Evaluating the Implementation of an Enhanced Recovery After Surgery Protocol for Colorectal Surgery at a Midwestern Community Hospital

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Presentation Objectives

- Define Enhanced Recovery After Surgery (ERAS) protocols and identify current evidence-based recommendations.

- Assess the impact of a colorectal ERAS protocol on hospital length of stay, 30-day readmission rates, and postoperative opioid use using a retrospective review of cohort data.

- Propose recommendations to support protocol compliance.

Background

- Prior to ERAS protocols, Colorectal surgery has been associated with significant morbidity and prolonged length of stay (LOS).
  - Postoperative complications after colorectal surgery resulted in:
    - 106% increase in hospital LOS (10.3 vs. 5.0 days; $P < 0.0001$)
    - 91% increase in mean hospitalization cost ($77,015.24 vs. $40,258.30; $P < 0.0001$) (Ma et al., 2019).

- Enhanced Recovery After Surgery (ERAS) protocols have demonstrated the ability to:
  - Reduced overall morbidity [relative ratio (RR) = 0.60, (95 % CI 0.46-0.76)]
  - Shortened hospital LOS (weighted mean differences (WMD) = -2.28 days [95 % CI -3.09 to -1.47]), without increasing readmission rates (Greco et al., 2014).
  - Net health system savings of $1768 (range: $920–$2619) per patient (Thanh et al., 2016).

- Northwestern Medicine Kishwaukee Hospital (NMKH), a midwestern community hospital, implemented an ERAS protocol for colorectal surgery patients, but the protocol's impact on patient outcomes has not been previously evaluated.

Significance

- 600,000 colorectal surgical procedures are performed in the United States annually (The Society of American Gastrointestinal and Endoscopic Surgeons, 2015)
- Colorectal surgery patients experience increased morbidity compared to other general surgery subspecialties (Tevis & Kennedy, 2016)
- 2005 - the first evidence-based consensus guideline for colonic surgery patients were published
- Positive outcomes of ERAS lead to further adoption
- 2018 - ERAS protocol was implemented at NMKH

ERAS at NMKH

Day of Surgery

- Multimodal analgesia premed
  - Acetaminophen 1g PO
  - Ibuprofen 600 mg PO
- Drink clear liquids up to 3 hours before surgical start time
- Entereg (12mg) in pre-op area 0-3 hours before surgery

Intraoperative Anesthesia

- Pre-induction Checklist
  - SCDs attached and running
- TIVA for patients with a significant history of PONV.
  - BIS 40-60
- Ventilation:
  - 6-8 ml/kg
  - PEEP 5-10 cm H2O
  - Expansion breaths
- Fluids. Goal: 1-5 ml/kg/hr.
- Dexamethasone: 0.1 mg/kg
- Ketamine: 0.5 mg/kg IV

Pain Management

- Epidural, TAP block or lidocaine infusion
- Ketorolac 15-30 mg IV
- Tylenol 1000 mg IV

Reversal

- Sugammadex IV

Prophylaxis for postoperative nausea/vomiting (PONV)

- Dexamethasone 4 mg IV & Ondansetron 4mg IV
  - If history of PONV despite Scopolamine patch → propofol IV infusion during case (25-30 mcg/kg/min)
- Intraoperative normothermia (>36° C) upon arrival to PACU
- Intraoperative euglycemia for diabetes (Goal BS < 200 mg/dL)
  - BS check q2 hours intraoperatively
  - Treat with sliding scale insulin with IV regular insulin if BS > 180 mg/dL
- Re-dosing of antibiotics as appropriate based on antibiotic redosing schedule
- Avoid nasogastric tubes and drains
  - Remove OGT prior to arousal and extubation
  - TAP block done in OR

Postoperative PACU

- Care per usual routine
- PONV protocol
- Postoperative Analgesia – Anesthesiologist's discretion

Aims of Project

- Evaluation of implemented ERAS protocol on patient outcomes
  - Opioid use and pain burden of the patients
  - Length of stay (LOS)
  - 30-day readmission rates
- Evaluation of protocol compliance
- Comparison of two local anesthetics used for transversus abdominis plane (TAP) blocks: Exparel (liposomal bupivacaine) vs. Ropivacaine
- Offer NMKH recommendations to enhance protocol compliance.

