DNP Scholarly Project Final Approvals

The DNP student Lia Zdysh **and the Scholarly Project** Preemptive Analgesia: An Enhanced Recovery After Surgery (ERAS) and Multimodal Analgesic Component for Postoperative Pain Management **meet all the requirements for the degree of Doctor of Nursing Practice at University of Saint Francis-Fort Wayne, IN.**

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Copies to: Student File, Graduate office and attached to the Final Project Manuscript.

Preemptive Analgesia: An Enhanced Recovery After Surgery (ERAS) and Multimodal Analgesic Component for Postoperative Pain Management

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Author Note

This doctoral project and associated manuscript fulfill the requirements set forth by the University of Saint Francis to achieve the Doctor of Nursing Practice (DNP) degree.

DNP Scholarly Project Final Approval Form

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DNP Scholarly Project Proposal Initial Approval

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Re: DNP Project Proposal Review Council Endorsement

Date: 11-12-2020

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Abstract

Postoperative pain remains an undermanaged aspect of perioperative patient care. Overreliance on opioids places patients at risk for pain and opioid-related adverse events with delayed recovery and increased hospital length of stay, cost, and patient morbidity and mortality risk. Anesthesia providers play a crucial role in postoperative pain management and inconsistencies remain regarding knowledge, awareness, and use of current evidence-based pain management guideline recommendations.

The project's purpose was to increase anesthesia providers' knowledge, awareness, and compliance with their facility and national organization preemptive analgesic evidence-based guideline and protocol recommendations. A secondary goal included improved patient postoperative pain-related outcomes (i.e., decreased narcotic use, initial pain score, and time to discharge in PACU) in the project's targeted patient surgical population.

An educational presentation with a one-group presurvey-postsurvey design was used to assess anesthesia providers' knowledge and awareness of facility and national organization preemptive analgesic guideline and protocol recommendations. A retrospective/prospective chart audit was used to assess provider preemptive analgesic ordering compliance and patient postoperative pain-related outcome indicators pre- to post-intervention.

Positive provider knowledge and awareness gains were made despite not achieving set project aims. These knowledge gains led to increased preemptive analgesic ordering compliance rates from 44% pre-intervention to 73% and 71% one- and two-months post-intervention. Patient postoperative pain-related outcome indicators minimally changed pre- to post-intervention and did not achieve set aims and goals, yet these changes led the project manager to infer that when

appropriately prescribed, preemptive analgesics presented minimal pain-related outcome risk to the project's target patient population.

Following project intervention, preemptive analgesic prescribing became standard of practice within the implementing facility. Increased provider compliance with evidence-based guideline recommendations is possible through providing education and addressing identified and perceived barriers to recommendation use in practice.

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Chapter 1: Introduction

Problem Statement

The majority of patients undergoing surgical procedures in the United States are at risk for experiencing inadequately controlled postoperative pain. According to Chou et al. (2016), less than 50% of patients that underwent surgical procedures reported adequately controlled postoperative pain. Traditional postoperative pain management techniques include unimodal methods with primary opioid administration to reduce pain levels, yet evidence implicates opioid use in postoperative side effects and adverse events leading to delayed recovery, increased hospital length of stay, increased cost, and unanticipated hospital readmission (Apfelbaum et al., 2003; Chou et al., 2016; Frauenknecht et al., 2019; Montgomery & McNamara, 2016). Postoperative opioid use also increases risk for opioid dependence and contributes to the current opioid epidemic in the United States (Chou et al., 2016; Frauenknecht et al., 2019).

Evidence suggests utilization of a combined multimodal analgesic approach versus overreliance on opioids provides more effective postoperative pain relief while decreasing opioid burden and related adverse events (Chou et al., 2016; Montgomery & McNamara, 2016). Despite advances in postoperative pain management and improved analgesic strategies, postoperative pain remains undermanaged, and overutilization of opioids persists due to familiarity and predictable efficacy without an analgesic ceiling (Apfelbaum et al., 2003; Koepke et al., 2018; Montgomery & McNamara, 2016; Oderda et al., 2007; Penprase et al., 2015). Anesthesia providers play a fundamental role in postoperative pain management, starting with preoperative interventions and continuing with interventions throughout the perioperative and postoperative recovery phases (Chou et al., 2016; Gustafsson et al., 2019). Anesthesia providers' knowledge base and utilization of current evidence-based postoperative pain management techniques are not

consistent among providers, and facilities do not routinely implement evidence-based pain management guidelines and protocols (Chou et al. 2016; Gustafsson et al., 2019). Minimizing perioperative and postoperative opioid use, especially in opioid naïve patients, should be a critical goal of all anesthesia providers to decrease risk for opioid-related adverse drug events (ORADEs), misuse, abuse, and addiction (Koepke et al., 2018).

Background and Significance of Postoperative Pain and Anesthesia Provider's Influence

Forty-eight million inpatient surgical procedures and 53.3 million ambulatory surgical and non-surgical procedures are performed in the United States annually (Gordon et al., 2016; Hall et al., 2017). In a national study assessing the postoperative pain experience of 250 adult surgical patients, 80% of patients that underwent surgical procedures reported the presence of postoperative pain. Of these patients, 75% reported pain as moderate to severe in nature with only 50% reporting adequate pain relief (Apfelbaum et al., 2003; Chou et al., 2016). Undermanaged or uncontrolled acute postoperative pain is associated with increased surgical recovery time, increased risk for postoperative adverse events including pneumonia and venous thromboembolism, prolonged post anesthesia care unit (PACU) recovery time and hospital length-of-stay, unanticipated hospital admission or readmission, increased financial burden, patient dissatisfaction, and increased risk for developing chronic pain syndromes (Montgomery & McNamara, 2016; Pavlin et al., 2002). Multiple factors are implicated in the severity of postoperative pain including surgical type, anesthetic type, analgesics administered by anesthesia providers, and patient-specific factors (Pavlin et al., 2002).

The economic burden of opioid abuse in the United States is estimated at $78.5 billion annually (Florence et al., 2016). Perioperative and postoperative opioid use places patients at risk for postoperative side effects and adverse events including nausea, vomiting, constipation,

urinary retention, sedation, respiratory depression, abuse, and addiction (Koepke et al., 2018; Montgomery & McNamara, 2016; Oderda et al., 2007). Kessler et al. (2013) found 98.6% of surgical patients received opioids with 13.6% experiencing an ORADE. Oderda et al. (2007) identified that opioid-related adverse events postoperatively significantly increased total hospital cost and overall length of stay.

An opioid naïve patient's first exposure to opioids may occur during anesthesia in the perioperative period and can continue through the postoperative phase, which places the patient at risk for opioid misuse, abuse, chronic use, and addiction (Brummett et al., 2017; Koepke et al., 2018). According to Brat et al. (2018), three to ten percent of opioid naïve patients prescribed opioids postoperatively will become chronic users. Brummet et al. (2017) identified the risk of new persistent opioid use greater than 90 days postoperatively was 5.9% in minor surgical patients and 6.5% in major surgical patients. Lee et al. (2017) also found a 10.4% risk of persistent opioid use postoperatively in patients undergoing curative cancer surgery in which postoperative opioids were prescribed.

Even though it is possible, complete abstinence from all opioid administration throughout the perioperative period is an unrealistic goal. Moderate to severe intractable pain unresponsive to non-opioid analgesics may require opioid therapy for relief. Anesthesia providers must understand their role in postoperative pain management and utilize interventions aimed at decreasing unnecessary opioid use (Koepke et al., 2018; Montgomery & McNamara, 2016). Anesthesia providers' utilization of alternative evidence-based analgesic strategies, including preoperative preemptive analgesia, intraoperative and postoperative multimodal analgesia, and Enhanced Recovery After Surgery (ERAS) pathways, can decrease overall opioid consumption and subsequent ORADEs while improving measurable patient outcomes (Chou et al., 2016;

Gustafsson et al., 2019; Montgomery & McNamara, 2016). Interventions aimed at decreasing postoperative opioid use serve to positively impact the anesthesia community's role in addressing the opioid epidemic and the financial burden currently facing the nation (Koepke et al., 2018).

Practice/Knowledge Gap

The American Pain Society, American Society of Regional Anesthesia and Pain Medicine, American Society of Anesthesiologists (ASA), American Society of Colon and Rectal Surgeons (ASCRS), Society of Gastrointestinal and Endoscopic Surgeons (SAGES), and ERAS Society support the use of preemptive analgesia in adult patients undergoing major surgical procedures as a multimodal analgesic strategy to reduce intraoperative and postoperative opioid consumption, patient pain, and risk for ORADEs (American Society of Anesthesiologist Task Force on Acute Pain Management, 2012; Carmichael et al., 2017; Chou et al., 2016; Gustafsson et al., 2019; Nelson et al., 2019). Unless contraindicated, patients undergoing minor and major surgical procedures should receive oral gabapentin and COX-II inhibitors as preemptive analgesics (Chou et al., 2016; Gustafsson et al., 2019; Nelson et al., 2019). The ERAS Society recommends the addition of acetaminophen to the gabapentin and COX-II inhibitor preemptive regimen (Gustafsson et al., 2019; Nelson et al., 2019). Evidence supports the use of combination preemptive agents versus single modalities for improved efficacy with associated decreased narcotic use and improved pain relief (Issioui et al., 2002; Ong et al., 2010). Dosages of each medication should be adjusted to the patient's age and comorbidities. Timing of administration should consider peak effect for maximum opioid-sparing capacity (Chou et al., 2016; Gustafsson et al., 2019).

At Mercy Health Fairfield located in Cincinnati, Ohio, current ERAS guidelines exist with anesthesia focus on preemptive analgesia, as well as intraoperative and postoperative multimodal analgesic strategies for adult patients undergoing scheduled laparoscopic robotic gynecologic and urologic surgeries. These evidence-based guideline interventions aim to decrease postoperative narcotic use, length of stay, and ORADEs while increasing functional recovery. The recommended preemptive analgesics according to the facility guidelines include acetaminophen and celecoxib without gabapentin.

At Mercy Health Fairfield, current anesthesia provider compliance with preemptive analgesic prescribing on retrospective chart audit of 100 patient electronic medical records (EMRs) was 44% compared to intraoperative multimodal analgesic administration of 93%. Of the preemptive analgesics prescribed, 75% of patients were prescribed acetaminophen only, 18% acetaminophen and celecoxib, and 2% acetaminophen and gabapentin. Five percent of patients were prescribed the national organization preemptive agent guideline recommendations of acetaminophen, gabapentin, and celecoxib. Use of acetaminophen as a single preemptive analgesic has shown mixed efficacy at reducing postoperative pain and total narcotic use versus combination therapy with other agents, such as NSAIDs (Oliveira et al., 2015; Wang et al., 2018).

Needs Assessment

Upon discussion, a need for provider education regarding preemptive analgesic agents, current evidence-based guidelines, and facility and national organization preemptive analgesic recommendations was identified in reviewing chart audit data with anesthesia leadership at Mercy Health Fairfield. Identification of perceived barriers to preemptive analgesic use was also acknowledged to address barriers through discussion, education, and provision of identified

resources. Increasing awareness and knowledge acquisition and addressing perceived barriers through education and discussion aimed to increase provider preemptive analgesic ordering compliance rates and improve patient-specific postoperative pain-related outcome indicators in patients undergoing scheduled laparoscopic robotic gynecologic and urologic surgical procedures.

