

A Resource for Healthcare Providers

Clinical Pathway for Gynecologic Surgery

Enhanced Recovery Canada:

A Collaborative to Improve Surgical Care



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This material is also available online through www.enhancedrecoverycanada.ca

About ERC Pathways

Scope and Purpose

The purpose of this clinical pathway is to provide practitioners in Canada with evidence-based strategies to improve surgical outcomes in gynecologic patients. The clinical pathway is based on six core principles applicable to all surgeries. The core principles include patient and family engagement, pain management, surgical best practices, fluid management, nutrition, and mobility. The clinical pathway is organized in a step-wise approach according to the patients' continuum of care. The clinical pathway includes variables for clinical audit and quality improvement purposes.

Target Population

This clinical pathway applies to adult patients undergoing scheduled benign or malignant gynecology surgery performed with either open or minimally invasive routes (vaginal, laparoscopic, or robotic).

Target Audience

Surgeons, anesthesiologists, nurses, dietitians, physiotherapists, other providers involved in the delivery of care of patients undergoing elective gynecologic surgery, and healthcare leaders.

Stakeholder Involvement

This clinical pathway was developed by a diverse group of experts from various healthcare fields and patients from across the country. A patient and family engagement working group developed the patient resources complementary to the clinical pathway, ensuring the patient perspective was integrated and prioritized throughout.

Development

The information in this resource was developed by the ERC Gynecologic Expert Panel using the clinical pathway template completed by the ERC Colorectal Expert Panel in 2019.¹ Information was adapted, as needed, to reflect optimal perioperative care in gynecologic patients.

About ERC Pathways

Two key publications served to guide discussions about how best to adapt the clinical pathway, including the updated ERAS Society's Guideline for Perioperative Care in Gynecology/Oncology² and the Agency for Healthcare Research and Quality (AHRQ) Safety Program for Improving Surgical Care and Recovery's (ISCR) Gynecology Surgery Pathway Worksheet.³ The ERAS Society publication was led by Canadian authors, including the ERC Gynecologic Expert Panel co-chairs, Drs. Alon Altman and Gregg Nelson, with the participation of contributors from Canada, the US and Europe. Both publications used standard literature review methodology to identify the strongest level of evidence on which to guide recommendations within the guideline/pathway.

Please refer to the three (3) key publications described above for a full list of references linking recommendations to the evidence. References are provided throughout this clinical pathway only for content not available in any of these publications.

Editorial Independence

All working group members signed a member agreement form indicating that they had no conflicts of interest in relation to the project.

NOTE: Drugs and dosages are provided as examples. Please consult with a pharmacist when developing your clinical pathway. All medications have side effects that should be taken into consideration on an individual patient basis prior to administration.

Key Messages

Patient and Family Engagement

The inclusion of patients in their care implies that care teams include patients, along with families, caregivers and/or advocates at the outset. It also implies that they are involved with collaborative decision-making and receive optimum communication and information before, during and after surgery.

- Healthcare providers should use plain language to optimize communication of patient-centred information throughout the perioperative trajectory. Prior to engaging patients in their care, patients and families must first be able to understand the information that is provided.
- Avoid providing verbal information exclusively. Written and other mediums should be available. Consider the use of images, anatomical drawings, and videos when counselling patients and their families.
- For more information on what patient and families, providers and leaders can do to increase patient engagement see [Engaging Patients in Patient Safety – a Canadian Guide](#).
- Create a non-judgmental environment where patients and families are encouraged to ask questions and feel comfortable voicing concerns. Use the [teach-back method](#) to reinforce learnings and optimize understanding.
- Strategies to increase patient engagement throughout the perioperative process should be known and utilized by all multidisciplinary team members.
- Healthcare providers should understand the concept of Health literacy and its effect on understanding, engagement, and its impact on health outcomes.

Analgesia

- Patients and families, caregivers and healthcare providers should be educated about the process of achieving optimal analgesia.
- Use a risk-based strategy for postoperative nausea and vomiting prophylaxis and adopt a multimodal approach for all patients with >2 risk factors.
- Patient medications and dosages, including over-the-counter products and herbal medications, should be documented throughout the entire episode of care to ensure safe care, and to help identify and appropriately manage opioid-tolerant patients. Refer to the [Health Standards Organization Required Organizational Practices](#) for medication safety.
- Before surgery, and at the surgical safety checklist time, the surgical and anesthesia team should work together to develop a multimodal pain management plan with active strategies to minimize the use of opioids throughout the perioperative period.
- Multimodal analgesic prescriptions should be considered when the patient is ready to be discharged. Non-opioid therapies should be encouraged as primary treatment.

Key Messages

Surgical Best Practices

- **Patients undergoing elective gynecologic surgery should not receive a bowel preparation.** For complex procedures where a colon resection may be required in conjunction with the gynecologic procedure, a mechanical bowel preparation (MBP) plus oral antibiotics should be considered. Prevent surgical site infections (SSIs) by routinely implementing infection prevention strategies.
- Use minimally invasive surgery whenever the expertise is available and clinically appropriate.
- Prevent surgical site infections (SSIs) by routinely implementing infection prevention strategies.
- Avoid routine use of intra-abdominal drains and nasogastric tubes (NGTs).
- Glucose control should be considered in all patients regardless of diabetic status, beginning in the immediate preoperative period and continuing until discharge to prevent hyperglycemia.
- Combined mechanical and chemoprophylaxis for venous thromboembolism (VTE) is not recommended for the duration of hospitalization for all patients.
- Patients should be advised to bathe the night before surgery and morning of surgery using either recommended or provided chlorhexidine soap or an antiseptic agent.
- Chlorhexidine cloths the morning of admission should be considered for patients that did not complete bathing prior to arrival at the hospital.

Fluid Management

Preoperative Fasting

- The importance of staying hydrated before and after surgery should be discussed with patients, and their caregivers/families.
- Patients should be encouraged to eat a normal meal the night before and a light snack up until six (6) hours before surgery. Patients can drink clear fluids up until to two (2) hours before initiation of anesthesia unless the patient has documented delayed gastric emptying or other factors that may increase risk of aspiration. A light snack is a non-fatty meal such as dry toast.
- With some exceptions, a clear complex carbohydrate fluid preparation containing 50 grams of carbohydrate is encouraged for carbohydrate loading before surgery to reduce insulin resistance. Maltodextrin is one preparation that has been studied and can be recommended.

Key Messages

Fluid Management

Peri-Operative Fluid Management

- Intraoperative fluid management should be individualized to minimize excessive fluid administration and maintain euvolemia. The goal of an enhanced recovery pathway is to maintain the patient in a euvolemic state across the continuum of care – aim for 1.0 to 1.5 L positive fluid balance. Invasive monitoring to allow for goal-directed fluid therapy is recommended for high-risk patients (i.e. presence of significant comorbidities such as congestive heart failure [CHF]) or when significant blood loss is predicted.
- In high-risk patients and/or in surgeries with higher bleeding risk (e.g. predicted blood loss > 500 mL), invasive hemodynamic monitoring is suggested. In these cases, goal directed fluid therapy should be used to replace intravascular losses.
- Fluid balances should routinely be reported and reviewed.
- Patients should be assessed clinically in the postoperative period for signs of fluid retention. Consider weighing patients regularly in the postoperative period.

Nutrition

- Patients and caregivers/families should understand the role of nutrition in recovery before surgery, in hospital, and once the patient is discharged home.
- Patients should be screened for nutritional risk at the initial surgical consult or at a pre-hospital or pre-surgery clinic.
- Patients at risk for malnutrition should be assessed by a dietitian, and receive appropriate therapy if needed, before being admitted to the hospital.
- Offer and encourage oral intake of food and fluids as soon as possible after surgery, including high-protein oral nutritional supplements.
- Patient food intake should be monitored. Patients consistently eating <50 per cent of their food for 72 hours, or as soon as clinically indicated, should receive a comprehensive nutrition assessment.

Key Messages

Mobility and Physical Activity

- Before surgery, discuss with patients and their caregivers/families, the negative impact of prolonged bed rest and the importance of early postoperative mobilization.
- Patients should be up and moving as soon as possible after surgery and throughout their recovery.
- Patients should be assessed by relevant members of the healthcare team to guide decisions about mobilization, exercise, and if needed, interventions to aid in the transition back to activities of daily living.
- Encourage patients to return to their normal activities of daily living once they leave the hospital.

Overarching Recommendations

1

Local champions should be identified from each discipline (surgery, anesthesiology, nursing) to lead implementation and address discipline specific issues, and concerns. It is also critical to identify a champion in hospital administration to get institutional buy-in and help to secure resources for the pathway.⁴

2

Pre-set orders should be used as part of ERAS pathways.

3

Implementation success requires assessment of adherence to ERAS processes, through ongoing process and outcome measurement. This may require utilizing a database, and risk adjustment for various procedures and patient populations.

4

Patients and caregivers/families are engaged as active partners in their care. As such, a pre-admission discussion of milestones, discharge criteria and the patient's role in the recovery process should take place with the patient and/or family prior to surgery. This discussion should begin in the surgeon's office and continue in the pre-admission unit by either a Registered Nurse (RN) involved in ERC Clinical Pathways or an Anesthesiologist, depending on patient factors and the complexity of the proposed surgery.

5

Patient and family education should be presented using a variety of formats and delivery styles, including:

- Printed material (booklets, pictograms);
- Individual and group counselling;
- Webinars;
- Videos; and/or
- Apps/software (tablet, phone, or computer)

6

All healthcare professionals involved in the care of elective gynecologic surgery patients should be familiar with the ERC clinical pathway for gynecologic surgery.

Phase 1. Patient and Family Engagement

Phase 2. Patient Optimization

Phase 3. Preoperative

Phase 4. Intraoperative

Phase 5. Postoperative

Phase 6. Discharge

1 Patient and Family Engagement

• Engaging Patients in their Care⁵⁻¹⁵



Recommendations

To help your organization improve the patient and family experience in the ERAS program we recommend the following:

- Avoid giving verbal information to the patient as the only form of communication. Some 40 to 80 per cent of what healthcare providers say to patients and families is forgotten immediately and half of what is remembered is actually recalled incorrectly. Patients and caregivers/families should receive preoperative information, ideally both written and verbal. Include detailed information about the surgical procedure and components of the enhanced recovery clinical pathway in which patients and caregiver/families are expected to participate, including:
 - preoperative bathing
 - reduced fasting
 - carbohydrate loading
 - early ambulation
 - early oral (PO) intake
 - surgical site infection (SSI) and venous thromboembolism (VTE) prophylaxis
 - possible use of regional anesthesia
 - avoiding or minimizing opioid pain medication, and
 - discharge planning
- Patients and caregivers/families need to be informed of any changes to the patient's medication regime in preparation for and after surgery.
- Be aware of the health literacy level within Canada (60 per cent of Canadian adults and 88 per cent of elders have low health literacy). Consider testing for health literacy levels, if appropriate.
- Use plain language by avoiding medical jargon and acronyms when conversing with patients and their families.
- Slow down and listen.
- Avoid interruptions.
- Avoid asking questions such as "Do you understand" or "Do you have any questions?" Instead use the teach-back method to ensure comprehension. The teach-back method is a strategy used to reinforce learning and optimize understanding.
- Practice a universal approach when communicating with patients and their families. In general, patients and their caregivers/families prefer to receive health information in the simplest way.
- Address people in the same way irrelevant of their education level.
- Refer patients and their caregiver/families to reliable websites. Many patients and their caregivers/families refer to the internet for health information.

(Continued on the next page)

1 Patient and Family Engagement

• Engaging Patients in their Care⁵⁻¹⁵



Recommendations

- Highlight the ERC Patient Guide and online videos for the patient and their caregiver/families.
- Help your organization improve the patient and family experience in an ERAS program.



Tools and Equipment

- Link to [A Guide to Gynecological Surgery](#)
- Link to [Precare Gynecological Surgery Patient Animation](#)



Additional Information

- Health literacy: <https://abclifeliteracy.ca/health-matters>
- Validated health literacy testing tools: <https://www.ahrq.gov/health-literacy/improve/index.html>
- Health literacy How-to tips: <https://healthliteracy.com/tips/>
- Evaluation tool for evaluating websites: [Health Information and the internet: The 5 Cs website evaluation tool](#)
- Meaningful patient engagement: [Meaningful and effective patient engagement: What matters most to stakeholders](#)
- Patient and family experience in an ERAS program: [Patients as partners in Enhanced Recovery After Surgery: A qualitative patient-led study](#)
- Teach-back method: <http://www.ihl.org/education/IHIOpenSchool/resources/Pages/Audio-andVideo/ConnieDavis-WhatIsTeachBack.aspx>
- How to write and create patient education materials: https://muhcpatienteducation.mcgill.ca/Writing_HI_Edition4.pdf



Data Collection

Patient pre-admission counselling

1 Patient and Family Engagement

• Analgesia



Recommendations

- Patients and their caregivers/families should receive preoperative counselling about the patient's pain management expectations, modalities of pain control, and the risks and side effects of opioid medications and other analgesics. This information can be provided either by an RN involved in the ERC clinical pathway, or an Anesthesiologist, depending on patient co-morbidities and surgical complexity.
- If regional anesthesia techniques are being considered, these should be discussed during the pre-admission visit.
- Careful consideration should be given to informing opioid-dependent patients and their caregiver/families about the potential for increased postoperative pain and effective pain management strategies.



Tools and Equipment

- Link to [A Guide to Gynecological Surgery](#)
- Link to [Precare Gynecological Surgery Patient Animation](#)



Additional Information

- Patient education regarding the process to achieve optimal analgesia for functional recovery needs to continue into the Post Anesthesia Care Unit (PACU) and postoperative ward.



Data Collection

Patient pre-admission counselling

1 Patient and Family Engagement

• Surgical Best Practice¹⁶



Recommendations

- Pre-admission coaching should include education about the planned surgery, its rationale and expected recovery phases, as well as anticipated limitations following surgery.
- For patients receiving an ostomy (e.g. patients undergoing debulking procedures for gynecologic cancer), please refer to the ERAS Colorectal Guidelines.
- Patients should bathe the night before surgery and morning of surgery using either recommended or provided chlorhexidine soap or an antiseptic agent.



Tools and Equipment

- Link to [A Guide to Gynecological Surgery](#)
- Link to [Precare Gynecological Surgery Patient Animation](#)



Data Collection

Patient pre-admission counselling

1 Patient and Family Engagement

• Fluid Management



Recommendations

- The importance of staying hydrated should be emphasized during the pre-admission discussion. Specific guidance on fasting and hydration recommendations should be provided to the patient, including the potential harm from prolonged preoperative fasting (i.e. nothing by mouth [NPO] after midnight).
- Patient should be encouraged to consume clear fluids, including oral carbohydrate drinks (in patients without delayed gastric emptying), up until two (2) hours before initiation of anesthesia.



