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A Systematic Record Review of a Local Quality Improvement Impacts on Anesthesia Provider Knowledge and Attitudes Following a Presentation of Current Evidence-Based Practices Involving Intrathecal Mepivacaine Use in Total Joint Arthroplasty Surgical Patients

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Final Scholarly Project: A Systematic Record Review of Local Quality Improvement Impacts on Anesthesia Provider Knowledge and Attitudes Following a Presentation of Current Evidence-Based Practices Involving Intrathecal Mepivacaine Use in Total Joint Arthroplasty Surgical Patients

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Abstract

Patients undergoing spinal anesthesia for total joint arthroplasty (TJA) must urinate and ambulate within 1-hour before discharge from the post-anesthesia care unit to indicate a healthy return of lower body neuro-function after spinal administration. The most common spinal medication used is bupivacaine which has complications including postoperative urinary retention (POUR), altered proprioception, delayed ambulation, and prolonged motor block, resulting in increased cost and length of stay. One alternative solution is mepivacaine, an intermediate local anesthetic lasting 1.5 to 2.5 hours with comparative surgical blockade but a quicker motor and sensory function return. Research suggests mepivacaine is just as safe and effective with fewer occurrences of POUR, delayed ambulation, increased LOS, and overall care costs than bupivacaine. Reports of increased PACU LOS due to POUR and delayed ambulation in TJA patients receiving spinal bupivacaine anesthesia occurred. The project aim is to ensure safe, quality, evidenced-based anesthesia care for patients undergoing TJA surgeries. The specific purpose was to conduct a systematic record review of anesthesia provider questionnaire responses to evaluate the effects on provider knowledge and attitudes following a presentation of evidence-based practices involving intrathecal mepivacaine use in TJA surgical patients. A literature review was conducted, followed by a presentation to staff using evidence on spinal mepivacaine administration. Results from a retrospective analysis of pre-and post-presentation questionnaire responses indicate a commonly reported need among providers to improve anesthesia care for TJA patients. Findings demonstrate enhanced anesthesia providers' knowledge and attitudes, and stakeholders reported interest in implementing mepivacaine into their TJA program.

Keywords: Alternative options, bupivacaine, spinal anesthesia, Total Knee Joint/Total Joint Arthroplasty/Total Hip Arthroplasty (TKJ/TJA/THA) surgical patients, postoperative urinary retention (POUR), delayed ambulation, increased postoperative urinary retention, Length of Stay (LOS), and Post-Anesthesia Care Unit (PACU).

Introduction

Patients undergoing spinal anesthesia for total joint arthroplasty (TJA) must urinate and ambulate before discharge from the post-anesthesia care unit (PACU). These standard benchmarks indicate lower body neurological function returns after spinal administration. The recovery expectation is to ambulate and urinate within one hour before discharge home. However, several cases have not met these parameters over the past year, resulting in increased length of stay (LOS) and admissions due to postoperative urinary retention (POUR) and delayed ambulation. The general problem occurs with increased costs associated with prolonged patient recovery time, unplanned admissions, and over-utilization of PACU resources, resulting in the operating room (OR) holds and delays of subsequent surgical cases, overburdening the limited-staffed OR personnel during evening shifts.

Anesthesia for TJA includes general anesthesia (GA) or a neuraxial blockade (spinal). Surgeons prefer spinal anesthesia over GA to reduce operative time, blood transfusion, and other complications (Schwenk et al., 2020). Spinal anesthesia comes with challenges, such as an increased risk of POUR and delayed ambulation. The most common spinal medication used is bupivacaine, a long-acting amide local anesthetic with two and a half to three hours of partial motor blockade with even longer sensory blockade (Schwenk et al., 2020). Bupivacaine spinal complications include POUR, altered proprioception, delayed ambulation, and prolonged motor block resulting in increased cost and length of stay (Siddiqi et al., 2022). Mepivacaine is an intermediate local anesthetic used in spinal administration, lasting one and a half to two and a half hours with comparative surgical blockade but with an increased motor and sensory function return providing the patient the ability to ambulate and urinate faster, resulting in decreased LOS (Mahan et al., 2019). Significant literature findings demonstrate that mepivacaine has a shorter

blockade length than bupivacaine, resulting in decreased urinary retention and delayed ambulation, reducing the LOS and overall cost (Siddiqi et al., 2022).

Problem Statement

Despite the potential benefits of using mepivacaine in spinal anesthesia for this TJA patient population, mepivacaine was not an option for these patients at this clinical site. Reports indicated a problem with increased LOS due to POUR and delayed ambulation in TJA patients receiving spinal anesthesia. Increased LOS congests the PACU, delays cases, strains PACU and OR resources, increases costs, and leads to poor patient and surgeon satisfaction. Spinal anesthesia is the surgeon's preferred type of anesthetic because of the decreased risk of complications (Schwenk et al., 2020). The anesthesia leadership group at the project site of interest reported recent congestion and delays in their cases due to patients experiencing increased recovery times for previous procedures. Additionally, the leadership reported that PACU staff observed increased anxiety and concerns among those patients who experienced delays because of prolonged spinal anesthesia. Surgeons were unsatisfied with current practices and discussed the need to improve the LOS with the anesthesia management team while maintaining quality anesthesia.

These problems affect TJA patients, families, nursing, OR staff, anesthesia, and surgeon job satisfaction (Tveit, 2021). Patients and families would like surgery completed safely, effectively, on time, and discharged to home within a reasonable, expected time frame. Also, delays may affect staffing's ability to get off work on time, increase perceived stress, and overwhelm available resources (Tveit, 2021). Surgeons like having a safe and efficient day to do their caseload and head home (Tveit, 2021). Resolving problems concerning anesthesia case delays due to prolonged spinal with current anesthesia practice using bupivacaine for TJA

surgeries may also help to improve staff and surgeons' work-life balance and patient satisfaction with their surgical procedures and outcomes.

Implications from this problem without intervention will result in poor outcomes and increased costs to the patients and healthcare organizations. Complications can arise from urinary retention and delayed ambulation, resulting in increased LOS or hospital admission (Siddiqi et al., 2022). Surgeons' and patients' satisfaction is essential because they can choose to use a different facility for their TJA procedures resulting in lost revenue (Dexter & Tinker, 1995). Anesthesia provides high-quality, effective, and efficient care throughout the preoperative, perioperative, and postoperative. Resolving problems by utilizing different medications, technologies, skills, and techniques is essential in progressing anesthesia through the quantum age of healthcare.

Background and Significance of the Problem

The Institute of Medicine (IOM) 2001 created six aims for healthcare improvement: safe, effective, patient-centered, timely, efficient, and equitable healthcare (Moran et al., 2019). The administration of mepivacaine, a local anesthetic (LA), for TJA spinal anesthesia needs evaluation on whether it achieves the six aims of healthcare improvement. Bupivacaine is the current practice, but is it the better choice for achieving these goals? A shorter-acting LA can significantly impact how healthcare professionals provide and recover patients from anesthesia when undergoing TJA. Over the years, surgeon skills and instrumentation have improved and decreased surgical time; however, our anesthetic practices have remained the same, potentially delaying recovery and early discharge due to prolonged blockade, urinary retention, and inability to ambulate.

The mepivacaine administration must be safe and effective in providing adequate blockade and an optimal surgical environment without increasing adverse events. The shorter-

acting LA must provide timely and efficient recovery resulting in a decreased blockade, urinary retention, and ambulation time (Schwenk et al., 2020; Siddiqi et al., 2022; Sung et al., 2015). Meeting these benchmarks would make having TJA more equitable by reducing costs for recovery room time and preventing admissions and operating room delays (Tveit, 2021).

Significance to Profession and Clinical Practice

There is indirect and direct significance for the anesthesia profession. It directly impacts patient satisfaction and positive outcomes by providing a safe and efficient anesthetic for their TJA. It decreases current costs by reducing recovery time and complications while maintaining an adequate OR schedule (Tveit, 2021). Indirectly improves surgeon and anesthesia satisfaction by reducing the need for staying late, requiring overtime pay, and exhausting resources. The provider's work-life balance will improve and decrease potential burnout risk.

The significance for the anesthesia profession could be substantial and provide a blueprint for other facilities to implement similar practices meeting the IOM's six aims of healthcare improvement (Moran et al., 2019). Potential collaboration between facilities or health systems can provide additional areas for improvement resulting in the safe, cost-effective care we provide our communities. Complacency does not meet the needs in the quantum age of healthcare. The current anesthesia practice for TJA utilizes intrathecal bupivacaine, which is associated with an increased risk for POUR, delayed ambulation, and PACU LOS (Mahan et al., 2019; Schwenk et al., 2020; Sung et al., 2015). The problem causes subsequent delays in other cases, exhausts PACU staff, leads to adverse patient outcomes, negative patient and staff satisfaction, and increases the overall cost (Dexter & Tinker, 1995; Tak et al., 2020).

Literature Review

The PICO(T) format provides a framework for examining and answering a specific question related to the previously described problem (Melnyk & Fineout-Overholt, 2015).

During a thorough literature review, the QI team used the PICO(T) format to develop the clinical question and provide strategic key search terms to obtain the best evidence for this project. The five components include "population of interest [P], the intervention of interest [I], comparison of interest [C], the outcome of interest [O], and [T] time period of evaluation" (Melnyk & Fineout-Overholt, 2015, p. 29). The PICO(T) question developed for this scholarly project is: *In (P) TJA/TKJ/THA patients receiving spinal anesthesia, how does the (I) use of mepivacaine spinal compared (C) to the current practice of bupivacaine spinal anesthesia affect the (O) LOS, urinary retention, and delayed ambulation over (T) three months*? The QI team author conducted a review of the literature, focusing on seven main topics to include the following key search terms derived from this project's developed PICO(T) question: Alternative options, bupivacaine, spinal anesthesia, Total Knee Joint/Total Joint Arthroplasty/Total Hip Arthroplasty (TKJ/TJA/THA) surgical patients, postoperative urinary retention (POUR), delayed ambulation, increased postoperative urinary retention, Length of Stay (LOS), andPost-Anesthesiaa Care Unit (PACU). Research databases used in the literature search included the Otterbein University Onesearch, PubMed, ProQuest, and the Cochrane Library and Cumulative Index to Nursing and Allied Health Literature (CINAHL).