DNP Project Overview

Scope of Project

The scope of this project included identifying facility and anesthesia provider barriers to preemptive analgesic agent use, as well as increasing provider knowledge, awareness, and acceptance of preemptive analgesic agents, national and facility guidelines, and ordering practices through education for all facility anesthesia providers. The increased anesthesia provider knowledge, awareness, and acceptance aimed to increase preemptive analgesic ordering compliance rates and improve secondary patient-related postoperative pain outcomes at the implementing facility.

The project did not pose untoward risk to the anesthesia providers involved. All data collected was anonymous in nature. The project did not include excessive financial cost nor burden to the facility. Individual patients were not at risk due to the non-experimental and anonymous nature of the project.

Stakeholders

The key stakeholders for this project included facility anesthesia staff, anesthesia leadership, institutional leadership, and patients served. The facility anesthesia staff benefited from this project through knowledge acquisition via education regarding evidence-based practice recommendations. Anesthesia leadership benefited through increase in provider preemptive

analgesic ordering compliance rates and associated improvement in measurable patient outcomes. The surgical patient populations served benefited through improved measurable postoperative pain-related outcomes, satisfaction with the surgical process, and decreased postoperative adverse event risk. The facility leadership benefited financially via improved patient satisfaction survey scores linked to reimbursement, decreased adverse event risk with associated prolonged hospital stay costs, and decreased resource utilization costs (i.e., medication costs, hospital stay costs with associated human and physical care resources).

The project also served to benefit stakeholders outside the facility including the community of Cincinnati, Ohio, and anesthesia community. Reduction in opioid abuse and addiction following surgical procedures benefitted the patients served by Mercy Health Fairfield. The patient-related outcomes of the project served to add to the existing body of evidence-based anesthesia literature addressing opioid-sparing postoperative pain control strategies for the anesthesia community.

Budget and Resources

Cost

Performance of a budget assessment identified the costs and revenue associated with project implementation (see Figure 1). The projected total cost of the project was $1,605. The potential projected savings associated with project implementation was $2,506 annually. This resulted in an overall projected net benefit of $3,515. The potential savings outweigh the cost of project development and implementation, which revealed potential project benefit. The financial benefit of the project served as a motivating factor for the implementing facility.

Description of Resources

The resources required for the project included physical, human, and time resources. Human resources included subject matter expert consultation with the facility's anesthesia leadership team members for input and project planning. These expert consults incurred an estimated cost of $1,536. The educational presentation for facility anesthesia providers did not incur an additional expense as the educational presentation was delivered by the project manager during a mandatory monthly staff meeting. Physical resources for the educational presentation, including educational handouts, room location, computer projector, etc., were donated from outside donors or provided free of charge by the implementation facility. The outside donors and implementing facility had no financial gain by supplying these resources. The educational presentation formation, delivery, data collection, and analysis were performed by the project manager and did not incur additional cost. SPSS data analysis software incurred a cost to the project manager of $69.

The potential projected project benefit of reduced narcotic use was addressed as a potential source of savings for the facility in the budget. The reduced narcotic use translated to a potential savings of $2,560 annually. The potential for decreased hospital length of stay with associated decreased adverse outcomes was identified as an additional source of cost savings within the budget, yet potential savings was difficult to determine as multiple factors such as insurance type and bundled payments affected reimbursement. For this reason, this value was left at zero within the budget yet was assumed that a decreased patient length of stay and decreased rate of ORADEs would provide financial benefit for the facility.

Process and Outcomes

General Timeline

The project timeline spanned over two years. The project timeline can be found in Appendix A. Early in the first year of the project, project idea approval was received from facility anesthesia leadership and university doctoral faculty and the project team was identified. A retrospective chart audit was performed in January of 2020. The problem, practice gap, and needs assessment was identified and supporting evidence was synthesized in literature review format. Baseline chart audit data and supporting evidence was presented to facility anesthesia leadership in April of 2020. In the second project year, university IRB approval was received in October of 2020. Following university IRB approval, project implementation occurred in January of 2021. Chart audit for post-implementation patient outcomes data was performed by the project manager in February and March of 2021. Following chart audit completion, two months was allotted for project manager statistical analysis of participant survey and chart audit data. Debriefing and dissemination of project findings to facility anesthesia staff and leadership occurred in June of 2021. Dissemination of project findings to University of Saint Francis doctoral faculty and students occurred in July of 2021.

Setting and Target Population

The project setting consisted of the anesthesia department located within the surgical department at Mercy Health Fairfield, a 293-bed community hospital located in Cincinnati, Ohio. The project intervention was targeted towards the anesthesia providers within the anesthesia department. A convenience sample of providers that deliver anesthesia to patients for surgical procedures at Mercy Health Fairfield was utilized as the project intervention group. Surgical

department staff uninvolved in the provision of anesthesia services, including nursing and surgical technology staff, were not included in project intervention.

Expected Outcomes

Following the project educational intervention, facility anesthesia provider's report of knowledge and awareness of preemptive analgesic agents and facility and national organization protocol/guideline recommendations pre-intervention compared to post-intervention was expected to increase. Self-report of knowledge and awareness was assessed through calculating and comparing average percent change in provider survey responses pre-intervention to post-intervention. Following project intervention, facility anesthesia provider preemptive analgesic ordering compliance in patients undergoing laparoscopic robotic gynecologic and urologic surgical procedures was expected to increase post-intervention compared to pre-intervention baseline compliance. As a result of increased preemptive analgesic ordering compliance post-intervention, patient-specific pain-related outcomes of initial postoperative pain score in PACU, total narcotic doses required in PACU, and PACU time to discharge in patients undergoing laparoscopic robotic gynecologic and urologic surgical procedures were expected to improve from baseline pre-intervention outcomes. Provider post-intervention compliance rates and patient-specific pain-related outcomes were assessed via prospective chart audit with comparison to retrospective chart audit pre-intervention baseline data.

Risk Analysis

Risk Analysis

There were no identifiable immediate or long-term risks to participants. Participation in the project was voluntary with participant ability to withdraw at any time without penalty. A paper copy of informed consent was provided and obtained from participants prior to the

educational presentation. The informed consent outlined the project purpose, procedures, risks, benefits, safeguards, confidentiality, and freedom to withdraw. See Appendix B for informed consent. Participant confidentiality was maintained as each survey was anonymous and contained no identifiable information in which an individual could be identified directly or indirectly (unique participant identifier, name, sex, age, provider type). The patient chart audit assessing overall anesthesia provider preemptive analgesic ordering compliance and associated postoperative pain-related outcomes did not contain patient assigned anesthesia provider information. As specific anesthesia provider preemptive analgesic ordering compliance rates and provider-specific patient outcomes data was not collected or reported, there was no risk of punitive action for the anesthesia provider.

Pre- and post-intervention chart audit data was collected following the Health Insurance Portability and Accountability Act (HIPPA) guidelines and did not include any patient-specific identifiable information (name, medical record number). The chart audit data was collected by the project manager, entered into an SPSS dataset for analysis, and stored on the project manager's password protected University of Saint Francis OneDrive accessible to the project manager only. Data did not require encryption as it did not contain identifiable information. The dataset was only shared with project team members for clarification purposes. All final project data was reported in aggregate form, and thus individual and chart audit information remained confidential and nonidentifiable.

Benefits to project participants included increased knowledge, awareness, and comfort in preemptive analgesic use for postoperative pain management, specific medications, and facility and national organization guidelines, recommendations, and protocols. A secondary potential benefit identified for providers was overall improved patient postoperative pain-related outcomes

and satisfaction following administration of preemptive analgesics and anesthesia in laparoscopic robotic surgical patient populations. Participants did not receive compensation for their time and deception was not used. The project intervention educational presentation was not recorded in any fashion (audio, visual, etc.).

Chapter 2: Synthesis of Supporting Evidence and Project Framework

Relevant Theory and Concepts

Awareness-to-Adherence Model (Pathman's Pipeline) and Associated Concepts

Origins of Model

The Awareness-to-Adherence model, also known as Pathman's Pipeline, was designed in 1996 to explore and address the cognitive steps physicians undergo when applying clinical practice guidelines for clinical decision making in direct patient care. The Awareness-to-Adherence model was designed due to the observed over-simplistic and inaccurate nature of the active dissemination model, which explained physician unacceptance of new medical knowledge. The new model was used to evaluate physician and pediatrician's usage of practice guidelines regarding national pediatric vaccination recommendations (Pathman et al., 1996). The model followed the provider from awareness of the clinical practice guideline to adoption in practice and regular adherence. Factors facilitating adherence to guideline utilization and barriers to utilization resulting in noncompliance were identified throughout each cognitive step on the path to adherence (Pathman et al., 1996).

Pathman et al. (1996) found physicians agreeing with the national hepatitis B vaccination recommendations had guideline adoption rates of 94.4% compared to 44.2% in unsure physicians and 24% in physicians that disagreed with the recommendations. Only 30.1% of physicians adhered to the vaccination recommendations. 82% of the adhering physicians were aware of, agreed upon, and adopted the national recommendations (Pathman et al., 1996). Compliance factors identified in disagreeing physicians included fear of malpractice claims, parental and societal demand, peer pressure, organization policy with risk of reprimanding, and monitoring by government and insurance agencies. Compliance factors in agreeing physicians

included reliance on national organization or special society information for recommendations, consultation with colleagues, and pediatric specialty. Provider-specific beliefs was an overarching theme determining both provider adoption and adherence (Pathman et al., 1996).

Stages of Evidence to Action

Pathman's Awareness-to-Adherence model consists of four cognitive stages providers move through in adopting clinical guidelines into practice. These stages include awareness of the guideline, agreement, adoption of the guideline into current practice, and long-term adherence to the guideline (Diner et al., 2007; Glasziou & Haynes, 2005; Pathman et al., 1996). Providers that are unaware of a current practice guideline must first be informed and aware of the guideline in order to progress to agreement. The provider then progresses to agreement that the practice guideline is appropriate and valid to practice. If the provider agrees with the guideline, he or she then decides whether to adopt the guideline into practice. Long-term adherence to the guideline occurs when providers routinely utilize the guideline in appropriate, applicable situations and environments (Diner et al., 2007; Glasziou & Haynes, 2005; Pathman et al., 1996). Failure to progress through Pathman's Awareness-to-Action cognitive stages results in noncompliance with clinical guidelines (Pathman et al., 1996).

Throughout Pathman's Awareness-to-Action model, barriers and facilitators to progression through each stage can be identified and potentially addressed (Diner et al., 2007; Glasziou & Haynes, 2005; Pathman et al., 1996). Examples of barriers to progression include lack of awareness, resources, knowledge, leadership, reinforcement, training, finances, provider unacceptance, poor evidence, time limitations, and patient values or preferences (Diner et al., 2007; Heneghan et al., 2007). Examples of facilitators to progression include provider acceptance, provider type, colleague support, positive provider attitude and beliefs, sufficient

supporting evidence on benefits and associated harms, universal applicability, membership to a specialty society with peer expectations, financial incentive, patient, community, and societal demand, peer pressure, and fear of malpractice claims (Heneghan et al., 2007; Pathman et al., 1996).

