iERAS Implementation of an Enhanced Recovery After Surgery Program

Summary of Enhanced Recovery after Surgery Guideline Recommendations

1. Preoperative Care

1.1 Preoperative Information and Counseling

1.1.1 For patients who do not have postoperative complications and have no other co-morbidities or issues which would affect length of stay, the target for the duration of stay for those having colon operations is 3 days and for rectal operations (anastomosis below the peritoneal reflection) is 4 days

1.1.2 Patients should receive information on approximate length of stay; preoperative fasting and carbohydrate loading; pain control; early ambulation; postoperative feeding/ileus; time of catheter removal; and gum chewing

1.1.3 Patients should also receive information on smoking cessation

1.1.4 Patients and their families should receive oral information, as well as the patient education booklet

1.1.5 The booklet should be given to patients in the surgeon's office. The surgeon should inform the patient to bring the booklet with them every time they come to the hospital, including their preoperative appointment and the day of their surgery

1.1.6 Nurses in the Pre-Admission Unit as well as on the Surgical Floor should be familiar with the booklet to assist the patients in answering any questions

1.1.7 Patients should be instructed to bring 2 packages of gum to the hospital

1.2 Reduced Fasting Duration

For patients who are undergoing elective colorectal surgery and a significant delay in gastric emptying is not suspected

1.2.1 Patients should be allowed to eat solid foods until 12 midnight and clear liquids until 2 to 3 hours before surgery or until they leave for the hospital (Level of evidence: High)

1.2.2 Patients should be encouraged to drink a suitable carbohydrate rich drink, up to 800 mL at bedtime the night before surgery and 400 mL until 2 to 3 hours before surgery or until they leave for the hospital (Level of evidence: Moderate-Low)

1.3 Mechanical Bowel Preparation (refer to BPIGS Guideline #2 at www.bpigs.ca)

1.3.1 All OPEN AND LAPAROSCOPIC procedures including segmental resections, APR, TPC, IPAA, etc. but EXCLUDING LAR with/without diverting stoma

- No dietary restrictions
- No MBP
- Fleet enema for patients having a left sided anastomosis where a stapler will be passed per anus

1.3.2 OPEN OR LAPAROSCOPIC low anterior resections (LAR) with/without diverting stoma
LAR is defined as a rectal resection where the anastomosis is at or below the peritoneal reflection

- No dietary restrictions prior to MBP; clear fluids after MBP completed
- MBP

2. Intraoperative Care

2.1 Surgical Site Infection Prevention (refer to BPIGS Guideline #1 at www.bpigs.ca)

2.1.1 Antibiotics Prophylaxis

- Antibiotics should be given within one hour prior to incision (infusion of vancomycin should be started more than 1 hour prior to incision because it requires infusion over 60 minutes)
- For operative procedures >3 hours, antibiotics should be re-dosed (see Table)
- Antibiotics should not be given postoperatively

Indication	**Regimen (no β-lactam allergy)**	**Regimen (β -lactam allergy)**
Gastroduodenal/Esophageal (includes bariatric surgery)	**cefazolin***	**vancomycin & gentamicin**
	Dose: **2 g IV**	**Dose:** **vancomycin: 1 g IV** **gentamicin: 1.5-2 mg/kg IV**
Biliary/Pancreas/Liver**	**cefazolin***	**vancomycin & gentamicin**
	Dose: **2 g IV**	**Dose:** **vancomycin: 1 g IV** **gentamicin: 1.5-2 mg/kg IV**
Low Risk Laparoscopic Cholecystectomy (i.e. no jaundice, age<70 yrs, non-diabetic, no acute inflammation)	**No prophylaxis**	
Breast/Hernia/Thyroid/Parathyroid	**cefazolin***	**vancomycin**
	Dose: **2 g IV**	**Dose:** **vancomycin: 1 g IV**
Colon, Rectum, Small Bowel and Non-Perforated Appendicitis**	**cefazolin* &** **metronidazole**	**metronidazole & gentamicin**
	Dose: **metronidazole: 500 mg IV** **cefazolin*: 2 g IV** **gentamicin: 1.5-2 mg/kg IV**	**Dose:** **metronidazole: 500 mg IV** **gentamicin: 1.5-2 mg/kg IV**
Low Risk Anorectal Procedures (i.e. hemorrhoidectomy, fistulotomy and sphincterotomy for fissure)	**No prophlaxis**	
*** For patients with known colonization with MRSA, vancomycin should be substituted for cefazolin**		
**** Patients who have been on antibiotics preoperatively (e.g Crohn's patients) or have had instrumentation of their biliary tree should also receive gentamycin**		

Intraoperative Antimicrobial Re-Administration Guidelines for Operations Lasting > 3 hours

Antimicrobial	Recommended Dosing Interval
cefazolin 1 g IV	q3h
gentamicin dosed at 2mg/kg	q6h
metronidazole	q8h
vancomycin	q12h
clindamycin	q8h