Tools and Equipment

- Link to [A Guide to Gynecological Surgery](#)
- Link to [Precare Gynecological Surgery Patient Animation](#)



Additional Information

- Discuss and explain the role of preoperative carbohydrate drinks.
- Normal daily water requirement is 25-30 ml/kg (on average 2 L of water/day).



Data Collection

Patient pre-admission counselling

1 Patient and Family Engagement

• Nutrition



Recommendations

- Prior to hospitalization all patients and their caregiver/families should receive information describing expectations around nutrition and surgery.
- Patients and their caregiver/families should understand the goals of nutrition therapy and how they can support their recovery through adequate food intake and optimization of their nutritional status.



Tools and Equipment

- Link to [A Guide to Gynecological Surgery](#)
- Link to [Precare Gynecological Surgery Patient Animation](#)



Additional Information

- For more detail on patient education regarding nutrition, see the [Preoperative section](#)



Data Collection

Patient pre-admission counselling

1 Patient and Family Engagement

• Mobility and Physical Activity

Prelude: Evidence for early mobility and physical activity following gynecologic surgery is limited. Thus, expert consensus was obtained using a Delphi study during development of the ERC pathway for colorectal surgery to provide guidelines to assist healthcare providers with strategies for early mobilization.



Recommendations

- The negative impact of prolonged bed rest and the importance of early and progressive mobilization after surgery should be discussed with the patient/family.
- Pre-surgical activity should not be restricted. Patients should be encouraged to be physically active and optimized for surgery.



Implementation Approaches

- Education regarding early mobilization should be provided by a nurse, physiotherapist, or kinesiologist.
- Discussions should take place with family members to understand how they can encourage and facilitate early mobilization.
- The benefits of early mobilization should be reinforced throughout the hospital stay.



Tools and Equipment

- Link to [A Guide to Gynecological Surgery](#)
- Link to [Precare Gynecological Surgery Patient Animation](#)



Data Collection

Patient pre-admission counselling

2 Patient Optimization

Analgesia

- **Opioid Tolerance**



Recommendations

- A medication assessment should be conducted preoperatively to help identify opioid-tolerant patients and to modify the pain management plan accordingly.
- Opioid-tolerant patients may require closer follow-up postoperatively and referral to Acute Pain Services, or clinicians specializing in pain management after surgery.

2 Patient Optimization

Surgical Best Practices

• Risk Assessment



Recommendations

- Patients should undergo a thorough, evidence-informed preoperative assessment prior to gynecologic surgery. This may include but is not limited to an assessment of allergies, medications, diabetes, cardiorespiratory status, frailty, and risk of thrombosis and bleeding.
- Anemia is common in patients presenting for gynecologic surgery and increases all cause morbidity. If surgery can be delayed, all attempts to correct anemia should be made prior to surgery. This includes medical options, in addition to iron replacement via oral or parenteral route depending on tolerability and degree of anemia. Appropriate pharmacologic and surgical interventions should be used intraoperatively to minimize unnecessary blood transfusions.
- Although rare, some patients do not respond to anesthetics. Assess patient sensitivities to penicillin etc.
- Delay of surgery could be considered when initiating oral or intravenous (IV) iron therapy, erythropoietin, and follow-up with hematology in certain patients depending on the urgency of surgery, benign or malignant status, and degree of menorrhagia.



Tools and Equipment

- Consider using screening tools like:
 - [Edmonton Frail Scale](#) for a frailty assessment
 - [Caprini Score](#) for a VTE risk assessment.

• Anxiety Screening



Recommendations

- Patients should be screened for anxiety. For patients with high levels of anxiety, consider psycho- social work and counselling referrals. Routine use of preoperative anxiolytics should be avoided.



Tools and Equipment

- Use a validated self-assessment screening tool like the Generalized Anxiety Disorder 7-item ([GAD-7](#)) scale, or the Hospital Anxiety and Depression Scale ([HADS](#)).



Additional Information

- Prevalence of anxiety is likely moderate to high among surgical patients.

2 Patient Optimization

Surgical Best Practices

• Smoking, Alcohol, and Substance Use^{17,18}



Recommendations

- Identify current smokers and patient's dependent on alcohol by self-reporting.
- Four (4) weeks or more of abstinence from smoking is recommended.
- Patients with high alcohol intake should receive an alcohol cessation intervention and remain abstinent for four (4) weeks or more.
- Neither should delay surgeries required of an urgent nature.



Tools and Equipment

- If available, offer all smokers, high-risk drinkers and recreational drug users access to an intervention program.



Additional Information

- Current smokers include daily and occasional smokers; refer to the Government of Canada tobacco use [terminology](#).
- High-risk drinking is defined as more than 10 drinks a week for women, with more than two (2) drinks a day most days.

• Oral Contraceptive Pill and Hormone Replacement Therapy



Recommendations

- Confirm the patient is not pregnant on the day of surgery.
- HRT is a relative risk factor for postoperative thromboembolism. Patients should be advised to consider the risks and benefits and to stop or switch to alternative preparations before surgery. If HRT is continued, thromboprophylaxis should be considered.

Combined oral hormonal contraception is a risk factor for thromboembolism. Patients should change to another form of contraception prior to surgery. If continued to the time of surgery, intra- and post- operative thromboprophylaxis should be prescribed.

2

Patient Optimization

Nutrition

• Nutrition Screening



Recommendations

- Patients should be screened as early as possible for nutritional risk at the pre-admission clinic.
- Systematic screening and monitoring for nutritional risk will determine the need for assessment and treatment to address factors impacting adequate food and nutrition intake.
- If there is a clinical concern for chronic malnutrition, refer to a dietitian for optimization.



Tools and Equipment

- Use a screening tool like the Canadian Nutrition Screening Tool ([CNST](#)). The CNST tool asks two questions:
 1. Have you lost weight in the past six months without trying to lose weight?
 2. Have you been eating less than usual for more than a week?



Data Collection

Malnutrition screening

2

Patient Optimization

Nutrition

• Nutrition Assessment



Recommendations

- Patients identified as being at risk for malnutrition should be assessed by a dietitian before being admitted to the hospital.
- Results of the nutrition assessment should be available at hospital admission to facilitate care continuity.



Tools and Equipment

- Use a validated assessment tool to diagnose malnutrition (i.e. the Subjective Global Assessment [[SGA](#)]), or a comprehensive nutrition assessment completed by a dietitian as soon as possible to facilitate nutrition optimization prior to surgery.

• Nutrition Therapy



Recommendations

- Patients assessed as malnourished (SGA B or C) should receive an individualized treatment plan that may include therapeutic diets (e.g. high energy, high protein diet), oral nutritional supplements (ONS), enteral nutrition (EN) and parenteral nutrition (PN) based on a comprehensive nutritional assessment by a dietitian.
- The decision to delay surgery to optimize nutritional status should be undertaken by the patient, dietitian and surgeon.



Additional Information

- Prioritize and optimize adequate food and nutrition intake and thus nutritional status for recovery throughout the patient journey.

3

Preoperative

Patient and Family Engagement

- **Engaging Patients in Their Care**



Recommendations

- Utilize adult education principles. Stimulate patient's interest in their surgical experience and answer from the start: "What's in it for me?" and the impact on their health outcomes.
- Include patient's caregiver/family in conversation.
- Let patient speak about their last hospitalization experience.
- Ensure patients and their caregiver/families receive consistent information from all members of the preoperative team.
- Encourage the patient and their caregiver/families to bring back the Guide to Gynecological Surgery booklet on day of surgery and to refer to it during hospital stay.
- Offer different teaching methods depending on patients' and their caregiver/family's preference.
- Provide/refer to reliable internet sites (see [Health On the Net Foundation](#))

- **Multidisciplinary Team Meeting/Safe Surgery Checklist**



Recommendations

- Prior to surgery, the multidisciplinary team should discuss elements of the surgical procedure with the patient including: the type of surgery, risk of opening (if laparoscopic), the plan for anesthetic technique, the analgesia plan, the location and length of incisions, and other potential complications.
- The team should also include discussion regarding the disposition plan, same day discharge vs. admission, and anticipated length of stay.
- Engage patients with relevant elements of the safe surgery checklist.

3

Preoperative

Analgesia

• Preanesthetic Medication



Recommendations

- Patients should not routinely receive long- or short-acting sedative medication from midnight prior to surgery and immediately before surgery.
- As part of foundational opioid-sparing analgesia, patients may receive preoperative acetaminophen and/or non-steroidal anti-inflammatory agents (NSAIDs), unless contraindicated for that patient.
- Routine administration of anxiolytics is not recommended.
- Patients receiving chronic opioid therapy at home should continue their opioids throughout the perioperative period. These patients may benefit from preoperative anesthesia consultation, especially patients who are taking buprenorphine.
- In opioid-dependent patients, an adequate opioid dose needs to be maintained to prevent opioid withdrawal.



Additional Information

- Sedative premedication delays immediate postoperative recovery by impairing mobility and oral intake.
- The degree of pain after surgery will vary based on the surgical approach and planned analgesia will need to take this into account.

3 Preoperative

• Antiemetic Prophylaxis^{19,20}



Recommendations

- Patients undergoing gynecologic procedures should receive prophylaxis using a multimodal approach to postoperative nausea and vomiting (PONV) using more than two antiemetic agents.



Tools and Equipment

- Use a validated score like the [Apfel](#) to identify patients who would benefit from prophylactic antiemetics.
- [Management of Postoperative Nausea and Vomiting: The 4th Consensus Guidelines](#)



Additional Information

- Risk factors for PONV are common in the gynecologic surgery population and include female gender, non-smoker, history of PONV, and postoperative use of opioids.
- All members of the multidisciplinary team should be aware of patients at risk for PONV.



Data Collection

Use of antiemetic prophylaxis

3 Preoperative

• Multimodal Opioid-Sparing Pain Management



Recommendations

- A multimodal pain management plan with active strategies to minimize the use of opioids should be developed before surgery, which covers all phases of perioperative care.
- The following preoperative interventions are acceptable in a pain management plan (see the algorithm in [Appendix B](#) for guidance):
 - IV/oral analgesia (oral analgesics should be prescribed when pain scores are low or when patients are able to tolerate oral intake)
 - NSAIDs / cyclo-oxygenase-2 (COX2)
 - Acetaminophen
 - Gabapentinoids can be considered but are not routinely used (opioid-tolerant patients only)
 - Neural blockades
 - Regional analgesia techniques administered as either:
 - Single shot: transversus abdominus plane (TAP) block, rectal sheath (RS) block, subarachnoid block +/- intrathecal opioid.
 - Continuous block: TAP/RS catheter, or less commonly preperitoneal wound catheter infiltration.
 - Also consider infiltration at the surgical site(s) by the surgeon.
 - Administer balanced multimodal analgesia, including foundational analgesia with acetaminophen and NSAIDs, if no contraindications.
 - For patients with chronic pain or extensive surgery, consider the use of opioid-sparing analgesics including lidocaine infusions (1-1.5 mg/kg intraoperatively and postoperatively), low dose ketamine infusions, IV magnesium or IV dexmedetomidine.



Tools and Equipment

- Multimodal opioid-sparing pain management plan.



Additional Information

(Please see next page for a complete list)

3

Preoperative

• Multimodal Opioid-Sparing Pain Management



Additional Information

- Minimizing opioid analgesia reduces the adverse effects of opioid use during and after surgery.
- Number/combination of components that should be selected to maximize pain control, reduce opioid burden, and avoid the side effects of all analgesics used is unknown.
- For complex procedures where colon resection may be required in conjunction with the gynecologic procedure, the use of NSAIDs should be discussed with the surgical team. NSAIDs may be beneficial in these cases but risk of leakage from the anastomotic site should be considered.
- Gabapentinoids decrease opioid requirements but increase sedation. Therefore, they should not be used routinely.

3

Preoperative

Surgical Best Practices

- **Preoperative Bathing**

**Recommendations**

- Patients should be advised to bathe the night before surgery and morning of surgery using either recommended or provided chlorhexidine soap or an antiseptic agent.
- Chlorhexidine cloths the morning of admission should be considered for patients who did not complete bathing prior to arrival at the hospital.

**Tools and Equipment**

- Link to [A Guide to Gynecological Surgery](#)
- Link to [Precare Gynecological Surgery Patient Animation](#)

**Data Collection**

Patient pre-admission counselling

- **Mechanical Bowel Preparation (MBP)**

**Recommendations**

- **Patients undergoing elective gynecologic surgery should not receive a MBP.**
- For complex gynecologic procedures where a colon resection is required, an oral antibiotic bowel preparation may be considered, but only in very select cases. Refer to the ERAS Gynecological Oncology Guidelines.²
- MBP should not be used without concurrent oral antibiotics.

**Tools and Equipment**

- Sodium picosulfate or polyethylene glycol-based electrolyte solutions.

**Data Collection**

Preoperative oral antibiotics

3

Preoperative

• Antimicrobial Prophylaxis



Recommendations

- IV antibiotics should be administered within 60 minutes before incision.
- Antibiotic selection should be based on SSI pathogens commonly associated with the specific procedure type, local antimicrobial resistance patterns, and a balance of benefits vs. potential risks associated with the antibiotic (e.g. risk for *Clostridium difficile* (*C. difficile*) infection or emergence of multi-drug resistant organisms). First-generation cephalosporins are used most often in gynecologic procedures.
- Weight-based dosing should follow guideline recommendations.



Tools and Equipment

- Refer to your local institutional antimicrobial stewardship guidelines.

• Preventing Hypothermia



Recommendations

- Patients should be pre-warmed for 20-30 minutes before induction of anesthesia.

3

Preoperative

- **Venous Thromboembolism (VTE) Prophylaxis**

**Recommendations**

- Patients should receive intermittent pneumatic compression and/or pharmacological thromboprophylaxis with low-molecular-weight heparin (LMWH).

**Tools and Equipment**

- Intermittent pneumatic compression device
- [Caprini Score](#)

**Additional Information**

- Risk factors for VTE are numerous. Most patients will have >one (1) risk factor, and as many as 40 per cent will have >three (3) risk factors.

**Data Collection**

Preoperative VTE chemoprophylaxis

- **Glycemic Control^{21,22}**

**Recommendations**

- Glucose control should be considered in all patients regardless of diabetic status, beginning in the immediate preoperative period and continuing until discharge to prevent hyperglycemia.
- Hyperglycemia is prevalent in both diabetic and non-diabetic hospitalized patients and has been associated with SSIs and complications. Refer to Internal Medicine if indicated.
- For most non-critically ill hospitalized patients with diabetes, preprandial blood glucose targets should be 5.0 to 8.0 mmol/L, in conjunction with random blood glucose values <10.0 mmol/L, if these targets can be safely achieved. For critically ill hospitalized patients with diabetes, blood glucose levels should be maintained between 6.0 and 10.0 mmol/L.
- Measures to optimize perioperative glycemic control should be included in SSI reduction bundles.

