Evaluating the Adherence to Anesthesia Practices of Enhanced Recovery after Cesarean Delivery Recommendations at Midwestern Community Hospital

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Objectives

Describe the current evidence-based recommendations and guidelines for enhanced recovery after cesarean surgeries and its impact on reducing post-operative pain and opioid use

Evaluate the adherence to current anesthesia-related guidelines to enhanced recovery recommendations using a retrospective cohort analysis

Evaluate the impact of anesthesia-related practices on patient outcomes including patient opioid use in morphine milliequivalents (MME) and postoperative mean pain scores on a visual analog scale (VAS)

Background

- Cesarean surgeries (c-section) account for **32% of all births in America** (Ituk & Habib, 2018)
- Operative deliveries are projected to **increase to 29% globally** by 2030 (Betran et al., 2021)
- Acute opioid use can progress to chronic dependence in as few as **five days** of continuous use of a prescription dose (Landau et al., 2023).
- Previously, patient-controlled analgesic (PCA) pumps were frequently used for inpatient pain control
- **85%-95% of c-section** patients are prescribed opioids upon discharge (Badreldin et al., 2018; Prabhu et al., 2018)

(Axios Visuals, 2024)

Surgical Pain Relief Can Lead to Addiction

- Among **92%** of patients who filled their opioid prescriptions, **75% had unused tablets**, and **63% stored the tablets** in an unlocked location
- Opioids play an effective role in managing acute pain
  - Adverse side effects: **nausea, vomiting, pruritus, and decreased ambulation**
  - Interference with both the patient's recovery as well as their ability to care for their newborn
- Over the past two decades, drug overdoses have tragically claimed more than **932,000 lives** (Centers for Disease Control and Prevention [CDC], 2022b)
- In 2020 alone, overdose fatalities saw a **31%** increase, with opioids accounting for **74.8%** of all overdose deaths (CDC, 2022a)
- According to the CDC, opioids account for 74.8% of overdose deaths
- Opioid overdose-related deaths among young women of reproductive age have been on the rise since 1999 (Llarena et al., 2022).