An article that compared bupivacaine to mepivacaine and its effects on post-operative ambulation demonstrates that mepivacaine is an alternative to current practice and suggests a solution to meeting the facilities' criteria of ambulation within an hour. Schwenk et al. (2020) conducted a double-blind, randomized control trial (RCT) study comparing mepivacaine against bupivacaine and its effects on postoperative ambulation. The study consisted of 150 patients undergoing total hip arthroplasty (THA) divided into three equal groups with similar characteristics, comprising of those who 1) received 52.5 mg of mepivacaine spinal anesthesia,

2) hyperbaric bupivacaine (11.25mg) spinal anesthesia, and 3) isobaric bupivacaine (12.5 mg) spinal anesthesia. All participants received similar anesthesia management post intrathecal injection of medication. Physical therapists (assessors) begin their first assessment three to three and half hours after the performed spinal and subsequently every two hours until the patient meets the criteria using the Tinetti score. Walking at least 100 feet safely, navigating stairs comparatively to specific home settings, ability to transfer self to and from chair or toilet, getting in and out of bed, and returning to baseline mobility function. Statistical analysis used in the study included one-way ANOVA, Shapiro-Wilk test, chi-square test, and binary logistic regression. The *p*-value for statistical significance (SS) is less than 0.05. Mepivacaine spinal group resulted in 70% (SS with a *p*-value of 0.001) meeting the three to three-and-a-half-hour ambulation criteria as opposed to the other two groups. Patient satisfaction was similar in all groups; however, in all the groups, the researcher determined that those who received mepivacaine required pain management earlier in recovery. Strengths of the study are its consistent and early time point set for primary outcome assessment, the inclusion of practice variability with the use of hyperbaric and isobaric bupivacaine, and clinical relevance when meeting ambulation requirements for discharge. The limits of the RCT are potential differences due to the sensory regression variability post-operatively, and the time between assessments could indicate reduced or no differences within the groups (Schwenk et al., 2020). The article is a level one grade for evidence with high solid reliability and can be repeatable, according to JHEBPN. Provides EBP alternatives to current practice and has a possible resolution to the problem statement.

A reviewed evidence-based article demonstrates a faster return of motor function and decreased urinary retention between mepivacaine and bupivacaine. Mahan et al. (2019)

performed RCT on 32 individuals who underwent unilateral total knee arthroplasty (TKA). Patients received sealed envelopes to determine which of the two groups would get either 10.5-12 mg of 0.75% hyperbaric bupivacaine or 60-68 mg of isobaric 2% mepivacaine. Before performing the intrathecal injection, the anesthesiologist became aware of which medication the patient would receive while everyone else was blinded. The certified registered nurse anesthetist (CRNA) continued anesthesia care per protocol for the remainder of the case. SAS 9.4 is the statistical analysis program that uses Fischer's exact test to determine categorical variables and two group *t*-tests for continuous variability. A *p*-value less than 0.05 determines if the results were SS. Statistically, the mepivacaine group demonstrates a faster return of sensory function by approximately 48 minutes and motor function by 47 minutes. Mahan et al. found urinary retention to be lower by 72 minutes but only determined the time it took to void: no use of bladder scans and no difference in catheterization between the groups.

Interestingly, the LOS was similar between the two groups, and it concluded that other variables besides the type of medication contributed to the increased LOS. No difference in opioid use post-operatively or level of anesthesia provided perioperatively would inform that both groups received safe and effective care. The limitations of this article are postoperative nursing care, variability in CRNA anesthesia technique, no push for SDD, no standardized PT assessment tools, and having a small sample size (Mahan et al., 2019). According to the JHEBPN appraisal and synthesis tool, Mahan et al. RCT is a Level 1 quantitative article with high credibility and reliability utilized as EBP resources for Schwenk et al. (2020) study.

A significant article comparing mepivacaine versus bupivacaine's effects on the return of motor function, POUR, and PACU LOS addresses the problem statement. Siddiqi et al. (2022) performed a systemic review and meta-analysis examining using mepivacaine compared to

bupivacaine spinal anesthesia for primary joint arthroplasty. Screening resulted in five studies, three randomized controlled trials, two retrospective cohort studies, and 1,550 patients. Three studies compared the neurologic motor return of mepivacaine vs. bupivacaine spinal. Mepivacaine patients resulted in a prompter return of motor function post-operatively (154 minutes) compared to bupivacaine (170 minutes). Studies on early mobilization and pain resulted in no significant difference between medications. Three studies compared the length of stay, reporting that mepivacaine had a shorter stay (26 hours) than bupivacaine (30 hours). Five studies compared urinary retention (POUR) with a significantly lower occurrence in mepivacaine (7.2%) versus bupivacaine (10.6%). Shorter-acting spinal like mepivacaine in THA and TKA patients will potentially result in a quicker return of motor function, early mobilization, decreased LOS, and lower POUR (Siddiqi et al., 2022). According to the JHEBPN, this is a level II quantitative article with high-quality data and potential for future research replication. Two RCTs in Siddiqi et al. (2022) are the evidence used within this DNP project, providing a solid foundation for recommending alternative EBP use of mepivacaine for spinal anesthesia in TJA.

Pain management is another criterion for same-day discharge. Theoretically, using a shorter-acting local anesthetic (mepivacaine), the sensory function will return faster and cause activation of pain receptors earlier in recovery. A double-blinded randomized clinical trial conducted by Tak et al. (2020) between March to June 2019 evaluated the adductor canal block (ACB) technique that is notable for controlling postoperative knee pain after total knee arthroplasty. One hundred eighty patients participated in the study. Three groups utilized the block randomization method with the type of neurological blockade blinded by the provider (two, four, or six). Group one consisted of ACB alone, while group two consisted of continuous ACB infusion with bolus infusions: group three combined ACB and IPACK block. Postoperative

pain assessment used the visual analog scale (VAS) at various hours post-operatively and after physiotherapy sessions. VAS scores were significantly better in group two for postoperative pain and after ambulation. Based on this article, continuous adductor canal block (CACB) results in better pain control in the postoperative period with less opioid consumption (Tak et al., 2020). JHEBPN hierarchy of evidence places this article as Level 1 with good quality evidence. The report is not as pertinent to the DNP project as other articles; however, it demonstrates that the supplementation of nerve block for pain assists with early ambulation and pain control.

POUR is another aspect of the problem statement that increases LOS and admissions at the facility. The article by Sung et al. (2015) investigated urinary retention or POUR after orthopedic procedures. A retrospective study of a tertiary care facility for people receiving orthopedic surgery between 2003-2013 who received documented GA or spinal anesthesia in EMR with available postoperative urination recorded. Statistical analysis compared patient demographics between the retention and the no-retention groups by independent *t*-test. Multivariate logistic regression determined significate contributing factors to POUR. Windows SPSS version 18 program performed all statistical analyses, and a *p*-value of less than 0.05 was determined to be SS. The study did not show any SS between GA and spinal anesthesia; however, demographics and characteristics such as elderly, males, those with hypertension (HTN), diabetes mellitus (DM), and TJA procedure were SS for developing POUR. The limitation of this study is its retrospective design and identification of POUR only through urology consults (Sung et al., 2015). An objective assessment with catheterization or bladder scan would have made for a more substantial study resulting in a potential for underestimating POUR in orthopedic patients. Potential Bias occurred due to excluding patients who had preoperative or perioperative catheterization. The exclusion in the statistical analysis of

uncontrolled variables that could potentially confound POUR symptoms includes benign prostatic hyperplasia (BPH) or previous history of urinary retention, pharmacological agents, and length of the procedure. Even with all these limitations, the finding warrants further investigation or evaluation. Sung et al. article is level V evidence according to the JHEBPN tool with limited findings and raised more questions than answers resulting in poor quality. The little information obtained supports this DNP scholarly project by determining demographics and characteristics that will increase patient risk for POUR when undergoing TJA. The article's shortcomings demonstrate the need to evaluate the effects of pharmacological agents and the potential utilization of mepivacaine on patients at higher risk for POUR.

Summarizing the Evidence Findings from the Literature

A summary of the evidence from the recent literature review is provided as a visual reference tool in a table format, as shown in Table 1 in Appendix A.

The literature summary and appraisal tool used included the JHNEBP Appraisal Tool forms, as shown in Appendix B. The literature review is the foundation of this DNP project because of the need to present an EBP alternative to anesthesia providers for TJA patients currently receiving bupivacaine spinal. TJA patients at this healthcare organization are having an increase in POUR, delayed ambulation, and increased LOS resulting in poor outcomes, patient and staff satisfaction scores, and an increase in overall cost. In summary, substantial, high-level evidence within the current literature suggests using mepivacaine as an alternative due to its shorter duration of action. Mepivacaine spinal improves the ability of the detrusor muscle to recover from neurological blockade reducing complications of POUR and faster return of sensor and motor function, enabling earlier ambulation resulting in decreased LOS with SDD. The evidence confirms that mepivacaine is just as safe and effective but can also be efficient in patients having TJA. Despite the potential benefits of using mepivacaine in spinal anesthesia for

this TJA patient population, mepivacaine is not an option for these patients at this clinical site. Reports indicate a problem with increased LOS due to POUR and delayed ambulation in TJA patients receiving spinal anesthesia. Increased LOS congests the PACU, delays cases, strains PACU and OR resources, increases costs, and leads to poor patient and surgeon satisfaction.

Project Implementation and Measures

Purpose and Aim

The overall purpose of this scholarly quality improvement project was to ensure safe, quality, evidenced-based practice anesthesia care of patients undergoing TJA surgeries who are at risk for POUR, delayed ambulation, and increased LOS in the PACU. The project's specific aim was to conduct a systematic record review of anesthesia provider questionnaire responses to evaluate the effects on provider knowledge and attitudes following a presentation of current evidence-based practices involving intrathecal mepivacaine use in total joint arthroplasty surgical patients at risk for postoperative POUR, delayed ambulation, and increased PACU LOS.

Researchable Questions

The project team created researchable questions and developed relevant objectives in meeting the overall aims of this project: 1) What does the research evidence show about spinal administration of mepivacaine compared to spinal bupivacaine anesthesia effects on urinary retention (urinary catheterizations), ambulation (return of motor function), and LOS in the PACU for postoperative TKJ patients? 2) How will a scholarly presentation using evidence from research and EBP literature on spinal mepivacaine anesthesia use (compared to spinal bupivacaine) affect the knowledge and attitudes of anesthesia providers who select mepivacaine or bupivacaine in spinal anesthesia in TJA patients? 3) Will a change in anesthesia provider knowledge and attitudes regarding using mepivacaine as an alternative to bupivacaine spinal

anesthesia result in a leadership group's decision to change clinical practice among anesthesia providers who care for TJA patients?

Project Objectives

The QI team established objectives used to help achieve the primary aim of this project: 1) Review and appraise evidence from the literature evaluating the safety, efficacy, and differences of effects regarding spinal administration of mepivacaine compared to spinal bupivacaine anesthesia on urinary retention (urinary catheterizations), ambulation (return of motor function) and LOS in the PACU for postoperative TJA patients.

2) To provide a scholarly presentation using evidence from research and EBP literature on spinal mepivacaine anesthesia use (compared to spinal bupivacaine) to anesthesia providers and assess their knowledge and attitudes regarding their decision to use or not use mepivacaine or bupivacaine in spinal anesthesia in TJA patients.