3

Preoperative

- **Weight Monitoring**


Recommendations

- Measure preoperative weight the morning of surgery.


Tools and Equipment

- Calibrated scales


Additional Information

- Despite limitations in interpreting weight changes after surgery (e.g. metabolic response to surgery), and challenges in obtaining accurate weight measurements (e.g. weighing immobile patients), measuring weight changes remains one of the simplest strategies to guide fluid therapy.
- For accurate comparison, all perioperative weight measurements should be obtained with the patient wearing a hospital gown.

- **Effects of Bowel Preparation**


Recommendations

- Avoid administration of IV fluids to replace preoperative fluid losses in patients who received iso-osmotic bowel preparation, provided there was unrestricted intake of clear fluids for up to two (2) hours before induction of anesthesia.

- **Pre-Existing Medication Management**


Recommendations

- Medication reconciliation is a Health Standards Organization Required Organizational Practice and should be completed with the patient and family as a part of the surgical intake process.


Tools and Equipment

- Complete a Best Possible Medication History (BPMH)

3

Preoperative

Fluid Management

• Reduced Fasting

**Recommendations**

- Prolonged preoperative fasting (NPO after midnight) should be abandoned.
- Patients should be encouraged to eat a normal meal the night before and a light snack up until six (6) hours, and drink clear fluids up until to two (2) hours before initiation of anesthesia unless the patient has documented delayed gastric emptying or other factors that may increase risk of aspiration. A light snack is a non-fatty meal such as dry toast.

**Additional Information**

- Clear fluid is a liquid that you can see through. Examples include: water, electrolyte-containing sports drinks, non-pulp fruit juices and tea/coffee without milk/cream.
- The day before surgery patients receiving MBP should only receive clear fluids.
- Risk factors for aspiration include:
 - Documented gastroparesis
 - Metoclopramide and/or domperidone used to treat gastroparesis
 - Documented gastric outlet or bowel obstruction
 - Achalasia
 - Dysphagia
- Examples of patients with fluid restrictions include dialysis and CHF.

**Data Collection**

Allow clear liquids up to two (2) hours before induction.

3 Preoperative

Nutrition

• Complex Carbohydrate Loading



Recommendations

- Routine carbohydrate loading in the immediate preoperative period is recommended, though there is no consensus regarding the optimal regimen and formulation.



Additional Information

- Maltodextrin may be used for carbohydrate loading to reduce insulin resistance.
- If maltodextrin is included, 50 g PO consumed over a maximum of five (5) minutes >two (2) hours before surgery is recommended. Simple sugar (e.g. fructose) may be used instead of maltodextrin. However, it will not have the same metabolic effect. Alternately, if maltodextrin is unavailable, though not evidence-based, consider advising patient to take 250-500 mL (1-2 cups) of high calorie clear fluid (e.g. apple juice or cranberry juice) >two (2) hours before surgery, or one (1) hour before arriving at the hospital.
- Maltodextrin should not be given to patients with gastric emptying disorders, other aspiration risks or with type 1 diabetes (efficacy and safety not studied).
- Administration of maltodextrin in type 2 diabetic patients and obese patients is controversial. Gastric emptying of type 2 diabetic patients and obese patients receiving maltodextrin is not prolonged (low quality of evidence). However, transient preoperative hyperglycemia is observed in type 2 diabetic patients (low quality of evidence).



Data Collection

Allow maltodextrin up to two (2) hours before induction

4 Intraoperative

Anesthesia



Recommendations

- Recommendation for use of total intravenous anesthesia (TIVA):
 - Consider propofol (main anesthetic agent). Depth of anesthesia monitor should be used (e.g., bispectral analysis, entropy, or electroencephalograph) and anesthetic titrated accordingly.
 - Additional agents may be considered as adjuncts for TIVA. Consider as an opioid-sparing analgesic option, especially in more extensive surgeries or in chronic pain patients.
 - Dexmedetomidine 0.3-0.7 mcg/kg/hr IV (with or without loading dose of 1 mcg/kg/hr over 10 minutes)
 - Ketamine 25-100 mcg/kg/hr
 - Lidocaine 0.5-1.5 mg/kg/hr (only if regional techniques or epidural are not being used)
- Short acting anesthetic agents (e.g. sevoflurane, desflurane, nitrous oxide) should be used if TIVA not performed.

4 Intraoperative

Analgesia

• Multimodal Opioid-Sparing Pain Management²⁰



Recommendations

- Multimodal opioid-sparing analgesia should be continued perioperatively (see the Analgesia Algorithm in [Appendix B](#) for guidance).

Review of preoperative recommendations:

- Ensure thorough patient evaluation including current medications and educate patient about expectations and the analgesic plan.
- Start preoperative multimodal analgesia, in the form of acetaminophen and a NSAID (unless contraindicated for the patient).
- Discuss the type of surgery (laparoscopic vs open, incision e.g. midline or Pfannenstiel) and risk of conversion to open surgery at the preoperative surgical safety checklist.

Intraoperatively:

For Laparoscopic Procedures:

- General anesthesia with consideration for TIVA.
 - Bupivacaine 0.25% with epinephrine at incision sites by surgeons.
 - Consider dexamethasone 10 mg IV when using regional techniques.

For Open Surgical Procedures:

- General anesthesia with consideration for TIVA.
- Spinal anesthesia (local anesthesia +/- intrathecal morphine) may be used in combination with general anesthesia for sub-umbilical open procedures.
- Consider combined general and epidural anesthesia for more extensive incisions, or in patients with significant chronic lung disease affecting their functional capacity or a history of significant chronic pain. In these patients, if the epidural is unsuccessful or contraindicated, then TAP blocks or a continuous IV lidocaine infusion should be considered.

Develop Postoperative Plan:

- Foundational multimodal analgesia (acetaminophen and NSAIDs) including opioids for breakthrough pain should be used.
- Recommend abdominal trunk blocks (e.g. TAP block), either single shot or with continuous infusion.
- Patient controlled epidural anesthesia (PCEA) may be considered for 48-72 hours for patients who receive an epidural (patients with extensive open incisions, significant chronic lung disease or chronic pain). The need for PCEA should be reassessed daily and weaning should occur at least 24 hours prior to anticipated discharge to allow for transition to oral medications and to avoid delay in discharge. Try to minimize motor block to enable patients to mobilize early.

4 Intraoperative

• Multimodal Opioid-Sparing Pain Management²⁰



Tools and Equipment

- Nociception monitors can be used to compute real-time nociception level (NOL) and analgesia nociception (ANI) indices. These could be considered to help guide opioid administration if they are available and routinely used at your institution.



Additional Information

- The use of opioid-sparing techniques, such as perioperative multimodal analgesia and regional anesthesia will help to reduce excessive intraoperative opioid use and therefore minimize the opioid-related side effects which can effect patient recovery (e.g. drowsiness, nausea, constipation, and opioid-induced hyperalgesia).



Data Collection

Use of regional anesthesia

Optional:

- Type of surgery
- Use of epidural anesthesia
- Use of nerve trunk blocks
- Use of multimodal analgesia and adjuvants
- Use of nociception monitors

4 Intraoperative

Surgical Best Practices

- **Antimicrobial Prophylaxis^{23,24}**



Recommendations

- Antibiotics with short half-lives (e.g. <two (2) hours) should be re-dosed every three to four (3-4) hours during surgery if the operation is prolonged (>four (4) hours) or bloody (1000cc).
- Postoperative doses of antibiotics covering aerobic and anaerobic bacteria given in the preoperative phase are not needed.



Tools and Equipment

- Refer to your local institutional antimicrobial stewardship guidelines.

- **Surgical Approach**



Recommendations

- A minimally invasive surgical approach should be employed whenever the expertise is available and clinically appropriate.

4 Intraoperative

• Normothermia



Recommendations

- Intraoperative maintenance of normothermia with appropriate interventions should be used routinely for any case longer than 30 minutes to keep central core temperature >36°C.



Tools and Equipment

- Heated IV fluids, under-body warming mattresses, and/or upper body forced air heating covers may help to maintain normothermia.
- [CAS Guidelines to the Practice of Anesthesia – Perioperative Temperature Management](#)



Additional Information

- Up to 90 per cent of patients undergoing surgery develop hypothermia.



Data Collection

Patient temperature at the end of surgery or on arrival to PACU.

• Surgical Site Infection (SSI) Prevention²³



Recommendations

- Infection prevention strategies (also called bundles) should be routinely implemented.



Tools and Equipment

- [CDC Prevention Guideline for the Prevention of SSI](#)
- [AHRQ Safety Program for Surgery – Building Your SSI Prevention Bundle](#)
- [CPSI Prevent SSIs: Getting Started Kit](#)

4 Intraoperative

• Drains and Tubes



Recommendations

- The routine use of drains and NGTs should be avoided. If, however, a NGT is used intraoperatively, it should be removed at the time of tracheal extubation.

• Blood Transfusion^{25,26}



Recommendations

- Although transfusion triggers between 6-10 g/dl are reported in the literature (including guidelines), experts agree that judicious use of blood transfusion during surgery is not associated with adverse outcomes and hemoglobin of 7-8 g/dL is the recommended trigger for transfusion, taking clinical context into account.

• Ventilation



Recommendations

- A lung-protective ventilation strategy is recommended. Tidal volumes of 6-8 mL/kg predicted body weight may decrease pulmonary complications. Supplemental oxygen 80 per cent fraction of inspired oxygen (FiO₂) continued into the postoperative phase for two to six (2-6) hours should be considered.

4 Intraoperative

Fluid Management

• Euvolemia



Recommendations

- Intraoperative fluid management should be individualized to minimize fluid and maintain euvolemia. When available, goal-directed fluid therapy is recommended for high-risk patients (presence of significant comorbidities such as CHF) or when there is large blood loss.
- Very restrictive or liberal fluid regimens should be avoided in favor of euvolemia. IV fluid maintenance with balanced crystalloid solution should be used to ensure water and electrolyte homeostasis with the goal of achieving 1.0 to 1.5.0 L positive fluid balance at the end of surgery.
- Goal-directed volume therapy to replace intravascular loss:
 - In major open surgery and for high-risk patients where there is >500 mL anticipated estimated blood loss (EBL), or a systemic inflammatory response syndrome response, the use of advanced hemodynamic monitoring to facilitate individualized fluid therapy and optimize oxygen delivery through the perioperative period is recommended.
 - Replace fluid loss with balanced crystalloid solution of colloids and determine the absolute amount based on hemodynamic response.
 - Advanced hemodynamic monitoring (stroke volume variation [SVV], pulse volume variation [PVV], stroke volume [SV], cardiac output [CO], velocity time integral [VTI] and end-tidal carbon dioxide [ETCO₂]) should be used for high-risk patients and/or for major surgeries associated with large amounts of blood loss or fluid shifts.
 - Replace urine output (UO) and gastrointestinal loss (if measurable) with balanced crystalloid solution.
- When patients leave the operating room or the PACU, intravascular volume status should be estimated based on physiologic parameters (e.g. blood pressure, heart rate) and quantitative measures (e.g. blood loss, UO). Fluid balance measurements should be reported and reviewed.



Tools and Equipment

- Volumetric pumps for maintenance infusion
- Advanced hemodynamic monitoring
- Intraoperative fluid balance chart

4 Intraoperative

• Euvolemia



Additional Information

- Acute kidney injury can have a significant negative impact on patient prognosis. Adequate fluid management is a valuable strategy to avoid prerenal failure.
- Maintenance infusion ≤ 5 ml/kg/hr can be used if goal-directed volume therapy is supported by advanced hemodynamic monitoring to minimize the risk of organ hypoperfusion.
- Acknowledge clinical and technical limitations of the advanced hemodynamic measures and monitors used.



Data Collection

Volume of IV fluid administration

Optional:

- Balanced Chloride-Restricted solution
- Duration of surgery
- Fluid balance
- Advanced hemodynamic monitoring
- Use of volumetric pumps

4 Intraoperative

• Management of Hemodynamic Instability



Recommendations

- Establish causation: rather than treat every instance of clinical anomaly (e.g. hypotension, tachycardia, oliguria) with bolus IV fluids, causation should be established based on available information about the patient and the clinical context.
- Treat the underlying problem: IV fluid, vasopressors and inotropes can be used to attempt to reverse the most likely cause of a hemodynamic derangement.
- Administer IV fluid when appropriate. Assess the patient's fluid status and fluid responsiveness, when possible, before administering IV fluids; then determine the most appropriate fluid type and volume.
- Evaluate the hemodynamic response to the initial treatment.
- Unless indicated, central line use should be avoided to reduce the risk of a bloodstream infection. If a central line is used, remove it as soon as possible.



Tools and Equipment

- Conventional or advanced hemodynamic monitoring equipment.



Additional Information

- Absolute hypovolemia may or may not be responsible for hemodynamic abnormalities. For example, stroke volume variation >13 per cent soon after the induction of anesthesia and with the institution of mechanical ventilation, or after an epidural bolus, should prompt consideration of vasodilation relative hypovolemia rather than as the cause of fluid responsiveness. The patient may require vasoconstrictors rather than fluid bolus provided the patient had unrestricted intake of clear fluids and iso-osmotic bowel preparation was used.
- Agents needing centrally mediated infusion necessitate central venous catheter placement.

5 Postoperative

Patient and Family Engagement

- **Involving Patients in their Care^{13,14}**



Recommendations

- Consider using whiteboards in patient rooms to improve communication between healthcare providers and patients and their caregiver/families.
- Remind patients and their caregiver/families to refer to their Guide to Gynecological Surgery booklet for goals of each postoperative day. Recovery goals and schedule of the day is important to know for hospitalized patients.
- Consider involving patients and their caregiver/families in the end of shift report.

5 Postoperative

Analgesia

• Multimodal Opioid-Sparing Pain Management



Recommendations

- A standard, multimodal antiemetic and opioid-sparing analgesic regimen is recommended for all patients. Medications should be administered orally with cessation of IV medication as early as tolerated by the patient.
 - Regional analgesia
 - Core non-opioid analgesic regimen
 - Optional analgesic adjuncts
 - Optional opioid analgesic agents only as PRN (as needed) dosing
- Foundational analgesia with acetaminophen and a NSAID should be used unless there are patient or surgical contraindications.
- Postoperative considerations for thoracic epidural anesthesia (TEA):
 - Patient age and cognitive function should guide the use of PCEA or epidural continuous infusion managed by a nurse.
 - Low-dose bupivacaine (0.05 per cent) is recommended to avoid hemodynamic side effects, motor blocks and increased length of stay (LOS) (5-14 ml/hr).
 - The rate should be dosed appropriately to ensure adequate patient analgesia but to minimize side effects such as motor blockade.
 - Low doses of opioids can be added to the epidural (e.g. fentanyl 2 mcg/mL or morphine 5-10 mcg/mL); rate between 5-14 ml/hr based on local anesthetic concentration used in the solution.
 - If utilized, TEA should be removed as soon as possible (i.e. when patient is tolerating oral diet and can be transitioned to oral medications). TEA should be reassessed daily, early in the day, and should be weaned at least 24 hours before anticipated discharge time to ensure appropriate transition to oral medications.
 - NSAIDs and acetaminophen (4 g/day) (when appropriate) should be used regularly to decrease the need for oral opioids when transitioning from TEA.
- Postoperative IV opioids should be discontinued and replaced by oral opioids as soon as possible.
- Continuous infusion lidocaine can be used in early and intermediate postoperative hours if an epidural was not placed, but at late time points (for up to 48 hours postoperatively) it should be considered for patients with high pain scores in PACU only (if not, discontinue infusion at the end of PACU).