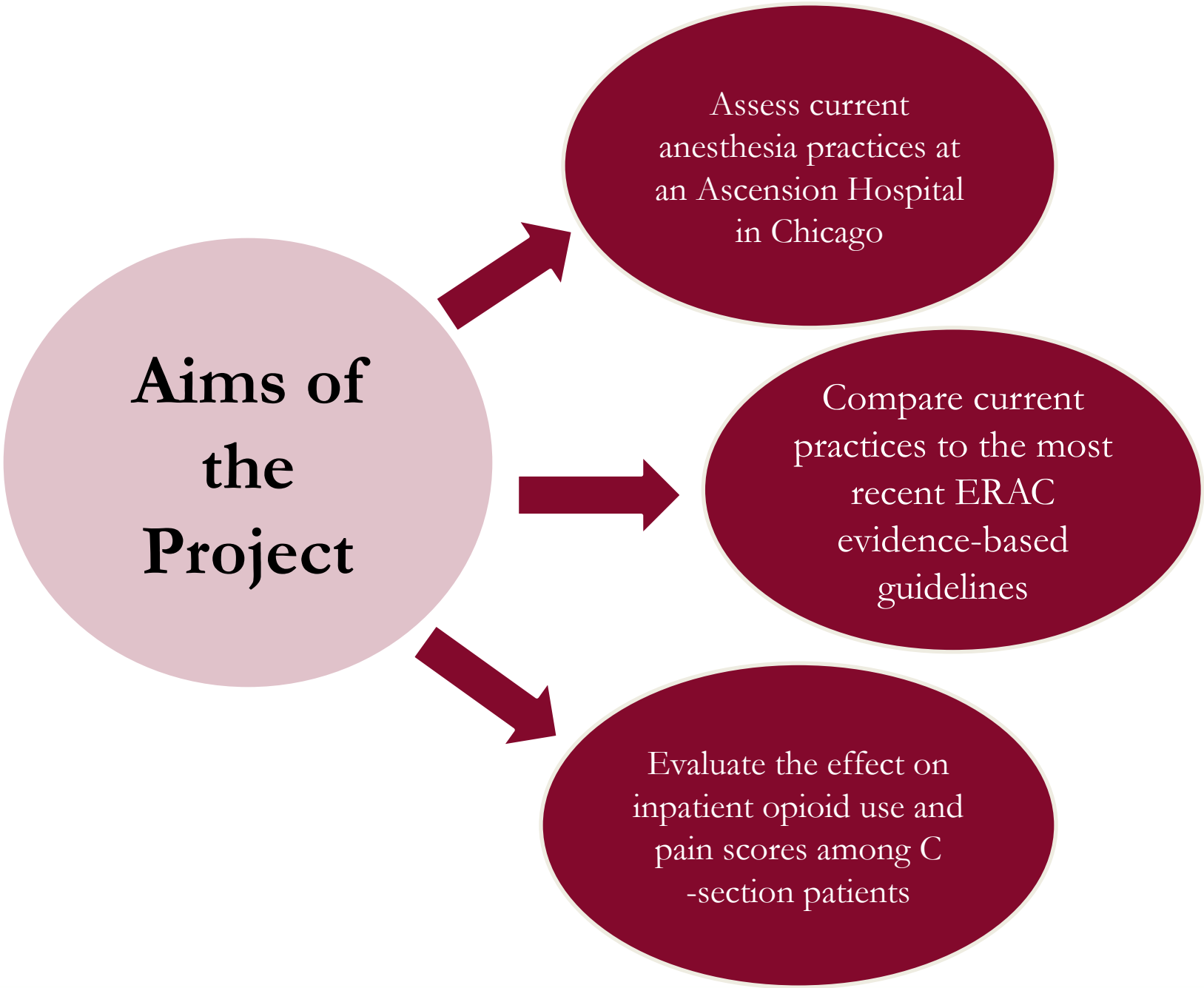
Significance of the Problem

- Patients are frequently discharged with opioids, even if they
  - report no pain upon discharge from hospital
  - did not receive opioids 24 hours before discharge
- A retrospective study of **804,752 c-section** patients under neuraxial anesthesia (2008-2018)
  - only **6.1%** received the recommended neuraxial morphine, NSAIDs, and acetaminophen
  - increasing from **1.3%** in 2008 to **15.0%** in 2018 (Reed et al., 2021).
- Despite improved compliance over the years, this percentage is still low, indicating a need for better ERAC implementation protocols.
- The rise in cesarean section rates, along with varying provider practices and opioid prescription patterns, suggests that better adherence to evidence-based recommendations could help mitigate the opioid epidemic in Cook County, where drug-induced overdoses have resulted in **4,467 deaths**

What is ERAC

- Enhanced recovery after surgery (ERAS) protocols are evidence-based standardized pathways created to optimize perioperative care
  - have been implemented for colorectal, orthopedic, and urology surgeries,
  - multimodal analgesia to reduce opioid exposure
  - decrease hospital length of stay and hospital costs

- The Society for Obstetric Anesthesia and Perinatology (SOAP), The American College of Obstetrics and Gynecology (ACOG), and the ERAS Society similarly have created an Enhanced Recovery after Cesarean Delivery (ERAC) pathway and recommendations focusing on preoperative, intraoperative, and postoperative care for women undergoing c-sections


Aims of the Project
Assess current anesthesia practices at an Ascension Hospital in Chicago
Compare current practices to the most recent ERAC evidence-based guidelines
Evaluate the effect on inpatient opioid use and pain scores among C -section patients

Current Anesthesia Related Guideline Recommendations

Preoperative

- Metoclopramide
- Sodium citrate antacids
- H2 Blocker Pepcid
- Non-opioid analgesic (gabapentin, acetaminophen)

