess colour, temperature, capillary refill
 - Every 4 hours and PRN until discharge
 - Notify physician if any decreased circulation
- Breast Area (including chest, axilla, back): assess for surgical site edema, pain, firmness
 - Every 4 hours and PRN until discharge
 - Notify physician if sudden or progressive edema

Activity

- Activity as tolerated
 - 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

Arm Positioning

Choose ONE:

- No restrictions
- Maintain in ipsilateral arm abduction (between 45 to 60 degrees)
- No abduction greater than 90 degrees

Abdominal Flap Patient Positioning

- Post-operative day (POD) 0: lie on back with hips and knees flexed; do not lean on side
- Use abdominal binder for ambulation; ensure abdominal binder is not in contact with breasts

Intake and Output

- Intake and Output: assess every 8 hours, include strict oral intake
- Indwelling Urinary Catheter: remove on POD 1 in AM
- In and Out Urinary Catheter: insert PRN for urinary retention once indwelling urinary catheter removed
- Weight: assess daily x 3 days, start on POD 1
- Active Surgical Drain(s): empty and reprime every 8 hours and PRN

Diet/Nutrition

- Clinical Communication: offer patient oral fluids; intake goal 500 mL on POD 0, no caffeine
- Post-Surgical Transition Diet: start on POD 0, no caffeine

- Regular Diet: start on POD 1, no caffeine
- Regular Diabetic - Adult Diet: start on POD 1, no caffeine

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

- Breast or Back Incision
 - POD 0: Do not remove initial post-operative dressing, reinforce dressing PRN
 - POD 1 and daily until discharge: Remove dressing. Cleanse with sodium chloride 0.9% and apply topical antibiotic ointment. Apply non-adherent dressing
- Abdominal Incision
 - POD 0: Do not remove initial post-operative dressing, reinforce dressing PRN
 - POD 1 and daily until discharge: Remove dressing. Cleanse with sodium chloride 0.9%. Apply non-adherent dressing and dry gauze
- Active Surgical Drain(s) Care: assess and change dressing daily and PRN
 - Teach: active surgical drain self-management

Respiratory Care

- Incentive Spirometry: perform every 1 hour while awake
- Oxygen Therapy: titrate to saturation, maintain SpO₂ 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

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
- Electrolytes (Na, K, Cl, CO₂) on POD 1 in AM
- Creatinine on POD 1 in AM

Intravenous Therapy

- sodium chloride 0.9% lock when patient tolerating oral fluid intake
- lactated ringer's infusion IV at 50 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 – Inpatient (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 28 days 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
- polyethylene glycol 3350 powder 17 g PO daily until discharge, start on POD 1

Analgesics

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

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
- gabapentin 200 mg PO every 8 hours x 32 hours

Choose ONE:

Use caution if patient has renal impairment or is at high risk of acute kidney injury.

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

Use caution if patient has renal impairment or is at high risk of acute kidney injury. 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

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

Consider dose reduction if patient is elderly or opiate-naïve.

- 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-naïve.

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

Antiemetics⁸

Prophylaxis Antiemetics

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

Choose ONE option:

Option 1:

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

Option 2:

- metoclopramide 10 mg PO/NG/IV/IM every 6 hours x 48 hours **and then** metoclopramide 10 mg PO/NG/IV/IM every 6 hours PRN

PRN Antiemetics

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

PRN antiemetic agent must be from a different class than prophylaxis agent.

- ondansetron 4 mg PO/NG/IV (or ODT if difficulty swallowing or active vomiting with no IV access) every 8 hours PRN. If nausea and vomiting persist after first PRN dose, notify prescriber
- 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](#).

Consults and Referrals

- Physiotherapy
- Occupational Therapy
- 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 goals of clinical

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 manage drains 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](#)
- [Your Journey Through Breast Cancer Surgery](#)

Outpatient follow-up

- Patient to follow-up with their surgeon in 1-2 weeks

Analytics

Outcome Measure #1

Name of Measure	ERASAlberta coverage rate
Definition	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.
Rationale	Intended to measure the ability of ERASAlberta to provide enhanced recovery after surgery.

Outcome Measure #2

Name of Measure	ERASAlberta length of stay (LOS) rates
Definition	Number of surgeries performed that were verified ERAS surgeries and resulted in <ul style="list-style-type: none"> • acute LOS less than or equal to acute LOS benchmark • ICU LOS less than or equal to ICU LOS benchmark • readmission LOS less than or equal to readmission LOS benchmark • total LOS less than or equal to total LOS benchmark divided by the total surgeries performed that were verified ERAS surgeries, multiplied by 100. Calculated provincially, by zone, by site.
Rationale	Demonstrates how ERAS impacts patient care by decreasing post-operative complications and accelerating recovery, thereby allowing for earlier discharge.

Outcome Measure #3

Name of Measure	ERASAlberta readmission rate
Definition	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.
Rationale	Demonstrates how ERAS impacts patient care by decreasing post-operative complications and accelerating recovery, thereby reducing the risk of readmission.