Examples of Model Utilization in Practice

Heneghan et al. (2007) recognized providers were consistently aware of current hypertension guidelines, yet if providers did not agree with guideline recommendations it was unlikely that they would adhere to and adopt the guideline into everyday practice. Beaulieu et al. (2005) found 90% of practitioners were aware of and agreed with guideline recommendations for pharmacologic treatment of patients with stable angina pectoris, yet negative attitudes towards beta-blocker and statin therapy resulted in decreased prescribing adherence of 76.9% and 55.5% respectively. Providers routinely agreed with aspirin prescribing recommendations with a 90.7% adherence rate, and thus aspirin prescribing was routinely adopted into everyday practice (Beaulieu et al., 2005). Both Beaulieu et al. (2005) and Heneghan et al. (2007) found awareness of practice guidelines was not an issue and disagreement with guidelines was a prominent factor in decreased adherence and adoption into practice.

Model Relationship to Project

The ERAS clinical practice guidelines at the implementing project facility serve as an evidence-based tool providers can utilize to improve patient outcomes following scheduled bariatric, gynecologic, and urologic surgery. Anesthesia providers are encouraged to utilize evidence-based preoperative, intraoperative, and postoperative guideline-based interventions with goals of improving postoperative pain management and functional recovery while decreasing postoperative morbidity and adverse event risk. Factors contributing to decreased

compliance with anesthesia provider usage of preoperative preemptive analgesic components are currently unknown. The Awareness-to-Action model can serve to determine anesthesia provider's awareness of current guidelines and assist in identification of provider's attitudes, perceptions, and perceived barriers and facilitators to utilization. Once these barriers and perceptions are identified, they can be addressed, and education provided to increase guideline adoption rates with improved compliance and long-term adherence.

Literature Review

Definition of Key Terms

- Enhanced recovery after surgery (ERAS): Process by which best evidence is assembled to form a standardized, surgery-specific guideline and/or protocol providers can utilize and tailor to the patient to optimize overall recovery (Carmichael et al., 2017; Ljungqvist, 2019)
- Unimodal analgesia: Analgesic strategy utilizing one pharmacologic agent or therapy for pain relief (Montgomery & McNamara, 2016)
- Multimodal analgesia: Analgesic strategy combining two or more pharmacologic agents or therapies with differing mechanisms of action targeting differing pain receptor pathways to produce more complete pain relief (Chou et al., 2016; Montgomery & McNamara, 2016)
- Preemptive analgesia: Administration of pharmacologic agents or therapies preoperatively to produce antinociception prior to tissue injury to decrease sensitization and resulting postoperative pain (Penprase et al., 2015)

PICO(T) Questions

In adult surgical patients undergoing scheduled robotic laparoscopic urologic or gynecologic abdominal surgery (P), does preemptive analgesic prescribing incidence increase (O) when barriers to use are identified and education is provided to anesthesia providers (I)?

In adult surgical patients undergoing scheduled robotic laparoscopic urologic or gynecologic abdominal surgery (P), does implementation of preoperative preemptive analgesia with intraoperative multimodal analgesia (I) compared with no preemptive analgesia (C) affect postoperative narcotic use, initial pain scores, and time to discharge (O) during the post-anesthesia care unit (PACU) recovery phase (T)?

Literature Search Strategies and Evidence Appraisal

In completing an exhaustive review of the literature related to ERAS, multimodal analgesia, and preemptive analgesia, approximately 400 articles underwent cursory review of article titles and abstracts with 100 articles fully read and 54 articles included in the review. Forty databases were preemptively searched with articles retrieved from EMCARE, OVID, CINHAL, EBSCO, and Google Scholar. Search terms began broad including “postoperative pain management”, “postoperative analgesia”, “enhanced recovery after surgery (ERAS)”, “multimodal analgesia”, and “preemptive analgesia”. Terms were then narrowed to include “anesthesia AND postoperative pain management”, “ERAS AND multimodal analgesia”, “ERAS AND preemptive analgesia”, and “postoperative pain management AND patient outcomes”. Limitations to surgical type, including laparoscopic and robotic abdominal, urologic, and gynecologic surgery were then added. Articles including pediatric patients and emergent surgical procedures were excluded.

The Cochrane Library was searched using the terms “preemptive analgesia”, “multimodal analgesia”, and “enhanced recovery after surgery”. Two systematic reviews relevant to the PICOT question were identified. Searches of the Campbell Collaboration Library and Joanna Briggs Institute Systematic Review Register utilizing the same search terms as the Cochrane Library search did not reveal reviews relevant to the PICOT question. Searches of the National Guideline Clearinghouse, Guidelines International Network (GIN), and Registered Nurses’ of Ontario (RNAO) also revealed no guidelines or protocols applicable to the PICOT question.

Included literature review articles were chosen based on level of evidence and relation to PICOT question topics. High-level evidence sources were sought from peer-reviewed journals and databases including randomized control trials, clinical practice guidelines, systematic reviews, and meta-analyses to ensure credibility, reliability, and validity of findings and recommendations. Systematic review, meta-analysis, and clinical practice guideline reference lists were reviewed for original research articles and additional studies supporting topics of interest. Forty articles were obtained in this format with 15 incorporated in the review.

Overview of Literature Review Organization and Topics

The literature review will serve to analyze anesthesia-specific postoperative pain management techniques. The history of enhanced recovery after surgery (ERAS) protocols and their components, goals, and efficacy with related outcomes and supporting evidence will be reviewed. The multimodal analgesic component of ERAS protocols with focus on postoperative pain management will be explored. Multimodal analgesic components and evidence supporting outcomes in adult surgical patients will be reviewed. Preemptive preoperative analgesic strategies as a component of multimodal analgesia, which is the focus of this doctoral project, and their use in ERAS protocols with evidence regarding application for postoperative pain

management, narcotic use, effect on length of stay, and adverse postoperative event outcomes will be visited. Evidence regarding specific preemptive analgesic medications and use in adult laparoscopic and robotic gynecologic and urologic surgical populations will also be explored. Lastly, a summary of the evidence with practice recommendations will be provided.

Postoperative Pain Management Techniques

Enhanced Recovery After Surgery (ERAS) Protocols

Origins and Background. The first ERAS protocol was derived in 2005 by surgeons Fearon and Ljungqvist with a multidisciplinary team as an evidence-based protocol aimed at patient-specific optimization for an expedited recovery from colon resection surgery (Fearon et al., 2005). ERAS protocols replaced "fast track" surgical bundles that focused on reduction in length-of-stay as the measurable end outcome. The original ERAS protocol focused on a holistic approach to patient care and optimization prior to the scheduled surgical procedure and ended with full functional recovery postoperatively (Fearon et al., 2005; Ljungqvist, 2019). Protocols focused on a multidisciplinary approach to preoperative, intraoperative, and postoperative patient optimization of physical, functional, nutritional, and mental status with overarching focus on decreasing the stress of the surgical procedure itself while maintaining homeostasis as each evidence-based component influenced patient recovery (Fearon et al., 2005; Gustafsson et al., 2019; Ljungqvist, 2019).

As interest in and utilization of ERAS protocols expanded, the Enhanced Recovery After Surgery (ERAS) Society was formed in 2010 to continue research to provide evidence-based practice guidelines and protocols for different surgical populations. The society has expanded to include protocols for orthopedic, colorectal, lung, breast cancer, liver, bariatric, pancreatic

resection, cystectomy, cardiac, colorectal, and gynecologic surgeries, as well as cesarean deliveries, with updates every two to four years (Ljungqvist, 2019).

ERAS Guideline Components. Each ERAS guideline contains specific evidence-based multidisciplinary recommendations providers can tailor to fit the specific patient's needs. Preadmission components include counseling regarding expectations, optimization of chronic conditions and modifiable risk factors, prehabilitation to improve preoperative functional status, optimization of nutritional status, and management of anemia (Carmichael et al., 2017; Gustafsson et al., 2019; Nelson et al., 2019). Preoperative recommendations include prophylactic postoperative nausea vomiting prevention interventions, preemptive interventions and medication for anxiety and pain, antimicrobial prophylaxis and skin preparation to decrease infection risk, avoidance of bowel preparation, and fluid deficit correction with decreased length of fasting and carbohydrate loading (Carmichael et al., 2017; Gustafsson et al., 2019; Nelson et al., 2019). Intraoperative components include anesthetic management recommendations, maintenance of fluid and electrolyte therapy to maintain euvolemia, interventions to decrease hypothermia risk, recommendations for minimally invasive surgical approaches, and avoidance of unnecessary lines and drains (Carmichael et al., 2017; Gustafsson et al., 2019; Nelson et al., 2019). Postoperative recommendations include multimodal analgesic strategies to decrease pain and narcotic usage, maintenance of euvolemia and normal electrolyte levels, prevention of postoperative ileus, glycemic control, early nutritional intake, and early mobilization (Carmichael et al., 2017; Gustafsson et al., 2019; Nelson et al., 2019).

Implementation of ERAS protocols require a multidisciplinary team approach as each component relies on different specialties, from the surgeon performing the procedure to nursing and physical therapy staff caring for patients postoperatively. Management of multiple guideline

recommendations and components are within the anesthesia provider's scope of practice and care including preoperative medication prophylaxis for anxiety and postoperative nausea and vomiting, preemptive analgesia, fluid and electrolyte maintenance, multimodal analgesic strategies, and interventions to prevent of hypothermia (Gustafsson et al., 2019; Nelson et al., 2019).

ERAS Goals and Outcomes. ERAS protocols serve to follow the patient from pre-hospital surgical preparation through post-hospital recovery (Ljungqvist, 2019). The overarching goals of ERAS protocols are to improve postoperative functional recovery, which may include decreased postoperative pain levels and narcotic use, early return of gastrointestinal function and ambulation, improved surgical wound healing, patient satisfaction, and decreased risk for adverse outcomes and surgical complications (Carmichael et al., 2017; Gustafsson et al., 2019). Improved patient clinical outcomes result in decreased length of stay and surgical complications requiring prolonged stay or hospital readmission, and thus provides cost savings to the facility implementing the protocol (Carmichael et al., 2017; Nelson et al., 2019)

Evidence Supporting Outcomes.

Desired Postoperative Pain Score and Narcotic Use. A frequently underreported ERAS outcome is postoperative pain scores and narcotic usage (Greer et al., 2018; Kalogera et al., 2019). Modesitt et al. (2016) found implementation of ERAS protocols in women undergoing major gynecologic surgery resulted in significant decrease in intraoperative narcotic consumption (12.7 mg vs. 0.3 mg; $p < 0.001$) and postop day 0 pain scores ($p < 0.001$) in the ERAS group. There was no significant difference in pain scores after postop day 0 (Modesitt et al., 2016). Chapman et al. (2016) found implementation of ERAS pathways in gynecologic

oncology surgery resulted in a 30% decrease in postoperative narcotic consumption and significantly decreased mean postoperative pain scores compared to control.