Intraoperative

- Neuraxial Anesthesia
- Epidural or Intrathecal (IT) duramorph
- Intravenous (IV) fluid loading
- Non-opioid IV analgesic (ketorolac)
- Two antiemetics with different mechanisms of action
- Goal-directed Fluid Therapy (<3 Liters)
- Interventions to prevent Hypothermia (fluid warmer, forced air warmer, warm blankets)
- Regional adjuncts for patients who received general anesthesia: local anesthetic infiltration, Transverse Abdominis Plane (TAP) blocks, Quadratus Lumborum (QL) block

Postoperative

- First-line treatments with non-opioid analgesics, followed by low-dose, short-acting, low-potency opioids
- Scheduled non-opioid analgesics
- Scheduled oral ibuprofen, acetaminophen, gabapentin, and IV ketorolac

SWOT Analysis

Strengths

- NorthStar anesthesia interest
- Rosalind Franklin University alumni willing to facilitate and support the project.
- Physician support from the medical director
- Daily OB huddles and weekly OB safety meetings
- Data collection via EMR

Opportunities

- Educate the diverse obstetric population
- Address a leading community health issue
- Project is supported by existing evidence, ACOG, SOAP and the ERAS society recommendations
- Allows for evaluation current opioid and multimodal analgesia practices
- Shared vision to improve patient outcomes, reduce hospital stay and readmission rates

Weaknesses

- Minimal experience of investigators
- Staff acknowledgement of the current practice gaps and receptiveness to the project
- Residents primarily responsible for postoperative orders and discharge prescriptions
- The intraoperative anesthesia record is on paper and later scanned into the EMR delaying its availability for data collection

Threats

- Resistance to changes in practice and policy
- Limited time at facility
- No set ERAC protocol
- Incomplete electronic and paper documentation

