Recommending an ERAS Guideline for Patients Undergoing Total Joint Arthroplasty

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Abstract

- Enhanced recovery after surgery (ERAS), a comprehensive guideline utilized throughout patients' surgical journey
- ERAS reduces body's response to surgical stressors
- Proven effective in various specialty surgical areas, like orthopedics
- Orthopedic surgery rates increase parallel to aging population, results in more joint replacements
- ERAS implementation, reduces healthcare costs to patient and facility from shorter stays and postop complications
- Investigation revealed lack of consistent care direction, developed ERAS approach for patients undergoing joint arthroplasty (TJA), research and recommendation of an ERAS guideline
- The final scholarly project (FSP) is to recommend an evidence-based ERAS guideline for patients undergoing (TJA) to decrease the length of stay (LOS) at the hospital facility of interest
- This educational project utilizes the Edward Deming Plan-Do-Study-Act (PDSA) cycle model
- Focal point of the ERAS guideline to assess the effectiveness of the recommended guideline
- The recommended ERAS guideline emphasizes patients receiving regional anesthesia before their total joint arthroplasty for its benefits of decreasing surgical stress on the body
- It is a multimodal analgesic technique reducing opioid requirements and decreases postoperative pain to allow early ambulation
- A cost-saving project for the hospital and patients
- The outcomes can lead to recommending an ERAS guideline to other specialty areas

- *Keywords:* enhanced recovery after surgery (eras), eras guideline, length of stay, eras outcomes, total hip arthroplasty, total knee arthroplasty, total joint arthroplasty

Introduction

- ERAS was first theorized by Henrik Kehlet, a Ph.D. Danish surgeon
- ERAS was first to implement in colorectal surgeries
- Multimodal analgesia, early ambulation, and enteral nutrition were initial focal points in ERAS
- A correlation was found between appropriate pain control and fewer adverse effects
- Management of postoperative pain allowed patients to ambulate sooner decreasing incidents of emesis and bowel obstruction
- Over 300 million surgical procedures are performed yearly
- Total hip and knee replacements account for nearly a million orthopedic procedures a year,
- Total joint arthroplasties have risen considerably in the last two decades
- Roughly 4 million Americans live with a total knee arthroplasty
- By 2030, the most significant jump in early TKAs and THAs will happen in the patient population between ages 45 and 55.
- Goals of ERAS are to reduce the length of hospitalization and overall costs
- The evidence suggests ERAS reduces LOS in patients undergoing TJA

Significance

- Anesthesia team plays most significant roles in ERAS pathway implementation
- Anesthesia delivers superior patient care in all three perioperative phases
- Multimodal opioid and non-opioid analgesics like neuraxial and regional techniques performed amongst others
- Improved patients' surgical experience coincides with anesthesia ERAS use

Problem Statement

- Among surgical patients undergoing total joint arthroplasty (TJA) **(P)**, does implementing an ERAS guideline **(I)**, compared to no ERAS guideline **(C)**, affect the length of stay **(O)**?

Literature Review

Agarwala et al., (2020)
- Retrospective analysis measuring LOS
- Sample size of 775 patients, 392 for UTKA and 383 for BTKA
- Average study LOS 3.17
- ERAS protocol decreased average LOS

Deng et al., (2018)
- Systematic review and meta-analysis over 25 studies
- 16,699 total patients
- LOS (mean difference (MD) −2.03, 95% CI −2.64 to −1.42)
- ERAS showed greater significance in patients undergoing joint surgeries than traditional methods

Heymans et al., (2022)
- Systematic review 40 studies: 34 in meta-analysis and 40 qualitative analysis comparing non-ERPs versus ERPs in TKA and THA patients
- Over 2 million patients
- ERPs showed greater statistical value
- Decreased LOS [average days being 6.5 (0.3-9.5)]
- ERP savings from $109 to $20,573

Ripollés-Melchor et al., (2020)
- Significant cohort study focused on ERAS versus non-ERAS in TKA and THA patients
- 6,146 subjects from 131 hospitals
- ERAS compliant hospitals had decreased length of stay
- The greater the ERAS compliance the better patient outcomes

Vendittoli et al., (2019)
- Prospective and retrospective cohort study between standard procedure control group and ERAS short stay protocol
- 114 patients in ERAS group versus 150 in control group
- ERAS group had a decreased length of stay of 2.8 days THA and 3.9 days TKA

Zhang et al., (2020)
- Umbrella study analyzing 23 meta-analyses and systematic reviews on ERAS clinical outcomes
- ERAS use decreases LOS and hospital costs without jeopardizing readmission and mortality rates
- ERAS positively effected all surgeries, orthopedic surgeries the most, including THA and TKA