5

Postoperative

- **Multimodal Opioid-Sparing Pain Management**



Tools and Equipment

- Use epidural stop test at 48 hours.



Additional Information

- Risk of anastomotic leakage may preclude the use of NSAIDs for oncology procedures. Careful discussion about the risks and benefits should occur before prescribing.
- Evidence of effect for IV lidocaine on reduction of postoperative pain at early (1-4 hours) and intermediate (24 hours) time points, but not at late time points (48 hours).
- Non-anesthesia providers should be educated about the possible hazards of lidocaine use (local anesthetic systemic toxicity).
- Tramadol should be used cautiously in patients >75 years, ASA three (3) or four (4), and with impaired mobility or frailty.
- IV ketamine might be continued for 48 hours in patients with a high level of postoperative pain. Gabapentinoids are not routinely used but can be considered for opioid-tolerant patients only.



Data Collection

Use of multimodal pain management
Date of removal of epidural

Optional:

- Use of epidural anesthesia

5

Postoperative

• Pain Assessment



Recommendations

- Suboptimal analgesia should be assessed promptly by staff members trained in acute pain management.
- Measurement of analgesia and the side effects of analgesics, as well as measurement of anxiety should occur through a system that accounts for patient experience, function, and quality of life.
- Consider the use of patient directed visual analog pain scales to assess level of pain.

• Breakthrough Pain Management



Recommendations

- The use of all appropriate non-opioid options from the treatment algorithm should be confirmed.
- Add oral opioids if tolerated, as needed. If not tolerated orally, use IV opioids (e.g., hydrocodone, oxycodone, morphine, hydromorphone). Carefully titrate for the lowest effective opioid dosage.

5 Postoperative

Surgical Best Practices

• Glycemic control



Recommendations

- Blood glucose should be maintained within the recommended range for patients with diabetes or elevated preoperative HbA1c.
- Care must be taken to avoid hypoglycemia caused by aggressive insulin treatment.



Additional Information

- Target blood glucose range should generally be 6-10 mmol/L.

• Urinary Catheters



Recommendations

- Urinary catheters should be removed immediately after minimally invasive gynecologic surgery, or within six (6) hours after uncomplicated abdominal hysterectomy.
- Urinary catheters can be removed immediately for vaginal surgery and by postoperative day 1 for complex vaginal surgery (e.g. prolapse repair, A&P repairs, and Burch)
- Urinary catheters should be removed on postoperative day 1 after debulking surgery for gynecologic malignancies or extensive resection of endometriosis in the absence of specific indications for prolonged urinary catheter use (e.g., partial bladder resection).
- For patients who fail trial of void, clean intermittent catheterization should be considered prior to re-insertion of the urinary catheter.



Data Collection

Urinary catheter removal

5

Postoperative

• Venuous Thromboembolism (VTE)



Recommendations

- Combined mechanical and chemoprophylaxis for VTE is not recommended for the duration of hospitalization in all patients.
- Postoperative chemoprophylaxis should begin within 24 hours of surgery, unless surgically contraindicated.
- Extended prophylaxis should be considered based on high risk American College of Chest Physician criteria.



Tools and Equipment

- Consider using validated screening tools like the [Caprini Score](#) for a VTE risk assessment.

5 Postoperative

Fluid Management

• Fluid Maintenance



Recommendations

- At the end of surgery, or at least by postoperative day (POD) 1, IV fluids should be discontinued in the absence of physical signs of dehydration or hypovolemia and provided patients tolerate oral fluid intake.
- Patients tolerating oral intake should consume a minimum of 25-30 ml/kg of fluids/day.
- In patients not tolerating oral fluid intake (e.g. postoperative ileus), a maintenance infusion of 1.5 ml/kg/hr of IV fluids should be started.



Tools and Equipment

- Careful monitoring of all patients should be undertaken using clinical examination, hydration status and regular weighing, when possible, until tolerating oral diet.
- Postoperative fluid balance chart, including oral fluid intake.



Additional Information

- Postoperative weight gain >2.5 kg has been associated with increased morbidity. See previous statement about the limitations and challenges of weight measurements.



Data Collection

IV fluid discontinuation
Daily weights

5 Postoperative

• Management of Hemodynamic Instability



Recommendations

- In patients in whom volume expansion is indicated to correct a clinical anomaly (e.g. hypotension, tachycardia, oliguria) the likelihood of fluid responsiveness should be estimated before giving a bolus of IV fluids.
 - In the high dependency unit (HDU) and intensive care unit (ICU), advanced hemodynamic monitoring should be used to determine fluid responsiveness, either after a fluid challenge or a passive leg raise (PLR) maneuver.
 - If advanced hemodynamic monitoring is unavailable (e.g. surgical wards and PACU), a rapid (15-30 mins) IV fluid bolus of 3 ml/kg of balanced salt solution should be used and the patient reevaluated.
 - The effectiveness of each fluid bolus should be reevaluated before it is repeated. If there is not beneficial response, further fluid boluses are unlikely to be effective and may cause harm.
- Vasopressors should be considered for managing vasodilatory states such as epidural-induced hypotension provided the patient is euvolemic.
- Anuria warrants immediate attention.



Tools and Equipment

- Volumetric pump for maintenance infusion and fluids boluses (except in critical situations - e.g. hemorrhage, resuscitation)
- Advanced hemodynamic equipment
- PLR maneuver + SV/CO/VTI/ETCO₂ monitoring when possible (PACU/ICU/HDU)



Additional Information

- Complete a physical assessment of the patient to decide if more IV fluids are needed; avoid consultation by phone.
- The goal of IV fluid bolus is to increase venous return, which in turn increases SV.
- On surgical wards consider assessing arterial pulse pressure (PP) response following a PLR maneuver to determine whether stroke volume will increase with volume expansion. An increase in PP of ≥ 10 per cent after a PLR maneuver can be considered clinically significant and indicate that SV is significantly increased. However, diagnostic accuracy of measuring the arterial PP response following the PLR maneuver (as an indicator of fluid responsiveness) is poor compared to SV or CO response. Even if arterial PP is positively correlated with stroke volume, it also depends on arterial compliance and pulse wave amplification.

5

Postoperative

- **Ileus**



Recommendations

- Use of postoperative laxatives may help to prevent ileus.
- Rational fluid replacement to maintain euvolemia and electrolyte repletion is recommended for the treatment of postoperative gastrointestinal dysfunction.

5

Postoperative

Nutrition

- Nutrition Therapy

**Recommendations**

- Early postoperative feeding with a well-balanced diet is recommended for patients unless they experience nausea or vomiting. Encourage oral intake as early as four (4) hours following surgery and advance as tolerated by the patient.
- Food intake should be self-monitored by patients to identify those who do not consume ≥ 50 per cent of their food. Patients consistently eating ≤ 50 per cent of their food for 72 hours or as soon as clinically indicated should receive a comprehensive nutrition assessment. Specialized nutrition care is personalized and includes use of therapeutic diets, fortified foods, ONS, EN, and PN.
- Patients assessed as malnourished (e.g. SGA B and SGA C) before surgery should receive a high protein, high energy diet postoperatively and be followed by a dietician. If they are not anticipated to meet nutritional goals within 72 hours through oral intake, they should receive supplemental PPN, PN, or EN. Nutrition support should be discontinued when the patient is able to take in ≥ 60 per cent of their protein/kcal requirements via the oral route.

**Tools and Equipment**

- Use a system to monitor food and fluid intake that works for your hospital and involves patients. For example: [My Meal Intake](#).

**Additional Information**

To encourage adequate intake in hospital, offer:

- Small servings for the first meals (POD 0 and POD 1).
- High-protein ONS targeting 250-500 kcal/day. Med Pass program can be used to deliver 60 ml up to four times per day.
- Nutrient dense snacks and high-protein ONS made freely available and offered throughout the day (especially after the evening meal).
- Information on how to optimize in-hospital oral intake (e.g. signs noting that the fridge in the hallway is stocked with ONS).
- Encouragement to family and friends to bring in favorite foods from home to stimulate appetite; education on optimal choices.

**Data Collection**

Date tolerating diet

5 Postoperative

Mobility and Physical Activity

• Patient Assessment Prior to Early Mobilization



Recommendations

- Nurses should be responsible for the initial assessment prior to first mobilization attempt.
- If mobility issues are identified (e.g. postoperative conditions or surgical complications that result in difficulty mobilizing after surgery) patients should be further assessed by a physiotherapist who should assist/supervise mobilization during hospital stay according to an individually prescribed exercise plan.

Implementation Approaches

- Patients should be assessed for the following:
 - Level of consciousness
 - Levels of pain
 - Symptoms of PONV
 - Signs of cardiovascular dysfunction
 - Signs of respiratory dysfunction
 - Lower body strength
- To ensure patient safety, mobilization should not be started and further assessment and action by the healthcare team may be required to ensure safe early mobilization if:
 - Patient is severely somnolent and/or disoriented.
 - Patient reports severe pain.
 - Severe nausea/vomiting present.
 - Severe tachycardia, low blood pressure or abnormal electrocardiography present.
 - Severe tachypnea and/or low oxygen present.
 - Lower limb weakness because of residual motor block present.
- Patients may be assessed for functional lower body strength using tests such as the 30 Second Sit to Stand; Six (6) Minute Walk and Timed Up and Go.

5

Postoperative

- In-Hospital Mobilization**

**Recommendations**

- If no mobility issues are identified in the initial assessment, patients should start mobilizing as soon as it is safety possible; ideally on POD 0.
- The first mobilization attempt should always be assisted/supervised by ward staff (e.g. nurse, nursing assistant, physiotherapist or kinesiologist).
- Throughout the hospital stay, patients should be encouraged to mobilize independently or with assistance from family and/or friends.
- All members of the healthcare team should encourage early, progressive mobilization during hospital stay.

Implementation Approaches

- On POD 0 patients should be encouraged to mobilize out of bed (e.g. sit on a chair) and, if possible, walk short distances.
- From POD 1 until hospital discharge, patients should be encouraged to mobilize out of bed as much as possible according to their tolerance. Out of bed activities may include, but are not limited to, sitting on a chair, walking in the corridor and climbing hospital stairs.
- Throughout the hospital stay patients should be encouraged to:
 - Perform foot and ankle pumping and quad setting (ideally every hour while awake)
 - Perform deep breathing and coughing exercises
 - Exercise in bed if walking is not feasible

**Data Collection**

First postoperative mobilization

6

Discharge

Patient and Family Engagement

• Engaging Patients in their Care



Recommendations

- Providers should take a moment to address or answer any questions that patients and their caregiver/families may have related to the patient's condition or concerns with their discharge and follow-up.
- Encourage patients and their caregiver/families to review the "At home" section of their Guide to Gynecological Surgery booklet prior to discharge.
- Encourage patients and their caregiver/families to ask questions as needed and/or use the teach-back method, as required.
- Ensure relevant members of the healthcare team are available to respond to questions or concerns patients or family members may have about the discharge plan.
- Educate patients and their caregiver/families on the safe use and disposal of opioids.



Additional Information

- More specific patient and family insights to support discharge are outlined below, in the Analgesia, Nutrition and Mobility sections.

6 Discharge

Analgesia

- **Discharge²⁸**



Recommendations

- Discharge planning should begin well before surgery and involve all members of the multidisciplinary team and the patient and family.
- Multimodal analgesics prescriptions can be suggested to the surgical team. Non-opioid therapies should be encouraged as primary treatment (e.g., acetaminophen, NSAIDs if approved by the surgical team).
- Titrate discharge medication based on what patients are taking in the hospital.
- Non-pharmacologic therapies should be encouraged (e.g., ice, elevation, physical therapy).
- Do not prescribe opioids with other sedative medications (e.g. benzodiazepines).
- Short-acting opioids should not be prescribed for more than 3-5 day courses (e.g. morphine, hydromorphone, oxycodone).
- Educate patient on tapering of opioids as surgical pain resolves.
- Fentanyl or long-acting opioids (e.g. methadone, OxyContin) should not be prescribed to opioid naïve patients.
- Educate patient about safe use of opioids, potential side effects, overdose risks, and developing dependence or addiction.
- To prevent non-prescribed use by others, ensure appropriate disposal and return all unused opioid doses to your local pharmacy.
- Refer and provide resources for patients who have or are suspected to have a substance use disorder after surgery.

6

Discharge

Nutrition

• Nutrition Care

**Recommendations**

- All patients should be made aware of the relevance of nutrition to recovery. Patients who are well nourished should receive education to optimize nutrition and monitor for challenges that could impact nutritional status.
- Malnourished patients (e.g. SGA B or SGA C), or those with dietary restrictions who do not fully recover from their nutritional status during hospitalization require ongoing care in the community. Patients, family, and caregivers should be educated on key aspects of the nutrition care plan to support continued recovery in the community, as well as key community resources that support access to food (e.g., meal programs, grocery shopping services).
- Patients with an ileostomy should receive specific instruction from a dietitian, to educate regarding the risk of dehydration.
- Primary caregivers and other practitioners involved in post-discharge care should be provided with details about the patient's nutritional status (e.g. SGA rating, body weight), treatment provided during hospitalization and recommendations for continued care. When rehabilitation of nutritional status is ongoing, or there are opportunities to discuss secondary disease prevention, consider a referral for prioritized nutrition treatment by a dietitian.

6

Discharge

Mobility and Physical Activity

• Patient Education Prior to Discharge



Recommendations

- Before hospital discharge, all patients should receive education about the negative impact of sedentary behavior and the importance of physical activity for health.

Implementation Approaches

- Family members should be educated about how they can facilitate and encourage post-discharge physical activity.
- Should physical restrictions beyond that of typical expectations be indicated, education regarding post-discharge physical activity should be delivered prior to discharge by a nurse, physiotherapist, or kinesiologist.