Outcome Measure #4

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

References

1. Temple-Oberle, C, Shea-Budgell, MA., Tan, M, Semple, JL, et al. Consensus Review of Optimal Perioperative Care in Breast Reconstruction: Enhanced Recovery after Surgery (ERAS) Society Recommendations. *Plast Reconstr Surg.* 2017; 139:1056e-71e. doi: 10.1097/PRS.00000000000003242
2. Scott MJ, Baldini G, Fearon KC, et al. Enhanced Recovery After Surgery (ERAS) for gastrointestinal surgery, part 1: pathophysiological considerations. *Acta Anaesthesiol Scand.* 2015; 59(10):1212-31. doi: 10.1111/aas.12601
3. Feldheiser A, Aziz O, Baldini G, et al. Enhanced Recovery After Surgery (ERAS) for gastrointestinal surgery, part 2: consensus statement for anaesthesia practice. *Acta Anaesthesiol Scand.* 2016; 60(3): 289-334. doi: 10.1111/aas.12651
4. Ljungqvist O, Scott M, Fearon KC. Enhanced Recovery After Surgery: A Review. *JAMA Surg.* 2017; 152(3): 292-298. doi: 10.1001/jamasurg.2016.4952
5. Guyatt GH, Oxman AD, Vist GE, et al; for the GRADE Working Group. GRADE: an emerging consensus on rating quality of evidence and strength of recommendations. *BMJ.* 2008; 336(7650):924-926
6. Dobson G, Chow L, Flexman A, et al. Guidelines to the Practice of Anesthesia – Revised Edition 2019. *Can J Anaesth.* 2019; 66(1): 75-108. doi: 10.1007/s12630-018-1248-2
7. Apfel CC, Greim CA, Haubitz I, et al. A risk score to predict the probability of postoperative vomiting in adults. *Acta Anaesthesiol Scand.* 1998; 42(5): 495-501
8. 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

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[®]) 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*)

An Enhanced Recovery after Surgery Pathway for Microvascular Breast Reconstruction Is Safe and Effective

https://journals.lww.com/prsgo/Fulltext/2018/01000/An_Enhanced_Recovery_after_Surgery_Pathway_for.1.aspx

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 – What to Expect

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

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 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>

MyHealth.Alberta.ca Your Journey Through Breast Cancer Surgery

<https://myhealth.alberta.ca/HealthTopics/breast-cancer-surgery>

Safer Healthcare Now! Prevent Surgical Site Infections

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

Your Surgery Journey – Patient Guide

<https://myhealth.alberta.ca/YourSurgeryJourney>

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^{1, 2}. The main purpose is to attenuate postoperative insulin resistance, which contributes to negative nitrogen balance, leading to muscle mass loss and reduced muscle strength.¹⁻⁶ In addition, CHO loading hinders preoperative stress, hunger and thirst in surgical patients.^{1, 2, 7, 8} 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.⁹⁻¹⁹

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.^{1, 2, 9-20} 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.²⁰ Gastric emptying is the major concern preoperatively, therefore beverages with lower osmolality assumed to be safer for preoperative consumption.²¹ In addition, it was suggested that the insulin response to the beverage should reach 60 μ IU/mL to achieve appropriate fed state that is believed to improve postoperative insulin resistance.^{2, 21} 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 H₂O) to induce faster gastric emptying.²² Nutricia Preop®, is in liquid form and is only available in Europe.²²

PREcovery™ is a new CHO-containing product commercially available in Canada that contains 12.5% CHO from maltodextrin and has low osmolality (114 mOsmol/kgH₂O).²³ 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 water²³, 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.

References:

