Enhanced Recovery Initiative

On February 14, 2012, the Colon and Rectal Surgery Service at St Joseph Mercy Hospital, Ann Arbor, launched the Enhanced Recovery Initiative, a collection of evidence-based interventions that improves patient outcomes, decreases complications, and decreases hospital length of stay. The Initiative is composed of 17 parts, some of which are a departure from traditional surgical care, and all of which are designed to bring health care providers and patients together in the recovery process.

A multidisciplinary committee representing Colon and Rectal Surgery, Anesthesiology, Pharmacy, Nursing (preoperative, operative, recovery room, inpatient care units), Nutrition, Social Work, Physical Therapy, Enterostomal Nursing, Case Management, Home Care, and Hospital Administration met for 8 months to review the evidence-based literature and to prepare implementation of the Enhanced Recovery Initiative. By communicating from the initial office visit, Enhanced Recovery is multidisciplinary care that unites caregivers and patients in a solitary recovery effort. In addition to learning about the disease process and treatment options, patients learn prior to hospital admission about expectations and milestones from admission to discharge, thereby allowing them to track their progress and participate in their own recovery.

1) Preadmission Patient Education and Counseling

Patient education prior to colon and rectal surgery is now far more than a conversation regarding disease process, treatment options, risks and benefits. At the initial office visit, patients not only schedule their surgery but also schedule a meeting with the Nurse Navigator who discusses and reviews expectations and milestones from the day before surgery to the office visit after discharge and everything in between. Malnourished patients and patients who need performance status upgrades are identified and interventions designed to improve operative risk prior to surgery. These proactive educational endeavors allow the patient and supporting relative/friend to participate in their recovery and are key components of the Enhanced Recovery Initiative.

2) Mechanical Bowel Preparation

Based on recent Surgical Care Improvement Project (SCIP) recommendations, oral antibiotics are now a routine part of bowel preparation at our institution (http://www.premierinc.com/safety/topics/scip/). Some patients may not need a bowel prep.

3) Carbohydrate Loading

The tradition of instructing patients to fast after midnight has been challenged by data which suggest that clear liquids up to 2 hours before surgery does not risk aspiration and that
carbohydrate beverages before midnight and up to 2 hours before surgery may decrease nitrogen and protein losses and insulin resistance, maintain lean body mass and muscle strength, decrease catabolism and morbidity, and decrease recovery time and hospital length of stay. Our patients are instructed in carbohydrate loading to improve the recovery process.

4) Standardized Anesthetic Methods

Avoiding narcotic opioids and long-acting sedatives and hypnotics may allow patients to get out of bed sooner because they will have less narcotic-related mental status impairment. They may also tolerate liquids and diets sooner because they will have less nausea and decreased postoperative ileus (opioids cause ileus), allowing earlier recovery and shorter hospital length of stay. Epidural analgesia with "caine" derivatives (benzocaine, for example) is administered with catheters placed in the midthoracic (T7/8) region prior to surgery. Epidural analgesia blocks operative stress hormone release and attenuates postoperative insulin resistance, allowing reduced doses of general inhalation anesthetics, and allowing earlier patient mobilization and feeding due to better pain control and lesser doses of narcotic opioids. There are many anesthetic options and some patients benefit from analgesic injection into the abdominal wall (TAP Block). This may contribute to earlier recovery and decreased hospital length of stay.

5) Thromboembolism Prophylaxis

Sequential Compression Device stockings and prophylactic subcutaneous heparin are used routinely at our institution. We are also looking at data suggesting that colorectal cancer and inflammatory bowel disease patients should be anticoagulated for 6 weeks after surgery.

6) Antibiotic Prophylaxis

Antibiotic prophylaxis is standard and based on Surgical Care Improvement Project measures. Patients receive cefazolin and metronidazole in the preoperative area. Those with penicillin allergies receive ciprofloxacin instead of cefazolin.

7) Pain Management

Pain control is a critical component of surgical patient care, and an intervention that may benefit from standardization. Patients receive either epidural analgesia, TAP blocks, or patient-controlled intravenous analgesia. Once patients tolerate oral fluids (often by the first postoperative day), they then transition to oral pain medications. A detailed pain medication algorithm has been developed through the cooperative efforts of Anesthesia and Pharmacy to provide an effective pain management program.

8) Prevention of Postoperative Nausea and Vomiting
Postoperative nausea and vomiting may be a significant problem for many patients. The Enhanced Recovery Initiative calls for the prevention of nausea and vomiting by the administration of dexamethasone early in surgery and zofran® (ondansetron) toward the end of surgery. Those with nausea and vomiting risk factors may receive a scopolamine patch.

9) Minimally Invasive Surgery

Laparoscopic and robotic surgery have the advantages of shorter incisions, less injury to tissue, less blood loss, less postoperative pain, less major morbidity, quicker return of bowel function and resumption of regular diet, shorter hospital stays, quicker recovery time, and quicker return to normal activities when compared to open surgery. Enhanced recovery protocols may benefit both open and minimally invasive patient populations.