• Patient Assessment Prior to Initiation of Post-Discharge Physical Activity



Recommendations

- A patient mobility assessment should be conducted prior to discharge.
- If mobility issues are identified, patients should be further assessed by a rehabilitation/exercise professional if possible (physiotherapist, occupational therapist, kinesiologist, as appropriate), who should prescribe and/or supervise physical activities according to an individually prescribed exercise plan.

Implementation Approaches

- Patients should be asked about baseline (preoperative) level of function and physical activity, as well as levels of pain and presence of other symptoms while mobilizing in the hospital.

6

Discharge

- **Post-Discharge Physical Activity**



Recommendations

- Patients should be encouraged not to stay in bed and resume activities of daily living (such as light housework and running errands) progressively after hospital discharge.
- Criteria for safe resumption of physical activity should be considered: patients should initially avoid strenuous physical effort (including core exercise, e.g. crunches, sit-ups) and lift weights only according to previous consensus-based recommendations (avoid lifting >5 kg (10-15 lbs.) for six weeks).
- Unless otherwise directed, penetrative sexual intercourse should be avoided until after the post-operative check (4-6 weeks after surgery), when a speculum exam confirms a healed vaginal vault.
- All members of the healthcare team should be accountable for encouraging postoperative physical activity after hospital discharge.
- All patients should have access to members of the healthcare team in case they have questions or require guidance regarding post-discharge physical activity.

Implementation Approaches

- Patients should be encouraged to follow recommendations for physical activity by the World Health Organization (WHO) as soon as it is safely possible (e.g., at least 150 minutes of moderate-intensity physical activity throughout the work week; muscle-strengthening activities of major muscle groups for two (2) or more days a week).
- Ideally, patients should be encouraged to walk (at least three (3) times per day) and climb stairs if available (daily or every two (2) days).
- Ideally, patients should receive a self-managed home exercise program with set progression goals. Coaching may be provided (e.g., over the phone) with a rehabilitation/exercise professional (where possible).
- A “Step Count” system may be used to set activity goals and facilitate progression.



Data Collection

Outcome Measures:

- Acute length of stay
- Complication rate
- Visits to emergency department within 30 days after discharge
- Readmission within 30 days after discharge

Analgesia Pathway

Epidural stop test	A process that generally occurs on POD 2 (6 a.m.), whereby the epidural infusion is stopped, subcutaneous heparin is withheld, and multimodal oral analgesia and opioids or tramadol are started as needed. If the patient is OK (optimal analgesia achieved) at noon the catheter is removed from the epidural space and oral analgesia is continued.
Optimal analgesia	A technique that optimizes patient comfort and facilitates recovery of physical function including the bowel, mobilization, cough and normal sleep, while minimizing adverse effects of analgesics.
Opioid induced hyperalgesia	Increased sensitivity to noxious stimuli.

Fluid Management Pathway

Passive leg raise (PLR)	The PLR test measures the hemodynamic effects of a leg elevation up to 45°. To perform the postural maneuver, transfer the patient from the semi-recumbent posture to the PLR position by using the automatic motion of the bed.
Pulse pressure	The difference between systolic and diastolic pressure.

Nutrition Pathway

Diet therapy	A broad term for the practical application of nutrition as a preventative or connective treatment of disease.
Dietitian	Includes the following protected titles: Registered Dietitian, Professional Dietitian, Dietitian, Registered Nutritionist, Nutritionist. See Dietitians of Canada for the full list of protected titles and initials.
Enteral nutrition (EN)	Also referred to as tube feeding. Tube feeding is when a special liquid nutrient mixture containing protein, carbohydrates (sugar), fats, vitamins and minerals, is given through a tube into the stomach or small bowel.
High protein oral nutritional supplements (ONS)	A ready-made liquid, powder, or pudding with macronutrients and micronutrients, containing >20 per cent of energy from the protein.
Malnutrition	For the purpose of this document, malnutrition is defined as the deficiency (or imbalance) of energy, protein and other nutrients.
Nutrition assessment	An in-depth, specific and detailed evaluation of nutritional status.
Nutrition screening	A quick and easy procedure using a valid screening tool, designed to identify those who are malnourished or at risk of malnutrition and may benefit from nutrition assessment.
Patient journey	Begins at time of diagnosis and continues through treatment and recovery.
Pre-admission clinic	A multidisciplinary clinic designed to ensure patients due to be admitted are well-prepared and informed about their surgery and forthcoming hospital stay.
Parenteral nutrition (PN)	IV administration of nutrition, which may include protein, carbohydrate, fat, minerals and electrolytes, vitamins and other trace elements for patients who cannot eat or absorb enough food through the gastrointestinal tract to maintain good nutrition status.
Subjective global assessment (SGA)	A nutrition assessment tool that is a gold standard for diagnosing malnutrition.

Mobility and Physical Activity Pathway

Delphi Method	A method of systematically surveying a group of experts to reach consensus opinion on a specific topic.
Early mobilization	Mobilization out of bed starting on the day of surgery (POD 0) or within 12 hours after arrival on the ward.
Exercise	Physical activity that is planned, structured, repetitive, and intended to maintain or improve physical fitness.
Kinesiologist	A professional trained in the science of human movement and exercise physiology. Scope of practice involves a broad range of subdisciplines intended to educate individuals about physical activity and exercise. Kinesiologists focus on modifying lifestyle behaviours, preventing injury and illness, optimizing health status and performance and perseverance of quality of life.
Mobility	The ability to move freely and easily.
Mobilization	The commencement of upright activities after a period of reduced mobility to resume activities of daily living.
Physical activity	Any body movement produced by skeletal muscles that requires energy expenditure.
Therapeutic exercise	Bodily movement that is prescribed to correct an impairment/ injury, improve physical function, or maintain a state of well-being.

Gynecologic Pathway

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Gynecologic Pathway

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Abbreviations

ACS , American College of Surgeons	ONS , oral nutritional supplements
AHRQ , Agency for Healthcare Research and Quality	PACU , Post Anesthesia Care Unit
ANI , analgesia nociception index	PCEA , patient-controlled epidural analgesia
ASA , American Society of Anesthesiologists	PLR , passive leg raise
CDC , Centres for Disease Control and Prevention	PN , parenteral nutrition
CHF , congestive heart failure	PO , by mouth
CNST , Canadian Nutrition Screening Tool	POD , postoperative day
CO , cardiac output	PONV , postoperative nausea and vomiting
COX2 , cyclo-oxygenase-2	PP , pulse pressure
CPSI , Canadian Patient Safety Institute	PPN , peripheral parenteral nutrition
EBL , estimated blood loss	PRN , as needed
EN , enteral nutrition	PVV , pulse volume variation
ERC , Enhanced Recovery Canada	RN , Registered Nurse
ERAS , Enhanced Recovery after Surgery	sTAP , subcostal transversus abdominis plane
ETCO₂ , end-tidal carbon dioxide	SGA , subjective global assessment
FiO₂ , fraction of inspired oxygen	SSI , Surgical site infection
GAD , Generalized Anxiety Disorder	SV , stroke volume
HADS , Hospital Anxiety and Depression Scale	SVV , stroke volume variation
HDU , high dependency unit	TAP , transversus abdominis plane
HEC , Healthcare Excellence Canada	TEA , thoracic epidural analgesia
HRT , hormone replacement therapy	TIVA , total intravenous anesthesia
ICU , intensive care unit	UO , urine output
IV , intravenous	VTE , venous thromboembolism
LMWH , low-molecular-weight heparin	VTI , velocity time integral
LOS , length of stay	WHO , World Health Organization
MBP , mechanical bowel preparation	
MUHC , McGill University Health Centre	
NGT , nasogastric tube	
NMB , neuromuscular blockade	
NOL , nociception level index	
NPO , nothing by mouth	
NSAID , non-steroidal anti-inflammatory agent	

Analgesia Algorithm

Preop	<ul style="list-style-type: none"> • Evaluate patient history and current medications. • Educate – Set expectations with the patient. • Discuss the NSAIDs based on surgical plan and patient issues. • Start preoperative multimodal analgesia: PO Tylenol +/- NSAIDs. • At the checklist: Discuss the type of surgery (laparoscopic vs open, incision e.g., midline or Pfannenstiel) and risk of conversion to open surgery. 	
	Intraoperative	<p style="text-align: center;">Laparoscopy surgery</p> <ul style="list-style-type: none"> • Discuss risk of conversion to open surgery. • General anesthesia with consideration for TIVA (propofol with depth of anesthesia monitor) +/- adjuncts (IV dexmedetomidine, IV ketamine, IV lidocaine). • Consider the addition of transversus abdominis plane (TAP) blocks (laparoscopic OR ultrasound guided), OR infiltration of local anesthesia at the laparoscopic port sites, depending on the size of incision required.
Postop		<ul style="list-style-type: none"> • Multimodal analgesia including opioids for breakthrough pain with +/- abdominal trunk blocks (e.g. TAP block), either single shot or with continuous infusion. • Patient controlled epidural anesthesia (PCEA) may be considered for 48-72 hours for patients with extensive open incisions. The need for PCEA should be reassessed daily and weaning should occur at least 24 hours prior to anticipated discharge to allow for transition to oral medications. Try to minimize motor block to enable patients to mobilize early.

Data Collection and Measurement

Summary

This resource will guide clinicians through data collection and measurement to support the implementation of the Enhanced Recovery Canada (ERC) gynecologic clinical pathway. It includes information regarding how to identify your study population, how to calculate the appropriate sample size, as well as identifies what specific data points to be collected on each patient.

Study Population

It is helpful for teams to collect data on patients undergoing the same gynecologic surgeries to allow for data aggregation and comparisons. This is possible because each Canadian acute care institution reviews patient's charts after discharge and classifies their surgeries based on a universal coding system.

The Canadian Institute for Health Information (CIHI) sets the national standard for morbidity data reporting in Canada and maintains, distributes, and supports the application of ICD-10-CA (the Canadian modification of ICD-10). Canadian Classification of Health Interventions (CCI) is the national standard for classifying healthcare procedures.

ICD-10-CA (International Statistical Classification of Diseases and Related Health Problems, 10th Revision, Canada) was developed by the World Health Organization (WHO) and enhanced by CIHI to meet Canadian morbidity data needs. CCI was developed by CIHI to accompany ICD-10-CA. It was designed to be service-provider and service-setting neutral and can be used comprehensively throughout Canada's health systems.

Data Collection and Measurement

Procedure	Notes for Inclusion	ICD-10-CA/CCI Codes
Hysterectomy	<p>Elective (non-emergent) surgical</p> <p>May include in combination with one or more of:</p> <ul style="list-style-type: none"> • unilateral salpingo-oophorectomy (USO) • bilateral salpingo-oophorectomy (BSO) • anterior, posterior, paravaginal repairs (mesh, tension-free vaginal tape [TVT], sling, enterocele) • Salpingectomy • Oophorectomy 	1.RM.89.AA, 1.RM.89.CA, 1.RM.89.DA, 1.RM.89.LA
Debulking Gynecology	<p>Elective surgery with planned OR time for confirmed cancer or suspicion of cancer.</p> <p>May include one or more of:</p> <ul style="list-style-type: none"> • appendectomy • unilateral or bilateral pelvic lymph node sampling • unilateral or bilateral salpingo oophorectomy • diaphragm stripping • hysterectomy • infracolic omentectomy • large bowel resection • liver resection • paraaortic lymph node sampling • radical hysterectomy • small bowel resection • splenectomy • supracolic omentectomy • urologic diversion • loop reversal • removal of retroperitoneal mass • partial cystectomy • partial gastrectomy • ureteroneocystostomy 	1.NV.89.LA 1.RD.89.LA, 1.RD.89.RA 1.RM.91.LA 1.RM.87.LA-GX, 1.RM.87.LA-AK 1.RM.89.LA 1.OT.87.LA 1.NM.87.RN, 1.NM.87.RD, 1.NM.87.RE, 1.NM.87.TF, 1.NM.87.TG , 1.NM.87.WJ 1.NM.89.RN, 1.NM.89.TF, 1.NM.89.WJ 1.NM.91.RN, 1.NM.91.RD, 1.NM.91.RE, 1.NM.91.TF, 1.NM.91.TG 1.OA.87.LA, 1.OA.87.LA 1.NK.77.RQ, 1.NK.77.RR 1.NK.87.DN, 1.NK.87.DP, 1.NK.87.DX, 1.NK.87.DY, 1.NK.87.GB, 1.NK.87.RE, 1.NK.87.RF, 1.NK.87.TF, 1.NK.87.TG, 1.NK.87.WJ 1.OB.87.LA, 1.OB.87.LA-X7, 1.OB.87.LA-W2, 1.OB.87.LA-W3, 1.OB.87.LA-AG, 1.OB.87.LA-XX-E, 1.OB.87.LAXX-N, 1.OB.87.PF, 1.OB.87.PF-X7, 1.OB.87.PF-W2, 1.OB.87.PF-W3, 1.OB.87.PF-AG, 1.OB.87.PF-XX-E, 1.OB.87.PF-XX-N 1.OB.89.LA, 1.OB.89.PF 1.OB.83.LA 1.PG.77.LA 1.PG.76.LA, 1.PG.76.RD-XX-G 1.PM.77.LA-XX-G, 1.PM.77.RR 1.RF.82.LA 1.PM.87.LA 1.NA.87.LB, 1.NA.87.LB-XX-G, 1.NA.87.LB-XX-F, 1.NA.87.QB, 1.NA.87.QB-XX-G, 1.NA.87.QB-XX-F, 1.NA.87.QF, 1.NA.87.QF-XX-G, 1.NA.87.QF-XX-F 1.PG.80.LA, 1.PG.80.LA-XX-E, 1.PG.80.LA-XX-G, 1.PG.80.LD

Data Collection and Measurement

Sampling

A suggested sampling calculation¹ is provided below. This calculation recommends how many patient charts should be reviewed during the baseline period selected and the ongoing data collection through the implementation phase. This sampling is based on the number of gynecologic surgeries performed monthly.

<i>Average Monthly Population Size “N”</i>	<i>Minimum required sample “n”</i>
<20	No sampling; 100% of population required
100% of population required	
20 - 100	20
>100	15 - 20% of population size

Collection Strategy

Before the initiation of a Patient Safety Improvement Project specific data points must be identified for collection which will demonstrate the success of the project. These data points should demonstrate both the process changes (process variables) and the impact of these changes (outcome variables). These data points must be obtained before any changes are made, then at scheduled time periods throughout the implementation to reflect the progress of the project.

Baseline Data Collection should occur over a three (3) month period to ensure an accurate reflection of the surgical care provided. Monthly data collection and reporting is recommended to reflect the process changes and improvements in postoperative patient outcomes. Data should continue to be collected monthly until the team has determined that a level of sustainability has been reached.

It is recommended to collect both outcome and process variables.