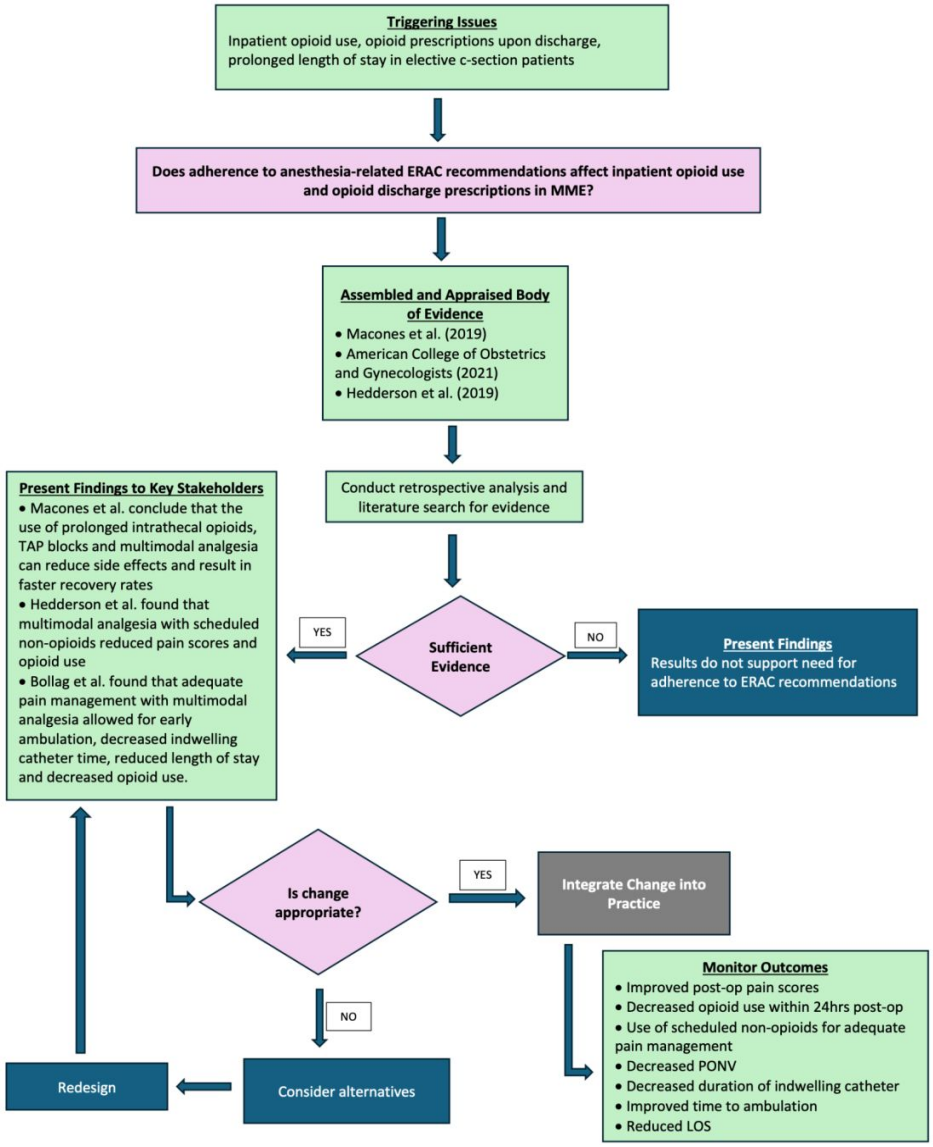
Research Question

For patients undergoing elective c-section at an Ascension Hospital in Chicago, what is the effect of the adherence to anesthesia-related ERAC recommendation practices on inpatient opioid use as morphine milliequivalents (MME) and inpatient pain scores?

Project Characteristics

- Target population is uncomplicated elective c-sections
  - Exclusion criteria: chronic opioid use, preeclampsia, emergent c-sections, and delivery prior to 36 weeks' gestation.
- Setting: critical care and level III NICU facility in Chicago, serving a diverse obstetric population.
- Outcome data collection via the electronic medical records (EMR) and paper documentation
- MME: standardized value of measurement for opioids based on potency relative to morphine
  - conversion factor for various opioids for comparisons and quantitative analysis.
- Pain Scores: Maximum post-operative pain scores (0-10) on a Visual Analogue Scale (VAS)

Modified Iowa Model for EBP



Measurable Outcomes

Primary Outcomes

- Intraoperative opioid use (MME)
- Postoperative opioid use at 4 hours, 24 hours, and 48 hours (MME)
- Maximum postoperative pain score (0-10) Visual Analogue Scale (VAS) within 1 hour, 24 hours, and the 2nd 24-hour period
- Pain score (0-10) at discharge on VAS

Secondary Outcomes

- Urinary catheter duration (hours)
- Length of stay (days)
- Discharge opioid prescription (Y/N)
- Total opioids prescribed at discharge (MME)
- Time to first documented mobility (hours)
- Number of rescue ondansetron doses at 4 hours, 24 hour, and 48 hours postoperatively

Methods

- Project was approved as a Quality Improvement (QI) initiative, therefore did not require Institutional Review Board (IRB) approval
- Obtained formal authorization for data collection from dedicated hospital leaders at Ascension Health System
- Retrospective data collected manually from **80 patient charts** in the EMR
- Data for **17 ERAC** parameters pertaining to anesthesia specifically were collected in a spreadsheet and coded for analysis

Data Analysis

- Formed three groups based on the number of anesthesia-related ERAC parameters implemented – Range of sample 6-13
  - Group A: 17 patients received 6-9 parameters
  - Group B: 55 patients received 10-11 parameters
  - Group C: 8 patients received 12-13 parameters

- SPSS statistical software used for analysis

- Primary and secondary outcomes were compared among the three groups using ANOVA and Wilcoxon Signed Ranks

Results

Overall Compliance (n=80)

Note. ERAC = Enhanced recovery after cesarean delivery; PO= oral; PR= rectal; IV= intravenous; L= Liters; TAP= Transverse Abdominis Plane; QL= Quadratus Lumborum; Intrathecal= IT, H2 blocker= histamine type 2 receptor antagonist; * = two patients received general anesthesia due to failed neuraxial techniques; **= received preloading, *** = two patients received general anesthesia, one out of these two patients received a TAP block.