Measured Outcomes

Primary Outcomes

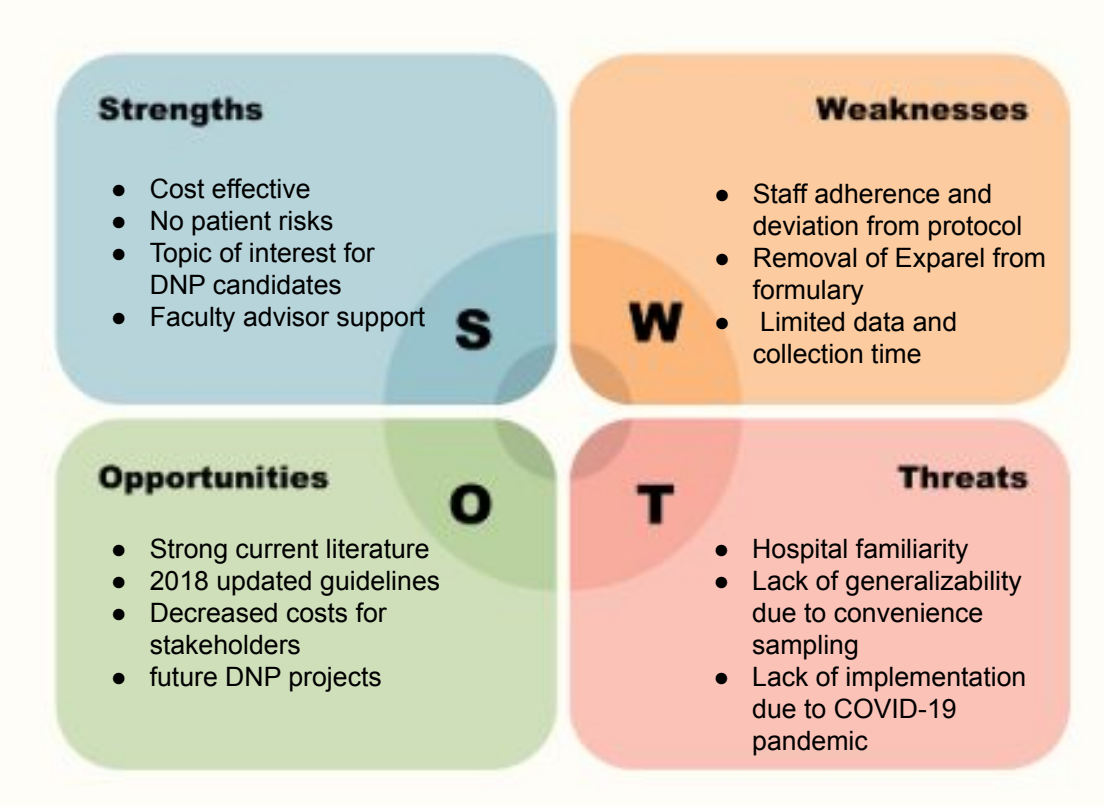
- Hospital LOS
- 30-day readmission

Secondary Outcomes

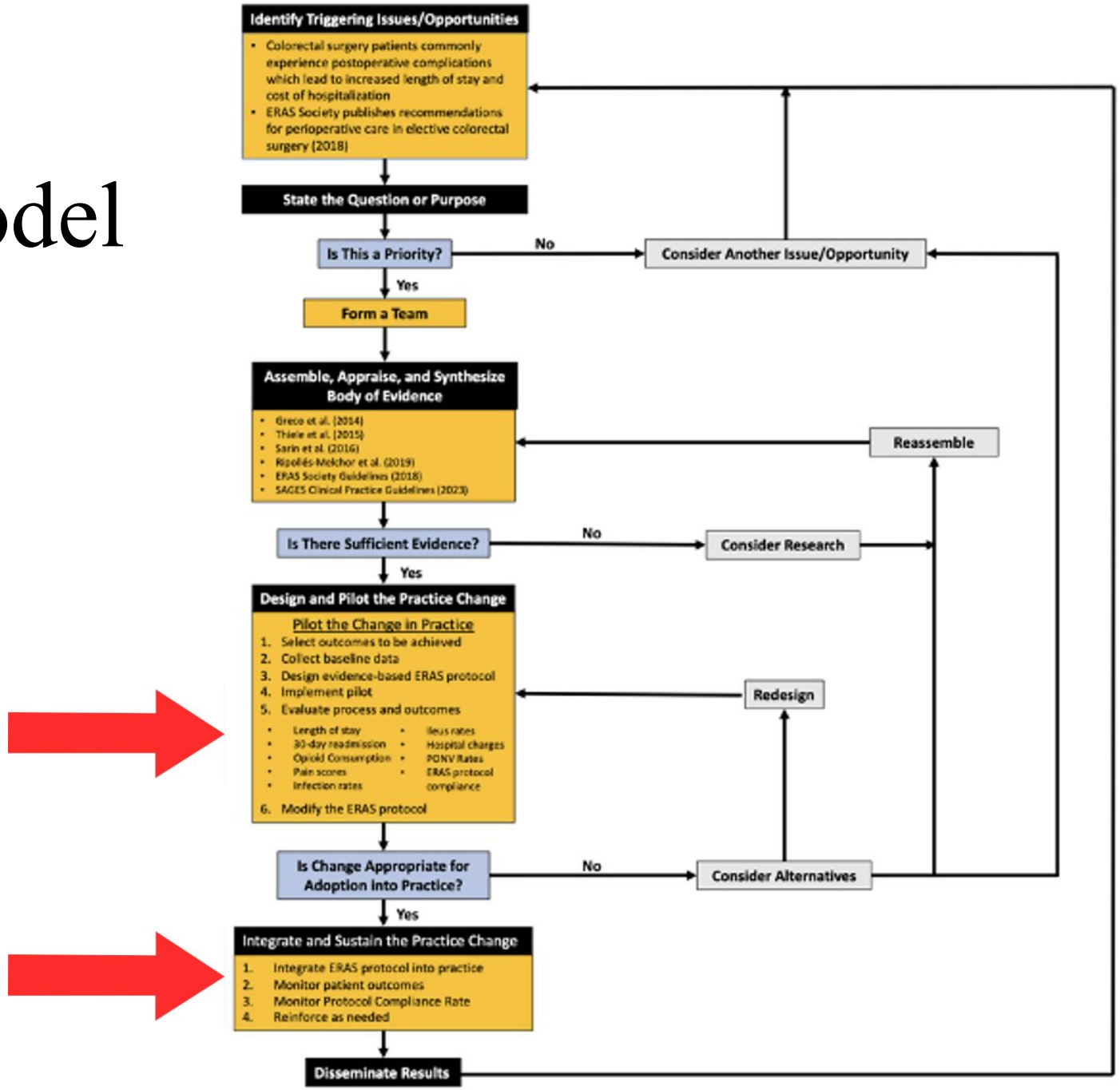
- Intraoperative and postoperative opioid consumption
- Postoperative pain burden
- Patient and provider compliance
- Comparison of two local anesthetics (Exparel vs. Ropivacaine) used for TAP blocks

Organizational Need

- SWOT analysis was performed to outline internal and external forces
  - Strengths
  - Weaknesses
  - Opportunities
  - Threats



Iowa Model of EBP



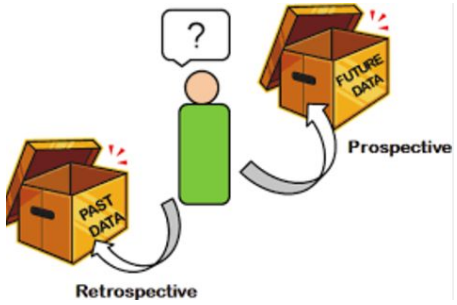
Note. Adapted from The Iowa Model-Revised, University of Iowa Hospitals and Clinics (2015)

Literature Review

- 11 research studies were analyzed across various levels of evidence
- ERAS protocols have been shown to reduce hospital
  - LOS
  - SSI
  - Mean direct cost
  - Opioid consumption
  - Postoperative pain scores

& Increase in patient satisfaction scores

Design and Methodology



- Retrospective data collection
- 154 colorectal surgery patients at NMKH from January 2018 to March 2024
  - Non-ERAS (n=60)
  - ERAS (n=94)

- Data collected using existing hospital quality improvement reports and manual chart review

Data Analysis

- Categorical variables
  - Chi-square test

- Continuous Variables (parametric vs. non-paramentric
  - Independent samples t-test vs. Mann-Whitney U test

- Statistical analysis using IBM SPSS Statistics, Version 29.0.0.0.