Kalogera et al. (2013) and Meyer et al. (2018) found women undergoing gynecologic surgery with ERAS protocols consumed 72% and 80% less opioids respectively. Meyer et al. (2018) observed 16% of ERAS patients were opioid-free up to postop day three ($p < 0.001$) compared to no opioid-free patients in the control group. Decreased opioid consumption did not result in a significant decrease in overall pain scores between groups (Kalogera et al., 2013; Meyer et al., 2018). Decreased opioid consumption with no change in pain scores reveals the opioid-sparing potential of ERAS protocols. Chemali & Eslick (2017) found patients undergoing colorectal surgery with ERAS protocols had no significant difference in postoperative pain scores between the ERAS group and control, yet overall narcotic consumption was not reported. Evidence supporting ERAS program utilization and associated effect on postoperative pain scores and narcotic usage exists, yet inconsistencies in reported study outcomes reveals a need for further evidence exploring ERAS and specific associated outcomes of pain scores and narcotic usage.

Length of Stay. Reduction in length of stay is a measurable outcome of ERAS protocol implementation. Chemali & Eslick (2017) found no significant difference in length of stay in patients undergoing colorectal surgery with ERAS protocols versus control. In patients undergoing the same surgical procedure, Greer et al. (2018), Spanjersberg et al. (2011), and Varadhan et al. (2010) found a significant reduction in length of stay. Greer et al. (2018) identified an average reduction of 2.6 days in the ERAS group. Kalogera et al. (2019) also found a statistically significant decrease in length of stay in invasive gynecologic procedures in which ERAS protocols were utilized and Chapman et al. (2016) observed 91% of patients were

discharged on postop day 1 compared to 60% in the control group ($p < 0.001$). Evaluation of the efficacy of ERAS guideline use in laparoscopic digestive surgery revealed ERAS protocols decreased hospital length-of-stay by an average of 2.13 days ($p = 0.000$) (Ni et al., 2019). Li et al. (2017) also found significant reduction in mean length of hospital stay by 3.2-9.3 days in patients undergoing lung cancer surgery where ERAS programs were utilized.

Adverse Postoperative Events. Adverse postoperative events can lead to increased length of stay, hospital readmission, and delayed recovery, as well as increased patient morbidity and mortality. Kalogera et al. (2018) identified no difference in readmission and reoperation rates in ERAS patients undergoing gynecologic surgeries versus control. Greer et al. (2018), Li et al. (2017), and Wang et al. (2017) identified a significant decrease in overall morbidity and complication rates in colorectal and lung cancer surgical patients participating in ERAS protocols compared to control, yet all-cause mortality, readmission within 30 days, and surgical site infection rates were not significant between groups. Spanjersberg et al. (2011) and Varadhan et al. (2010) identified significant reductions in overall complication rates in patients undergoing colon resection and colorectal surgery with ERAS protocols respectively, yet major complication and readmission rates were similar between groups. Evidence reveals utilization of ERAS protocols and guidelines does not increase patient risk, jeopardize safety, or produce undue harm (Li et al., 2017; Varadhan et al., 2010; Wang et al., 2017).

Patient Satisfaction. Patient satisfaction is a measurable outcome for medical service reimbursement (Steinberg et al., 2017). Modesitt et al. (2016) found utilization of ERAS protocols in patients undergoing major gynecologic surgery led to a significant increase in patient satisfaction scores ($p < 0.001$) with increased satisfaction in pain control from the 26th to 63rd percentile. Kalogera et al. (2013) reported a 90-99% patient satisfaction rating in the areas of

education, quality care, and pain management in patients undergoing gynecologic surgery in which ERAS protocols were utilized.

Multimodal Analgesia as a Component of ERAS

Definition. Multimodal analgesia is the foundational postoperative pain management strategy in ERAS protocols (Nelson et al., 2019). Multimodal analgesia is a pain management strategy in which two or more synergistically acting pharmacologic agents or techniques with differing mechanisms of action are utilized to treat pain (American Society of Anesthesiologist Task Force on Acute Pain Management, 2012; Chou et al., 2016; Montgomery & McNamara, 2016). Targeting pain at multiple points in the pain pathway produces more complete, efficacious analgesia compared to a unimodal opioid-based strategy (Chou at al., 2016; Montgomery & McNamara, 2016). Multimodal analgesic strategies produce an opioid-sparing effect with associated decrease in opioid-related adverse drug events and improved functional recovery (Elia et al., 2005; Nelson et al., 2019; Rafiq et al., 2014). Choosing a multimodal analgesic strategy and specific pharmacologic agent combinations can pose a challenge as multiple combinations are available, yet rigorous trials of combination use are not consistently reported (Chou et al., 2016).

Multimodal Analgesia Components. Multimodal analgesic components consist of systemic pharmacologic agents, local anesthetic infiltration, regional anesthetic techniques, neuraxial anesthesia, and nonpharmacologic techniques (Chou et al., 2016). Pharmacologic agents may include opioids, non-steroidal anti-inflammatory (NSAIDs) agents, acetaminophen, gabapentinoids, ketamine, magnesium, and lidocaine (Chou et al., 2016). Local infiltration of incision and joint spaces with local anesthetic is frequently used to provide site-specific analgesia (Chou et al., 2016). Regional nerve blocks and neuraxial analgesia via spinal or

epidural placement is strongly recommended as a multimodal adjunct by the American Society of Anesthesiologists (ASA), American Pain Society, American Society of Regional Anesthesia and Pain Medicine, and ERAS society (American Society of Anesthesiologist Task Force on Acute Pain Management, 2012; Chou et al., 2016; Nelson et al., 2019). Nonpharmacologic therapies, including cognitive therapy, acupuncture, application of heat and cold, and transcutaneous electrical nerve stimulation (TENS) application can also serve as multimodal adjuncts for postoperative pain management (Chou et al., 2016).

Evidence Supporting Multimodal Analgesic Outcomes in Adult Surgical Patients.

Postoperative Pain Score and Narcotic Use. In adult surgical populations where multimodal postoperative analgesic strategies were compared to unimodal morphine, Elia et al. (2005) found a statistically significant decrease in overall 24-hour morphine consumption by 15-55%. Differences in postoperative pain scores at 24 hours were not significant between multimodal and morphine-only groups (Elia et al., 2005). Rafiq et al. (2014) found patients undergoing cardiac surgery with opioid-sparing multimodal analgesia versus opioid-based analgesia had a statistically significant decrease in pain scores in the multimodal group from day 0 to day 3 compared to the opioid-based group. Fu et al. (2010) compared multimodal analgesic strategies to traditional opioid postoperative analgesic use in patients undergoing total knee arthroplasty. The multimodal group had significant decreases in morphine consumption for up to 48 hours and decreased pain scores at rest and with activity postoperatively (Fu et al., 2010).

Length of Stay. The effect of intraoperative multimodal analgesic use on length of stay was found to be underreported. Jensen et al. (2007) found multimodal analgesic usage in patients undergoing laparoscopic cholecystectomy resulted in a decreased post-anesthesia care unit (PACU) discharge time to an average of 46 minutes. Length of stay is more frequently reported

when multimodal analgesia is reported as a component within ERAS protocols, and thus studies are lacking as to whether the multimodal analgesic component itself affects length of stay. The American Society of Anesthesiologist Task Force on Acute Pain Management (2012) ascertains undermanagement of postoperative pain and related adverse effects and outcomes result in prolonged recovery, length of stay, and hospital readmission, and thus recommends multimodal analgesia as a postoperative pain management component.

Adverse Postoperative Events. Multimodal analgesia reduces postoperative nausea vomiting risk without producing increased risk for adverse events that would impact patient safety (Elia et al., 2005; Fu et al., 2010; Rafiq et al., 2014). Rafiq et al. (2014) identified a significant decrease in postoperative nausea and vomiting in the multimodal analgesia group compared to control. Patients in the multimodal group suffered from less adverse events, including myocardial infarction, stroke, and gastrointestinal bleeding, yet this decrease did not meet significance (Rafiq et al., 2014). Elia et al. (2005) identified multimodal analgesia with NSAID usage significantly decreased rates of postoperative nausea, vomiting, and sedation. Fu et al. (2010) also identified a significant decrease in postoperative nausea and vomiting in the multimodal group with nonsignificant differences in adverse events including delayed wound healing, infection, respiratory depression, urinary retention, and deep vein thrombosis between the multimodal and opioid-based groups (Fu et al., 2010).

Preoperative Preemptive Analgesia

Preemptive Analgesia as an ERAS and Multimodal Analgesia Component. Traditional surgical pain management strategies utilize analgesic medications following surgical insult once pain has already occurred. Preemptive analgesia is a form of multimodal analgesia that utilizes preoperatively administered analgesics prior to surgical insult to decrease pain

impulses before they occur to reduce pain intensity, duration, and severity (Nir et al., 2016; Steinberg et al., 2017). Preemptive analgesia is thought to decrease central nervous system sensitization caused by incisional and inflammatory stimuli during the surgical procedure and into the postoperative recovery period (Nir et al., 2016; Steinberg et al., 2017).

The American Pain Society Guideline on the Management of Postoperative Pain recommends the use of preemptive analgesia as a multimodal analgesic component in adult surgical patients unless contraindicated (Chou et al., 2016). The ERAS society also recommends preemptive analgesia as an opioid-sparing multimodal analgesic component in the colorectal and gynecologic/oncology ERAS guidelines (Gustafsson et al., 2019; Nelson et al., 2019). Like the ERAS Society, the American Society of Colon and Rectal Surgeons (ASCRS) and the Society of American Gastrointestinal and Endoscopic Surgeons (SAGES) also support use of preemptive analgesia as an ERAS component in colon and rectal surgery (Carmichael et al., 2017).

Preemptive Analgesia Medication Review.

Gabapentin and Pregabalin. The gabapentinoids pregabalin and gabapentin are anticonvulsant medications that are routinely used to treat neuropathic pain. Recent evidence has revealed their efficacy as a preemptive analgesic in attenuation of postoperative analgesic consumption and pain (Agarwal et al., 2008). Agarwal et al. (2008) found a single preemptive pregabalin dose of 150 mg one hour before surgery significantly decreased postoperative fentanyl consumption without differences in side effects including sedation in patients undergoing laparoscopic cholecystectomy. In the same surgical population, Gurunathan et al. (2016) found no statistically significant decrease in postoperative pain, fentanyl usage, and anxiety between the preemptive pregabalin group given two doses of 150 mg pregabalin 12

hours apart versus control. There was a statistically significant increase in drowsiness and lightheadedness in the pregabalin group compared to control (Gurunathan et al., 2016).

