

LEVEL OF COMPLIANCE WITH THE ENHANCED RECOVERY AFTER SURGERY (ERAS) PROTOCOL AND POSTOPERATIVE OUTCOMES

Miller TE¹, Ernst FR², Krukus MR², Gan TJ¹

¹Duke University Medical Center, Durham, NC, USA; ²Premier healthcare alliance, Charlotte, NC, USA

Introduction

- Substantial evidence suggests that following an enhanced recovery after surgery (ERAS) program is effective in improving post-surgical outcomes.
- Despite the best efforts of clinicians, the degree of compliance with ERAS protocols has been inconsistent.

Objective

- To examine the potential associations between compliance with ERAS protocol elements and post-op fluid use, opioid use, hospital length of stay (LOS), and readmissions.

Study Design

- Retrospective and prospective comparative effectiveness study using real-world hospital data
- Sample Selection:** Elective colorectal surgery patients within the ERAS program in 2010 were compared with a historical cohort of consecutive patients who underwent colorectal surgery in 2009 (non-ERAS).

Data Sources

- De-identified data from the Premier research database, and retrospective and prospective data collected on surgical patients at Duke University Medical Center (DUMC) were linked using common patient characteristics to find exactly matched patients.*
- Premier research database**
 - Large US hospital-based, service-level, all-payer, comparative database
 - Contains data on approximately 5.5 million inpatient hospital discharges annually from primarily nonprofit, nongovernmental, community and teaching hospitals, and health systems
 - Contains data from >500 US hospitals, from 2000 through 2013 (present)
 - Nationally representative hospital coverage by number of hospital beds, US Census region, urbanicity, and teaching status
 - HIPAA compliant database, with masked patient-level records
- DUMC ERAS program data***
 - Retrospective and prospective data collected on surgical patients at Duke University Medical Center, before and after implementation of ERAS program

* IRB approval was obtained via Duke University

ERAS Protocol (includes the following):

- SURGICAL PLANNING**
 - IDENTIFY elective surgery patients who can benefit from participation
 - LABEL patients for their journey through
 - Screening → Preop → OR → Postop → Follow-up
 - EDUCATE patients about the track and our expectations
 - REINFORCE with a written copy of our plan and expectations
 - SCREEN for malnutrition, tobacco abuse, and diabetes (H&P, labs)
- PREOP SCREENING CLINIC**
 - ROUTINE preop screening, specific attention to known risk factors
 - DISTRIBUTE
 - Nutritional supplements if serum albumin <3.5
 - Smoking cessation info
 - Chlorhexidine sponges for 2 preop showers
 - CHO drink for morning of surgery
 - REINFORCE with written instructions and contact info
- PREOP HOLDING, day of operation**
 - IDENTIFY fast track patients and initiate protocol
 - THROMBOPROPHYLAXIS timed with epidural
 - EPIDURAL anesthesia placement
 - HAIR CLIPPING
- INTRAOP**
 - ANTIBIOTICS PROPHYLAXIS before skin incision
 - SCD's on before induction
 - GOAL-DIRECTED IVF THERAPY with ESOPHAGEAL DOPPLER MONITORING
 - TEMPERATURE regulation
 - NG/OG discontinued before leaving OR
 - Foley discontinued before leaving OR, except for pelvic operations
- POSTOP**
 - IDENTIFY ERAS patients for protocol participation
 - DIET begins night of surgery
 - AMBULATION begins night of surgery
 - HOB at 30 degrees at all times
 - IVF ≤ 1L/24hrs (70kg)
 - EPIDURAL and SCD continuation
 - Postop THROMBOPROPHYLAXIS begins POD 1
 - Close BS monitoring and maintenance of normoglycemia

Comparisons

- We analyzed patient demographics and clinical factors stratified by ERAS use and compliance.
 - ERAS vs. Non-ERAS (based on application of protocol)
 - Full/near compliant ERAS patients were defined as having ≤1 missing ERAS measure
 - Partially compliant ERAS patients were defined as having ≥2 missing ERAS measures
- All analyses were descriptive in nature, and comparisons were performed using Fisher's Exact Test for categorical variables and T-tests for continuous variables, α=0.05.

