



## **ERAS: A Community Hospital's Experience in Implementing Enhanced Recovery After Surgery for Patients Undergoing Colorectal Surgery**

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**Enhanced Recovery After Surgery (ERAS)** protocols are multimodal and interdisciplinary perioperative care pathways designed to optimize surgical outcomes through incorporation of evidence-based best practice and interventions which reduce the physiologic stress response to surgery. ERAS protocols have been implemented worldwide (currently in over 20 countries) for a variety of procedures in several surgical subspecialties, and have been shown to decrease surgical complications and reduce length of stay while increasing patient satisfaction.

### **Background**

In October 2014, The Connecticut Surgical Quality Collaborative challenged all Connecticut Hospitals to implement some or all of the ERAS components in the colorectal patient population. Through an association with the international ERAS Society, Connecticut hospitals were offered assistance with implementation along with associated startup and maintenance fees. The ERAS Society provided educational seminars, access to their data base, and compliance reports for each component of the pathway. The Hospital of Central Connecticut (HOCC), along with the other HHC hospitals, chose not to participate in the Society membership, and instead undertook the challenge of ERAS implementation at the local level. Our early understanding of ERAS was informed by discussions among the Collaborative membership, attendance at regional lectures on the subject, and reviews of the literature relevant to ERAS implementation in a community-hospital context. Notably, the Chairman of the ERAS Society, Dr. Olle Ljungqvist MD PhD, a

Professor of Surgery at the Orebro University Hospital in Stockholm, gave the distinguished Clarke Lecture for 2016, sponsored by the Department of Surgery, during an early phase of ERAS' introduction at HOCC.

### **ERAS Workgroup and Engagement of Frontline Staff**

We began an ERAS workgroup within the Surgical Services Process Improvement (SSPI) Committee at HOCC in November 2015 to address implementation. Through a multidisciplinary team approach, we engaged colorectal and general surgeons, quality nurses, surgical intensivists, anesthesiologists, certified nurse anesthetists, peri-operative nursing staff, physician assistants, nurse managers, floor and office nursing staff, dietitians, physical therapists and support from IT. This interdisciplinary approach allowed us to view patients and their surgical experience as a whole – with a unified goal of achieving fully coordinated care consistent with ERAS principles. The work group developed specific algorithms and tools (outlined below).

Operationalizing ERAS required wide dissemination to all clinical areas. Rather than a top-down approach, we used an integrated model of information dissemination, in which individual members and leaders of the ERAS workgroup took the goals and specific plans to their department meetings and to H3W workgroups. Additional ideas were generated, and with the support of SSPI leadership, a continuous feedback loop for improvement was developed between the frontline staff and the ERAS workgroup.

### **ERAS Implementation**

Initial efforts at HOCC focused on the components of Enhanced Recovery that were new to our practice: preadmission patient counseling, fluid and carbohydrate loading, no prolonged fasting, no premedication, short acting anesthetic agents, avoidance of salt and water overload, early oral nutrition, non-opioid oral analgesia/NSAIDS and early mobilization. To measure compliance and assess the effectiveness of the ERAS project, a database was designed and customized to our institution's needs.

ERAS can be viewed as a continuum of three phases of care: Pre-operative, Intra-operative and Post-operative. Each of these areas requires specific strategies and tools.

## **Pre-operative Phase**

1. **Preadmission patient counseling** – A primary objective of Enhanced Recovery is patient education and pre-operative readiness for surgery. We recognized that many patients come into surgery with a very limited understanding of what to expect and what is expected of them in order to achieve optimal outcomes. A detailed patient education book was created by our Surgical Clinical Reviewer, containing everything from how to optimize their health at home before surgery, preparing their home, engaging a family member or friend (coach), what to bring to the hospital, an introduction of their care team, what to expect after surgery and engaging themselves and the team in their recovery. This three-ring bound book was the starting point and gave a strong foundation to everything that followed in ERAS. The overwhelmingly positive feedback we received from patients and staff emphasized to us that our patients had previously come into the hospital for planned surgery ‘blind,’ with a very limited understanding of what they were about to experience.

The book was given to surgeons to review with their patients in their offices. Each patient received their own copy of the book to take home and to keep as a reference before, during and after their hospitalization. A one-page summary timeline was included with the book as a quick reference for day-by-day instructions.

Patient education was then reinforced during a preadmission testing appointment (PAT). After the PAT appointment, patients were offered a tour of the hospital’s peri-operative departments and nursing floors for familiarity and to introduce the patients to caregivers prior to surgery.