10) Normothermia

Maintaining normal body temperature and preventing hypothermia by the use of warming blankets and/or forced air heating reduces coagulopathies, cardiac complications, and surgical site infections. The routine use of Bair Huggers® on the patient’s chest and upper extremities, along with standardized temperature monitoring by anesthesia caregivers, has largely eliminated hypothermia in elective colon and rectal surgery at our institution.

11) Euglycemia

Maintaining normal blood glucose may decrease surgical site infections. The monitoring and maintenance of normal blood glucose levels was one of seven Surgical Care Improvement Project initiatives applied to the perioperative period.

12) Perioperative Fluid Management

It was traditional to administer 3-7 liters of crystalloid fluid during an elective colon and rectal operation to make up for fluid losses outside the vascular system and to account for perceived fluid loss from the mechanical bowel preparation. Studies have shown that liberal intraoperative fluid administration leads to postoperative ileus, perhaps by increasing the amount of 3rd space fluid in the bowel wall, thereby impairing bowel motility. Liberal fluid administration may also adversely affect wound and anastomotic healing, all of which may lead to longer hospital stays. The recent trend toward goal directed fluid administration, often less than 2 liters per case, may decrease postoperative ileus and other surgical complications and is now being embraced by anesthesia caregivers. We are also evaluating the role of a finger cuff that measures beat-to-beat blood pressure, heart rate, stroke volume, and stroke volume variance in an effort to optimize fluid administration in this patient population.

13) Early Removal of Urinary Catheters
Traditional duration of indwelling urinary catheter use was 2-5 days. Our Enhanced Recovery Initiative mandates the removal of urinary catheters on postoperative day 1. This practice may lead to a decrease in the incidence of urinary tract infections.

14) Prevention of Postoperative Ileus

Enhanced Recovery Initiative items thought to help prevent postoperative ileus (the inhibition of gut motility) include:
   a) midthoracic epidural analgesia
   b) avoiding traditional large volumes of intraoperative intravenous fluid
   c) avoiding long acting opioids and sedatives
   d) minimally invasive surgery (when possible)
   e) alvimopan

Alvimopan (Entereg®) is a mu-opioid receptor antagonist which decreases postoperative ileus by promoting gastrointestinal motility. This medication was introduced to our Colon and Rectal Surgery service on a trial basis. Data collected from our institution and other hospitals in the Michigan Surgical Quality Collaborative (MSQC) demonstrated that oral alvimopan decreased postoperative ileus and hospital length of stay in both open and minimally invasive colon and rectal surgery patients. It is now routinely administered to patients just prior to surgery.

15) Early Postoperative Feeding

Starting liquids by mouth on the day of surgery has largely supplanted the traditional dictum of nothing by mouth until gastrointestinal activity occurs. Nitrogen balance and the avoidance of insulin resistance are goals of enhanced recovery and best achieved by preoperative carbohydrate loading, epidural analgesia, and early enteral nutrition to be started after surgery when the patient is awake and alert.

16) Early Mobilization

Getting patients out of bed shortly after surgery on the same day contributes significantly to patient recovery. Bed rest promotes muscle loss, increases insulin resistance, increases the risk for deep venous thrombosis (blood clots in legs) and pulmonary embolus (blood clots in legs that detach and go to lungs). Enhanced Recovery Initiative components that promote early mobilization include the use of epidural analgesia to provide adequate pain relief (which allows the patient to get out of bed), the avoidance of opioid narcotics when possible (so the patient’s mental status allows them to get out of bed), and a prescheduled protocol that the patient participates in and which calls for the patient to be out of bed for 2 hours on the day of surgery, and 6 hours each day until discharge.

17) Discharge Planning Rounds

The conversation regarding discharge planning and support starts in the office and involves Social Work, Physical Therapy, Case Managers, Enterostomal Nursing (for those patients...
with stomas), and Home Care. The goal of home or extended care facility as the discharge destination, and the need for physical therapy are proactively formulated so that patient goals and expectations are met at the highest level. Postoperative follow up appointments are scheduled at the same time as surgery at the initial office visit. In addition, the Enhanced Recovery team meets daily on the Patient Care Unit to discuss every patients potential discharge needs. Proactive communication between all health care providers and patients allows for seamless transition to outpatient care in the recovery process.

**Conclusion**

By standardizing evidence-based components of surgical patient care and bringing relevant health care providers together on the same page for each patient, the St Joseph Mercy Hospital Enhanced Recovery Initiative is expected to decrease complications, improve patient outcomes, and decrease hospital length of stay. The Initiative is a dynamic process and some components change with new information and new literature. Data will be analyzed for quality purposes and progress will be monitored to allow future evidence-based innovations to be readily incorporated into the Initiative.

**References**