3) To conduct a retrospective review of provider questionnaire responses (collected by the project site's Quality Improvement Practice Committee) following the EBP presentation regarding mepivacaine use in TJA patients, comparing pre-and post-presentation questionnaire findings (e.g., knowledge and attitudes regarding incorporating the use of mepivacaine into clinical practice and care of TJA patients); and lastly, 4) To provide project findings, identified barriers, and clinical practice guideline recommendations for implementation, sustainment, and continued monitoring of mepivacaine and bupivacaine spinal anesthesia use in TJA patients using a SWOT/COA analysis briefing and discussion format to the key stakeholders and leaders (Prof. Dr. Nábrádi et al., 2021).

Project Design, Setting, and Population of Interest

This DNP scholarly project proposal involved a non-implementation approach. The clinical project site was a regional, urban, 420-bed level-two trauma surgical center and teaching

hospital located in South-Central Michigan, United States, which also houses an outpatient orthopedic surgery center, performing thousands of surgeries annually. Because this project focused on anesthesia providers' knowledge, attitudes, and preferences/decisions concerning using mepivacaine compared to the standard practice of using bupivacaine for TJA patients, the target population of interest for this project centered on Board Certified Anesthesiologists, CRNAs, and Anesthesia Residents. The anesthesia department at this clinical project site comprises 72 anesthesia providers (e.g., 40 full-time employees, six locums, eight per diem, and 18 anesthesiologists).

Project Team

The project team for this proposed DNP scholarly project comprised of the following members: a Doctor of Nursing Practice Student who is a CRNA and served as an Associate Investigator; a PhD-prepared Faculty Advising Principal Investigator (PI) who has diverse and extensive experience as a former Vice Chair of an IRB for a large regional military medical center, and has served as a PI or AI on numerous Clinical Research, Evidence-based Practice, and Quality Improvement Projects for both Ph.D. and DNP graduate students and healthcare professionals. Additional local community project members comprised the Head CRNA, Quality Improvement Coordinator RN, and Head Anesthesiologist at the clinical project site.

Protection of Human Subjects

Before initiating this DNP Final Scholarly Project (FSP), a scholarly written project proposal was submitted as part of an application to the Otterbein University Institutional Review Board (IRB). Following the IRB review, a determination letter was obtained by the university's IRB, attached to this FSP for record-keeping by the project team, and then enclosed within the project's final report (as Appendix F). No names or unique patient/staff identifiers, or personal health information (PHI) were collected or stored. All collected data were fully de-identified

before storage into a password-protected, secure spreadsheet. Only de-identified aggregate data will be shared outside the project site with the university's Department of Nursing during the dissemination of the Final Report Presentation (partially fulfilling the degree requirements: Doctor of Nursing Practice at Otterbein University).

Project Timeline

QI team member performed An evidence-based practice-framed presentation using the SWOT analysis meeting method and conducted in January 2023 as part of the routine weekly Anesthesia Education and Quality Improvement leadership rounds by a Staff CRNA and Quality Improvement Nurse. Just before and immediately following the EBP-SWOT presentation, the Quality Improvement Coordinator administered and collected a pre-and post-presentation per that department's typical practices following these briefings. In April 2023, the QI team applied for and completed the Otterbein University IRB process. After IRB approval, the Project team retrospectively collected and analyzed the response data contained within previously recorded pre- and post-presentation questionnaires. After analyzing the pre- and post-presentation questionnaire response data, the results and a discussion of the project findings were incorporated into a Final Scholarly Project Report as required by the Nursing Department at Otterbein University in partial fulfillment of the requirements for the Doctor of Nursing Practice degree for the student investigator AI of the Project Team. Finally, in mid-April 2023, the project will be presented and disseminated to the Nursing Department faculty and students at Otterbein University in an open forum. Once the final written report is approved by the Project Team Leader/PI/Advisor, the final report will be submitted to Otterbein University Digital Commons for published archiving no later than May 2023.

Project Budget

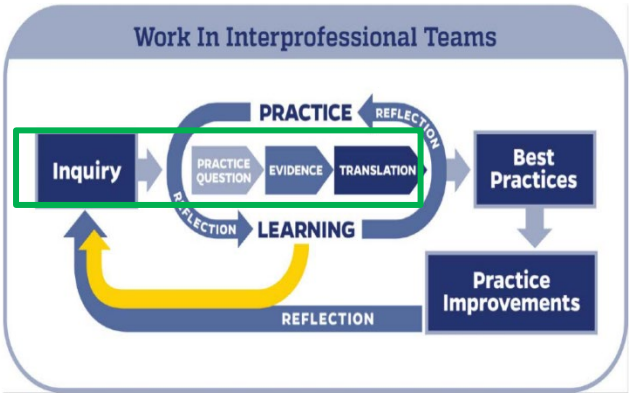
The budget considerations for this project were minimal. Since this project uses a non-implementation approach, the only burden to participants was time spent attending the mandatory anesthesia provider education and quality improvement meetings, which was accounted for in their standard pay and required duties. The project team leader's time was the only significant cost associated with developing and executing the DNP project. The DNP project was very involved and time-consuming, accounting for all aspects of preparation, presentation, and evaluation estimating 10-15 hours per week for a four-to-six-month timeframe. Miscellaneous costs included administrative consumable products such as paper material not covered by the clinical project site's Anesthesia and Quality Improvement Departments, such as an estimated $200 for printed FSP Final Report presentation items.

EBP Framework

The QI team utilized the Johns Hopkins Nursing Evidence-Based Practice Model (JHNEBP) and EBP Appraisal tool to help review, appraise, and translate best evidence practice for clinical, learning, and operational aspects of spinal anesthesia for TJA (Melnyk & Ellen, 2018). The JHNEBP model helps nurse investigators to identify and recognize gaps or areas for improvement within standard practice and disseminate new knowledge to create a practice culture supported by evidence (Melnyk & Ellen, 2018). This problem-solving model helped the project team integrate the best available scientific evidence while allowing for internal and external influences and promoting provider critical thinking on which best to implement in the care of individuals, the patient population, and healthcare organizations (HCO) (Dang et al., 2021). Figure 1 illustrates the JHNEBP model used in this project, which focused on the framework's Inquiry, Practice Question, Evidence, and Translation Components (Melnyk & Ellen, 2018, Figure 14.9).

Figure 1.

Evidence-Based Practice Framework using the Johns Hopkins Nursing EBP Model



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The Practice Question, Evidence, and Translation (PET) process and the 18 steps within the phases are a systematic approach to meeting the aims and objectives of EBP quality improvement projects like this (Melnyk & Ellen, 2018).

Phase 1, the Practice question phase:

1. Recruit an interprofessional team
2. Develop and refine the EBP question
3. Define the scope of the EBP question and identify stakeholders
4. Determine responsibility for project leadership
5. Schedule team meetings (Melnyk & Ellen, 2018)

Phase 2, the Evidence phase, comprises the following steps:

1. Conduct an internal and external search for evidence
2. Appraise each piece of evidence (Evidence level and quality Guide)

3. Summarize the individual evidence

4. Synthesize the overall strength and quality of evidence

5. Develop recommendations for change based on evidence synthesized from discovery (Melnyk & Ellen, 2018, Figure 14.10)

Phase 3, Translation steps include:

1. Determine fit, feasibility, and appropriateness of recommendations

2. Create an action plan

3. Secure support and resources to implement an action plan

4. Implantation of the action plan

5. Evaluate outcomes

6. Report outcomes to stakeholders

7. Identify the next steps

8. Disseminate findings (Melnyk & Ellen, 2018, Figure 14.10)

Quality Improvement Framework

The Plan-Do-Study-Act (PDSA) framework for quality improvement (QI) was also used to help guide this project within the phases of the JHNEBP PET Process model through completion (Wong & Headrick, 2020). The following objectives were established to achieve the aims of this project: 1) to review, and appraise evidence from the literature evaluating the safety, efficacy, and differences of effects regarding spinal administration of mepivacaine compared to spinal bupivacaine anesthesia on urinary retention (urinary catheterizations), ambulation (return of motor function), and LOS in the PACU for postoperative TJA patients; 2) to provide a scholarly presentation using evidence from research and EBP literature on spinal mepivacaine anesthesia use (compared to spinal bupivacaine) to anesthesia providers and assess their knowledge and attitudes regarding their decision to use or not use mepivacaine or bupivacaine in

spinal anesthesia in TJA patients; and lastly; 3) to conduct a retrospective, review of provider questionnaire responses (collected by the project site's Quality Improvement Practice Committee) following EBP presentation regarding mepivacaine use in TJA patients, comparing pre-and post-presentation questionnaire findings (e.g., knowledge and attitudes, regarding incorporating the use of mepivacaine into clinical practice and care of TJA patients); and lastly; and lastly, 4) provide evidence, project findings, identified barriers, and clinical practice guideline recommendations for implementation, sustainment, and continued monitoring of mepivacaine and bupivacaine spinal anesthesia use in TJA patients through the utilization of SWOT (Strength, Weakness, Opportunities, and Threats) analysis and COA (Course of Actions) decision briefing and discussion format techniques to the clinical site's key stakeholders and anesthesia leaders (Prof. Dr. Nábrádi et al., 2021). Data will not include any patient or staff personnel identifiers.

The PDSA framework for QI was used to help guide this project within the phases of the JHNEBP model through completion (Wong & Headrick, 2020). This quality improvement project followed a traditional Plan-Do-Study-Act (PDSA) framework. This Deming cycle model is the most widely used and accepted quality improvement model in healthcare, which utilizes PDSA cycles to provide a structure for iterative testing of local changes toward improving the quality of systems (Polit & Beck, 2021). The quality improvement framework comprises a four-step cycle beginning with the 'Plan' phase.

Plan. During this initial phase, key components included identifying the problem and deriving potential solutions (Connelly, 2021; Polit & Beck, 2021; Moen & Norman, 2010). The initial indication of a problem was brought to light by the project team during a scheduled monthly quality meeting with the anesthesia leadership group and Quality Department

Coordinator. During this meeting, the anesthesia leadership group at the project site of interest reported recent congestion and delays in their cases due to patients experiencing increased recovery times for previous procedures. Additionally, the leadership reported that PACU staff observed increased anxiety and concerns among those patients who underwent delays because of prolonged spinal anesthesia. Surgeons were unsatisfied with current practices and discussed the need to improve the LOS with the anesthesia management team while maintaining quality anesthesia. Resolving problems concerning anesthesia case delays due to prolonged spinal with current anesthesia practice using bupivacaine for TJA surgeries may also help to improve staff and surgeons' work-life balance and patient satisfaction with their surgical procedures and outcomes. A potential solution to this issue was the proposed use of Mepivacaine in TJA surgeries. Mepivacaine is an intermediate local anesthetic used in spinal administration, lasting one and a half to two and a half hours with comparative surgical blockade but with an increased motor and sensory function return providing the patient the ability to ambulate and urinate faster, resulting in decreased LOS (Mahan et al., 2019). Significant evidence in the research literature demonstrates that mepivacaine has a shorter blockade length than bupivacaine, resulting in decreased urinary retention and delayed ambulation, reducing the LOS and overall cost (Siddiqi et al., 2022). However, despite the potential benefits of using mepivacaine in spinal anesthesia for this TKJ patient population, mepivacaine was not an option for these patients at this clinical project site. Consequently, reports indicated increased LOS problems due to POUR and delayed ambulation in TJA patients receiving spinal anesthesia. The QI team attributed these problems to anesthesia provider preference, knowledge, and attitudes toward current practices and potential alternate solutions. So, the planning phase aligned nicely with the first objective of this scholarly project. The plan was to conduct a thorough review and appraisal of evidence from within the

literature evaluating the safety, efficacy, and differences of effects regarding spinal administration of mepivacaine compared to spinal bupivacaine anesthesia on urinary retention (urinary catheterizations), ambulation (return of motor function) and LOS in the PACU for postoperative TJA patients. The planning also involved the development of an EBP-framed presentation of the evidence to present the evidence findings and recommendations for practice change to key stakeholders in the second PDSA cycle, the "Do" phase.