Process and Outcome Variables

Process Variables

Enhanced Recovery programs are the implementation of evidence-based recommendations in the preoperative, intraoperative, and postoperative phases. Thus, there are various process variables to be collected along the surgical continuum to ensure compliance to these recommendations. A process variable evaluates whether the recommended intervention is being followed. For example, if an organization is trying to reduce the outcome of postoperative urinary tract infection, it may measure the process of removing urinary catheters.

It is anticipated that process variables will be found via manual chart review, whether your organization documents on paper or electronically. The recommended process variables are listed below, with a full description found in [Appendix D](#).

Surgical Phase	Process Variables
Preoperative	Pre-admission Counselling Malnutrition Screening Use of Antiemetic Prophylaxis** Preoperative Oral Antibiotics Preoperative VTE Chemoprophylaxis Allow Clear Liquids up to Two (2) Hours Before Induction Allow Maltodextrin up to Two (2) Hours Before Induction
Intraoperative	Use of Regional Anesthesia Patient Temperature at the End of Surgery or on Arrival to PACU Volume of IV Fluid Administration
Postoperative	Use of Multimodal Pain Management Urinary Catheter Removal IV Fluid Discontinuation Date Tolerating Diet Daily Weights First Postoperative Mobilization Date of Removal of Epidural

**The Enhanced Recovery Canadian Leaders who authored the ERC Clinical Pathways have recommendations for optional data points in the areas of Fluid Management and Multimodal Pain Management. If your site would like to collect more specific information regarding these areas, please refer to [Appendix E](#) and connect with your Clinical Team Leader for further guidance.*

*** Please note that use of antiemetic prophylaxis in the intraoperative phase would also be compliant with evidence-based Enhanced Recovery recommendations.*

Process and Outcome Variables

Many institutions with established Enhanced Recovery clinical pathways across Canada also subscribe to a database to measure their surgical health care quality, titled NSQIP. The American College of Surgeons (ACS) National Surgical Quality Improvement Program (NSQIP) is a nationally validated, risk-adjusted, outcomes-based program to measure and improve the quality of surgical care. This database uses standardized definitions to describe both process and outcome variables within Enhanced Recovery programs. To allow for comparisons between NSQIP and non-NSQIP participating hospitals, and with permission from ACS NSQIP, the ERC project has adopted many of these definitions to ensure standardization across Canada. ERC would like to thank the ACS NSQIP and the Improving Surgical Care in Recovery (ISCR) program for sharing their content to allow for consistency of data collection.

Outcome Variables

An outcome variable determines if a specific intervention is having the desired effect on a clinical measure, such as reducing postoperative infection rates.

Recommended outcome variables are listed below, with full description found here in [Appendix D](#).

- Acute length of stay
- Complication rate
- Visits to emergency department within 30 days of discharge
- Readmission within 30 days of discharge

As previously mentioned, patient charts are reviewed and coded on discharge. This information is entered into the Discharge Abstract Database (DAD), including postoperative complications, acute care length of stay and readmissions to hospital. It is suggested to liaise with your organization's Health Care Information Management and Technology Department to extract this data, as it would significantly reduce data collection time and ensure consistency in collection methods between sites. By providing the Health Care Information Management and Technology Department with the list of ICD-10-CA/CCI Codes used to define the gynecologic surgery population, they can provide the number of gynecologic surgeries and the patient outcomes from information which has already been collected in your organization.

Process and Outcome Variables

Preoperative Phase

• Pre-admission Counselling

Intent of Variable	To capture whether or not the patient received counselling before admission describing expectations and detailing the postoperative care plan.
Definition	Pre-admission counselling refers to the provision of written information prior to admission which details expectations specific to diet and bathing preoperatively and breathing/coughing exercises, mobility, and diet advancement postoperatively.
Criteria	Describe if patient was provided with specific written instructions detailing expectations and responsibilities before surgery such as: fasting times, oral carbohydrate, showering and after surgery (pain control, deep breathing and coughing exercises, mobility expectations, goals for nutritional intake, discharge criteria, and expected hospital stay). <ul style="list-style-type: none"> • Yes: Patient provided with specific written instruction • No: Patient not provided with specific written instructions
Options	<ul style="list-style-type: none"> • Yes • No
Scenarios to Clarify (Assign Variable)	<ul style="list-style-type: none"> • N/A
Scenarios to Clarify (Do NOT Assign Variable)	<ul style="list-style-type: none"> • N/A
Notes	Hospitals can meet these criteria by providing the ERC Patient Optimization Guide, precare.ca gynecologic animation video, or having their own similar instructions which address elements such as preoperative skin preparation and limited fasting, as well as postoperative pain control and mobilization/exercise. Instructions should address all of these elements: <ul style="list-style-type: none"> • Preoperative Information <ul style="list-style-type: none"> ◦ Fasting times ◦ Oral carbohydrate ◦ Showering • Postoperative Information <ul style="list-style-type: none"> ◦ Pain control ◦ Deep breathing and coughing exercises, mobility expectations ◦ Goals for nutritional intake ◦ Discharge criteria ◦ Expected hospital stay

Process and Outcome Variables

Preoperative Phase

• Malnutrition Screening

Intent of Variable	To capture whether or not the patient received malnutrition screening to determine whether intervention was necessary to nutritionally optimize a patient prior to surgery.
Definition	Malnutrition screening refers to the use of a screening tool like the CNST as early as possible for nutrition risk, either at the initial surgical consult or at the pre-admission clinic.
Criteria	Describe if a screening tool was used prior to surgical intervention: <ul style="list-style-type: none"> • Yes: Malnutrition screening tool was used • No: Malnutrition screening tool was not used
Options	<ul style="list-style-type: none"> • Yes • No
Scenarios to Clarify (Assign Variable)	<ul style="list-style-type: none"> • N/A
Scenarios to Clarify (Do NOT Assign Variable)	<ul style="list-style-type: none"> • N/A
Notes	The CNST tool asks two questions: <ul style="list-style-type: none"> • Have you lost weight in the past six months without trying to lose this weight? • Have you been eating less than usual for more than a week?

Process and Outcome Variables

Preoperative Phase

• Use of Antiemetic Prophylaxis

Intent of Variable	To capture patients whether antiemetic prophylaxis was used.
Definition	Examples include: <ul style="list-style-type: none"> • Antiemetics (cholinergic, dopaminergic [D2], serotonergic [5-HT3], or histaminergic); OR • Dexamethasone; OR • Omission of nitrous oxide; OR • TIVA with Propofol and Remifentanyl
Criteria	Indicate whether preoperative OR intraoperative antiemetic interventions were used: <ul style="list-style-type: none"> • Yes: Patient has documented preoperative antiemetic interventions within 2 hours before surgery; OR intraoperative antiemetic interventions were used • No: Preoperative or Intraoperative antiemetic intervention was not used
Options	<ul style="list-style-type: none"> • Yes • No
Scenarios to Clarify (Assign Variable)	<ul style="list-style-type: none"> • N/A
Scenarios to Clarify (Do NOT Assign Variable)	<ul style="list-style-type: none"> • N/A
Notes	

Process and Outcome Variables

Preoperative Phase

• Preoperative Oral Antibiotic

Intent of Variable	To capture patients who received an oral antibiotic prior to surgery.
Definition	Preoperative oral antibiotics include erythromycin, neomycin, and metronidazole.
Criteria	<ul style="list-style-type: none"> • Yes: Patient received preoperative oral antibiotics within 24 hours prior to surgery • No: Patient did not receive preoperative oral antibiotics
Options	<ul style="list-style-type: none"> • Yes • No
Scenarios to Clarify (Assign Variable)	<ul style="list-style-type: none"> • N/A
Scenarios to Clarify (Do NOT Assign Variable)	<ul style="list-style-type: none"> • Assign “No” if prophylactic antibiotics were only administered intravenously at the time of surgery and no oral antibiotics were received within 24 hours prior to surgery. • Assign “No” if there is no documentation of preoperative oral antibiotics that meet criteria. • Assign “No”, if the preoperative oral antibiotics are prescribed or started, but not complete.
Notes	<ul style="list-style-type: none"> • If there is no consistent documentation of this information at your site, we recommend following up with nursing/surgery to determine whether it is done and where it is documented. • The purpose of this variable is to identify patients who have completed preoperative oral antibiotics. This would not include patients which attempted but could not tolerate or complete the process. • If patient is taking other antibiotics for other medical conditions and not specifically for surgery, do not assign this variable.

Process and Outcome Variables

Preoperative Phase

• Preoperative Venous Thromboembolism (VTE) Chemoprophylaxis

Intent of Variable	To capture whether patient received preoperative VTE chemoprophylaxis .
Definition	VTE chemoprophylaxis agents include heparin, enoxaparin, and fondaparinux administered subcutaneously immediately preoperatively or intraoperatively. High risk of bleeding is considered a contraindication to the administration of VTE chemoprophylaxis. Patients who are at high risk of bleeding complications have a contraindication to receiving VTE prophylaxis. Patients at high risk of bleeding include those with: <ul style="list-style-type: none"> • Active gastrointestinal bleeding, cerebral hemorrhage, or retroperitoneal bleeding • Documented bleeding risk • Thrombocytopenia
Criteria	<ul style="list-style-type: none"> • Yes: Patient received a dose of chemoprophylaxis preoperatively or intraoperatively • No: Patient did not receive chemoprophylaxis preoperatively or intraoperatively • No, high bleeding risk: Patient did not receive chemoprophylaxis preoperatively or intraoperatively but has a documented contraindication to receiving VTE chemoprophylaxis (high risk of bleeding)
Options	<ul style="list-style-type: none"> • Yes • No • No, high bleeding risk
Scenarios to Clarify (Assign Variable)	<ul style="list-style-type: none"> • N/A
Scenarios to Clarify (Do NOT Assign Variable)	<ul style="list-style-type: none"> • Assign “no” if the first dose of VTE chemoprophylaxis is administered postoperatively.
Notes	

Process and Outcome Variables

Preoperative Phase

• Allow Clear Liquids Up to 2 Hours Before Induction

Intent of Variable	To capture whether patients take clear liquids up to two (2) hours before surgery start time , rather than traditional fasting after midnight.
Definition	<p>Clear liquids refer to transparent liquids that are easily digested, and include: water, juices without pulp, lemonade, sport drinks, clear broth, clear sodas, ice pops, tea, and jello.</p> <p>Alternative fasting guidelines should be administered to those who are considered high risk for aspiration. High risk patients include:</p> <ul style="list-style-type: none"> • Delayed gastric emptying • Gastroparesis • Gastrointestinal obstruction • Upper gastrointestinal malignancy <p>Alternative fasting guidelines should be administered to those who have fluid restrictions. Fluid restriction patients include:</p> <ul style="list-style-type: none"> • Dialysis • CHF
Criteria	<p>Indicate whether the patient actually consumed clear liquids between midnight and two (2) hours prior to surgery, rather than traditional fasting after midnight:</p> <ul style="list-style-type: none"> • Yes: Consumption of clear liquids any time between midnight and two (2) hours before surgery • No: No consumption of clear liquids between midnight and two (2) hours • No, high risk or fluid restriction patient: Patient has one of the conditions listed above
Options	<ul style="list-style-type: none"> • Yes • No • No, high risk or fluid restriction patient
Scenarios to Clarify (Assign Variable)	<ul style="list-style-type: none"> • Assign “Yes” if there is documentation that patient consumed clear liquids up to two (2) hours prior to surgery.
Scenarios to Clarify (Do NOT Assign Variable)	<ul style="list-style-type: none"> • Assign “No” if clear fluids have been exclusively used to take PO medications.
Notes	

Process and Outcome Variables

Preoperative Phase

• Allow Maltodextrin 2 Hours Before Induction

Intent of Variable	To capture whether patient consumed maltodextrin two (2) hours before surgery start time.
Definition	50 g of maltodextrin was administered and consumed over a maximum of five (5) minutes ≥ 2 hours before surgery start time. Exclusion Criteria: <ul style="list-style-type: none"> • Patients with diabetes mellitus, type 1 • Patients given alternative fasting guidelines due to high risk of aspiration or fluid restriction (refer to previous process variable)
Criteria	<ul style="list-style-type: none"> • Yes: Patient received maltodextrin ≥ 2 hours before surgery start time • No: Patient did not receive maltodextrin ≥ 2 hours before surgery start time • No, exclusion criteria: Patient did not receive maltodextrin two (2) hours before surgery start time due to documented contraindication to consuming maltodextrin
Options	<ul style="list-style-type: none"> • Yes • No
Scenarios to Clarify (Assign Variable)	<ul style="list-style-type: none"> • Assign “yes” if patient received maltodextrin two (2) hours before surgery start time and it was consumed within a maximum of five (5) minutes.
Scenarios to Clarify (Do NOT Assign Variable)	<ul style="list-style-type: none"> • Assign “no” if maltodextrin was consumed over a time period > 5 minutes. • Assign “no” if maltodextrin was consumed > 2 hours before surgery start time.
Notes	

Process and Outcome Variables

Intraoperative Phase

• Use of Regional Anesthesia

Intent of Variable	To capture whether a form of regional anesthesia was employed intraoperatively for postoperative pain control.
Definition	<p>Regional anesthesia includes epidural analgesia with anesthetics or opioids, intrathecal (spinal) opioid administration, and transversus abdominis plane (TAP) blocks.</p> <ul style="list-style-type: none"> • A thoracic epidural is placed in the T1 - T12 levels and is used for infusion of anesthetics or opioids (e.g. bupivacaine, lidocaine, mepivacaine, fentanyl, morphine) into the epidural space for pain control during and after surgery. A thoracic epidural is indicated for an open case. • Intrathecal (spinal) anesthesia is a single dose of intrathecal opioid and or anesthetic (e.g. morphine, fentanyl and/or lidocaine, procaine, ropivacaine) administered once prior to surgery. • TAP blocks are performed under ultrasound guidance, where local anesthetic (e.g. ropivacaine, bupivacaine) is injected into the space between the internal oblique and transverse abdominis muscles to anesthetize the nerves supplying the anterior abdominal wall (T6 to L1). TAP blocks are performed at the end of the procedure and are indicated for laparoscopic surgery.
Criteria	<p>Indicate whether a form of regional anesthesia was employed:</p> <ul style="list-style-type: none"> • Yes (please indicate type administered): <ul style="list-style-type: none"> <input type="checkbox"/> Thoracic epidural <input type="checkbox"/> Spinal anesthesia OR <input type="checkbox"/> TAP block • No: None of the above regional anesthesia methods were employed
Options	<ul style="list-style-type: none"> • Yes • No
Scenarios to Clarify (Assign Variable)	<ul style="list-style-type: none"> • N/A
Scenarios to Clarify (Do NOT Assign Variable)	<ul style="list-style-type: none"> • Subcutaneous local wound injection of bupivacaine liposome injectable suspension/bupivacaine/lidocaine or disposable continuous local anesthetic infusion pump would not be included as a type of regional anesthesia.
Notes	<ul style="list-style-type: none"> • See examples per Analgesia Algorithm (see Appendix B)