Preemptive gabapentin use in adult surgical populations including abdominal hysterectomy, breast surgery, cholecystectomy, spinal surgery, and thyroid surgery revealed significant decreases in total opioid consumption and pain scores at varying points postoperatively (Alayed et al., 2014; Arumugam et al., 2016; Fabritus et al., 2016). Arumugam et al. (2016) did not find significant decreases in opioid consumption in patients undergoing cesarean section, prostatectomy, and thoracotomy surgeries and found significant increase in postoperative somnolence in the gabapentin group. Fabritus et al. (2016) found no significant differences in adverse events including postoperative nausea and vomiting, sedation, and dizziness between the gabapentin and control groups in which adverse events were reported. Fabritus et al. (2016) cautioned imprecision and inconsistencies in outcome and adverse event reporting with gabapentin use requires further studies for firm evidence.

The American Pain Society recommends preemptive gabapentin or pregabalin in adult surgical patients undergoing major surgery as a multimodal analgesic strategy to decrease opioid requirements and postoperative pain (Chou et al., 2016). Carmichael et al. (2017) and Chou et al. (2016) caution there is insufficient evidence to support a recommended preoperative dose, yet trials supported 600-1200 mg of gabapentin or 150-300 mg pregabalin administered 1-2 hours preoperatively. Adverse effects of dizziness and sedation were not associated with respiratory depression (Chou et al., 2016). The ERAS Society also recommends single low-dose preoperative gabapentin or pregabalin dosing prior to surgery to provide opioid-sparing benefits while decreasing risk for opioid-related sedative side effects (Gustafsson et al., 2019; Nelson et al., 2019).

Acetaminophen (paracetamol). Acetaminophen produces analgesia by inhibiting prostaglandin synthesis and is routinely utilized in the treatment of mild to moderate pain (Wang et al., 2018). In patients undergoing robotic-assisted laparoscopic prostatectomy, Wang et al. (2018) revealed preemptive acetaminophen did not significantly decrease postoperative pain scores, narcotic usage, or PACU length of stay, yet repeated usage postoperatively decreased overall hospital length of stay. Oliveira et al. (2015) found single-dose preemptive acetaminophen use in orthopedic, gynecologic, abdominal, and thyroid surgical procedures improved pain at rest and with movement, decreased opioid consumption, and decreased postoperative nausea and vomiting in the acetaminophen group compared to control.

Ong et al. (2010) identified preemptive acetaminophen in combination with NSAIDs more effectively reduced postoperative pain intensity and analgesic usage compared to each medication used alone. The ERAS Society recommends administration of oral preemptive acetaminophen to reduce perioperative opioid requirements in patients undergoing gynecologic/oncology and colorectal surgery (Gustafsson et al., 2019; Nelson et al., 2019). The American Pain Society recommends postoperative administration of acetaminophen as a multimodal analgesic component yet does not provide recommendations for preoperative administration (Chou et al., 2016).

NSAIDs and Selective COX-2 Inhibitors. Cyclooxygenase-2 (COX-2) inhibitors are selective NSAIDs that spare the antiplatelet and increased bleeding effects of traditional NSAIDs while decreasing inflammation and pain (Penprase et al., 2015). Straube et al. (2005) evaluated preemptive COX-2 inhibitor usage in a wide range of surgical procedures and found significant reductions in postoperative pain scores and analgesic consumption without report of any significant adverse events. Ekman et al. (2006) and Shultz (2012) found administration of

celecoxib preemptively in patients undergoing arthroscopic knee surgery and robot-assisted hysterectomy respectively resulted in significant reductions in postoperative opioid consumption without increase in adverse events in the celecoxib group compared to control. Issioui et al. (2002) and Ong et al. (2010) identified combination of acetaminophen and NSAIDs preemptively resulted in more effective pain control postoperatively than either drug used alone. Moiniche et al. (2002) did not find postoperative analgesic benefit with preemptive administration of NSAIDs.

The American Pain Society recommends administering 200-400 mg celecoxib 30 minutes to 1 hour preoperatively as a multimodal adjunct in adult surgical patients undergoing major surgery without contraindications (Chou et al., 2016). The ERAS Society recommends preoperative celecoxib in combination with acetaminophen and gabapentin in adult patients undergoing gynecologic/oncology surgery as part of an opioid-sparing multimodal analgesic strategy (Nelson et al., 2019). The ERAS Society also recommends administration of a preemptive NSAID in combination with acetaminophen and gabapentin in colorectal surgical patients to decrease opioid usage and opioid-related adverse events postoperatively (Gustafsson et al., 2019).

Opioids. In a Cochrane review analyzing preemptive administration of opioids to adult surgical patients undergoing all types of surgical procedures, preemptive administration of opioids did not result in decreased pain scores at six, 24, and 48 hours postoperatively (Doleman et al., 2018). Reduction in postoperative morphine consumption was not significantly reduced between groups. The risk of opioid-related adverse events (i.e. respiratory depression, bradycardia, hypotension) was similar between groups (Doleman et al., 2018). Moiniche et al.

(2002) also found no improvement in postoperative pain control in patients receiving preemptive opioid analgesics.

Preemptive Analgesia Outcomes.

Postoperative Pain Scores and Narcotic Use. As mentioned previously, preemptive analgesic components have varying evidence on effects relating to postoperative pain scores and narcotic usage. With preemptive analgesic utilization in varying surgical procedures, Nir et al. (2016) identified significant reduction in postoperative total opioid and non-opioid analgesic requirements 24 hours postoperatively in patients receiving preemptive NSAIDs, COX-2 inhibitors, and gabapentin. Preemptive administration of opioids, ketorolac, pregabalin, clonidine, and oxicams resulted in nonsignificant reductions in postoperative opioid and non-opioid requirements (Nir et al., 2016). Penprase et al. (2015) also found gabapentin and COX-2 inhibitors to be efficacious as a preemptive analgesics in reduction of postoperative pain.

Steinberg et al. (2017) identified preemptive analgesia with paracetamol, gabapentin, and COX-2 inhibitors in combination with gabapentin resulted in improved pain scores and reduced narcotic usage compared to placebo in patients undergoing hysterectomy. Preemptive ketamine, fentanyl, and morphine also resulted in decreased postoperative pain scores and narcotic use (Steinberg et al., 2017). Combination of preemptive analgesics versus unimodal preemptive analgesia is recommended by the American Pain Society and ERAS Society to decrease postoperative pain scores and narcotic usage (Chou et al., 2016; Gustafsson et al., 2019; Nelson et al., 2019).

Length of Stay. There is limited evidence regarding preemptive analgesia usage's effect on length of stay. In patients undergoing robot-assisted hysterectomy with preemptive analgesia with celecoxib and ropivacaine infiltration versus traditional postoperative opioid-based

analgesia, Shultz (2010) identified significant decreases in PACU length of stay (72.0 minutes vs. 88.4 minutes; $p < 0.0001$) and time to hospital discharge (8.5 hours vs. 30.2 hours; $p < 0.0001$) in the preemptive group compared to the opioid-based group. 95% of preemptive patients were discharged on the same day of surgery compared to 24% in the opioid-based group (Shultz, 2010). As mentioned previously, significant effects on length of stay for ERAS protocol utilization is well established, yet additional evidence is required to determine if preemptive analgesia itself effects PACU and total hospital length of stay.

Adverse Postoperative Events. Elia et al. (2005) identified utilization of NSAIDs for preemptive analgesia resulted in statistically significant decreases in opioid-related adverse events of postoperative nausea, vomiting, and sedation. Acetaminophen usage had no significant effect on opioid-related adverse events (Elia et al., 2005). Steinberg et al. (2017) identified no significant increase in adverse events including intraoperative blood loss, increased length of surgery, sedation, postoperative nausea and vomiting, and increased hospital length of stay with preemptive analgesic usage compared to placebo. Shultz (2012) found no difference in procedure times, transfusion requirements, and hospital readmission between preemptive analgesic groups and control. Drug-specific effects on postoperative adverse events is infrequently reported and further evidence supporting unimodal and combination preemptive therapy and effects on postoperative adverse events requires further exploration.

Preemptive Analgesia Usage in Specific Surgical Populations.

Gynecologic Surgery. Kalogera et al. (2013) identified usage of preemptive analgesia as a multimodal and ERAS component in gynecologic surgery led to significant decreases in overall postoperative opioid consumption by 80% with no change in overall pain scores, a four-day reduction in hospital length of stay, and cost savings of $7,600 per patient with no difference

in postoperative complication rates between preemptive and control groups. Kandappan & Raju (2016) and Jokela et al. (2008) found significant reductions in pain scores in the preemptive group without differences in postoperative side effects between the preemptive and control group. Shultz (2012) and Steinberg et al. (2017) also identified improved postoperative pain scores and reductions in narcotic usage in patients undergoing hysterectomy with preemptive analgesic usage compared to control. Shultz (2012) found decreased PACU and total hospital length of stay in the preemptive group without significant differences in postoperative adverse events between groups.

Evidence in support of preemptive analgesic usage in gynecologic surgery varies regarding specific medications used and recommended dosages (Long et al., 2018). Jokela et al. (2008) utilized 150 mg pregabalin and 800 mg ibuprofen, while Kandappan & Raju (2016) administered gabapentin 300 mg preoperatively. Kalogera et al. (2013) administered celecoxib 400 mg, acetaminophen 1,000 mg, and gabapentin 600 mg preemptively. Steinberg et al. (2017) recommended preemptive gabapentin, paracetamol, NSAIDs, and COX-2 inhibitors, and narcotics used alone or in combination to reduce postoperative pain and narcotic use. The ERAS Society guideline for gynecologic/oncology surgery currently recommends preemptive administration of oral acetaminophen, gabapentin, and celecoxib as part of a multimodal opioid-sparing analgesic plan to decrease opioid-related adverse events (Nelson et al. 2019).

Urologic Surgery. Surgical intervention for prostate cancer is one of the most frequently performed surgical procedures in men (Wang et al., 2018). In patients undergoing robotic-assisted laparoscopic radical prostatectomy, Trabulsi et al. (2010) found preemptive administration of pregabalin, acetaminophen, and celecoxib compared to control significantly reduced intraoperative and postoperative opioid requirements with no significant difference in

adverse postoperative events, including blood loss, in patients undergoing laparoscopic robotic radical prostatectomy. Wang et al. (2018) found administration of preemptive acetaminophen in the same surgical population did not significantly reduce pain scores or narcotic usage, but significantly decreased total hospital length of stay. Trabulsi et al. (2010) found no significant difference in length of stay between preemptive group and control.

Summary and Practice Recommendations

Support for Preemptive Multimodal Analgesia

The American Pain Society, American Society of Regional Anesthesia and Pain Medicine, American Society of Anesthesiologists, American Society of Colon and Rectal Surgeons (ASCRS), Society of Gastrointestinal and Endoscopic Surgeons (SAGES), and Enhanced Recovery After Surgery (ERAS) Society support the use of preemptive analgesia as a multimodal analgesic pain management strategy to decrease postoperative pain scores, narcotic use, and opioid-related adverse drug events in adults undergoing surgical procedures (American Society of Anesthesiologist Task Force on Acute Pain Management, 2012; Carmichael et al., 2017; Chou et al., 2016; Gustafsson et al., 2019; Nelson et al., 2019). Recommendations include greater efficacy with combination of preemptive medications, including oral gabapentin, acetaminophen, and celecoxib, with dosage adjustment based on patient age and comorbid conditions (American Society of Anesthesiologist Task Force on Acute Pain Management, 2012; Chou et al., 2016; Gustafsson et al., 2019; Nelson et al., 2019).