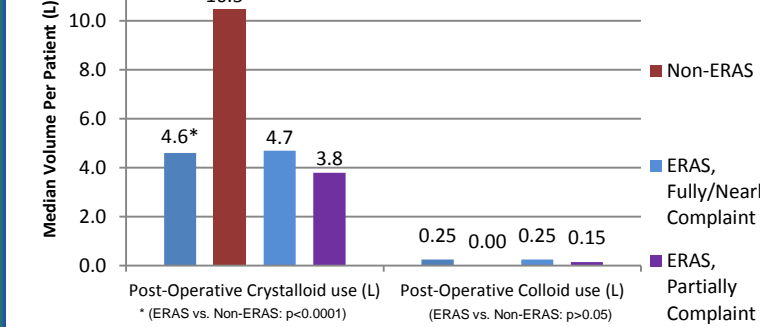
Results

	Non-ERAS		ERAS				P-value*	
	N	%	Total ERAS	Fully/Nearly Compliant*	Partially Compliant**	ERAS vs Non-ERAS	Fully/Nearly vs Partially Compliant	
Total Discharges	99	100.0%	137	100.0%	74	100.0%	63	100.0%
Age, years								
0-17	4	4.0%	0	0.0%	0	0.0%	0	0.0%
18-44	16	16.2%	24	17.5%	11	14.9%	13	20.6%
45-64	47	47.5%	58	42.3%	34	46.0%	24	38.1%
65-74	26	26.3%	41	29.9%	20	27.0%	21	33.3%
75-84	5	5.1%	7	5.1%	6	8.1%	1	1.6%
85+	1	1.0%	7	5.1%	3	4.1%	4	6.4%
Mean	56.4		58.2		58.7		57.6	
Std Dev	14.9		15.1		14.8		15.4	
Gender								
FEMALE	56	56.6%	68	49.6%	38	51.4%	30	47.6%
MALE	43	43.4%	69	50.4%	36	48.7%	33	52.4%
Race								
BLACK	16	16.2%	33	24.1%	16	21.6%	17	27.0%
OTHER	4	4.0%	4	2.9%	2	2.7%	2	3.2%
WHITE	79	79.8%	100	73.0%	56	75.7%	44	69.8%
Admission Source								
Clinic	98	99.0%	58	42.3%	40	54.1%	18	28.6%
Emergency Room	1	1.0%	0	0.0%	0	0.0%	0	0.0%
Nonhealthcare Facility	0	0.0%	78	56.9%	34	46.0%	44	69.8%
Transfer From Hospital (Diff Facility)	0	0.0%	1	0.7%	0	0.0%	1	1.6%
Admission Type								
Elective	97	98.0%	133	97.1%	72	97.3%	61	96.8%
Emergency	1	1.0%	2	1.5%	1	1.4%	1	1.6%
Urgent	1	1.0%	2	1.5%	1	1.4%	1	1.6%
Discharge Status								
Discharged To Home Health	25	25.3%	31	22.6%	17	23.0%	14	22.2%
Discharged To Home Or Self Care	68	68.7%	94	68.6%	52	70.3%	42	66.7%
Discharged/Transferred To Snf	4	4.0%	10	7.3%	5	6.8%	5	7.9%
Dschrgd/Tmsfrd To LTC Hospital	0	0.0%	1	0.7%	0	0.0%	1	1.6%
Dschrgd/Tmsfrd To Another Rehab Facility	1	1.0%	0	0.0%	0	0.0%	0	0.0%
Expired	1	1.0%	0	0.0%	0	0.0%	0	0.0%
Left AMA	0	0.0%	1	0.7%	0	0.0%	1	1.6%
SNAP™ DRG Severity Of Illness								
1 = Minor	37	37.4%	56	40.9%	26	35.1%	30	47.6%
2 = Moderate	43	43.4%	51	37.2%	33	44.6%	18	28.6%
3 = Major	16	16.2%	23	16.8%	12	16.2%	11	17.5%
4 = Extreme	3	3.0%	7	5.1%	3	4.1%	4	6.4%
Comorbidities								
Malabsorption	0	0.0%	1	0.7%	0	0.0%	1	1.6%
Cancer	0	0.0%	2	1.5%	2	2.7%	0	0.0%
Liver Impairment	1	1.0%	4	2.9%	1	1.4%	3	4.8%
Renal Failure	4	4.0%	13	9.5%	7	9.5%	6	9.5%
Diabetes	8	8.1%	25	18.3%	12	16.2%	13	20.6%
Malnutrition	3	3.0%	5	3.7%	2	2.7%	3	4.8%
GI Disorders	74	74.8%	91	66.4%	48	64.9%	43	68.3%

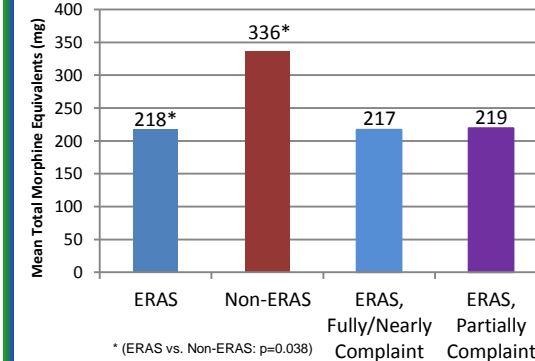
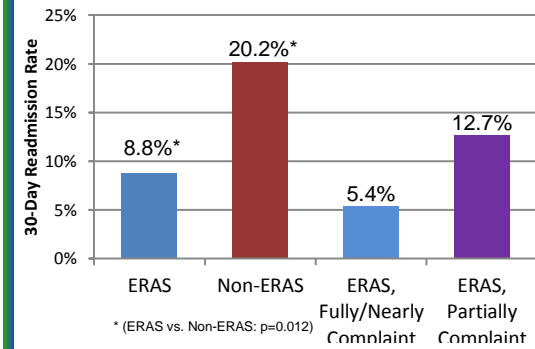
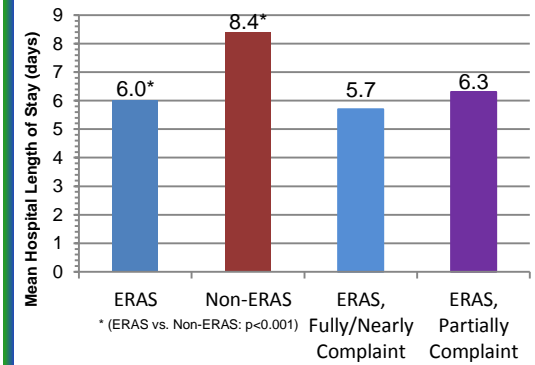
*Fully/Nearly Compliant is defined as having ≤1 missing ERAS measure (among measures included in the Duke data capture)

**Partially Compliant is defined as having ≥2 missing ERAS measures (among measures included in the Duke data capture)

*P-value is calculated with the Fisher's Exact Test for categorical variables and T-test for continuous variables



Results



Conclusions

- Use of an ERAS protocol was associated with reductions in post-operative crystalloid intravenous fluids, post-operative opioids, hospital length of stay, and 30-day readmissions.
- However, it is inconclusive whether a high level of compliance would be associated with improved outcomes, due to sample size constraints.

Funding for the Study: Deltex Medical, Inc.