Results

Baseline Characteristics Between Non-ERAS and ERAS Groups			
	Non-ERAS (n= 60)	ERAS (n=94)	p-value
Age (years) (±*SD*)	66.2 (± 13.8)	61.8 (± 15.6)	0.077
Sex Male Female	 32 (52.5%) 29 (47.5%)	 50 (53.2%) 44 (46.8%)	0.853
BMI	27.5	29.4	0.182
Smoker Current Former	 7 (11.7%) 23 (38.3%)	 18 (19.1%) 36 (38.3%)	0.425
DM Type 1 Type 2 non-insulin Type 2 insulin	 0 (0%) 8 (13.3%) 4 (6.7%)	 0 (0%) 9 (9.6%) 6 (6.4%)	0.761
HTN	38 (63.3%)	56 (59.6%)	0.641
CAD	7 (11.7%)	7 (7.4%)	0.374
CHF	1 (1.7%)	5 (5.3%)	0.253
COPD	7 (11.7%)	8 (8.5%)	0.519
History of PONV	5 (8.3%)	11 (11.7%)	0.504
Physical Status Classification 1 2 3 4	 0 (0%) 28 (46.7%) 30 (50.0%) 2 (3.3%)	 0 (0%) 46 (48.9%) 46 (48.9 %) 2 (2.1%)	0.881
Duration of procedure (minutes)	105	102	0.688

Primary Outcomes

	Non-ERAS (n=60)	ERAS (n=94)	p-value
LOS (days)	3.03	2.28	0.006
Readmission within 30 days	5 (8.3%)	10 (10.6%)	0.64

Opioid Use

	Non-ERAS (n=60)	ERAS (n=94)	p-value
Intraoperative opioid use	10.33	10	0.30
Total perioperative opioid use	22.05	16.60	0.12
Postoperative opioid use first 24 hours	1.67	1.67	0.71
PACU opioid use	2.50	0	0.19

Note. MME: morphine milligram equivalents; PACU - post-anesthesia care unit.
$p<0.05$