Do. The second portion of this cycle required implementing the proposed plan, or the 'Do' phase (Moen & Norman, 2010). This stage is best implemented on a small scale to implement small local change, allowing the project investigators to learn and adapt while minimizing the use of organizational resources (Connelly, 2021; Taylor et al., 2014). This "Do" phase of the PDSA model for this project includes providing an EBP-framed presentation of the research literature evidence and recommendations for practice change to key stakeholders.

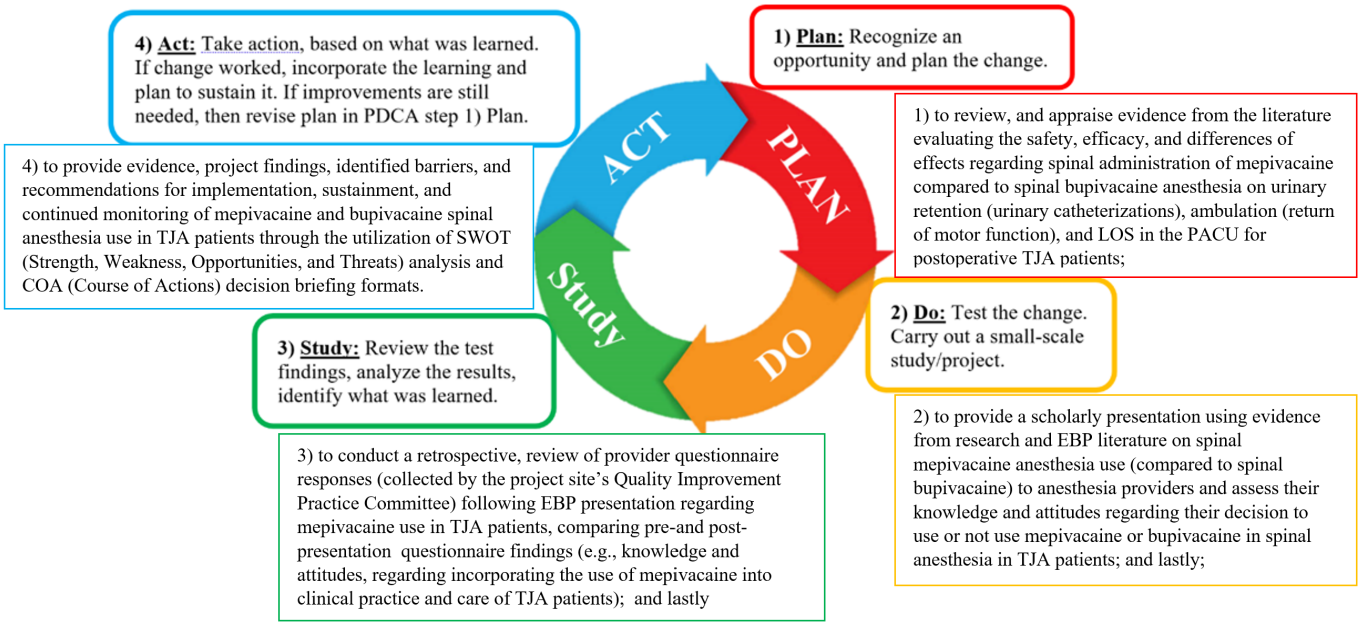
Study. The third phase of the PDSA cycle is the 'Study' portion, which emphasizes results evaluation (Moen & Norman, 2010). Results were collected and analyzed by comparing pre-and post-presentation outcomes measures described within the methodology section.

Act. After evaluating the results, the cycle's final 'Act' phase focused on lessons learned, identifying adjustments as necessary to optimize a new cycle or sustain effective processes already in place (Connelly, 2021; Taylor et al., 2014).

The QI team project objectives and methods were framed using the quality improvement PDSA Model and established to achieve the project's overall aim, as shown in Figure 2.

Figure 2.

Plan-Do-Study-Act Quality Improvement Framework



Using the JHNEBP model and PDSA framework aided the project team in implementing quality improvement changes within the HCO, providing a culture of EBP. The EBP literature will support change and hold under scrutiny due to the evaluation and discovery process within this model. The open and continuous concept direction of these models enabled internal and external changes in the process, allowing flexibility and the likelihood of future successful implementation.

Strengths, Weaknesses, Opportunities, and Threats Analysis (SWOT)

The QI team used the SWOT analysis briefing format (Appendix B) during individual stakeholder meetings to help the project team understand the status of non-pharmacological therapy. A SWOT analysis is a process of identifying a company's Strengths, Weaknesses Opportunities and Threats (Moran et al., 2020). The strength (S) components will focus on the current practice benefits of using bupivacaine for TJA patients. Additionally, a brief discussion of the evidence from the literature was provided as part of the (S) in the SWOT brief to highlight further the benefits of continued use of bupivacaine in spinal anesthesia during surgical procedures. However, the weakness (W) components help investigate the identified clinical

problem reports of increased anesthesia care and case delays attributed to increased POUR rates and PACU LOS as barriers. The QI team obtained this through interactive discussions during SWOT meetings and conferences with anesthesia leadership, the quality improvement team, and stakeholders. The QI team identified barriers obtained from the meeting interactions with stakeholders added to the (W) section of the SWOT, which included part of the FSP Final Report presentation with the project site stakeholders and the university faculty and students. The opportunity (O) component was presented to explore further the desired state that would address identified barriers and recommended ways to overcome the obstacles/weaknesses towards improving anesthesia care and case delays due to prolonged spinal anesthesia effects such as increased rates of POUR and LOS in the PACU. The QI team's opportunity is to incorporate mepivacaine as a safe and effective alternative to bupivacaine. A discussion for those anesthesia providers and leadership members who may not have been aware of the current evidence in the existing literature regarding its use in TJA patients. The presentation of the threat (T) component addressed implications and vulnerabilities to current clinical practice if no change or use of alternate spinal anesthesia agents such as Mepivacaines utilization at the clinical project site. The SWOT analysis helped develop a full awareness of all the factors involved and described within this project proposal surrounding the current problem of increased POUR and PACU LOS due to prolonged spinal anesthesia effects of the standard practice of bupivacaine spinal intrathecal anesthesia. The EBP-framed SWOT presentation meetings lasted less than fifteen to 30 minutes. The project team recorded keywords from conversations with stakeholders in the corresponding quadrant of Appendix B and incorporated them into the Project Team FSP Final Report presentations. No private or unique identifying information was collected or disseminated. The QI team recorded only de-identified data from the SWOT analysis in Appendix C.

Analysis and Outcome Evaluation

Pre- and Post-Presentation Questionnaire

How will a scholarly presentation using evidence from research and EBP literature on spinal mepivacaine anesthesia use (compared to spinal bupivacaine) affect the knowledge and attitudes of anesthesia providers who select mepivacaine or bupivacaine in spinal anesthesia in TJA patients? Will a change in anesthesia provider knowledge and attitudes regarding using mepivacaine as an alternative to bupivacaine spinal anesthesia result in a leadership group's decision to change clinical practice among anesthesia providers who care for TJA patients? To answer these specific researchable questions of this project, the QI Team provided a short Pre- and Post-Presentation Questionnaire form (Appendix D) to all anesthesia providers who attended the routinely scheduled anesthesia education and quality improvement meeting addressing this topic. The pre- and post- presentation questionnaire consisted of 10 declarative statements: 1) There is an opportunity/need to improve the quality and care for our TJA patients receiving spinal anesthesia, using bupivacaine, regarding LOS and POUR; 2) Mepivacaine provides a similar blockade compared to bupivacaine; 3) The current practice using bupivacaine for TJA is efficient and effective regarding LOS and POUR; 4) EBP and research literature demonstrates that mepivacaine spinal has a faster return of motor function than bupivacaine (e.g., reducing risk for POUR and increased LOS); 5) Sufficient evidence from the literature supports intrathecal mepivacaine reducing postoperative urinary retention (POUR) and LOS; 6) There are concerns regarding adequate blockade for the procedure, using bupivacaine; 7) Patients will have increased postoperative pain with the use of mepivacaine; 8) There will be more complications with the use of mepivacaine than bupivacaine; 9) Mepivacaine will be insignificant in TJA patient's overall outcomes (e.g., LOS, POUR); and 10) Plan on implementing intrathecal mepivacaine in current practice for TJA when appropriate. The questionnaire rated participant

responses on a 5-point Likert scale of 1 to 5 (1 being "strongly disagree" and 5 being "strongly agree").

Data Collection Procedure

The dissemination of an EBP-framed presentation regarding using mepivacaine spinal for TJA occurred during facilities-designated anesthesia education and quality improvement meeting on Fridays between 07:15 AM – 08:15 AM. The anesthesia department comprises 72 providers (e.g., 40 full-time employees, six locums, eight per diem, and 18 anesthesiologists). The QI team provided an email with a PowerPoint presentation with voice-over narration to all attendees who could attend and those who were unavailable to participate in the in-person SWOT/COA brief meeting. The utilization of a Pre- & Post- EBP Presentation Questionnaire (Appendix D) helped the project team in evaluating the impact of the disseminated literature evidence and SWOT/COA briefing techniques on anesthesia provider knowledge and attitudes regarding the potential incorporation of mepivacaine use in their clinical practice and care of TJA patients. The Pre- & Post- EBP Presentation Questionnaires were anonymous and distributed using survey monkey per routine Quality Improvement Department survey techniques after quality and leadership round meetings. The project team leader handled and secured the data to maintain its integrity. The QI team used the data from the pre-and post- presentation questionnaire to assess and describe the provider's potential willingness to use mepivacaine intrathecally as an alternative to bupivacaine for TJA. The results may also help the clinical project site's anesthesia leadership determine if further education, resources, policy, or practice guideline changes may be needed.