2.1.2 Choice of Skin Preparation

- Patients undergoing general surgical procedures should be prepped with chlorhexidine gluconate (2% chlorhexidine gluconate and 70% isopropyl alcohol)
- Prevent pooling of chlorhexidine gluconate on drapes and patient and allow the antiseptic solution time to dry completely (~ 3 minutes)

2.1.3 Perioperative Normothermia

- Patients undergoing surgery where the abdominal cavity is entered should have active measures such as warmed intravenous fluids, inspired gases, as well as forced air warming undertaken to maintain core temperature between 36.0 and 38.0° C

2.2 Thromboprophylaxis (refer to BPIGS Guideline # 3 at www.bpigs.ca)

2.2.1 For patients having surgery, administer thromboprophylaxis at the 'time out', and between 10:00-12:00 daily thereafter
For patients admitted through the ER, administer thromboprophylaxis on admission
For all patients, continue thromboprophylaxis until discharge

2.2.2 Low risk patients
Includes: patients who are having outpatient surgery, minor procedures (anorectal procedures, inguinal hernia repairs, elective laparoscopic cholecystectomy, or breast surgery) and who have no additional thromboembolic risk factors

- No thromboprophylaxis is required

2.2.3 All other patients having elective or emergency abdominal surgery
Includes: patients having open or laparoscopic abdominal procedures for benign or malignant disease, irrespective of their age or other risk factors for VTE

- Lovenox (enoxaparin) 40 mg subcu q 24 hr OR Fragmin (dalteparin) 5000 units subcu q 24 hr*
- For patients at high risk for bleeding, where anticoagulation prophylaxis is contraindicated, bilateral well measured below knee support stockings or surgical compression devices should be used.
- Patients should be reassessed daily and converted to LMWH when the risk of bleeding is decreased

2.2.4 All general surgery patients admitted with acute abdominal conditions treated non-operatively or for observation prior to surgery
Includes: patients admitted with acute abdominal conditions who are treated non-operatively or for observation prior to an operation

- Lovenox (enoxaparin) 40 mg subcu q 24 hr OR Fragmin (dalteparin) 5000 units subcu q 24 hr*

* See dose adjustment recommendations by weight

2.2.5 Special Circumstances:

2.2.5.a Patients having elective or emergency abdominal surgery after 6 PM

- Give half of the regular dose of LMWH preoperatively:
- Lovenox (enoxaparin) 20 mg OR Fragmin (dalteparin) 2500 units*
- Administer full dose next day between 10:00-12:00

2.2.5.b Adjustment of thromboprophylaxis according to weight*

Wt (kg)	Enoxaparin	Dalteparin
<50	30 mg QD	2,500 U QD
50-100	40 mg QD	5,000 U QD
100-125	40 mg BID	5,000 U BID
125-150	60 mg BID	7,500 U BID
150-200	80 mg BID	10,000 U BID

2.2.5.c Patients having an epidural catheter

- Epidural catheter should be inserted before surgery
- The first dose of thromboprophylaxis can be given 2-8 hrs after the epidural catheter is inserted provided it has not been a traumatic insertion:
- Lovenox (enoxaparin) 40 mg OR Fragmin (dalteparin) 5000 units*
- Epidural catheter should be removed between 8 and 10 AM (ie: 20-24 hours after the last dose of LMWH)
- Prophylaxis can be restarted 2 hours following removal
- In obese patients where BID LMWH is recommended, decisions about whether a patient should have an epidural catheter should be individualized and the risks and benefits of an epidural catheter should be discussed with the patient

2.2.5.d Patients with renal dysfunction

- Lovenox (enoxaparin) should be decreased to 30 mg q 24 hr in individuals with a creatinine clearance less than 30 cc/min
- No dose modification is required for individuals receiving Fragmin (dalteparin)

2.2.5.e Patients at very high risk of VTE

- Consideration may be given to patients who have major cancer operations or have multiple risk factors to receive LMWH up to 28 days following discharge from hospital

2.3 Intraoperative Fluid Management

Patients should have goal directed fluid management

2.4 Avoidance of Prophylactic Abdominal Drains

2.4.1. The use of prophylactic abdominal drains should be avoided following elective colorectal surgery (Level of evidence: High)

2.4.2. Prophylactic drains may be used following abdominoperineal resection (Based on consensus only)

2.5 Avoidance of Prophylactic Nasogastric Tubes

Prophylactic use of nasogastric tubes for decompression should be avoided. (Level of evidence: High)

3. Postoperative Care

3.1 Early Mobilization

Patients who undergo elective colorectal surgery should be encouraged to participate in early mobilization

3.1.1 Patients should dangle their legs on the day of surgery

3.1.2 Patients should eat all of their meals in a chair beginning POD 1

3.1.3 Patients should ambulate every 4 to 6 hours each day while they are awake until discharge beginning POD 1 (Level of evidence: Moderate)