Mean Opioid Use

Note: Groups were categorized based on the number of ERAC parameters received: group A, 6-9 parameters; group B, 10-11; and group C, 12-13. It is important to note that the researchers excluded the two general anesthesia cases in the sample, one of which was included in group B and the other in group C.

Mean Opioid Use

Opioid Consumption by Patient Group

Time Interval	Opioid Consumption, in MME, *mean (±SD)*			p-value
	Group A (*n*= 17)	Group B (*n*= 54)	Group C (*n*= 7)	
Intra-op	1.82 (±SD=3.509)	1.56 (±SD=4.196)	3.57 (±SD=4.476)	*p*=0.476
Post-op in 4-Hrs	1.47 (±SD=4.926)	1.67 (±SD=5.664)	2.14 (±SD=5.669)	*p*=0.964
Post-op in 24-Hrs	0	0.28 (±SD=2.041)	0	*p*=0.805
Post-op in 48-Hrs	0	1.39 (±SD=10.206)	0	*p*= 0.805

Note. Group A = patients who received 6-9 anesthesia-related ERAC parameters; Group B = patients who received 10-11 anesthesia-related ERAC parameters; Group C = patients who received 12-13 anesthesia-related ERAC parameters; n = sample size; SD = standard deviation; Intra-op = intraoperative; Post-op = postoperative; Hrs = Hours; MME = morphine milliequivalents; statistical significance = $p<0.05$. It is important to note that the two general anesthesia cases have been excluded in this analysis, one of which was from group B and the other from group C.

Pain Scores Between Groups

Opioid Consumption by Patient Group

Note. Group A = patients who received 6-9 anesthesia-related ERAC parameters; Group B = patients who received 10-11 anesthesia-related ERAC parameters; Group C = patients who received 12-13 anesthesia-related ERAC parameters; n = sample size; Hrs = hours; at 1-Hr= max pain scores from time of procedure end to first hour; by 24-Hrs= max pain scores between hour 1-24; by 2nd 24-Hrs= max pain scores between hour 24-48. Post-op = postoperative; VAS= Visual Analogue Scale; SD= standard deviation; MME = morphine milliequivalents; statistical significance = $p<0.05$.

Secondary Outcomes of Interest

- Urinary catheter duration
- Length of stay
- Discharge opioid prescriptions
- Total opioids prescribed at discharge (MME)
- Time to first mobility
- Rescue PONV medication
- Multimodal Antiemetic use

Barriers and Challenges

- Time restriction at the hospital due to clinical rotation assignments
- Willingness of providers to acknowledge existing gaps in practice
- Intraoperative paper charting
  - Delay in scanning to EMR
  - Illegible penmanship
- Resistance to change in policies or practice
- Collaboration of multiple interdisciplinary teams
- No established ERAC protocol - varying provider practices
- Inconsistencies in documentation, specifically mobility and pain scores

Areas for Improvement

IT Morphine

Max pain scores lower 24-hours postop with IT morphine vs without

- Variability IT morphine dosing among providers

Regional

1.25% received TAP block: GA patients (50%)

- 0% surgical site local infiltration

PONV

25% received >2 agents for PONV

- Full stomach & aspiration pneumonitis prophylaxis - 1% received an H2 blocker and metoclopramide preoperatively