2. **Pre-operative carbohydrate loading and hydration** – One of the important tenets of ERAS is pre-operative carbohydrate loading and the avoidance of prolonged fasting. Bowel prep instructions remain patient specific, depending on the type of colon surgery and surgeon preference. However, surgeons and anesthesiologists adopted best practice recommendations for patients being able to drink a dextrose source up to two - three hours prior to surgery. This evolution in peri-operative management has allowed patients to remain well hydrated, while limiting some of the stress response to surgery, such as insulin resistance. We started with retail-available Gatorade, and have recently switched to Nutricia Pre-op®, an FDA approved malt-dextran containing carbohydrate drink specifically formulated for pre-operative surgical patients. Drink times are individualized up to two – three hours prior to the patients’ surgical start times.

3. **Pre-operative management**– In the pre-operative area prior to surgery, nurses re-inforce education. Anesthesia pre-operative and post-operative order sets were created and uploaded into the current electronic medical record. These order sets standardize the approach to both ERAS-specific and other core (formerly SCIP) measures:
  - a. medications to prevent post-operative nausea, including scopolamine transdermal patches and IV dexamethasone, in appropriate patients
  - b. DVT/VTE prophylaxis using both pharmacologic (subcutaneous heparin or LMWH) and mechanical prophylaxis prior to surgery
  - c. appropriate antibiotics administered within one hour of incision
  - d. avoidance of pre-operative sedatives

### **Intra-operative Phase**

1. **Fluid management** – The Anesthesia leadership and champion designed and implemented an algorithm to avoid over-resuscitation with salt containing IV solutions during the intra-operative phase, and instructed all anesthesia staff in modified, goal directed resuscitation. IV infusion of crystalloid with an estimate of 5ml/kg/hour was use as a starting point, with adjustments according to laparoscopic versus open, blood loss, stability and duration of surgery.
2. **Anesthetic modifications** – Optimal analgesia with an emphasis on multimodal techniques and shorter acting medications. Anesthesiologists and surgeons consider the use of regional epidural analgesia in patients undergoing open colorectal surgeries.
3. **Glucose and temperature control** – Maintenance of peri-operative glucose control and normothermia in the peri-operative period.

### **Post-operative Phase**

1. **Staff education** – All healthcare providers responsible for taking care of the colorectal patients during their post-operative phase were educated on the ERAS program. For the patient arriving on the floor, this meant an interdisciplinary approach with all team members speaking the same postoperative “language” and working toward the same goals.
2. **Surgical post-operative order sets** – With IT support we developed CPOE order sets to standardize post-op algorithms

- a. multimodal analgesia with the use of around-the-clock NSAIDs and oral acetaminophen as adjuncts to narcotic use
  - b. aggressive management of nausea/vomiting with pharmacologic and olfactory sensory aids
  - c. early oral intake with clear liquids the day of surgery and advancement to a regular diet by post-op day 1, as tolerated
  - d. limited IV fluids with crystalloid at 50 ml/hour on post-op day 0, and discontinuation of IVFs by post-op day 1, as appropriate
  - e. no drains or NG tubes, and prompt removal of urinary catheters
3. **Mobilization/Ambulation** – The importance of early postoperative mobilization was emphasized, with nurses, nurse technicians and physical therapists engaged to assist in mobilization of every patient, every day, starting on postoperative day zero. This has been the most visible change for our patients and staff; a perpetual “rush hour” of patients ambulating in the halls. To date, 70% of our patients have achieved the goal of ambulation on post-op day zero, walking an average of 270 feet.

### **Audit and Compliance**

A comprehensive audit tool was created through an Access/Excel data base. Compliance with Enhanced Recovery components is audited bi-monthly, and reports reviewed with the ERAS workgroup (Figures 1-5). The workgroup considers modifications to practice, as well as refinement of the audit tools and compliance definitions at each review meeting. Feedback is solicited from members of all patient care teams, and updates are offered on the program’s progress.

Providers and caregivers have responded very well to this process, as they appreciate our early, positive outcomes as a direct result of their efforts. The ERAS team has noted tremendous staff engagement, enthusiasm and sense of professional affirmation and pride during the implementation of this program.