3.2 Postoperative Fluid Management

3.2.1. Patients who do not have adequate oral intake should receive not more than 75 mL/hr of 2/3-1/3 with 20 mEq potassium/day, or a similar rate using a balanced salt solution if electrolyte replacement is required. The routine use of saline is to be discouraged (Level of evidence: Moderate-Low)

3.2.2. Postoperatively, volume status should be assessed before fluid boluses are given. Boluses should not be given because of low urine output or low blood pressure alone. Instead, the

blood pressure, heart rate, urine output and mental status of patients should all be considered. In addition, the preoperative blood pressure should be considered when making decisions about the postoperative volume status (Level of evidence: Moderate-Low)

3.3 Early Enteral Feeding

3.3.1. Patients should be offered sips of clear fluid 2 hours postoperatively provided they are awake, alert and capable of swallowing (Level of evidence: Moderate-Low)

3.3.2. Patient controlled diet should be encouraged: patients should be offered a regular diet beginning postoperative day 1 and patients should be allowed to decide what and how much they want to consume each day (Level of evidence: Moderate)

3.3.3. Patients should be encouraged to bring dry food from home

3.4 Use of Chewing Gum to Reduce Postoperative Ileus

The use of chewing gum should be encouraged starting on postoperative day 1. Each patient should chew one stick of gum, for at least 5 minutes, ≥ 3 times per day (Level of evidence: Moderate-High)

3.5 Optimal Duration of Urinary Drainage

3.5.1 All patients undergoing surgery with a low colorectal anastomosis or coloanal anastomosis (≤6 cm the anal verge) should have their urinary catheter removed within 72 hours after the surgery (Level of evidence: High)

3.5.2 For patients undergoing some colon resections, it may be appropriate to not insert a urinary catheter. If patients do require a urinary catheter it should be removed within 24 hours after the surgery (Level of evidence: High)

3.5.3 The above recommendations apply to patients with or without an epidural catheter at the time of removal (Level of evidence: Moderate-High)

3.5.4 The above recommendations do not apply if a catheter is needed for monitoring purposes (Level of evidence: Moderate-Low)

Perioperative Pain Management Summary of Reccomendations

1. Preoperative

1.1 A single 1000 mg dose of acetaminophen is recommended to be given preoperatively in open and laparoscopic colorectal surgical procedures (Level of evidence: Low)

1.2 A single 300 mg dose of gabapentin should be given be should be given preoperatively in open and laparoscopic colorectal surgical procedures (Level of evidence: Moderate)

2. Intraoperative

2.1 Thoracic epidural analgesia (TEA) at level T6-9 with a combination of local anaesthetic and opioid as a continuous infusion should be considered for all patients having open colorectal surgery and for patients having laparoscopic surgery who are at high risk pulmonary morbidity. TEA should be inserted preoperatively (Level of evidence: High)

2.2 Intraoperative lidocaine infusion bolus of 100 mg prior to the incision and then 1-2 mg/kg/hour continuous infusion is recommended for patients having laparoscopic colorectal surgery, or open colorectal surgery cases where a TEA is contraindicated or declined. Intravenous lidocaine can be continued in the PACU where patients can be monitored but should be discontinued before discharge to the ward (Level of evidence: High)

3. Postoperative

Patients having open or laparoscopic colorectal surgery should receive a multimodal analgesia package of:

3.1 Acetaminophen 1000 mg given orally every 6 hours for 72-96 hours (Level of evidence: Low)

3.2 Prescription Post-operative celecoxib 400 mg initial dose followed by 200 mg bid for 5 days is recommended in patients having a colorectal resection where NO anastomosis is performed (for example, abdominal perineal resection) and where no contraindications to its use are present.

3.2b There is inconclusive evidence about an increased risk of anastomotic leaks in patients who receive perioperative NSAIDS. However, there is some evidence linking perioperative NSAID use and anastomotic leak in patients having a colorectal resection. Thus, for patients having a colorectal resection WITH anastomosis, celecoxib (or other NSAIDS) should only be prescribed with the agreement of the surgeon, and following discussion between the surgeon and the pain team/anesthesiologist, concerning the relative risks and benefits of NSAIDS for that particular patient. (Level of evidence: Moderate)

And one of following alternatives:

3.3 Thoracic epidural analgesia (TEA) at level T6-9 with a combination of local anaesthetic and opioid as a continuous infusion should be considered for all patients having open colorectal surgery and for patients having laparoscopic surgery who are at high risk pulmonary morbidity. TEA should be continued postoperatively for 48-72 hours (Level of evidence: High)

3.4 In patients where TEA is contraindicated or declined, IV Patient Controlled Analgesia (PCA) should be given as part of a multimodal analgesia package. Alternately, oral sustained release opioids may be given in addition to or instead of PCA to increase duration of analgesia and sleep (Level of evidence: Moderate)