Data Analysis Plan

The data collected (e.g., anesthesia provider responses to the Pre- and Post-Presentation Questionnaire (Appendix C) was uploaded from the Excel spreadsheet into an SPSS software for

analysis. The QI team used descriptive statistics to analyze and summarize quantitative data. The use of descriptive statistics allowed the project team to examine and provide basic summary information about anesthesia providers' clinical knowledge and attitudes regarding the current practice and use of bupivacaine compared to the alternate use of mepivacaine for TJA before the following the introduction of the EBP presentation. Once the collection of pre-test and post-test results were complete, the project team analyzed the results using a paired 2-tail t-test to observe whether the presentation of evidence had any influence on provider knowledge and attitudes concerning the possibility of incorporating the use of mepivacaine as an alternate spinal anesthesia for TJA. A p-value less than .05 indicated a significant difference in the participant's knowledge and attitudes concerning this EBP-supported alternate medication for spinal anesthesia in TJA patients in helping to reduce the risk of POUR, delayed ambulation, and increased PACU LOS. The result is the prolonged effects of current anesthesia practices in TJA patients. The information aided the project team, as well as the project site's anesthesia provider and quality improvement leadership, in evaluating the impacts of the EBP presentation and determining if there were any improvements to the identified initial clinical rates of POUR, delayed ambulation, and increased LOS in PACU problem, which was previously reported and observed. All project findings identified barriers, and recommendations for future implementation, sustainment, and continued monitoring, were presented to the QI team using SWOT analysis briefing and discussion format techniques. All key stakeholders and leaders, as well as the university's Nursing Department faculty and students, during the project team FSP Final Report dissemination.

Results

A 5-point Likert-scaled questionnaire was administered before and after the educational presentation to evaluate the knowledge received and whether providers would utilize the

alternative mepivacaine in their practice. A total of 33 surveys were collected and analyzed (18 pre-education and 15 post-education) with an attendance of 24 individuals, including the Director of Anesthesia, orthopedic surgeon, anesthesia quality improvement manager, CRNA clinical coordinator, and anesthesia providers. Results from a retrospective analysis of pre-and post-presentation questionnaire response data, as shown in Appendix G, consisting of 10 charts representing response data to each question, labeled Q1 through Q10.

Discussion

The differences between the pre-and post-presentation questionnaire response findings in this project indicate a shift in the tendency of these participants. These findings demonstrate that the anesthesia providers who participated in this project believed and understood the evidence presented. Wherein mepivacaine provides comparable analgesia without increased risk or complications, allowing for early ambulation, decreasing the risk of POUR, and reducing LOS and potential admissions after TJA with spinal anesthesia. The evidence presented was compelling about alternative treatment to current spinal anesthesia practice for TJA. For example, Question #10 on the survey asked the likelihood of using mepivacaine when appropriate for TJA patients, indicating a shift from 5.6% in the presurvey responses to 46.7% in the “Agree” response category in post-presentation questionnaire response regarding future mepivacaine use in practice. Although the smaller sample size, there is evidence that we improved the knowledge and attitudes towards using mepivacaine for TJA by introducing the most current and evidenced-based practice research on this clinical topic.

Overall, a retrospective analysis of pre-and post-presentation questionnaire responses indicated a commonly reported need among providers to improve anesthesia care for TJA patients. Findings demonstrate enhanced anesthesia providers' knowledge and attitudes and

stakeholders' reported interest in implementing mepivacaine into their TJA program after the presentation.

Conclusion and Recommendations

Patients undergoing spinal anesthesia for total joint arthroplasty (TJA) must urinate (a.k.a. "void") and ambulate before discharge from the post-anesthesia care unit (PACU) because it indicates the return of lower body neuro function after spinal administration. The recovery expectation is to ambulate and urinate within an hour before discharge home. Anesthesia for TJA includes general anesthesia (GA) or a neuraxial blockade (spinal). Surgeons prefer spinal anesthesia over GA to reduce operative time, blood transfusion, and other complications. Spinal anesthesia comes with challenges, such as an increased risk of POUR and delayed ambulation. The most common spinal medication used is bupivacaine, a long-acting amide local anesthetic with 2.5 to 3 hours of partial motor blockade with even longer sensory blockade. Bupivacaine spinal complications include postoperative urinary retention (POUR), altered proprioception, delayed ambulation, and prolonged motor block. It results in increased cost and length of stay. An alternative to using bupivacaine is for anesthesia providers to use mepivacaine intrathecally. Mepivacaine is an intermediate local anesthetic used in spinal administration, lasting 1.5 to 2.5 hours with comparative surgical blockade but with an increased motor and sensory function return, allowing the patient to ambulate and urinate faster, resulting in decreased LOS. Substantial evidence from the research literature suggests that mepivacaine is just as safe and effective but has a shorter blockade duration than bupivacaine, reducing occurrences of urinary retention, delayed ambulation, LOS, and overall care costs (multiple citations). However, despite the potential benefits of using mepivacaine in spinal anesthesia for this TKJ patient population, mepivacaine was not being utilized as an option for these patients at this clinical site due partly to provider preference-based decisions, knowledge, and current attitudes.

Meanwhile, reports of increased LOS in the PACU due to POUR and delayed ambulation in TJA patients receiving spinal anesthesia was occurring, which may have indicated a low utilization of evidence-based and best practices in anesthesia care at this current clinical site. This scholarly quality improvement project aimed to ensure safe, quality, evidenced-based practice anesthesia care of patients undergoing TJA surgeries who are at risk for POUR, delayed ambulation, and increased LOS in the PACU. The project aimed to improve clinical knowledge, attitudes, and decisions among the anesthesia provider team about using mepivacaine as an alternative to bupivacaine for spinal anesthesia administration to TKJ surgical patients at risk for postoperative POUR, delayed ambulation, and increased PACU LOS. The DNP FSP proposal utilizes best practices from the literature and a systematic approach. The proposal can serve as a beginning point towards ensuring safe, quality, evidence-based practice nursing care for patients who receive spinal anesthesia for TJA.

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Appendix A
Literature Review Table

Article #	Author & Date	Evidence Type	Sample, Sample Size & Setting	Study findings that help answer the EBP question	Limitations	Evidence Level & Quality (per JHEBPN apprasial and synthesis tool)
2	Siddiqi et al (2022)	Meta-anaylsis (3 RCT, 2 retopsepctive studies	1550 patients	Return motor function MP 154 min vs BP 170 min No difference in early mobilization and pain LOS MP 26 hours vs BP 30 hours POUR MP 7.2% lower than BP 10.6%	meta anaylsis	Level 2 (high quality data and potential for replication)
3	Schwenk et al (2020)	RCT	150 patients, 3 groups	Mepivcaine group met the ambulation criteria of 3.3.5 hours 70% of time compared to other two groups with similar satisfaction scores	none	Level 1 (high credibility and reliability)
4	Tak et al (2020)	Double blind RCT	180 patients 3 groups	Demonstrates subsequent nerve blocks for pain and early ambulation with use of CACB	none	Level 1 (high credibility and reliability)
5	Sung et al (2015)	Retrospective study 2003-2013 GA vs Spinal	Anyone receiving orthopedic surgery	Linked patients demographics to POUR: elderly males, HTN, DM, and TJA	Potential Bias, no objective asssesments, excluded uncontrolled variables that compoind POUR	Level 4 (limited findings and poor quality)

Appendix B

Johns Hopkins Evidence-Based Practice Model for Nursing and Healthcare Professionals Research Evidence Appraisal Tool

Johns Hopkins Evidence-Based Practice Model for Nursing and Healthcare Professionals

Research Evidence Appraisal Tool
Appendix E

Does this evidence answer the EBP question?	☐ Yes → Continue appraisal ☐ No → STOP, do not continue evidence appraisal

Article Summary Information

Article Title:	
Author(s):	Number:
Population, size, and setting:	Publication date:
Complete after appraisal	
Evidence level and quality rating:	
Study findings that help answer the EBP question:	

Article Appraisal Workflow

Is this study:

☐ **QuaNtitative** (collection, analysis, and reporting of numerical data)
Numerical data (how many, how much, or how often) are used to formulate facts, uncover patterns, and generalize to a larger population; provides observed effects of a program, problem, or condition. Common methods are polls, surveys, observations, and reviews of records or documents. Data are analyzed using statistical tests.
- → For **QuaNtitative** leveling of a **single** research study, go to Section IA
- → For **QuaNtitative** leveling of **multiple** research studies, go to Section IIB

☐ **QuaLitative** (collection, analysis, and reporting of narrative data)
Rich narrative data to gain a deep understanding of phenomena, meanings, perceptions, concepts, and experiences from those experiencing it. Sample sizes are relatively small and determined by the point of redundancy when no new information is gleaned, and key themes are reiterated (data saturation). Data are analyzed using thematic analysis. Often a starting point for studies when little research exists; may use results to design empirical studies. Common methods are focus groups, individual interviews (unstructured or semi-structured), and participation/observations.
- → For **QuaLitative** leveling of a **single** research study, go to Section IIA
- → For **QuaLitative** leveling of **multiple** research studies, go to Section IIB

☐ **Mixed methods** (results reported both numerically and narratively)
A study design (a single study or series of studies) that uses rigorous procedures in collecting and analyzing both quaNtitative and quaLitative data. *Note*: QuaNtitative survey designs with open-ended questions do not meet criteria for mixed methods research because those questions are not approached using strict quaLitative methods. Mixed methods studies provide a better understanding of research problems than using either a quaNtitative or quaLitative approach alone.
- → For **Mixed Methods** leveling of **single** and **mixed** studies review go to Section III

Appendix B (Cont.)

Johns Hopkins Evidence-Based Practice Model for Nursing and Healthcare Professionals Research Evidence Appraisal Tool

Johns Hopkins Evidence-Based Practice Model for Nursing and Healthcare Professionals

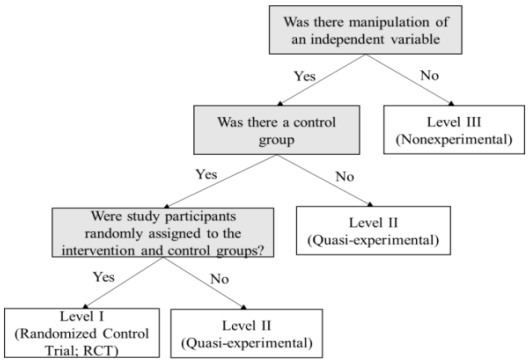
Research Evidence Appraisal Tool
Appendix E

Section I: QuaNtitative Appraisal

A Is this a report of a single research study?