Process and Outcome Variables

Intraoperative Phase

• Patient Temperature at the End of Surgery or on Arrival to PACU

Intent of Variable	To capture whether or not the patient was normothermic at the end of surgery or on arrival to PACU.
Definition	Normothermia is defined as central core temperature $\geq 36.0^{\circ}\text{C}$.
Criteria	<ul style="list-style-type: none"> • Yes: Patient's central core temperature was at or above 36.0°C at the end of surgery or on arrival to PACU • No: Patient's central core temperature was at or below 35.9°C at the end of surgery or on arrival to PACU
Options	<ul style="list-style-type: none"> • Yes • No
Scenarios to Clarify (Assign Variable)	<ul style="list-style-type: none"> • N/A
Scenarios to Clarify (Do NOT Assign Variable)	<ul style="list-style-type: none"> • N/A
Notes	

Process and Outcome Variables

Intraoperative Phase

• Volume of IV Fluid Administration

Intent of Variable	To capture the volume of IV fluid administered intraoperatively.
Definition	IV fluid includes crystalloid and colloid solutions.
Criteria	<ul style="list-style-type: none"> Numeric value representing total volume of IV crystalloid and colloid fluid administered.
Options	<ul style="list-style-type: none"> Any numeric value ≥ 0 ml
Scenarios to Clarify (Assign Variable)	<ul style="list-style-type: none"> N/A
Scenarios to Clarify (Do NOT Assign Variable)	<ul style="list-style-type: none"> Do not include volumes of blood products.
Notes	

Process and Outcome Variables

Postoperative Phase

• Use of Multimodal Pain Management

Intent of Variable	To capture whether multimodal approaches to pain management were utilized postoperatively within 48 hours of surgery finish time.
Definition	Multimodal pain management refers to use of non-opioid analgesics to reduce opioid-related side effects. Strategies or medications that would qualify include two or more of the following: <ul style="list-style-type: none"> • NSAIDs (including ibuprofen, ketorolac, COX-2 inhibitors) • Acetaminophen • Gabapentinoids (gabapentin or pregabalin) • Ketamine • IV lidocaine (infusion) • Regional anesthesia (refer to “Use of Regional Anesthesia” variable)
Criteria	Indicate whether a multimodal approach to pain management was used in the postoperative period. <ul style="list-style-type: none"> • Yes: Two more of the above analgesics were administered (simultaneously) in the postoperative period within 48 hours of surgery finish time • No: Two or more of the above analgesics were not administered simultaneously in the postoperative period within 48 hours of surgery finish time
Options	<ul style="list-style-type: none"> • Yes • No
Scenarios to Clarify (Assign Variable)	<ul style="list-style-type: none"> • N/A
Scenarios to Clarify (Do NOT Assign Variable)	<ul style="list-style-type: none"> • PRN orders for pain medication alone would not qualify.
Notes	<ul style="list-style-type: none"> • Combination opioid medications which include acetaminophen, do not count as a dose of acetaminophen.

Process and Outcome Variables

Postoperative Phase

• Urinary Catheter Removal

Intent of Variable	To capture the date of urinary catheter removal following surgery .
Definition	A urinary catheter is typically placed at the time of surgery and removed within the first 24 hours after surgery.
Criteria	Indicate the documented date of urinary catheter removal, or indicate if the patient did not have a urinary catheter placed for the procedure. <ul style="list-style-type: none"> • POD 0: immediately following procedure until 23:59 on day of surgery • POD 1: from 00:00 on day following surgery until 23:59 • POD 2: from 00:00 two days following surgery until 23:59 • ≥ POD 3: documented date of urinary catheter removal after 00:00 on POD 3 • N/A: No urinary catheter placed preoperatively or intraoperatively
Options	<ul style="list-style-type: none"> • POD 0 • POD 1 • POD 2 • ≥ POD 3 • N/A
Scenarios to Clarify (Assign Variable)	<ul style="list-style-type: none"> • Enter date of urinary catheter removal, even if urinary retention occurs and the patient requires intermittent catheterization or catheter reinsertion. • If urinary catheter is removed at the end of the case in the operating room, enter removal on POD 0. • If patient is discharged from the hospital with a urinary catheter in place, enter ≥ POD 3.
Scenarios to Clarify (Do NOT Assign Variable)	<ul style="list-style-type: none"> • N/A
Notes	

Process and Outcome Variables

Postoperative Phase

• IV Fluid Discontinuation

Intent of Variable	To capture the date of maintenance IV fluid discontinuation following surgery .
Definition	Maintenance IV fluids are run at a continuous, steady rate (usually 50-150 cc/hour).
Criteria	Indicate the date of maintenance IV fluids discontinuation: <ul style="list-style-type: none"> • POD 0: immediately following procedure until 23:59 on day of surgery • POD 1: from 00:00 on day following surgery until 23:59 • POD 2: from 00:00 two days following surgery until 23:59 • ≥ POD 3: documented date of IV fluid discontinuation after 00:00 on POD 3 • No postoperative IV fluids administered
Options	<ul style="list-style-type: none"> • POD 0 • POD 1 • POD 2 • ≥ POD 3 • No postoperative IV fluids administered
Scenarios to Clarify (Assign Variable)	<ul style="list-style-type: none"> • Enter date if maintenance rate IV fluids are stopped, even if the patient subsequently receives a bolus of a set volume of fluid (e.g., 500 cc or 1,000 cc). • Enter date if the maintenance rate IV fluids are stopped, even if fluids are subsequently resumed for a change in the patient's clinical status.
Scenarios to Clarify (Do NOT Assign Variable)	<ul style="list-style-type: none"> • N/A
Notes	

Process and Outcome Variables

Postoperative Phase

• Date Tolerating Diet

Intent of Variable	To capture the date on which patient first tolerated a diet .
Definition	First date on which the patient took a diet including at least one solid meal and could drink liquids (800-1,000 cc) without need for IV fluids.
Criteria	<p>Indicate the first date on which the patient tolerated a diet:</p> <ul style="list-style-type: none"> • POD 0: immediately following procedure until 23:59 on day of surgery • POD 1: from 00:00 on day following surgery until 23:59 • POD 2: from 00:00 two days following surgery until 23:59 • ≥ POD 3: dfirst documented time of tolerating diet after 00:00 on POD 3
Options	<ul style="list-style-type: none"> • POD 0 • POD 1 • POD 2 • ≥ POD 3
Scenarios to Clarify (Assign Variable)	<ul style="list-style-type: none"> • N/A
Scenarios to Clarify (Do NOT Assign Variable)	<ul style="list-style-type: none"> • N/A
Notes	<ul style="list-style-type: none"> • While vomiting may be a sign that a patient did not tolerate their diet, vomiting can be due to multiple factors and we do not have a specific threshold defined for when vomiting indicates lack of tolerating diet. Documentation of emesis/vomiting by itself is not an indication that a patient did not tolerate the diet. However, if documentation indicates directly that a patient both was not tolerating a diet and had vomiting, then do not assign this variable. • Solid food indicates non-liquid, non-puree food (e.g. regular diet, low residue diet, cardiac/diabetic diet).

Process and Outcome Variables

Postoperative Phase

• Daily Weights

Intent of Variable	To capture whether a patient was weighed daily postoperatively for the first 48 hours after surgery (POD 1 and POD 2) as surrogate measure of fluid overload.
Definition	The patient was weighed daily as an additional vital sign to avoid fluid overload.
Criteria	Indicate whether the patient was weighed daily: <ul style="list-style-type: none"> • Yes: The patient was weighed on POD 1 and POD 2 • No: The patient was not weighed on POD 1 and POD 2
Options	<ul style="list-style-type: none"> • Yes • No
Scenarios to Clarify (Assign Variable)	<ul style="list-style-type: none"> • N/A
Scenarios to Clarify (Do NOT Assign Variable)	<ul style="list-style-type: none"> • If a patient was not weighed preoperatively then do not assign this variable. • If a patient was not weighed on both POD 1 and POD 2, do not assign this variable.
Notes	<ul style="list-style-type: none"> • For accurate comparison, all perioperative weight measurements should be obtained with the patient wearing a hospital gown and using calibrated scales. • Some patients may not be able to mobilize to weigh scales or stand independently to gather accurate weight measurement. Make all efforts to place immobile patients in hospital beds which have the capacity for weight measurement.

Process and Outcome Variables

Postoperative Phase

• First Postoperative Mobilization

Intent of Variable	To capture the date and time when a patient is first mobilized following surgery.
Definition	Mobilization is defined as ambulation (any distance or length of time), including with the assistance of a walking aid. A patient has been mobilized if they perform either of the following: <ul style="list-style-type: none"> • Ambulation a distance of 10 feet or more • Ambulation for a duration of two (2) minutes or more
Criteria	Specify the first documented date of patient ambulation following surgery. <ul style="list-style-type: none"> • POD 0: immediately following procedure until 23:59 on day of surgery • POD 1: from 00:00 on day following surgery until 23:59 • POD 2: from 00:00 two days following surgery until 23:59 • ≥ POD 3: first documented time of patient mobilization after 00:00 on POD 3
Options	<ul style="list-style-type: none"> • POD 0 • POD 1 • POD 2 • ≥ POD 3
Scenarios to Clarify (Assign Variable)	<ul style="list-style-type: none"> • N/A
Scenarios to Clarify (Do NOT Assign Variable)	<ul style="list-style-type: none"> • Standing at bedside • Up to chair
Notes	

Process and Outcome Variables

Outcome Variables

**Please note that all definitions below were provided through Canadian Coding Standards and apply to all data sets submitted to the Discharge Abstract Database (DAD).*

Outcome Variable	Definition
Acute Length of Stay	Acute Length of Stay (LOS) is the Calculated Length of Stay minus the number of Alternate Level of Care (ALC) days. The ALC designation identifies a patient is occupying a bed in a facility and does not require the intensity of resources/services provided in that care setting.
Complication Rate	<p>Complication: a post-intervention condition or symptom that is not attributable to another cause arises during an uninterrupted, continuous episode of care within 30 days following the intervention, or a cause/effect relationship is documented, regardless of timeline.</p> <p>*Noted that the 30-day timeline does not apply when a patient has been discharged. This is considered an interruption in care. To clarify, postoperative complications occurring after discharge are not recorded.</p> <p>Complication rate is calculated by:</p> $\frac{\text{number of patients who experienced a complication}}{\text{total number of patients who underwent surgery}}$
Visits to emergency department within 30 Days after Discharge	<p>Patients who were discharged from an acute care institution after surgery but returned to hospital emergency department within 30 days after discharge.</p> <p>*Noted that there may be limitations to accessing information of patients who visit emergency departments outside the regional health authority.</p>
Readmission within 30 Days after Discharge	<p>Patients who were discharged from an acute care institution after surgery but were readmitted to an acute care institution within 30 days after the discharge.</p> <p>*Noted that there may be limitations to accessing information of patients who are readmitted outside the regional health authority.</p>

Optional Process Variables

Optional Fluid Management Variables		
Variable Name		
Balanced Chloride-Restricted Solution	Intent of Variable	To capture whether the IV solutions administered as maintenance infusion are isotonic and chloride-restricted.
	Definition	Any IV solution administered with very similar physiologic plasma osmolarity and solute concentrations. <ul style="list-style-type: none"> • Examples of balanced chloride-restricted solutions include: Lactated Ringer's and Plasma-lytes. • Example of unbalanced solutions: 0.9% Na+Cl- solution (normal saline).
	Criteria	Indicate whether the IV solutions administered as maintenance infusion were isotonic and chloride-restricted. <ul style="list-style-type: none"> • Yes: If the patient received IV solutions that were isotonic AND chloride-restricted • No: If the patient received IV solutions that were not isotonic AND chloride-restricted
	Options	<ul style="list-style-type: none"> • Yes • No
Duration of Surgery	Intent of Variable	To capture the time required to complete the procedure.
	Definition	Elapsed time between skin incision and skin closure.
	Criteria	Time required to complete surgery.
	Options	Elapsed time expressed in minutes.
Fluid Balance	Intent of Variable	To capture the fluid balance of the patient.
	Definition	Absolute difference between fluid input and output (measurable losses). Inputs include: any IV fluids administered, blood products. Outputs include: urine output, estimated blood loss, other outputs (e.g. gastrointestinal loss).
	Criteria	Fluid balance calculated by subtracting the total output from the total input.
	Options	Fluid balance (negative or positive) expressed in ml or L.

Optional Process Variables

Optional Fluid Management Variables (Continued)		
Variable Name		
Advanced Hemodynamic Monitoring	Intent of Variable	To capture whether advanced hemodynamic monitoring was used during the procedure.
	Definition	Serial assessment of hemodynamic variables that include, but are not limited to, CO, SV, systemic vascular resistance, and dynamic indices (e.g., pulse pressure variation, SVV). Heart rate and blood pressure monitoring (invasive or non-invasive) are not considered advanced monitoring.
	Criteria	Indicate whether an advanced hemodynamic monitor was used during the procedure: <ul style="list-style-type: none"> • Yes: An advanced hemodynamic monitor was used during the procedure • No: An advanced hemodynamic monitor was not used during the procedure
	Options	<ul style="list-style-type: none"> • Yes • No
Use of Volumetric Pumps	Intent of Variable	To capture whether volumetric pumps were used to administer IV fluids as maintenance infusion, to ensure that IV fluids will be administered in controlled amounts.
	Definition	Volumetric pumps were used for the administration of IV fluids as maintenance infusion.
	Criteria	Indicate whether a volumetric pump was used during the procedure: <ul style="list-style-type: none"> • Yes: A volumetric pump was used during the procedure to administer IV fluids • No: A volumetric pump was not used during the procedure to administer IV fluids
	Options	<ul style="list-style-type: none"> • Yes • No

Optional Process Variables

Optional Multi-Modal Pain Management Variables		
Variable Name		
Open or Laparoscopic	Intent of Variable	To capture whether the gynecologic surgery performed was open or laparoscopic.
	Definition	An open procedure involves a large surgical incision in the abdomen (often vertical median incision). A laparoscopic procedure involves numerous smaller incisions and the use of a laparoscope.
	Criteria	Specify whether a patient underwent an open or laparoscopic procedure: <ul style="list-style-type: none"> • Open: The patient underwent an open surgical procedure • Laparoscopic: The patient underwent a laparoscopic surgical procedure +/- Pfannenstiel incision
	Options	<ul style="list-style-type: none"> • Yes • No
Epidural Anesthesia	Intent of Variable	To capture whether epidural anesthesia was used.
	Definition	A thoracic epidural is placed between the T9-T12 levels and is used for infusion of anesthetics or opioids (e.g., bupivacaine, lidocaine, mepivacaine, fentanyl, morphine) into the epidural space for pain control during surgery. Epidural anesthesia is recommended in open surgeries, surgeries where there is a high risk of conversion from laparoscopic to open, and for patients at high risk of pulmonary complication.
	Criteria	Specify whether patient received epidural anesthesia: <ul style="list-style-type: none"> • Yes: The patient received epidural anesthesia • No: The patient did not receive epidural anesthesia
	Options	<ul style="list-style-type: none"> • Yes • No

