

## Implementing an Health System Wide Enhanced Recovery Program for Patients Undergoing Colorectal Surgery - The Anesthesiologists

Colquhoun D., Turrentine F., Rea K., Friel C. American Society of Anesthesiologists 2014; A2010.

### Introduction

The concept of Enhanced Recovery Programs for surgical care was developed in Denmark in early 1990's.<sup>1-4</sup> While individual programs vary they incorporate a core of pre-operative education, limited fasting, early mobilization and balanced or multimodal pain management regimens.<sup>1-5</sup> Previous work with these techniques have demonstrated reduction in length of stay.<sup>4</sup>

### Methods

In August 2013 a program was developed to standardize the peri-operative care of patients undergoing colorectal surgery. The program includes ingestion of a carbohydrate drink two hours prior to surgery, pre-operative multimodal analgesic regimen, intraoperative low dose spinal morphine, limiting intraoperative opiates, fluid therapy tailored to Pleth Variability Index (PVI - Masimo Corp, Irvine, CA), intraoperative infusions of ketamine and lidocaine (continued 48hrs post operatively), early mobilization and oral intake post operatively.

A retrospective evaluation of this program comparing every ERAS patient undergoing colorectal surgery to historical controls was undertaken. Data was collected via means of chart review and review of billing and accounting data. Data analysis was conducted in R, statistical significance was established at a p-value < 0.05. Missing data points were excluded from the analysis.

### Results

The records from who 108 patients underwent colorectal surgery whose perioperative management was guided by this protocol was compared to continuous 98 proceeding patients. They differ only in their propensity for pre-operative chronic pain diagnosis (Table 1). Patients whose care was guided by the ERAS protocol received less fluid (973ml vs 3000ml) and morphine equivalents in the both the OR had earlier return of bowel function, required fewer days of hospitalization and incurred significantly lower hospital costs (\$18,017 vs \$15,150) (Table 2).

5) Gustafsson UO et al. World J Surg. 2012;37(2):259-284.

**Figure 1**

Table 1: Patient Characteristics	Conventional	ERAS	P-Value
Age	58 yrs	58.1 yrs	0.95
Female	51%	56%	0.52
No Ostomy At End of Surgery	63%	58%	0.56
Surgery Length (mins)	188	214	0.10
ASA > 3	64%	50%	0.06
Pre-operative Chronic Pain	24%	12%	0.04
Open Procedure	69%	58%	0.13

**Figure 2**

Table 2: Outcome Measures	Conventional	ERAS	P-Value
Median 30-Day Hospital Costs	\$18,017	\$15,150	0.009
Median Length of Stay	5 days	3 days	<0.001
Median Return of Bowel Function	POD 2	POD 2	0.03
Median Fluid Administered in OR	3000 ml	973 ml	<0.001
Median of Mean Patient Pain Score on Day of Surgery	4.85	2.33	<0.001
Median Intraoperative Opiate Consumption (in Morphine Equivalents mg)	20	0.1	<0.001

### Discussion

Our review demonstrates the utility of an Enhanced Recovery After Surgery program in reducing hospital cost and length of stay. While this program includes a several measures, most significantly patients received markedly less fluid and opiates in the operating room. Our program is novel in the use of PVI to guide therapy. This work highlights the importance of selection of anesthesia technique in determining outcomes for patients. Our ongoing work is in applying the lessons learned from this program to patients undergoing other types of surgery.

### References

- 1) Kehlet H. Lancet. 2008;371(9615):791-793.
- 2) White PF et al. Anesth Analg. 2007;104(6):1380-96
- 3) Bardram L et al. Lancet. 1995;345(8952):763-764
- 4) Basse L et al. Ann Surg. 2000;232(1):51-57.