☐ Yes → Continue to decision tree
☐ No → Go to Section I: B

Level



Level I studies include randomized control trials (RCTs) or experimental studies

Level II studies have some degree of investigator control and some manipulation of an independent variable but lack random assignment to groups and may not have a control group

Level III studies lack manipulation of an independent variable; can be descriptive, comparative, or correlational; and often use secondary data

Quality

After determining the level of evidence, determine the quality of evidence using the considerations below:

Does the researcher identify what is known and not known about the problem?	☐ Yes	☐ No	
Does the researcher identify how the study will address any gaps in knowledge?	☐ Yes	☐ No	
Was the purpose of the study clearly presented?	☐ Yes	☐ No	
Was the literature review current (most sources within the past five years or a seminal study)?	☐ Yes	☐ No	
Was sample size sufficient based on study design and rationale?	☐ Yes	☐ No	
If there is a control group: • Were the characteristics and/or demographics similar in both the control and intervention groups?	☐ Yes	☐ No	☐ N/A
• If multiple settings were used, were the settings similar?	☐ Yes	☐ No	☐ N/A
• Were all groups equally treated except for the intervention group(s)?	☐ Yes	☐ No	☐ N/A
Are data collection methods described clearly?	☐ Yes	☐ No	
Were the instruments reliable (Cronbach's α [alpha] ≥ 0.70)?	☐ Yes	☐ No	☐ N/A
Was instrument validity discussed?	☐ Yes	☐ No	☐ N/A
If surveys or questionnaires were used, was the response rate ≥ 25%?	☐ Yes	☐ No	☐ N/A
Were the results presented clearly?	☐ Yes	☐ No	
If tables were presented, was the narrative consistent with the table content?	☐ Yes	☐ No	☐ N/A
Were study limitations identified and addressed?	☐ Yes	☐ No	
Were conclusions based on results?	☐ Yes	☐ No	

Appendix B (Cont.)
Johns Hopkins Evidence-Based Practice Model for Nursing and Healthcare Professionals Research Evidence Appraisal Tool

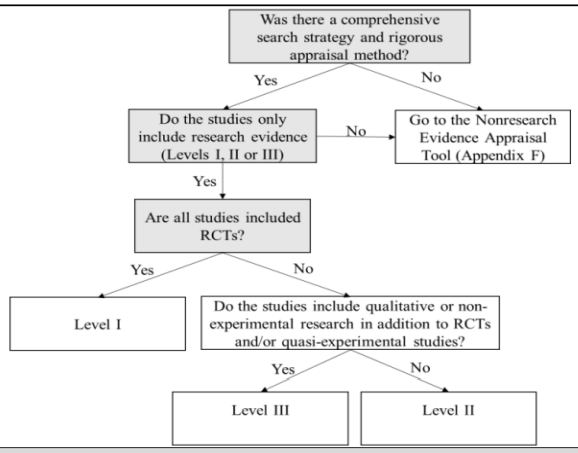
Johns Hopkins Evidence-Based Practice Model for Nursing and Healthcare Professionals

Research Evidence Appraisal Tool
Appendix E

Section I: QuaNtitative Appraisal (continued)

B Is this a summary of multiple sources of research evidence?
☐ Yes → Continue to decision tree
☐ No → Use the Nonresearch Evidence Appraisal tool (Appendix F)

Level



Quality

After determining level of evidence, determine the quality of evidence using the considerations below:		
Were the variables of interest clearly identified?	☐ Yes	☐ No
Was the search comprehensive and reproducible? • Key terms stated • Multiple databases searched and identified • Inclusion and exclusion criteria stated	 ☐ Yes ☐ Yes ☐ Yes	 ☐ No ☐ No ☐ No
Was there a flow diagram that included the number of studies eliminated at each level of review?	☐ Yes	☐ No
Were details of included studies presented (design, sample, methods, results, outcomes, strengths, and limitations)?	☐ Yes	☐ No
Were methods for appraising the strength of evidence (level and quality) described?	☐ Yes	☐ No
Were conclusions based on results? • Results were interpreted • Conclusions flowed logically from the research question, results, and interpretation	 ☐ Yes ☐ Yes	 ☐ No ☐ No
Did the systematic review include a section addressing limitations and how they were addressed?	☐ Yes	☐ No

Appendix B (Cont.)

Johns Hopkins Evidence-Based Practice Model for Nursing and Healthcare Professionals Research Evidence Appraisal Tool

Johns Hopkins Evidence-Based Practice Model for Nursing and Healthcare Professionals

Research Evidence Appraisal Tool
Appendix E

Section II: QuaLitative Appraisal			
A	Is this a report of a single research study?	☐Yes → This is Level III evidence ☐No → Go to Section II: B	
Quality	After determining level of evidence, determine the quality of evidence using the considerations below:		
	Was there a clearly identifiable and articulated: • Purpose? • Research question? • Justification for design and/or theoretical framework used?	☐ Yes ☐ Yes ☐ Yes	☐ No ☐ No ☐ No
	Do participants have knowledge of the subject the researchers are trying to explore?	☐ Yes	☐ No
	Were characteristics of study participants described?	☐ Yes	☐ No
	Was a verification process used in every step of data analysis (e.g., triangulation, response validation, independent double check, member checking)? (Credibility)	☐ Yes	☐ No
	Does the researcher provide sufficient documentation of their thinking, decisions, and methods related to the study allowing the reader to follow their decision-making (e.g., how themes and categories were formulated)? (Confirmability)	☐ Yes	☐ No
	Does the researcher provide an accurate and rich description of findings by providing the information necessary to evaluate the analysis of data? (Fittingness)	☐ Yes	☐ No
	Does the researcher acknowledge and/or address their own role and potential influence during data collection?	☐ Yes	☐ No
	Was sampling adequate, as evidenced by achieving data saturation?	☐ Yes	☐ No
	Does the researcher provide illustrations from the data? • If yes, do the provided illustrations support conclusions?	☐ Yes ☐ Yes	☐ No ☐ No
	Is there congruency between the findings and the data?	☐ Yes	☐ No
	Is there congruency between the research methodology and: • The research question(s) • The methods to collect data • The interpretation of results	☐ Yes ☐ Yes ☐ Yes	☐ No ☐ No ☐ No
	Are discussion and conclusions congruent with the purpose and objectives, and supported by literature?	☐ Yes	☐ No
	Are conclusions drawn based on the data collected (e.g., the product of the observations or interviews)?	☐ Yes	☐ No

Appendix B (Cont.)
Johns Hopkins Evidence-Based Practice Model for Nursing and Healthcare Professionals
Research Evidence Appraisal Tool

Johns Hopkins Evidence-Based Practice Model for Nursing and Healthcare Professionals

Research Evidence Appraisal Tool
Appendix E

Section II: QuaLitative Appraisal (continued)

Quality

Circle the appropriate quality rating below:

A/B High/Good Quality: The report discusses efforts to enhance or evaluate the quality of the data and the overall inquiry in sufficient detail; it describes the specific techniques used to enhance the quality of the inquiry.

Evidence of at least half or all the following is found in the report:

- *Transparency*: Describes how information was documented to justify decisions, how data were reviewed by others, and how themes and categories were formulated.
- *Diligence*: Reads and rereads data to check interpretations; seeks opportunity to find multiple sources to corroborate evidence.
- *Verification*: The process of checking, confirming, and ensuring methodologic coherence.
- *Self-reflection* and *self-scrutiny*: Being continuously aware of how a researcher's experiences, background, or prejudices might shape and bias analysis and interpretations.
- *Participant-driven inquiry*: Participants shape the scope and breadth of questions; analysis and interpretation give voice to those who participated.
- *Insightful interpretation*: Data and knowledge are linked in meaningful ways to relevant literature.

C Low quality: Lack of clarity and coherence of reporting, lack of transparency in reporting methods; poor interpretation of data and offers little insight into the phenomena of interest; few, if any, of the features listed for high/good quality.

Record findings that help answer the EBP question on page **1**

Appendix B (Cont.)

Johns Hopkins Evidence-Based Practice Model for Nursing and Healthcare Professionals Research Evidence Appraisal Tool

Johns Hopkins Evidence-Based Practice Model for Nursing and Healthcare Professionals

Research Evidence Appraisal Tool
Appendix E

Section II: QuaLitative Appraisal

B Is this a summary of multiple sources of qualitative research evidence with a comprehensive search strategy and rigorous appraisal method (Meta-synthesis)?

☐Yes → This is Level III evidence
☐ No →Use the Nonresearch Evidence Appraisal tool (Appendix F)

Quality

After determining level of evidence, determine the quality of evidence using the considerations below:		
Was the aim of the review clearly stated?	☐ Yes	☐ No
Were the search strategy and criteria for selecting primary studies clearly defined?	☐ Yes	☐ No
Was there a description of a systematic and thorough process for how data were analyzed?	☐ Yes	☐ No
• Were methods described for comparing findings from each study?	☐ Yes	☐ No
• Were methods described for interpreting data?	☐ Yes	☐ No
• Was sufficient data presented to support the interpretations?	☐ Yes	☐ No
Did synthesis reflect: • New insights? • Discovery of essential features of the phenomena? • A fuller understanding of the phenomena?	 ☐ Yes ☐ Yes ☐ Yes	 ☐ No ☐ No ☐ No
Are findings clearly linked to and match the data?	☐ Yes	☐ No
Are findings connected to the purpose, data collection, and analysis?	☐ Yes	☐ No
Are discussion and conclusions connected to the purpose, objectives, and (if possible) supported by literature?	☐ Yes	☐ No
Did authors describe clearly how they arrived at the interpretation of the findings?	☐ Yes	☐ No

Circle the appropriate quality rating below:

High quality: Topic and aim of the review are clearly stated. Literature search methods are clear and appropriate. Data analysis well-described. Literature thoroughly synthesized to generate deeper understanding. Findings thoroughly linked to data analysis. Definitive conclusions can be drawn.

Good Quality: Topic and aim of the review clearly stated. Literature search methods are adequate. Data analysis described. Literature reasonably synthesized to generate deeper understanding. Findings linked to data analysis. Fairly definitive conclusions can be drawn.

Low Quality: Topic and aim of review not well defined. Literature search methods lack clarity and may or may not be appropriate. Literature synthesis insufficient. Findings not sufficiently linked to data analysis. Definitive conclusions cannot be drawn.

Record findings that help answer the EBP question on page **1**

Appendix B (Cont.)

Johns Hopkins Evidence-Based Practice Model for Nursing and Healthcare Professionals Research Evidence Appraisal Tool

Johns Hopkins Evidence-Based Practice Model for Nursing and Healthcare Professionals

Research Evidence Appraisal Tool

Section III: Mixed Methods Appraisal

You will need to appraise both parts of the study independently before appraising the study as a whole. Evaluate the quaNtitative part of the study using Section IA (single research study) or Section IIB (multiple research studies). Evaluate the qualitative part of the studying using Section IIA (single research study) or Section IIB (multiple research studies, then return here to complete appraisal.

		Level	Quality
Level	QuaNtitative Portion		
	QuaLitative Portion		
	The level of mixed methods evidence is based on the sequence of data collection for a single research study. QuaNtitative data collection followed by quaLitative (explanatory design) is based on the level of the quaNtitative portion. All other designs (exploratory, convergent, or multiphasic) are Level III evidence. Explanatory sequential designs collected quantitative data first, followed by qualitative. Exploratory sequential designs collect qualitative data first, followed by quantitative. Convergent parallel designs collect quantitative and qualitative data at the same time. Multiphasic designs collect qualitative and quantitative data over more than one phase. A summary of multiple QuaNtitative and QuaLitative studies is a mixed studies review and is Level III evidence.		