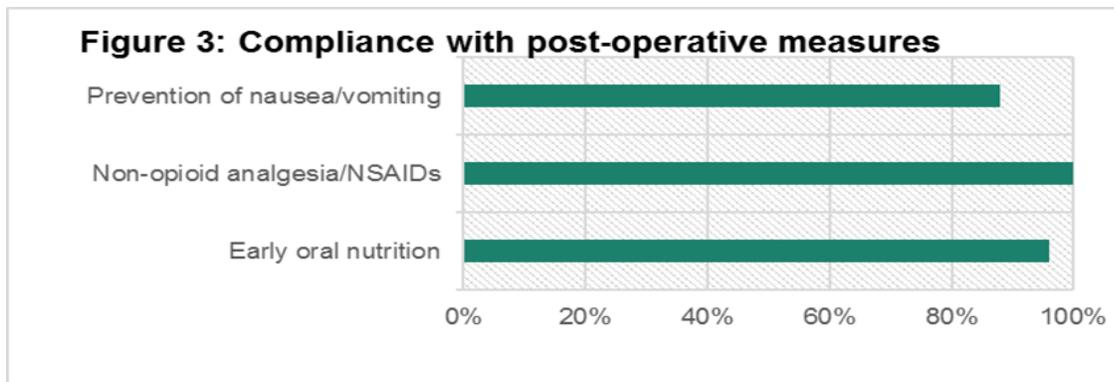
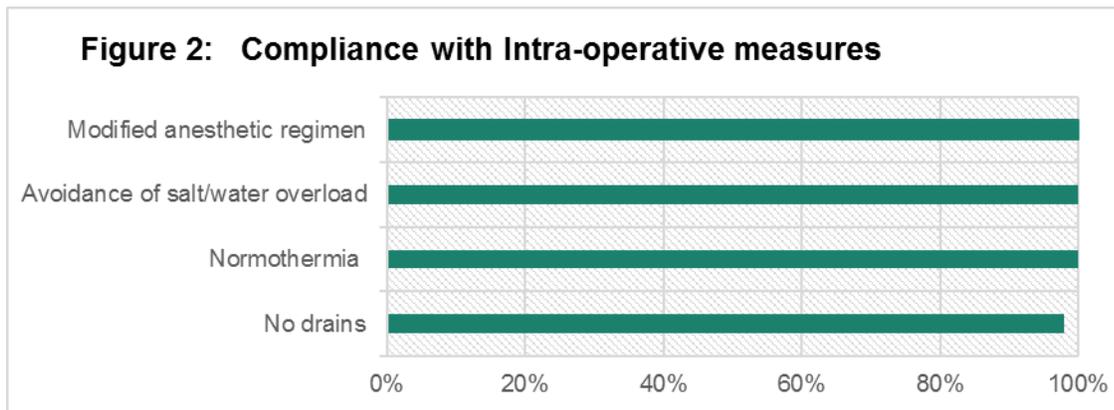
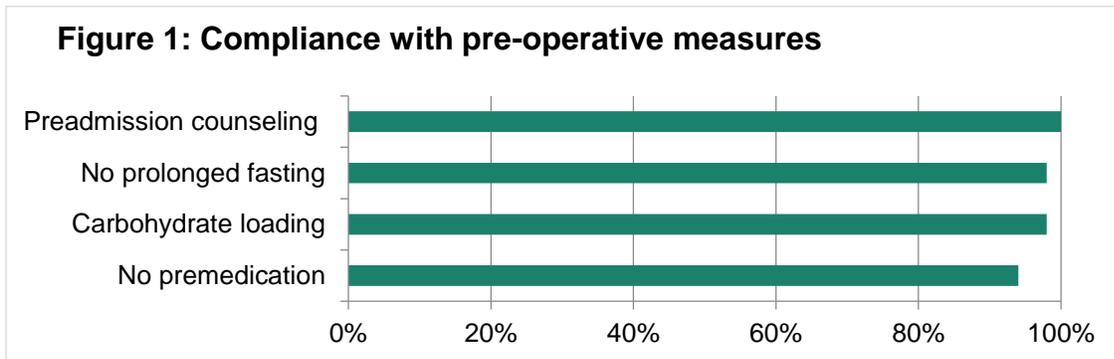
### **Future Opportunities**

1. **ERAS for other in-patient surgeries and specialties** –The initiation of ERAS with colorectal surgery allowed us to focus on a well-described process in single patient group. This was important for patient and staff education, data collection, analysis and outcome metrics. At this point, we feel that the principals of Enhanced Recovery can be extended