1. Ljungqvist, O., Scot, M., Fearon, K.C. Enhanced Recovery After Surgery. A Review. *Journal of the American Medical Association Surgery*. 2017; 152(3):292-298.
2. Ljungqvist, O. Jonathan E. Rhoads lecture 2011: insulin resistance and enhanced recovery after surgery. *Journal of Parenteral and Enteral Nutrition*. 2012; 36(4):389-98.
3. Svanfeldt M, Thorell A, Hausel J et al. Randomized clinical trial of the effect of preoperative oral carbohydrate treatment on postoperative whole-body protein and glucose kinetics. *The British Journal of Surgery* 2007; 94(11): 1342–1350.
4. Crowe PJ, Dennison A and Royle GT. The effect of pre-operative glucose loading on post-operative nitrogen metabolism. *Brit J Surg* 1984; 71(8):635-7.
5. Yuill KA, Richardson RA, Davidson HI, Garden OJ, Parks RW. The administration of an oral carbohydrate-containing fluid prior to major elective upper-gastrointestinal surgery preserves skeletal muscle mass post-operatively – a randomized clinical trial. *Clin Nutr* 2005; 24(1):32-7.
6. Henriksen MG, Hesson I, Dela F, Hansen HV, Haraldsted V, Rodt SA. Effects of preoperative oral carbohydrates and peptides on post-operative endocrine response, mobilization, nutrition and muscle function in abdominal surgery. *Acta Anaesth Scand*. 2003;47(2):191–9.
7. Nygren J, Thorell A, Jacobsson H, LarssonS, Schnell P. Preoperative gastric emptying effects of anxiety and oral carbohydrate administration. *Ann Surg*. 1995; 6:728-34.
8. Hausel, J., Nygren, J., Lagerkranser, M., Hellstrom PM., et al. A carbohydrate-rich drink reduces preoperative discomfort in elective surgery patients. *Anesthesia and Analgesia*. 2001; 93:1344-50.
9. Gustafsson UO, Scott MJ, Schwenk W, Demartines N, Roulin D, Francis N, et al. Guidelines for perioperative care in elective colonic surgery: enhanced recovery after surgery (ERAS) society recommendations. *World J Surg* 2013; 37(2):259-84.
10. Nygren J, Thacker J, Carli F, Fearon KCH, Norderval S, Lobo DN, et al. Guidelines for perioperative care in elective rectal/pelvic surgery: enhanced recovery after surgery (ERAS) society recommendations. *World J Surg* 2013; 37(2):285-305.
11. Lassen K, Coolson MME, Slim K, Carli F, de Aguilar-Nascimento JSchafer M. et al. Guidelines for perioperative care for pancreaticoduodenectomy: Enhanced Recovery After Surgery (ERAS) Society Recommendations. *World J Surg* 2012; DOI: 10.1007/s00268-012-1771-1.
12. Cerantola Y, Valerio M, Persson B, Jichlinski P, Ljungqvist O, Hubner M et al. Guidelines for perioperative care after radical cystectomy for bladder cancer: Enhanced Recovery After Surgery (ERAS) Society Recommendations. *Clinical Nutrition* 2013; 32(6):879-87.
13. Mortensen K, Nilsson M, Slim K, Schafer M, Mariette C et al. Consensus guidelines for enhanced recovery after gastrectomy: Enhanced Recovery After Surgery (ERAS) Society Recommendations. *British J Surgery* 2014; 101(10):1209-29.
14. Nelson G, Altman AD, Nick A, Meyer LA, Ramirez PT, et al. Guidelines for pre- and intra-operative care in gynecologic/oncology surgery: Enhanced Recovery After Surgery (ERAS®) Society recommendations – Part I *Gynecol Oncol* 2015; <http://dx.doi.org/10.1016/j.ygyno.2015.11.015>.
15. Melloul E, Hübner M, Scott M, Snowden C, Prentis J, et al. Guidelines for perioperative care for liver surgery: Enhanced Recovery After Surgery (ERAS) Society recommendations. *World J Surg* 2016; 40:2425-40.
16. Dort JC, Farwell G, Findlay M, Huber GF, Kerr P, et al. Optimal perioperative care in major head and neck cancer surgery with free flap reconstruction a consensus review and recommendations from the Enhanced Recovery After Surgery Society. *JAMA Otolaryngology Head Neck Surg* 2016; doi:10.1001/jamaoto.2016.2981.
17. Thorell A, MacCormick AD, Awad S, Reynolds N, Roulin D, et al. Guidelines for perioperative care in bariatric surgery: Enhance Recovery After Surgery (ERAS) Society recommendations. *World J Surg* 2016; 40:2065-83.
18. Temple-Oberle, C., Shea-Budgell, M.A., Tan, M., Semple, J.L., et al. Consensus review of optimal perioperative care in breast reconstruction: enhance recovery after surgery (ERAS) society recommendations. *Plastic Reconstruction Surgery*. 2017; 139:1056e-71e.
19. Feldheiser, A., Aziz, O., Baldini, G., Cox, B. P. B. W., et al. Enhanced recovery after surgery (ERAS) for gastrointestinal surgery, part 2: consensus statement for anaesthesia practice. *Acta Anaesthesiologica Scandinavica*. 2016; 60:289-334.

20. Smith I., Kranke P., Murat I., Smith A., O'Sullivan G., Soreide E., Spies C., Veld B. Perioperative Fasting in Adults and Children: Guidelines from the European Society of Anaesthesiology. *Eur J Anaesthesiol.* 2011; 28:556-569.
21. Soop, M., Nygren, J., Myrenfors, P., Thorell, A., & Ljungqvist, O. Preoperative oral carbohydrate treatment attenuates immediate postoperative insulin resistance. *American Journal of Physiology-Endocrinology and Metabolism.* 2001; 280(4), E576-E583.
22. Nutricia Advanced Medical Nutrition. Nutricia Preop. [Cited 2018 March 06]; Available from: <http://www.nutricia.ie/products/view/preop>
23. Enhanced Medical Nutrition. PREcovery™. [Cited 2018 March 06]; Available from: <https://enmednut.com/products/precovery>

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