Quality	After determining the level of evidence, determine the quality of evidence using the considerations below:		
	Was the mixed-methods design appropriate to address the research question?	☐ Yes	☐ No
	Circle the appropriate quality rating below:		
	A High quality: Contains high to good quality quaNtitative and quaLitative study components; highly relevant study design; relevant integration of data or results; and careful consideration of the limitations of the chosen approach. **B Good quality:** Contains good-quality quaNtitative and quaLitative study components; relevant study design; moderately relevant integration of data or results; and some discussion of limitations of integration. **C Low quality:** Contains good to low quality quaNtitative and quaLitative study components; study design not relevant to research questions or objectives; poorly integrated data or results; and no consideration of limits of integration.		

Record findings that help answer the EBP question on page **1**

Appendix C
SWOT Analysis Briefing Format (Example)

Strengths:	**Weakness:**
Opportunities:	**Threats:**

Appendix D
Pre- & Post-EBP Presentation Questionnaire

1. There is an opportunity/need to improve the quality and care of our TJA patients receiving spinal anesthesia, using bupivacaine, regarding LOS and POUR.

- o Strongly disagree (1)
- o Disagree (2)
- o Neither agree nor disagree (3)
- o Agree (4)
- o Strongly agree (5)

2. Mepivacaine provides a similar blockade compared to bupivacaine.

- o Strongly disagree (1)
- o Disagree (2)
- o Neither agree nor disagree (3)
- o Agree (4)
- o Strongly agree (5)

3. The current practice of using bupivacaine for TJA is efficient and effective regarding LOS and POUR.

- o Strongly disagree (1)
- o Disagree (2)
- o Neither agree nor disagree (3)
- o Agree (4)
- o Strongly agree (5)

Appendix D (Cont.)
Pre- & Post-EBP Presentation Questionnaire

4. EBP and research literature demonstrate that mepivacaine spinal has a faster return of motor function than bupivacaine (e.g., reducing risk for POUR and increased LOS).

- o Strongly disagree (1)
- o Disagree (2)
- o Neither agree nor disagree (3)
- o Agree (4)
- o Strongly agree (5)

5. Sufficient evidence from the literature supports intrathecal mepivacaine reducing postoperative urinary retention (POUR) and LOS.

- o Strongly disagree (1)
- o Disagree (2)
- o Neither agree nor disagree (3)
- o Agree (4)
- o Strongly agree (5)

6. There are concerns regarding adequate blockade for the procedure using bupivacaine.

- o Strongly disagree (1)
- o Disagree (2)
- o Neither agree nor disagree (3)
- o Agree (4)
- o Strongly agree (5)

Appendix D (Cont.)

Pre- & Post-EBP Presentation Questionnaire

7. Patients will have increased postoperative pain with the use of mepivacaine.

- o Strongly disagree (1)
- o Disagree (2)
- o Neither agree nor disagree (3)
- o Agree (4)
- o Strongly agree (5)

8. There will be more complications with the use of mepivacaine than bupivacaine.

- o Strongly disagree (1)
- o Disagree (2)
- o Neither agree nor disagree (3)
- o Agree (4)
- o Strongly agree (5)

9. Mepivacaine will be insignificant in TJA patient's overall outcomes (e.g., LOS, POUR)

- o Strongly disagree (1)
- o Disagree (2)
- o Neither agree nor disagree (3)
- o Agree (4)
- o Strongly agree (5)

Appendix D (Cont.)

Pre- & Post-EBP Presentation Questionnaire

10. Plan on implementing intrathecal mepivacaine in current practice for TJA when appropriate.

- o Strongly disagree (1)
- o Disagree (2)
- o Neither agree nor disagree (3)
- o Agree (4)
- o Strongly agree (5)

Appendix E

Recommended Clinical Practice Guidelines (as Presented during SWOT Briefing)

Anesthesia Department

Same-Day Discharge for TJA Intrathecal Anesthesia Guidelines

Requirements:

Void before discharge

Ambulate without weakness (return to baseline ability) signed off with Physical therapy

Adequate pain control (consider nerve blocks)

Postoperative Urinary Retention (POUR) prevention

Voiding before spinal administration

Intraoperative fluid management between 1000-1500 ml

Recommend Lipophilic intrathecal (Fentanyl) avoid Hydrophilic (Morphine)

Low-dose intrathecal narcotics local anesthetic

Limit anticholinergics, antihistamines, and sympathomimetics (Alpha-adrenergic agents), e.g., Glycopyrrolate

Patients at risk: elderly males, HTN, DM, history of urinary retention (BPH) and TJA

Narcotic dosing

Agent	Dose	Onset	Duration
Fentanyl	5-10 mcg	rapid	1-2 hours

Appendix E (Cont.)
Recommended Clinical Practice Guidelines (as Presented during SWOT Briefing)
Anesthesia Department

Same-Day Discharge for TJA Intrathecal Anesthesia Guidelines

Mepivacaine dosing: M

Height	Mepivacaine 2% Total Hip (T8)	Mepivacaine 2% Total Knee (T10)
4'9"- 4'11"	48 mg	40 mg
5'0"-5'1"	50 mg	42 mg
5'2"-5'3"	50 mg	42 mg
5'4"-5'5"6	52 mg	44 mg
5'6"- 5'7"	54 mg	44 mg
5'8"-5'10"	56 mg	46 mg
5'11"- < 6'0"	58-70 mg	48 mg

Appendix F
Otterbein University IRB Determination Letter

OTTERBEIN UNIVERSITY

INSTITUTIONAL REVIEW BOARD

☒ Original Review
☐ Continuing Review
☐ Amendment

Dear Dr. Sribanditmongkol,

With regard to the employment of human subjects in the proposed research:

HS # 22/23-77
Sribanditmongkol & McClellan: A Systematic Record Review of a Local Quality

THE INSTITUTIONAL REVIEW BOARD HAS TAKEN THE FOLLOWING ACTION:

☒ Approved
☐ Approved with Stipulations*
☐ Limited/Exempt/Expedited Review
☐ Disapproved
☐ Waiver of Written Consent Granted
☐ Deferred

*Once stipulations stated by the IRB have been met by the investigator, then the protocol is APPROVED.

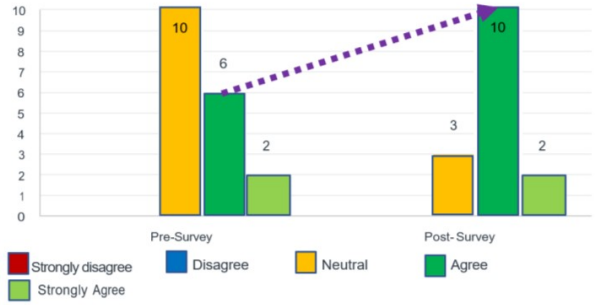
1. As Principal Investigator, you are responsible for ensuring all individuals assisting in the conduct of the study are informed of their obligations for following the IRB-approved protocol.
2. It is the responsibility of the Principal Investigator to retain a copy of each signed consent form for at least four (4) years beyond the termination of the subject's participation in the proposed activity. Should the Principal Investigator leave the university, signed consent forms are to be transferred to the IRB for the required retention period.
3. If this was a limited, exempt, or expedited review, there is no need for continuing review unless the investigator makes changes to the proposed research.
4. If this application was approved via full IRB committee review, the approval period is one (1) year, after which time continuing review will be required.
5. You are reminded you must promptly report any problems to the IRB and no procedural changes may be made without prior review and approval. You are also reminded the identity of the research participants must be kept confidential.

Signed: Noam Shpancer Date: 4-1-2023
IRB Chairperson

Appendix G
Questionnaire Results

Q1. There is room to improve the quality and care for our TJA patients receiving spinal anesthesia.

Answered: 33 Skipped: 0

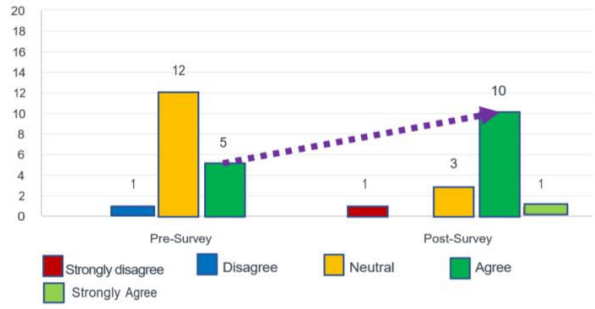


	STRONGLY DISAGREE (1)	DISAGREE (2)	NEITHER AGREE NOR DISAGREE (3)	AGREE (4)	STRONGLY AGREE (5)	TOTAL
Pre-Survey (A)	0.00% 0	0.00% 0	55.56% 10	33.33% 6	11.11% 2	54.55% 18
Post survey (B)	0.00% 0	0.00% 0	20.00% 3	66.67% 10	13.33% 2	45.45% 15
Total Respondents	0	0	13	16	4	33

BASIC STATISTICS	MINIMUM	MAXIMUM	MEDIAN	MEAN	STANDARD DEVIATION
Pre-Survey (A)	3.00	5.00	3.00	3.56	0.68
Post survey (B)	3.00	5.00	4.00	3.93	0.57

Q2. Mepivacaine provides a similar blockade compared to bupivacaine.

Answered: 33 Skipped: 0

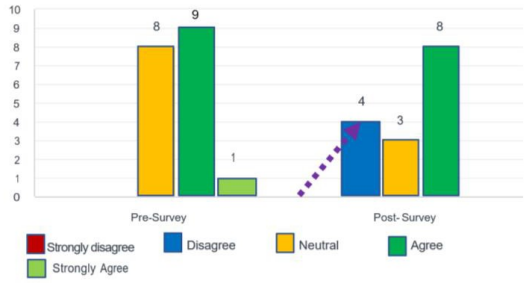


	STRONGLY DISAGREE (1)	DISAGREE (2)	NEITHER AGREE NOR DISAGREE (3)	AGREE (4)	STRONGLY AGREE (5)	TOTAL
Pre-Survey (A)	0.00% 0	5.56% 1	66.67% 12	27.78% 5	0.00% 0	54.55% 18
Post survey (B)	6.67% 1	0.00% 0	20.00% 3	66.67% 10	6.67% 1	45.45% 15
Total Respondents	1	1	15	15	1	33

BASIC STATISTICS	MINIMUM	MAXIMUM	MEDIAN	MEAN	STANDARD DEVIATION
Pre-Survey (A)	2.00	4.00	3.00	3.22	0.53
Post survey (B)	1.00	5.00	4.00	3.67	0.87

Q3. The current practice for TJA is efficient and effective.