Optional Process Variables

Optional Multi-Modal Pain Management Variables (Continued)		
Variable Name		
Intraoperative Nerve Trunk Blocks	Intent of Variable	To capture whether the patient received intraoperative nerve trunk blocks.
	Definition	<p>Nerve trunk blocks are performed under ultrasound guidance, where local anesthetic (e.g. ropivacaine, bupivacaine) is injected to anesthetize the nerves supplying the anterior abdominal wall (T6 to L1). Intraoperative trunk blocks are recommended for laparoscopic surgery and administered as either:</p> <ul style="list-style-type: none"> • Single shot: TAP, RS, SAB +/- opioid, wound infiltration. • Continuous block: TAP/RS catheter, pre-peritoneal wound catheter infiltration.
	Criteria	<p>Specify whether patient received intraoperative trunk blocks:</p> <ul style="list-style-type: none"> • Yes: The patient received either single shot: TAP, RS, SAB, wound infiltration OR continuous block: TAP/RS catheter, peritoneal wound catheter infiltration • No: The patient did not receive either single shot: TAP, RS, SAB, wound infiltration OR continuous block: TAP/RS catheter, peritoneal wound catheter infiltration
	Options	<ul style="list-style-type: none"> • Yes • No

Optional Process Variables

Optional Multi-Modal Pain Management Variables (Continued)		
Variable Name		
Intraoperative Multimodal Analgesia and Adjuvants	Intent of Variable	To capture whether patient received intraoperative multimodal analgesia and adjuvants.
	Definition	Minimizing opioid analgesia reduces the adverse effects of opioid use during and after surgery. Examples of adjuvants include IV infusions of lidocaine, ketamine, +/- magnesium sulfate, +/- clonidine or dexmedetomidine
	Criteria	Indicate whether intraoperative multimodal analgesia and adjuvants were used: <ul style="list-style-type: none"> • Yes: The patient received either IV lidocaine, ketamine, magnesium sulfate, clonidine OR dexmedetomidine intraoperatively • No: The patient did not receive either IV lidocaine, ketamine, magnesium sulfate, clonidine OR dexmedetomidine intraoperatively
	Options	<ul style="list-style-type: none"> • Yes • No
Use of Intraoperative Nociception Monitors	Intent of Variable	To capture whether intraoperative nociception monitors were used.
	Definition	A device used to monitor the sympathetic response to the surgical noxious stimuli.
	Criteria	Indicate whether a nociception monitor was used: <ul style="list-style-type: none"> • Yes: A nociception monitor was used • No: A nociception monitor was not used
	Options	<ul style="list-style-type: none"> • Yes • No

Data Collection and Measurement

1. Canadian Patient Safety Institute (CPSI). Prevent surgical site infections: Getting started kit. <https://www.patientsafetyinstitute.ca/en/toolsResources/Pages/SSI-resources-Getting-Started-Kit.aspx> (Accessed February 25, 2019)
2. Gustaffson UO, Hausel J, Thorell A, Ljungvist O, Soop M, Nygren J. Adherence to the enhanced recovery after surgery protocol and outcomes after colorectal cancer surgery. *Arch Surg.* 2011;146(5):571-7.

Template for Physician Order Set

Enhanced Recovery After Gynecologic Surgery Preoperative Medication Orders

Patient Name	
Healthcare Number	
Date of Birth	

Allergies

Preoperative Clinic

- Patients undergoing elective gynecologic surgery should not receive a bowel preparation. For complex procedures where a colon resection may be required in conjunction with the gynecologic procedure, a MBP plus oral antibiotics should be considered.
- Routine carbohydrate loading in the immediate preoperative period is recommended, though there is no consensus regarding the optimal regimen and formulation.

Day of Surgery

- 50 g Maltodextrin consumed over five (5) minutes, two (2) hours prior to surgery (excluding specific patient populations - refer to Fluid Management Clinical Pathway)
- IV antibiotics administered within 60 minutes before incision
- Pharmacological thromboprophylaxis with LMWH
- 1 x preoperative dose of acetaminophen and a NSAID such as celecoxib or ibuprofen, unless contraindicated.

If opioid-tolerant:

- Regular dosing of opioids
- Gabapentanoids

Template for Physician Order Set

Enhanced Recovery After Gynecologic Surgery Preoperative Medication Orders

Patient Name	
Healthcare Number	
Date of Birth	

Allergies

Surgical Clinic or Surgeon's Office

- Thorough, evidence-informed preoperative assessment, including cardiorespiratory status, frailty, risk of thrombosis and bleeding, diabetes, etc.
- Patient and Family Education regarding:
 - Achieving milestones and the patient's role in the recovery process.
 - Discharge criteria.
 - Nutrition and surgery milestones – adequate food intake, optimization of nutrition status, hydration.
 - Early and progressive mobilization after surgery and negative impacts of immobility.
 - Opioid sparing analgesia - pain management expectations, modalities of pain control, risks of opioid medications, optimal analgesia for functional recovery, transition to oral analgesics.
- Screening for nutritional risk (e.g. CNST):
 - If patient at risk for malnutrition, send consult for assessment by dietitian.
 - If dietitian identifies patient as malnourished, individualized treatment plan commenced.
- Identify smokers and high-risk drinkers via self-reporting:
 - Educate regarding 4-week abstinence from smoking and alcohol.
 - If available, offer access to intervention program.
- If necessary, attempt to correct anemia

Preoperative Clinic

- If not conducted previously, a thorough, evidence-informed preoperative assessment, including cardiorespiratory status, frailty, risk of thrombosis and bleeding, diabetes, etc.
- Screening for anxiety (e.g., GAD-7, HADS).
- Screening for opioid tolerance. Take detailed history of medications and doses.
- Screening for risk factors of PONV (Apfel Scoring System).
- Instructions regarding preoperative fasting:
 - Patients should be encouraged to eat a normal meal the night before and a light snack up until six (6) hours before anesthesia (if no MBP); and drink clear fluids for up to two (2) hours before the induction of anesthesia. A light snack is a non-fatty meal such as dry toast.
 - If increased risk of aspiration identified, diet restrictions extended.
 - Role of preoperative carbohydrate drinks.
 - Potential harm from prolonged preoperative fasting.
- Review of patient and family education, as per information delivered in surgeon's clinic or office.
- Instructions regarding bathing with chlorhexidine soap or regular soap the night before and the morning of surgery.
- A multimodal pain management plan with active strategies to minimize the use of opioids should be developed, covering all phases of perioperative care.

Template for Physician Order Set

Enhanced Recovery After Gynecologic Surgery Preoperative Medication Orders

Patient Name	
Healthcare Number	
Date of Birth	

Allergies

Day of Surgery

- Patients should be encouraged to eat a normal meal the night before surgery and have a light snack up until six (6) hours before anesthesia (if no MBP); and drink clear fluids for up to two (2) hours before the induction of anesthesia.
- Intermittent pneumatic compression device applied.
- Measure patient weight with the patient wearing surgical gown.

In Operating Suite

- During Safe Surgery Checklist, the multidisciplinary team should discuss the type of surgery, risk of opening (if applicable), location and length of incisions, potential complications.

Fluid Management

- IV fluid maintenance with balanced crystalloid solution, via volumetric pump, to ensure water and electrolyte homeostasis with the goal of achieving 1.5 to 2.0 L positive fluid balance at the end of surgery (6-8 ml/kg/hr).
- Goal-directed volume therapy to replace intravascular loss:
 - Replace fluid loss with crystalloids or colloids and determine the absolute amount based on hemodynamic response.
 - Advanced hemodynamic monitoring (SVV, PPV, SV, CO, VTI and ETCO₂) should be used for high-risk patients and/or for major surgeries associated with large amounts of blood loss or fluid shifts.
 - Replace urine output and gastrointestinal loss (if measurable) with balanced crystalloids.

Pain Management

- If anxiety identified, order single dose short-acting anxiolytic to be administered prior to epidural placement.

For laparoscopic surgery:

- General anesthesia with consideration for TIVA (IV propofol with depth of anesthesia monitor).
- Adjuncts to TIVA to be considered:
 - Dexmedetomidine 0.3-0.7 mcg/kg/hr IV (with or without loading dose of 1 mcg/kg/hr over 10 minutes).
 - Ketamine 25-100 mcg/kg/hr.
 - Lidocaine 0.5-1.5 mg/kg/hr (only if regional techniques or epidural are not being used).
- Short acting anesthetic agents (e.g. sevoflurane, desflurane, nitrous oxide) should be used if TIVA not performed.
- Regional analgesia techniques should be considered:
 - Single shot or continuous infusion via catheter: transversus abdominis plane (TAP), rectus sheath, or wound infiltration with local anesthetics.

Template for Physician Order Set

Enhanced Recovery After Gynecologic Surgery Preoperative Medication Orders

Patient Name	
Healthcare Number	
Date of Birth	

Allergies

For open surgeries:

- General anesthesia with consideration for TIVA.
- Spinal anesthesia (local anesthesia +/- intrathecal morphine) may be used in combination with general anesthesia for sub-umbilical open procedures.
- Consider combined general and epidural anesthesia for more extensive incisions, or in patients with significant chronic lung disease affecting their functional capacity or a history of significant chronic pain.
 - If the epidural is unsuccessful or contraindicated, then TAP blocks or a continuous IV lidocaine infusion should be considered.

VTE Prophylaxis

- Postoperative chemoprophylaxis should begin within 24 hours of surgery, unless surgically contraindicated.
- Extended prophylaxis with LMWH should be considered, with consideration for extended duration (4 weeks) in patients with high risk ACCP criteria
- Intermittent pneumatic compression

Nausea Management

Using Apfel Scoring System:

- Patients with 1 - 2 risk factors, use two (2) drugs in combination using front-line antiemetics (e.g. dopamine antagonists, serotonin antagonists and corticosteroids)
- Patients with ≥ 2 risk factors, use multimodal PONV prophylaxis

Pain Management

- Acetaminophen 1000 mg PO every six (6) hours (maximum from all sources 4000 mg in 24 hours)
- NSAIDs x 72 hours (risk of leakage in oncology patients may preclude use of NSAIDs)
- If non-opioid medications insufficient, administer oral opioids for breakthrough pain relief
- If IV or subcutaneous opioids necessary, carefully titrate for lowest effective opioid dosage

If patient opioid-tolerant:

- Continue preoperative opioid regime
- Refer to Acute Pain Management Services

If epidural placed prior to OR (e.g. extensive incision, high risk of pulmonary complications or chronic pain):

- Bupivacaine (0.05%) +/- low dose opioids (e.g. fentanyl 2 mcg/ml or morphine 5-10 mcg/ml) at 5-14 ml/hr. Adjust rate to optimize analgesia and minimize motor blockade.
- Low doses of opioids can be added to the epidural (e.g. fentanyl 2 mcg/mL or morphine 5-10 mcg/mL); rate between 5-14 ml/hr based on local anesthetic concentration used in the solution.
- If utilized, TEA should be assessed daily and weaned 24 hours prior to planned discharge to allow for smooth transition to oral analgesics.

(Pain Management continued on the next page)

Template for Physician Order Set

Enhanced Recovery After Gynecologic Surgery Preoperative Medication Orders

Patient Name	
Healthcare Number	
Date of Birth	

Allergies

If no epidural placed prior to OR, can consider:

- Single shot or continuous infusion abdominal trunk blocks
- Continuous IV lidocaine for 24-48 hours postoperatively or low dose IV ketamine infusion
- Continuous wound infiltration (if lidocaine not used)

Patient's Reconciled Home Medications

- _____
- _____
- _____
- _____
- _____
- _____
- _____
- _____
- _____
- _____

Admission Information

- Unit of Admission: _____ Physician: _____
- Diagnosis: _____
- Expected Length of Stay: _____

Consults

- Various physician specialties, as clinically appropriate
- Various allied health disciplines, as clinically appropriate
- Other: _____

Template for Physician Order Set

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Allergies

Diet and Nutrition

- Encourage oral fluids on admission to surgical unit (minimum 25 – 30 ml/kg/day)
- Advance diet as tolerated, offer solid food at least by POD 1
- Food intake self-monitoring by patient
- High protein ONS (60 ml) administered up to x 4/day with medications
- If patient consuming less than 50% of meals x 72 hours, send consult to dietitian

If patient identified as malnourished prior to admission:

- High protein, high energy diet
- Consult to dietitian
- Other: _____

Activity

- Encourage early mobilization throughout inpatient stay
- Deep breathing and coughing exercises
- Foot and ankle pumping, and quadriceps exercises every hour while awake
- POD 0, mobilize to chair or walk short distance with assistance from ward staff
- Starting POD 1, out of bed as much as tolerated and ambulate at least x 3/day
- If mobility issues identified, send consult to physiotherapy
- Other: _____

Vitals / Monitoring

- Temperature, heart rate, respiratory rate, blood pressure, oxygen saturation monitoring as per institutional policies
- Fluid balance, including oral fluid intake, as per institutional policies
- Blood glucose maintained between 6-10 mmol/L
- Daily weight measurements on POD 1 and POD 2
- Other: _____

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Allergies

Urinary Catheterization

- Urinary catheter to straight drainage.
- Discontinue urinary catheter immediately after minimally invasive gynecologic surgery, or within 6 hours after uncomplicated abdominal hysterectomy.
- Urinary catheters should be removed on POD 1 after debulking surgery for gynecologic malignancies in the absence of specific indications for prolonged urinary catheter use (e.g. partial bladder resection).
- If trial of void failed, intermittent catheterizations should be considered with elective surgery.
- Other: _____

Laboratory Investigations

- As per individual patient requirements based on history and clinical presentation

Wound Care

- Postoperative dressing monitoring and changes as per institutional policies
- Other: _____

IV Therapy

- Discontinue continuous IV fluids at the end of surgery, or at least by POD 1, when patient tolerating oral fluids and in absence of physical signs of dehydration or hypovolemia
- Prior to administration of IV fluid bolus, give consideration to all possible causations of clinical anomalies (e.g. hypotension, tachycardia, oliguria)
- If patient is anticipated to be fluid responsive, IV fluid bolus of 5 ml/kg of isotonic fluids can be administered over 15 - 30 minutes
- If patient not tolerating oral fluid intake, maintenance infusion of 1.5 ml/kg/hr of IV fluids should be started, and reassessed regularly
- Other: _____

Other Medical Orders

- _____
- _____
- _____
- _____
- _____
- _____
- _____
- _____



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