Recommendations for Practice

Preemptive Analgesia as a Multimodal and ERAS Guideline Component. In adult patients undergoing major surgical procedures, ERAS protocols with focus on multimodal analgesia should be utilized with goals of decreasing postoperative pain scores, narcotic usage,

length of stay, and improved functional recovery while decreasing risk for postoperative adverse events (Chou et al., 2016; Gustafsson et al., 2019). Evidence reveals combination preemptive multimodal analgesics provide improved pain relief with decreased narcotic usage compared to unimodal preemptive techniques (Issioui et al., 2002; Ong et al., 2010). Whenever possible, oral gabapentin and a COX-II inhibitor should be administered preoperatively in adult patients undergoing major surgical procedures unless contraindicated (Chou et al., 2016; Gustafsson et al., 2019; Nelson et al., 2019). Addition of oral acetaminophen to gabapentin and COX-II inhibitor in a preemptive analgesic regimen is recommended by Gustafsson et al. (2019) and Nelson et al. (2019). Dosages of all medications must be adjusted to the patient's age and comorbidities to avoid adverse events (Chou et al., 2016; Gustafsson et al., 2019). Optimal timing of administration has not been fully established, yet providers must take into consideration time to achieve optimal effect that correlates with the start of the surgical procedure to ensure maximum opioid-sparing effect and pain management potential is achieved (Gustafsson et al., 2019).

Preemptive Analgesia Use in Gynecologic Surgery. In adult women undergoing gynecologic surgery, ERAS protocols with multimodal analgesic strategies should be utilized to decrease postoperative pain, narcotic usage, and improve functional recovery (Nelson et al., 2019). Combination preemptive analgesic strategies with oral acetaminophen, celecoxib, and gabapentin should be utilized to provide an opioid-sparing, synergistic approach to postoperative pain management (Kalogera et al., 2013; Nelson et al., 2019; Steinberg et al., 2017). Preoperative patient education should include expectations for pain control and use of non-opioid adjuncts as first-line therapy versus traditional opioid therapy (Nelson et al., 2019). Preemptive analgesic dosages should be adjusted based on the patient's age and comorbidities and timing of

administration should coincide with maximum drug effect and the beginning of the surgical procedure (Gustafsson et al., 2019).

Chapter 3: Project Design

Methodology

Project Design

A quality improvement (QI) project design was chosen because it fit the overarching goal of improving clinical outcomes through practice/process improvement. The implementing facility utilized evidence-based practice (EBP) initiatives of developing and implementing anesthesia-focused ERAS protocols. These protocols contain evidence-based interventions to improve overall pain-related patient outcomes postoperatively (i.e. length of stay, postoperative pain levels, adverse events, etc.).

A QI design was appropriate for this project as a gap in care, not a gap in evidence-guided interventions, was identified. A gap in care was identified as compliance rates for preemptive analgesic prescribing were low, regardless of evidence-based protocols. Placing evidence-guided interventions into practice can lead to positive clinical outcomes. This project required ongoing dynamic improvement with close monitoring and assessment for sustainability, which is a process of QI. A major data collection method of QI projects includes extraction of data to evaluate clinical outcomes. Tracking of provider compliance and associated patient outcomes through electronic medical record (EMR) review provided data to evaluate the goals, aims, and outcomes of the project.

Ethical Considerations

Maintaining the protection and safety of all participants was of utmost importance throughout project development and implementation. Prior to the educational intervention, each participant received an informed consent (see Appendix B) that outlined the voluntary nature of the project with potential risks, benefits, safeguards, and the confidentiality of data. No

immediate nor long-term risks to participants were identified. Data collected including demographic and pre/post-intervention survey data were anonymous in nature and contained no identifiable information through which the participant could be identified directly or indirectly (i.e. unique participant identifier, name, sex, age, provider type). All outcomes data was reported in aggregate form, and thus resulted in no punitive action for individual participants. Deception was not used, and all participants were debriefed during in-person dissemination of project findings to anesthesia leadership at a mandatory monthly staff meeting.

The non-experimental nature of this project placed no risk of harm to the patient population observed. Pre- and post-intervention chart audit data was collected following the Health Insurance Portability and Accountability Act (HIPPA) guidelines and did not contain any patient-specific identifiable information (name, medical record number) to protect patient privacy and confidentiality.

Additional measures to ensure the project met ethical standards included evidence-based practice/quality improvement project human subjects review and approval by the University of Saint Francis Institutional Review Board (IRB). Approval by the IRB was received in October 2020 (see Appendix C). The project manager also received Collaborative Institutional Training Initiative (CITI) training in human subjects research to ensure sound ethical decisions were considered throughout project planning, development, and implementation (see Appendix D-H).

Project Schedule

Retrospective chart audit for baseline preemptive analgesic ordering compliance rates and patient-specific pain-related outcomes data was obtained in January 2020. University of Saint Francis IRB project approval was received in October 2020. Facility IRB approval was not required due to the quality improvement project design (see Appendix I for letter of exemption).

Delivery of the educational presentation and pre- and post-intervention surveys to anesthesia providers at Mercy Health Fairfield occurred at a mandatory monthly staff meeting in January 2021 following USF IRB approval. Post-intervention chart audit for compliance and patient outcomes data was performed on two separate occasions in February and March 2021 to decrease collection time burden. Pre- and post-intervention provider survey data and patient chart audit data was analyzed to assess projected project outcomes from April to May 2021. Dissemination of project findings to university doctoral faculty and facility anesthesia leadership and staff occurred in June and July 2021. See Appendix A for full project timeline.

Implementation Methods

Measures and Aims

The project contained three aims with associated outcome measure indicators. The project aims with associated measures are presented in Table 1. Aims 1 and 2 relate to the primary PICOT question while Aim 3 is associated with the secondary PICOT question.

Table 1

Project Aims, Outcome Indicators, and Associated Measures

Aim 1: Increase anesthesia provider knowledge in preemptive analgesic ordering practices.
Outcome/Indicator 1a: Following project intervention, anesthesia provider self-report of knowledge of preemptive analgesic protocols/guidelines will increase by 30%.
Outcome/Indicator 1b: Following project intervention, anesthesia provider awareness of national organization and facility preemptive analgesic protocols will increase by 30%.

Aim 2: Increase anesthesia provider preemptive analgesic ordering compliance prior to laparoscopic robotic gynecologic and urologic surgical procedures.
Outcome/Indicator 2a: One month following project intervention, anesthesia provider preemptive analgesic ordering compliance in patients undergoing laparoscopic robotic gynecologic and urologic surgical procedures will increase to 60%.
Outcome/Indicator 2b: Two months following project intervention, anesthesia provider preemptive analgesic ordering compliance in patients undergoing laparoscopic robotic gynecologic and urologic surgical procedures will increase to 75%.

Aim 3: Improve patient associated postoperative pain outcomes as they relate to preemptive analgesic prescribing practices.
Outcome/Indicator 3a: Two months following project intervention, average PACU postoperative narcotic use in patients undergoing laparoscopic gynecologic and urologic surgical procedures will decrease by 15%.
Outcome/Indicator 3b: Two months following project intervention, average initial PACU postoperative pain scores in patients undergoing laparoscopic robotic gynecologic and urologic surgical procedures will decrease by 15%.
Outcome/Indicator 3c: Two months following project intervention, PACU time to discharge will decrease by an average of 10 minutes in patients undergoing laparoscopic robotic gynecologic and urologic surgical procedures.

Intervention Plan and Methods

The project followed a one-group pre/post-intervention survey format with retrospective and prospective chart audit methodology. Prior to project implementation, a pre-intervention chart audit of 100 patient charts was performed by the project manager in January 2020 for baseline preemptive analgesic prescribing compliance and patient pain-related outcome data in patients undergoing laparoscopic robotic gynecologic and urologic surgical procedures at Mercy Health Fairfield. This data was statistically analyzed and presented to the facility anesthesia leadership for engagement, identification of a gap in care, and project support.

Immediately prior to the project intervention, an informed consent, demographic survey, and pre-intervention survey were administered in paper format to participants. Participant anonymity was maintained as each survey contained no identifiable information through which an individual could be identified directly or indirectly (unique participant identifier, name, sex, age, provider type). The project informed consent and demographic survey can be found in Appendices B and J respectively. The pre-intervention survey provided subjective data regarding the anesthesia providers' baseline knowledge and awareness of national organization and facility-specific preemptive analgesic guidelines and protocols in patients undergoing laparoscopic robotic gynecologic and urologic surgical procedures. The project intervention

consisted of a PowerPoint presentation constructed and presented by the project manager with assistance from anesthesia leadership to anesthesia providers at Mercy Health Fairfield. The presentation reviewed preemptive analgesic medications, indications, risks, benefits, current national organization evidence-based guideline recommendations, protocols for preemptive analgesic use as identified in the literature and facility protocol review, and baseline compliance rates and patient outcome data obtained from retrospective chart audit.

The presentation was followed by a question and answer session regarding preemptive analgesic agent use, potential barriers to use, and provider beliefs and perceptions. Immediately following the educational presentation, a post-intervention survey was administered in paper format to participants. The project intervention served to address the primary PICOT question and project Aim 1 with associated outcomes. Pre-intervention survey data was analyzed and compared to post-intervention data to assess change in provider knowledge and awareness of national organization and facility preemptive analgesic protocol/guideline recommendations post-intervention, as well as perceived barriers and facilitators to preemptive analgesic use. All participant survey data was reported as aggregate group data, and thus unique identifiers linking the participants' pre-intervention to post-intervention survey were not used. This further added to the anonymity and confidentiality of participant survey responses.

One and two months following project intervention, a post-intervention chart audit was performed by the project manager to assess provider preemptive analgesic ordering compliance and patient pain-related outcome data in patients undergoing laparoscopic robotic gynecologic and urologic surgical procedures. Patient and provider confidentiality and anonymity was maintained as chart audit data was collected following the Health Insurance Portability and Accountability Act (HIPAA) guidelines and contained no provider or patient-specific identifiable

information (name, medical record number). Chart audit data was used to address the secondary PICOT question and project Aims 2 and 3 with associated outcomes. The baseline data was analyzed and compared to post-intervention chart audit data to assess if patient pain-related quality improvement outcomes and ordering compliance rates improved post-intervention.

Measures/Tools/Instruments

Larson's (2004) *Attitudes Regarding Practice Guidelines Instrument* was modified and used as the pre/post-intervention survey instrument to assess the primary PICOT and project Aim 1 with associated outcomes (see Appendix K for modified instrument). The original instrument was adapted to fit the project topic, specific aims, and projected outcomes. Larson's (2004) original instrument can be seen in Appendix L. Dr. Elaine Larson was contacted via e-mail on July 25, 2020 for permission to modify the instrument for this doctoral project. Approval was received on July 26, 2020. See Appendix M for authorization to modify instrument for project use.