Answered: 33 Skipped: 0



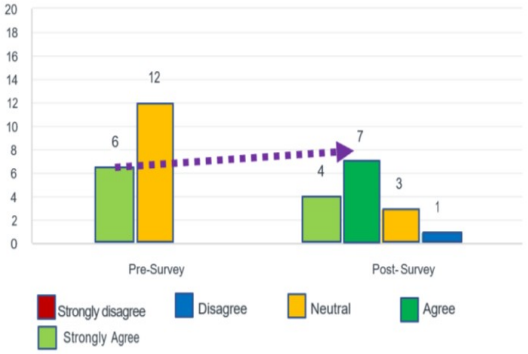
	STRONGLY DISAGREE (1)	DISAGREE (2)	NEITHER AGREE NOR DISAGREE (3)	AGREE (4)	STRONGLY AGREE (5)	TOTAL
Pre-Survey (A)	0.00% 0	0.00% 0	44.44% 8	50.00% 9	5.56% 1	54.55% 18
Post survey (B)	0.00% 0	26.67% 4	20.00% 3	53.33% 8	0.00% 0	45.45% 15
Total Respondents	0	4	11	17	1	33

BASIC STATISTICS

	MINIMUM	MAXIMUM	MEDIAN	MEAN	STANDARD DEVIATION
Pre-Survey (A)	3.00	5.00	4.00	3.61	0.59
Post survey (B)	2.00	4.00	4.00	3.27	0.85

Q4. EBP demonstrates that Mepivacaine spinal has a faster return of motor function than bupivacaine.

Answered: 33 Skipped: 0



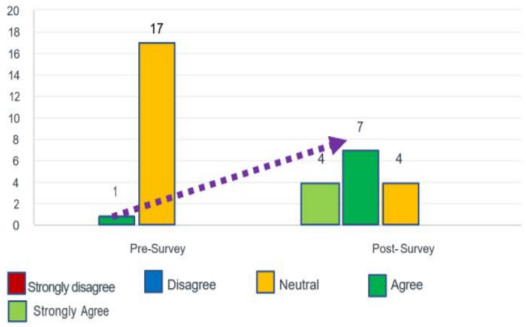
	STRONGLY AGREE (1)	AGREE (2)	NEITHER AGREE NOR DISAGREE (3)	DISAGREE (4)	STRONGLY DISAGREE (5)	TOTAL
Pre-Survey (A)	0.00% 0	33.33% 6	66.67% 12	0.00% 0	0.00% 0	54.55% 18
Post survey (B)	26.67% 4	46.67% 7	20.00% 3	6.67% 1	0.00% 0	45.45% 15
Total Respondents	4	13	15	1	0	33

BASIC STATISTICS

	MINIMUM	MAXIMUM	MEDIAN	MEAN	STANDARD DEVIATION
Pre-Survey (A)	2.00	3.00	3.00	2.67	0.47
Post survey (B)	1.00	4.00	2.00	2.07	0.85

Q5. EBP supports intrathecal Mepivacaine reduces postoperative urinary retention (POUR).

Answered: 33 Skipped: 0

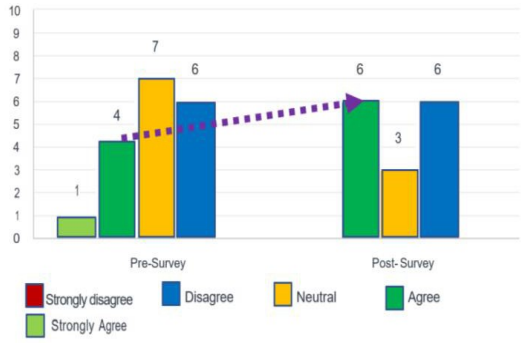


	STRONGLY AGREE (5)	AGREE (4)	NEITHER AGREE NOR DISAGREE (3)	DISAGREE (2)	STRONGLY DISAGREE (1)	TOTAL
Pre-Survey (A)	0.00% 0	5.56% 1	94.44% 17	0.00% 0	0.00% 0	54.55% 18
Post survey (B)	26.67% 4	46.67% 7	26.67% 4	0.00% 0	0.00% 0	45.45% 15
Total Respondents	4	8	21	0	0	33

BASIC STATISTICS	MINIMUM	MAXIMUM	MEDIAN	MEAN	STANDARD DEVIATION
Pre-Survey (A)	2.00	3.00	3.00	2.94	0.23
Post survey (B)	1.00	3.00	2.00	2.00	0.73

Q6. There are concerns with adequate blocking for the procedure.

Answered: 33 Skipped: 0

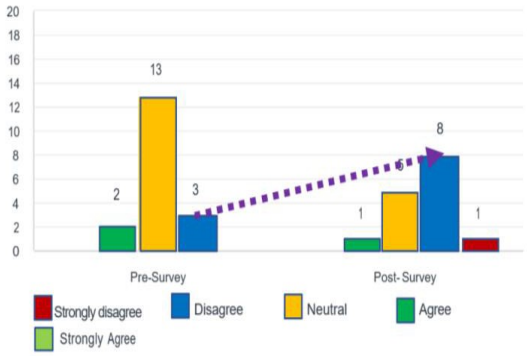


	STRONGLY AGREE (5)	AGREE (4)	NEITHER AGREE NOR DISAGREE (3)	DISAGREE (2)	STRONGLY DISAGREE (1)	TOTAL
Pre-Survey (A)	5.56% 1	22.22% 4	38.89% 7	33.33% 6	0.00% 0	54.55% 18
Post survey (B)	0.00% 0	40.00% 6	20.00% 3	40.00% 6	0.00% 0	45.45% 15
Total Respondents	1	10	10	12	0	33

BASIC STATISTICS	MINIMUM	MAXIMUM	MEDIAN	MEAN	STANDARD DEVIATION
Pre-Survey (A)	1.00	4.00	3.00	3.00	0.88
Post survey (B)	2.00	4.00	3.00	3.00	0.89

Q7. Patients will have increased postoperative pain with the use of Mepivacaine.

Answered: 33 Skipped: 0



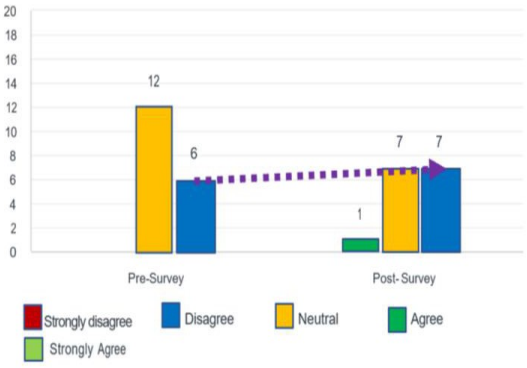
	STRONGLY AGREE (1)	AGREE (2)	NEITHER AGREE NOR DISAGREE (3)	DISAGREE (4)	STRONGLY DISAGREE (5)	TOTAL
Pre-Survey (A)	0.00% 0	11.11% 2	72.22% 13	16.67% 3	0.00% 0	54.55% 18
Post survey (B)	0.00% 0	6.67% 1	33.33% 5	53.33% 8	6.67% 1	45.45% 15
Total Respondents	0	3	18	11	1	33

BASIC STATISTICS

	MINIMUM	MAXIMUM	MEDIAN	MEAN	STANDARD DEVIATION
Pre-Survey (A)	2.00	4.00	3.00	3.06	0.52
Post survey (B)	2.00	5.00	4.00	3.60	0.71

Q8. There will be more complications with the use of Mepivacaine vs. bupivacaine.

Answered: 33 Skipped: 0



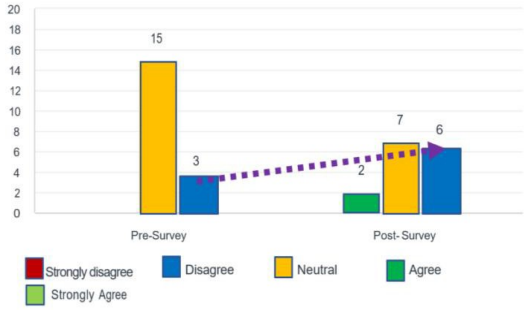
	STRONGLY AGREE (1)	AGREE (2)	NEITHER AGREE NOR DISAGREE (3)	DISAGREE (4)	STRONGLY DISAGREE (5)	TOTAL
Pre-Survey (A)	0.00% 0	0.00% 0	66.67% 12	33.33% 6	0.00% 0	54.55% 18
Post survey (B)	0.00% 0	6.67% 1	46.67% 7	46.67% 7	0.00% 0	45.45% 15
Total Respondents	0	1	19	13	0	33

BASIC STATISTICS

	MINIMUM	MAXIMUM	MEDIAN	MEAN	STANDARD DEVIATION
Pre-Survey (A)	3.00	4.00	3.00	3.33	0.47
Post survey (B)	2.00	4.00	3.00	3.40	0.61

Q9. Mepivacaine will be insignificant in TJA patients' overall outcomes.

Answered: 33 Skipped: 0



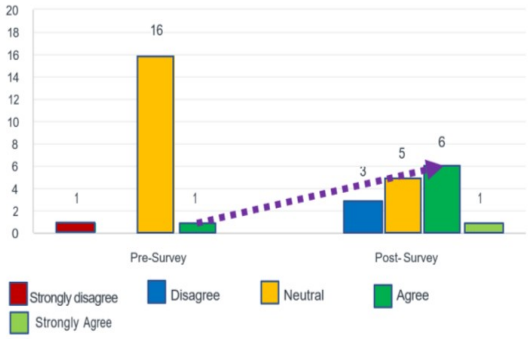
	STRONGLY AGREE (1)	AGREE (2)	NEITHER AGREE NOR DISAGREE (3)	DISAGREE (4)	STRONGLY DISAGREE (5)	TOTAL
Pre-Survey (A)	0.00% 0	0.00% 0	83.33% 15	16.67% 3	0.00% 0	54.55% 18
Post survey (B)	0.00% 0	13.33% 2	46.67% 7	40.00% 6	0.00% 0	45.45% 15
Total Respondents	0	2	22	9	0	33

BASIC STATISTICS

	MINIMUM	MAXIMUM	MEDIAN	MEAN	STANDARD DEVIATION
Pre-Survey (A)	3.00	4.00	3.00	3.17	0.37
Post survey (B)	2.00	4.00	3.00	3.27	0.68

Q10. I plan on implementing intrathecal Mepivacaine into my practice for TJA when appropriate.

Answered: 33 Skipped: 0



	STRONGLY DISAGREE (1)	DISAGREE (2)	NEITHER AGREE NOR DISAGREE (3)	AGREE (4)	STRONGLY AGREE (5)	TOTAL
Pre-Survey (A)	5.56% 1	0.00% 0	88.89% 16	5.56% 1	0.00% 0	54.55% 18
Post survey (B)	0.00% 0	20.00% 3	33.33% 5	40.00% 6	6.67% 1	45.45% 15
Total Respondents	1	3	21	7	1	33

BASIC STATISTICS

	MINIMUM	MAXIMUM	MEDIAN	MEAN	STANDARD DEVIATION
Pre-Survey (A)	1.00	4.00	3.00	2.94	0.52
Post survey (B)	2.00	5.00	3.00	3.33	0.87