Non-opioid Analgesics

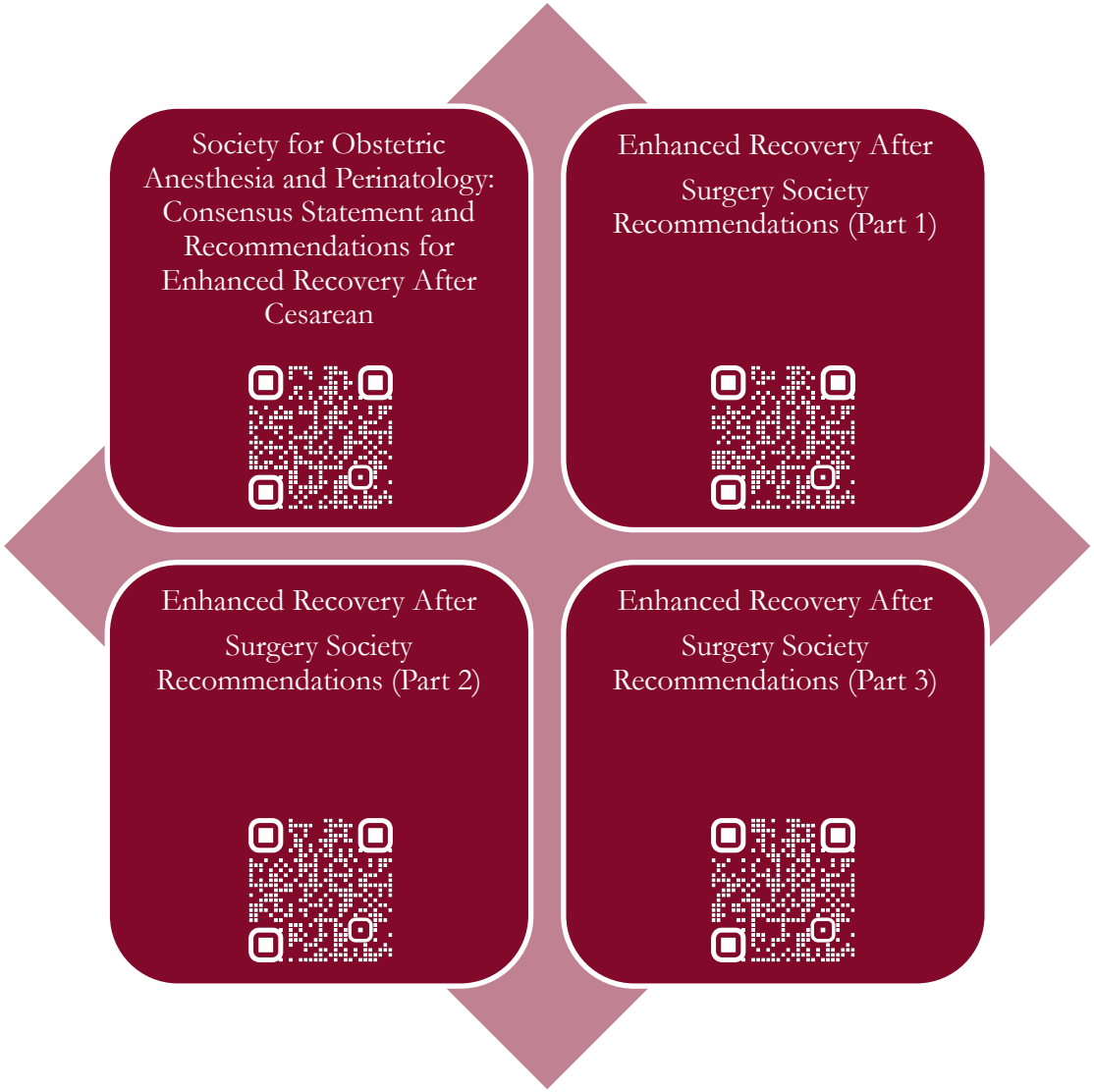
Early IV NSAID (34%)

Active Warming

Active warming (28%)

- shivering, oxygen consumption, bleeding , and wound healing

Translation to Practice



Future work could aim to establish more consistent practices, greater adherence to best practice recommendations, and implementation of a formal ERAC protocol.

References