To assess the secondary PICOT and project Aims 2 and 3, a chart audit was performed by the project manager in February and March 2021 to collect provider preemptive analgesic ordering compliance rates and patient pain-related outcome data. Data collected included patient age, sex, surgical type, orders for preemptive analgesics, specific preemptive analgesic medications ordered, initial postoperative pain score in PACU, number of postoperative narcotic doses in PACU, and PACU time to discharge. Data was collected until the goal of 100 post-intervention patient chart audits was achieved.

Evaluation Plan

Methods for Collection of Data

As previously mentioned, a pre/post-survey format was utilized for project intervention. Immediately prior to the educational intervention, a paper demographic survey (see Appendix J) and pre-intervention survey (see Appendix K) were distributed to participants by the project manager. Immediately following participant survey completion, the project manager collected the demographic and pre-intervention surveys. Immediately following the educational intervention by the project manager, a paper post-intervention survey (see Appendix K) was distributed and collected by the project manager.

Following the project intervention, paper pre- and post-intervention and demographic surveys were stored in a folder in a locked filing cabinet only accessible to the project manager. Survey responses were entered by the project manager into a SPSS dataset for statistical analysis. The dataset was stored on the project manager's password protected University of Saint Francis OneDrive which was only accessible to the project manager. Survey instrument responses contained no identifiable participant information (name, age, sex, provider type, unique identifier), and thus maintained participant response confidentiality. Immediately following data entry into SPSS, paper surveys were shredded via a paper shredder and disposed of.

One and two months following the intervention, a chart audit of patient electronic medical records (EMRs) was performed by the project manager to assess anesthesia provider preemptive analgesic ordering compliance and patient postoperative pain-related outcomes. The timeframe was chosen to decrease collection time burden. Patient data was first entered into a Microsoft Word chart audit data log sheet. Following collection, data was then transferred into a SPSS dataset by the project manager for statistical analysis and evaluation of ordering

compliance rates. The data log sheet and SPSS dataset were stored on the project manager's password protected University of Saint Francis OneDrive which was only accessible to the project manager. Data contained no identifiable information (name, medical record number, unique identifier) and thus did not require data encryption. The dataset was only shared with project team members for clarification purposes.

Data Analysis Plan

SPSS was used to statistically analyze data for achievement of project aims and related outcomes/indicators. Descriptive statistics with measures of central tendency (mean, median, mode) were used to describe the anesthesia provider participant sample. Descriptive statistics were also used to assess and compare baseline and post-intervention EMR data (i.e. provider compliance rates, associated patient pain outcome indicators). Descriptive statistics allowed for evaluation of differences in provider compliance rates pre and post-intervention (Aim 2, Outcomes 2a and 2b; see Table 1).

Likert scale pre/post-intervention survey data was assessed for average percent response change to evaluate for differences between pre and post-intervention survey data. This calculation served to assess project Aim 1 and Outcome/Indicators 1a and 1b (see Table 1) to determine if increased awareness and knowledge acquisition in anesthesia providers were achieved through project intervention. Qualitative pre/post-intervention questions were assessed for common themes and trends in perceived barriers and facilitators to preemptive analgesic use.

Calculation of average percent change pre- versus post-intervention was performed to compare pre-intervention group patient data to post-intervention group patient data. This was used to evaluate for differences in associated patient postoperative pain outcome indicators of total PACU narcotic doses (Aim 3, Outcome 3a) and initial PACU pain score (Aim 3, Outcome

3b). Average time change in minutes was used to evaluate for differences in time from PACU admission to discharge pre- versus post-intervention (Aim 3, Outcome 3c). See Table 1 for Aim 3 and associated Outcomes/Indicators.

Dissemination Plan

Following project intervention, chart audit, and statistical analysis of project data, project findings were disseminated to Mercy Health Fairfield anesthesia leadership and participants in June 2021 at a mandatory monthly staff meeting. Feedback given to the project participants by the project manager included pre/post-survey findings, preemptive analgesic ordering compliance rates, and patient specific pain-related postoperative outcomes. Participant interaction and discussion was encouraged for feedback, concerns, and potential process improvement. Dissemination of project overview and findings to the University of Saint Francis doctoral faculty and students occurred in July 2021 as a formal PowerPoint presentation.

Implementation Process Analysis

Implementation of this doctoral project flowed seamlessly through each project phase without inconsistencies, conflict, or delays. The project manager attributes this fluid progression to a well thought out timeline, established mutual team goals, frequent interprofessional collaboration and communication with project team members, and early identification of potential barriers to implementation. Addressing barriers early on while capitalizing on facilitating factors allowed for successful and timely project implementation that remained within the project's established timeline.

Chapter 4: Results and Outcomes Analysis

Data Collection Techniques

A pre-intervention chart audit was performed by the project manager to assess baseline preemptive analgesic ordering compliance rates and patient postoperative pain-related outcome indicators. A pre/post-survey format was used for project intervention. Immediately prior to the educational presentation intervention, paper copy informed consents, demographic surveys, and pre-intervention surveys were distributed to all project participants (see Appendices B, J, and K respectively). Surveys were immediately collected by the project manager following completion. The educational intervention PowerPoint presentation was then given by the project manager. Immediately following intervention, paper copy post-intervention surveys (see Appendix K) were distributed to participants and collected by the project manager upon completion.

One and two months following educational intervention, a post-intervention chart audit was performed by the project manager to assess post-intervention preemptive analgesic ordering compliance rates and patient postoperative pain-related outcome indicators. Following data collection completion, demographic, survey, and chart audit data were entered into SPSS for analysis by the project manager. All paper copies of surveys were destroyed following entry into SPSS. All statistical testing and data analysis were performed by the project manager.

Measures/Indicators

Participant Demographics

Out of twenty-nine total facility anesthesia providers, thirteen attended the project intervention (n = 13; 45% participation rate). One provider in attendance declined completion of project survey data (i.e. demographic, pre/post-intervention surveys). Out of the twelve responding providers in attendance, eleven were CRNAs and one participant was an

anesthesiologist. The average age of anesthesia providers in attendance was 36.5. Eighty-two percent of providers in attendance were female with 18% male. Two providers did not complete age and gender information on the demographic survey.

Seven providers in attendance were Masters of Science in Nursing (MSN) prepared nurse anesthetists, three participants were Doctor of Nursing Practice (DNP) prepared nurse anesthetists, and one participant was a Doctor of Medicine (M.D.) prepared anesthesiologist. Two providers did not complete education background information. The average provider years in anesthesia practice was five and one quarter years with the minimum years in practice being zero and the maximum eleven. The provider average years practicing at Mercy Health Fairfield was three years with the minimum being zero years and maximum eight. One provider did not complete the information about years in anesthesia practice and years practicing at Mercy Health Fairfield. Fifty-four and one-half percent of providers in attendance reported routinely ordering preemptive analgesics for patients undergoing robotic laparoscopic gynecologic and urologic procedures. Forty-five and one-half percent reported not routinely ordering preemptive analgesics for this patient population. Two providers did not complete this information.

Pre/Post-Intervention Survey Data

The pre/post-intervention survey (see Appendix K) contained eleven Likert-scale questions to assess the primary PICOT and the first project aim and associated Outcomes/Indicators 1a and 1b (see Table 1). Survey questions one through four assessed anesthesia providers' awareness of facility and national organization ERAS guidelines/protocols and associated preemptive analgesic agent guideline/protocol recommendations (Aim 1, Outcome/Indicator 1b). Questions five, seven, and eight assessed provider knowledge regarding patient pain outcomes related to preemptive analgesic use (Aim 1, Outcome/Indicator 1a).

Questions six, nine, ten, and eleven assessed potential barriers to preemptive analgesic prescribing and use. Each question was assessed for average percent change from pre- to post-intervention. The Likert-scale survey data analysis is presented in Table 2.

Table 2

Pre/Post-Intervention Survey Data Analysis

Question 1: I am familiar with Mercy Health Fairfield/NorthStar Anesthesia's ERAS protocols for robotic gynecologic and urologic surgical procedures (Aim 1, Outcome/Indicator 1b).
Average Pre-Intervention Response: 5.333 (Agree)
Average Post-Intervention Response: 5.538 (Agree to Strongly Agree)
Average Percent Change in Response: 3.8% increase in familiarity

Question 2: I am familiar with the preoperative preemptive analgesic medication recommendations in Mercy Health Fairfield/NorthStar Anesthesia's ERAS protocols for robotic gynecologic and urologic surgical procedures (Aim 1, Outcome/Indicator 1b).
Average Pre-Intervention Response: 5.273 (Agree)
Average Post-Intervention Response: 5.538 (Agree to Strongly Agree)
Average Percent Change in Response: 5.0% increase in familiarity

Question 3: I am familiar with the ERAS Society's preoperative preemptive analgesic guideline recommendations for patients undergoing gynecologic and urologic surgical procedures (Aim 1, Outcome/Indicator 1b).
Average Pre-Intervention Response: 4.818 (Somewhat Agree to Agree)
Average Post-Intervention Response: 5.462 (Agree)
Average Percent Change in Response: 13.4% increase in familiarity

Question 4: I am familiar with the American Pain Society's preoperative preemptive analgesic guideline recommendations for postoperative pain management (Aim 1, Outcome/Indicator 1b).
Average Pre-Intervention Response: 4.455 (Somewhat Agree)
Average Post-Intervention Response: 5.231 (Agree)
Average Percent Change in Response: 17.4% increase in familiarity

Question 5: I am knowledgeable of preoperative preemptive analgesic medications and their use to decrease postoperative pain (Aim 1, Outcome/Indicator 1a).
Average Pre-Intervention Response: 5 (Agree)
Average Post-Intervention Response: 5.308 (Agree)
Average Percent Change in Response: 6.2% increase in knowledge

Question 6: I feel competent ordering preoperative preemptive analgesic medications for my patient.
Average Pre-Intervention Response: 4.545 (Somewhat Agree to Agree)
Average Post-Intervention Response: 5.308 (Agree)
Average Percent Change in Response: 16.8% increase in competency

Question 7: If I follow ERAS guideline preemptive analgesic recommendations, it is likely that patient narcotic requirements will decrease (Aim 1, Outcome/Indicator 1a).
Average Pre-Intervention Response: 5.273 (Agree)
Average Post-Intervention Response: 5.615 (Agree to Strongly Agree)
Average Percent Change in Response: 6.5% increase

Question 8: If I follow the preemptive analgesic guideline recommendations, it is likely that patients' postoperative pain will decrease (Aim 1, Outcome/Indicator 1a).
Average Pre-Intervention Response: 5.273 (Agree)
Average Post-Intervention Response: 5.615 (Agree to Strongly Agree)
Average Percent Change in Response: 6.5% increase

Question 9: Conflicting evidence hinders my use of preemptive analgesic medications.
Average Pre-Intervention Response: 2.455 (Disagree)
Average Post-Intervention Response: 2.615 (Disagree to Somewhat Disagree)
Average Percent Change in Response: 6.5% increase

Question 10: Guidelines and protocols help standardize care and improve patient outcomes.
Average Pre-Intervention Response: 5.727 (Agree to Strongly Agree)
Average Post-Intervention Response: 5.769 (Agree to Strongly Agree)
Average Percent Change in Response: 0.7% increase

Question 11: Guidelines and protocols interfere with my personal autonomy and limit my practice.
Average Pre-Intervention Response: 2.364 (Disagree)
Average Post-Intervention Response: 2.538 (Disagree to Somewhat Disagree)
Average Percent Change in Response: 7.4% increase

Chart Audit Data

A retrospective/prospective chart audit was performed by the project manager to assess the secondary PICOT and project Aims 2 and 3 with associated outcomes/indicators (see Table 1). Data was collected until the goal of 100 pre- and 100 post-intervention patient chart audits were achieved. This chart audit data assessed for changes in provider preemptive analgesic ordering compliance rates and patient pain-related outcome indicators (i.e. initial PACU pain score, total narcotic doses in PACU, and PACU time to discharge) from pre- to post-intervention. Preemptive analgesic ordering compliance pre versus post-intervention was reported as total percent compliance. The patient pain-related outcome indicators of total PACU narcotic doses and initial PACU pain score were assessed for average percent change pre- to

post-intervention. The outcome indicator PACU time to discharge was assessed for average time change in minutes pre- to post-intervention. The chart audit data analysis is presented in Table 3.