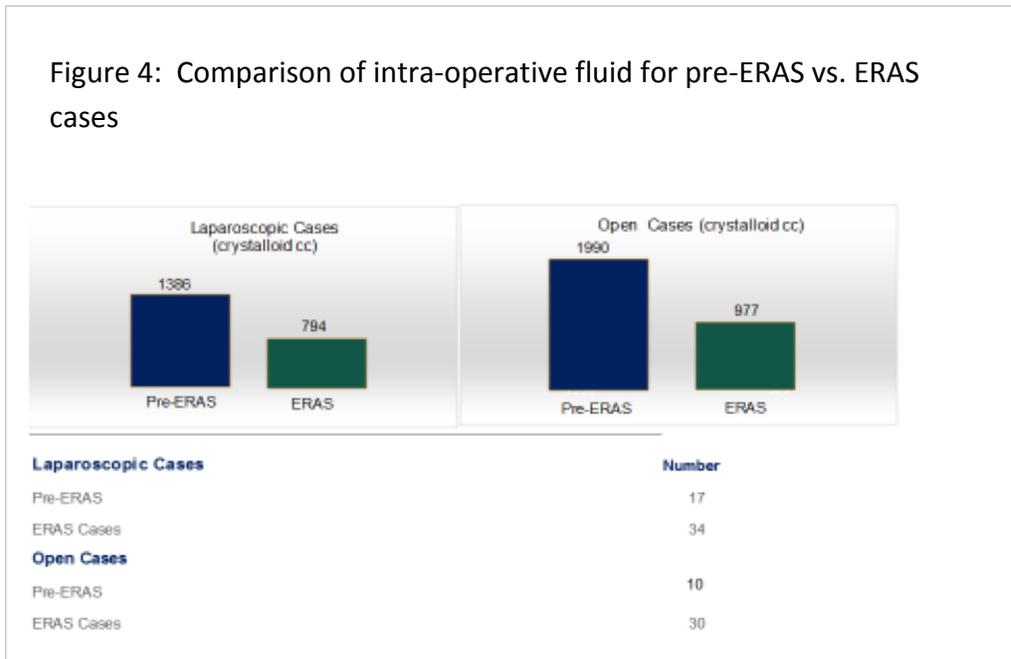
to other elective in-patient specialties. Orthopedic total joint programs have been early adopters of similar initiatives, and have proven these concepts successful. Ultimately, enhanced recovery need not be viewed as a special program applied to a distinct patient group, but simply as the steps we take to ensure *optimal* recovery after any surgery. Specific education has been developed for minimally invasive gynecologic surgery, and soon we plan to extend this further to other specialties, including thoracic surgery, gynecologic oncology and other in-patient surgeries.

2. **Patient Experience** – Patient experience is an ongoing balanced scorecard focus, and enhanced recovery has greatly advanced our patients’ understanding, their expectations, communication with doctors, nurses and ancillary staff; in essence their *total experience*. Patients have responded with very positive feedback; one patient even wrote an entire manuscript entitled “My Colon Story,” to chronicle her experience and express her gratitude. From the patients’ perspective, when they are told they need surgery, they may be scared, confused and uncertain. By arming them with information and setting expectations, we’ve empowered them and given them control over their own health and recovery.
3. **Standardization across Hartford Healthcare** – Our goal is to assist in the implementation of Enhanced Recovery across all of Hartford Healthcare. Many of the tools developed at HOCC, including the patient education handbook, order sets through each phase of care (built with IT Care Connect support in Epic), the audit tool and Access database may assist others within the system; all Hartford Healthcare acute care hospitals can similarly incorporate Enhanced Recovery, build on it, and share opportunities for improvement and standardization across the system.
4. **Research Initiatives** – Data analysis gives us an opportunity for clinical research, and the research questions are endless. Does Enhanced Recovery equally benefit patients undergoing laparoscopic and open colorectal surgeries? Do newer anesthetic regimens have an impact on post-operative pain management? Are 30 day outcomes (NSQIP occurrences) affected by ERAS? Do pre-operative nutritional risk factors play a role in post-operative dietary advancement and outcomes? Several IRB applications have been written for projects which will address some of these questions, using data generated from our early ERAS experience.

**Figures 1-3:** Compliance with ERAS measures was audited for the period January 19 – July 15 2016. There were 65 cases performed during this period, and compliance was >88% for all measures reported here.



**Figure 4:** Intra-operative fluid management in ERAS avoids salt and water overload, using a more conservative, goal-directed approach. A comparison of intra-operative fluid before and after the implementation of ERAS (cases from 2015, n=27) shows a marked decrease in fluid utilized for both laparoscopic and open cases.



**Figure 5:** ERAS implementation has impacted length of stay for colorectal patients at HOCC. The average length of stay has decreased to 3.7 from 4.8 days. Median length of stay has decreased from 4 to 3 days.