Zhu et al., (2017)
- Systematic review and meta-analysis included RCTs, and clinical control trials
- Focused on ERAS protocol postoperative outcomes for THA and TKA patients
- Ten published studies accounting for 9,936 cases; 4,205 ERAS and 5,731 non-ERAS cases
- ERAS cases proved better in LOS
- ERAS case patients benefited the most

Project Description & Design

- DNP Final Scholarly Project is to recommend an ERAS guideline for patients undergoing total joint arthroplasty
- A quality improvement (QI) utilizing PDSA model, four stages
- Project timeline over twelve-month period
- The PDSA model guides system practices, enhances results
- **Plan:** plan the redesign and review
- **Do**: trial project in minor fashion
- **Study:** examine information and discover findings
- **Act**: alter the redesign from findings, repeat trial

Act
- Initial trial run results revealed to the stakeholders
- For undesirable project results, use of SWOT analysis assessment tool
- SWOT results will influence project modifications
- Project re-trialed optional
- **Months Ten-Twelve**

Plan
- Local midwestern, inner-city, level-one trauma hospital with prolonged stay for TJA patients
- In-depth review lack of ERAS guideline for ortho surgical population
- Literature review revealed correlation ERAS guideline use and decreased LOS
- **Months One-Three**

Figure 1

The figure explains and demonstrates the four stages of the PDSA cycle, including the model's continuous, cyclical nature (Crowfoot & Prasad, 2017, Figure 1)

Study
- Anesthesia team evaluates both groups patients' outcomes using **Appendix A**
- Anesthesia follow-up with PACU nurse and patient
- **Appendix A** top half for patient's PACU stay in PACU labeled "PACU Follow-Up"
- Next day patient follow-up phone call, bottom half of **Appendix A** labeled "Next-Day Follow-Up Call"
- Follow-up identifies ERAS group success compared to the non-ERAS
- **Appendix A** data analyzed by collective analysis method
- **Months Four-Six**

Do
- Regional anesthesia, critical ERAS guideline component studied
- Nerve blocks: adductor canal block, infiltration between popliteal artery and capsule of the knee (IPACK), interscalene block, and spinal anesthesia
- Inclusion criteria: ages 18-90 years of age, undergoing a TJA, metabolic equivalents of task (METS) >4
- Exclusion criteria: active infection, congestive heart failure (CHF), end-stage renal or liver failure, severe lung disease
- Patients selected, randomly placed in ERAS or Non-ERAS group
- **Months Seven-Nine**

Outcome & Evaluation

- ERAS or non-ERAS patients results recorded using the **Appendix A** survey uploaded into EPIC
- Project anesthesia member contact, gather survey data
- The questions in the survey were adapted from an already utilized survey proven by validity and reliability

Data collection focal points:
- ✓ Highest PACU pain score (out of 10 scale; specify location & characteristics)
- ✓ Total PACU narcotics administered (intravenous or oral)
- ✓ First ambulation time
- ✓ Total PACU time
- ✓ Adverse PACU events (nausea, vomiting, local anesthetic toxicity, extremity numbness, bleeding, uncontrolled postoperative pain)
- ✓ Time of first significant breakthrough pain (date and time)
- ✓ Pain score once block wore off (out of 10 scale; location of pain)
- ✓ Home adverse events (bleeding, dizziness, nausea, vomiting, etc.)
- ✓ Motor function return (yes or no)
- ✓ Paresthesia or skin numbness after block wore off (yes or no)

- Comparative analysis for ERAS and non-ERAS groups
- Collected data loaded in secure computer for future projects and analysis
- Determining ERAS guideline effectiveness comparing the outcomes in **Appendix A** survey on both ERAS and non-ERAS groups
- Three-month trial period intended, initial trial period to determine possible outcome

Conclusions & Recommendations

- Literature supports ERAS implementation in TJA decreases patient's LOS, decreasing costs
- Lack of consistent ERAS significantly hinders its effectiveness
- Patients and hospital facility benefit from ERAS most
- Resulting in shorter LOS, quicker patient turnover
- More favorable outcomes for TJA patients with most up-to-date guideline

References

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Appendix A

QI ERAS Postoperative Follow-Up Survey
(For non-ERAS patients, place N/A over sections that do not apply)

Type of Regional Anesthesia: _____

Medication(s) Used: _____

PACU Follow-up

Highest PACU Pain Score: __/10 _____ (Specify location & characteristics)

Total PACU Narcotics Administered

Intravenous: _____   **Oral:** _____

First Ambulation Time: _____   **Total PACU Time:** _____

Adverse PACU Events: _____

Next-Day Follow-Up Call

Time of First Significant Breakthrough Pain: _____ (Date & Time)

Pain Score Once Block Wore Off: __/10   **Location of Pain:** _____

Home Adverse Events: _____ (bleeding, dizziness, nausea, vomiting, etc.)

Motor Function Return: YES / NO (circle one)

Paresthesia or Skin Numbness after Block Wore Off: YES / NO (circle one)

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