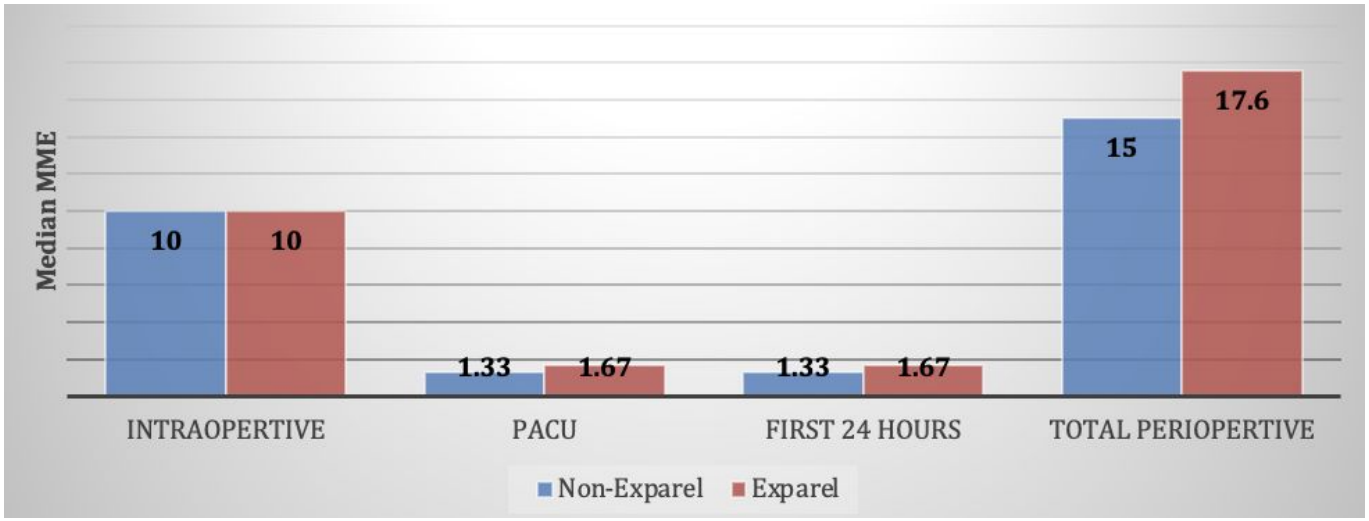
Pain Burden

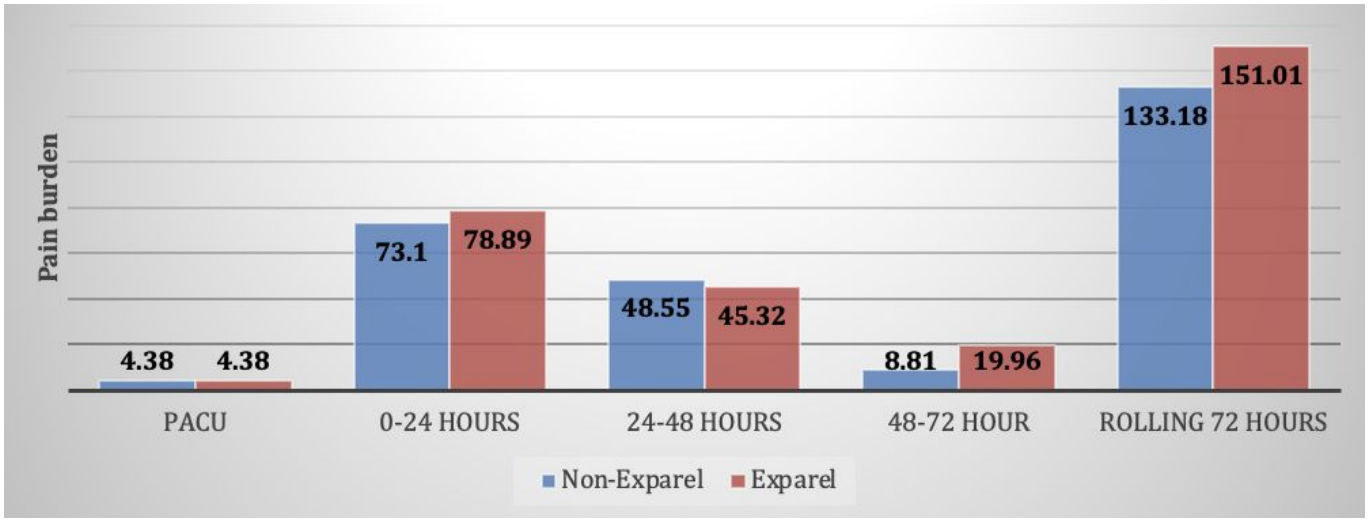
	Non-ERAS (n=60)	ERAS (n=94)	p-value
Pain burden PACU	4.23	4.46	0.84
Pain burden 0-24 hours	80.52	72.90	0.38
Pain burden 24-48 hours	54.02	44.68	0.21
Pain burden 48-72 hours	32.55	13.18	0.31
Pain burden rolling 72 hours	166.17	128.65	0.16

Note. PACU - post-anesthesia care unit. $p<0.05$

- Pain burden was determined by calculating the total dose of analgesics administered over a specific time period, which the organization used as a proxy for the patient's pain experience.

Exparel Vs. Ropivacaine





Compliance

	Non-ERAS (n=60)	ERAS (n=94)	p-value
Intraoperative IV fluids (ml)	1,250	1,000	0.009
Preoperative acetaminophen	40%	91.5%	< 0.001
Preoperative ibuprofen	41.7%	89.4%	< 0.001
Intraoperative ketamine	16.7%	31.9%	0.04
Intraoperative ketorolac	28.3%	42.6%	0.08
Intraoperative acetaminophen	50%	47.9%	0.80
Sugammadex	1.7%	26.6%	< 0.001
TAP block	51.7%	88.3%	< 0.001
Epidural analgesia	0%	0%	N/A
Intraoperative lidocaine infusion	0%	12.8%	0.004
Intraoperative propofol infusion for history of PONV	0%	25%	0.43

Note. IV = Intravenous; ml= milliliters; TAP = transversus abdominis plane; PONV = postoperative nausea and vomiting. $p<0.05$

Results

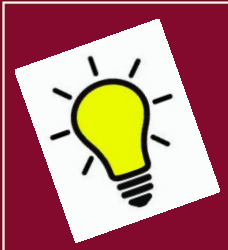
- ERAS group had a 25% reduction in median LOS (2.28 days vs. 3.03; p=0.006) without an increase in 30-day readmissions (5 vs 10; p=0.64)

- No statistically significant difference in opioid use or pain burden between the two groups

- Overall ERAS protocol compliance was 55.8%

Translation of Findings

- Shorter LOS suggests reduced costs for both the patient and the hospital.
- A significant amount of data was hard to access, not readily coded, and incomplete.
- Low protocol compliance may have been influenced by:
  - Provider adherence
  - Incomplete documentation
  - Limited researcher access to detailed protocol information.



Recommendations

- Validate the accuracy of pain scores, given the use of a non-traditional evaluation method
  - Evaluate pain scores using a validated measurement tool, such as the numeric pain scale or visual analog scale

- NMKH should promote protocol adherence through in-service education on the ERAS protocol and its components

- Assess protocol compliance monthly or semiannually annually by generating detailed data reports to enhance sustainability

References