Table 3

Pre/Post-Intervention Chart Audit Data Analysis

Indicator: Preemptive analgesic ordering compliance (Primary PICOT, Aim 2, Outcome/Indicator 2a and 2b)
Pre-Intervention Compliance Rate: 44%
Post-Intervention Compliance Rate at One Month: 73%
Post-Intervention Compliance Rate at Two Months: 71%

Pain-Related Outcome Indictor: Total PACU Narcotic Doses (Secondary PICOT, Aim 3, Outcome/Indicator 3a)
Average Pre-Intervention Total PACU Narcotic Doses: 1.99
Average Post-Intervention Total PACU Narcotic Doses: 1.97
Average Percent Change in Total PACU Narcotic Doses: 1% decrease post-intervention

Pain-Related Outcome Indictor: Initial PACU pain score (Secondary PICOT, Aim 3, Outcome/Indicator 3b)
Average Pre-Intervention Initial PACU Pain Score: 5.035
Average Post-Intervention Initial PACU Pain Score: 5.419
Average Percent Change in Initial PACU Pain Score: 7.63% increase in initial PACU pain score post-intervention

Pain-Related Outcome Indictor: PACU time to discharge in minutes (Secondary PICOT, Aim 3, Outcome/Indicator 3c)
Average Pre-Intervention PACU Time to Discharge: 96.28 minutes
Average Post-Intervention PACU Time to Discharge: 90.91 minutes
Change in Average PACU Time to Discharge: 5.37 minutes decrease post-intervention

Data Analysis Inferences

Pre/Post-Intervention Survey Data

From the results of survey questions one and two, it was inferred that the anesthesia providers at Mercy Health Fairfield were aware of their facility's ERAS guidelines and preemptive analgesic recommendations within the robotic gynecologic and urologic surgical procedure guidelines prior to project intervention. The average response pre- and post-intervention correlated with agreeing/strongly agreeing to these questions with minimal average percent change in response. Survey questions three and four revealed anesthesia providers were less familiar with a national organization preemptive analgesic recommendation at baseline compared to their facility recommendations. Familiarity with a national organization (i.e. ERAS Society, American Pain Society) preemptive analgesic recommendations increased from somewhat agree pre-intervention to agree post-intervention with an average response percent increase of 13.4% for question three and 17.4% increase for question four.

Survey questions one through four addressed project Aim 1, Outcome/Indicator 1b (see Table 1). Even though the goal of increased anesthesia provider awareness of national organization and facility preemptive analgesic protocols by an average of 30% post-intervention was not achieved with any question, awareness of facility preemptive protocols was high at baseline and awareness of a national organization preemptive analgesic recommendations positively increased post-intervention.

Questions five, seven, and eight addressed project Aim 1, Outcome/Indicator 1a (see Table 1). Even though the goal of increased anesthesia provider self-report of knowledge of preemptive analgesic protocols/guidelines by an average of 30% post-intervention was not achieved with these questions, each question achieved an increase in average percent response

change of self-reported knowledge pre- versus post-intervention. The project manager inferred that anesthesia providers' knowledge regarding specific preemptive analgesics and their use to decrease postoperative pain and narcotic requirements increased following intervention regardless of not reaching the outcome/indicator goal.

Survey questions six, nine, ten, and eleven assessed potential barriers to preemptive analgesic ordering compliance. Question six addressed provider competence in preemptive analgesic ordering practices. The provider response increased by an average of 16.8% and from a response of somewhat agree/agree to agree. This increase in response suggests provider competence could serve as a potential barrier to preemptive analgesic ordering compliance. Question nine responses suggest conflicting evidence did not hinder providers from using preemptive analgesics in their practice as responses minimally changed pre- versus post-intervention. Questions ten and eleven responses suggest that on average providers believe guidelines and protocols help standardize care, improve patient outcomes, and do not interfere with personal provider autonomy or limit practice. This was inferred by the project manager as these questions' responses minimally changed pre- to post-intervention. The project manager also inferred from these questions that providers held guidelines and protocols in a positive regard, and thus personal provider beliefs may not present as a barrier to facility ERAS and preemptive analgesic guideline use.

Pre/Post-Intervention Chart Audit Data

The retrospective/prospective chart audit revealed an increase in anesthesia provider preemptive analgesic ordering compliance. Prior to project intervention, ordering compliance was at 44%. One month following project intervention, ordering compliance increased to 73%. This attained the project Aim 2, Outcome/Indicator 2a goal of increased preemptive analgesic

ordering compliance to 60% one month following project intervention. Two months following project intervention, ordering compliance was 71%. This did not attain the Aim 2, Outcome/Indicator 2b goal of increased preemptive analgesic ordering compliance to 75% two months following project intervention. Even though this target was not met, positive gains reflected the potential influence of the project's educational intervention on anesthesia provider preemptive analgesic prescribing incidence.

Patient PACU narcotic dose data was collected to assess project Aim 3, Outcome/Indicator 3a. The average patient pre-intervention total PACU narcotic doses were 1.99 with average post-intervention total PACU narcotic doses 1.97. This resulted in a 1% decrease in average PACU narcotic doses from pre- to post-intervention. This average percent decrease did not attain the Outcome/Indicator 3a goal of an average PACU narcotic use decrease of 15% two months post-intervention. Even though the average PACU narcotic dose did not dramatically decrease post-intervention, it was inferred that preemptive analgesic prescribing did not increase average PACU narcotic requirements. Unfortunately, preemptive analgesic prescribing is one of multiple factors that affect a surgical patient's narcotic requirements. Additional factors, such as preemptive analgesic type, intraoperative multimodal analgesic techniques, pain-relieving procedures (i.e. peripheral nerve blocks, neuraxial anesthesia), PACU administered narcotic type and dose, patient pain tolerance, etc., can affect postoperative narcotic requirements. These factors would require additional consideration and evaluation to assess definitively if preemptive analgesic prescribing affected overall patient PACU narcotic use.

Initial PACU pain score data was collected to assess project Aim 3, Outcome/Indicator 3b. The patient pre-intervention average initial PACU pain score was 5.035 on 0-10 Likert-based scale. The average post-intervention initial PACU pain score was 5.419, which was a 7.63%

increase in average initial PACU pain score pre- to post-intervention. This increase did not attain the Outcome/Indicator 3b goal of an average initial PACU postoperative pain score decrease of 15% two months post-intervention. Multiple factors mentioned in the review of postoperative narcotic use data also influence a patient's perceived pain intensity and resulting pain score. These influential factors require consideration to assess if preemptive analgesic prescribing resulted in increased initial PACU pain scores in the project's patient population.

PACU time to discharge data was collected to assess project Aim 3, Outcome/Indicator 3c. This was the weakest of all Aim 3 indicators as multiple factors influence patient time in PACU at Mercy Health Fairfield including Aldrete score factors (i.e. activity, consciousness, vital signs), presence of postoperative nausea and vomiting, inpatient bed availability, staff availability, etc. Even though minimal evidence exists regarding preemptive analgesia's effects on PACU time to discharge, the project manager selected this indicator to be explored. The average pre-intervention PACU time to discharge was 96.28 minutes. The average post-intervention PACU time to discharge was 90.91 minutes, resulting in an average 5.37-minute decrease pre- to post-intervention. Even though the Outcome/Indicator 3c goal of average PACU time to discharge decrease of ten minutes was not achieved, there was a positive average decrease. The aforementioned factors would require exploration to determine if preemptive analgesic prescribing resulted in the decrease in average PACU time to discharge.

Gaps

The most notable gap observed during project intervention was over half of the anesthesia provider population was not present during the educational presentation. Thirteen of twenty-nine providers were in attendance (45% participation rate). Most notably, of the thirteen providers in attendance, one was an anesthesiologist. Anesthesiologists are the main preemptive

analgesic ordering providers at Mercy Health Fairfield as it is the anesthesiologist's responsibility to perform a preoperative assessment on all surgical patients. A post-intervention e-mail summarizing the presentation was delivered to all anesthesia providers by Dr. Kevin Hartwig after the project manager's educational presentation, which allowed all providers not in attendance to review presentation points and recommendations. This e-mail potentially contributed to increased preemptive analgesic ordering compliance, yet increased attendance could have further positively impacted the project's outcomes.

An additional gap previously mentioned was one provider did not complete demographic or survey data. Additionally, one provider completed the post-intervention survey yet did not complete the pre-intervention survey. All survey data calculations were performed utilizing responses from responding participants instead of total participants to reflect accurate data analysis. If data was complete without missing responses, it could have potentially influenced survey question results, interpretations, and inferences.

A gap noted in chart audit data collection was thirteen pre-intervention and fourteen post-intervention patient charts were missing a PACU documented pain score. Multiple missing pain scores were associated with no narcotic requirements in PACU, and thus it was inferred that these patients may have had low to no pain in PACU. This missing data was omitted during average initial PACU pain score calculations, yet these scores could have potentially changed the result of this project outcome indicator.

Unanticipated Consequences

As mentioned in the review of gaps in data, the decreased participation rate was an unanticipated consequence of the project. Anesthesia provider attendance to the monthly staff meeting was mandatory, yet circumstances such as scheduled vacations, sick time, and active

provision of anesthesia services warranted excused absences from project intervention. Dr. Kevin Hartwig's e-mail summary and the project manager's personal discussions with anesthesia staff not in attendance supplemented this decrease in attendance and survey response rates, yet it remains unknown if this decrease in attendance influenced the overall project outcomes. The project manager also did not anticipate missing survey data from participants.

An additional unanticipated consequence during project intervention was the projector in the room was not functioning, and thus the PowerPoint presentation could not be displayed. Fortunately, the anesthesia leadership informed the project manager that the projector did not reliably function properly prior to project intervention. The project manager included a printed, bound version of the PowerPoint presentation for all providers present, and thus providers were able to view the presentation as the project manager presented. The providers were also able to keep the presentation copy for reference. Additional copies were given to anesthesia leadership to distribute to anesthesia providers not in attendance and to potential new hires as a means for project sustainability.

Expenditures

The project expenditures aligned with the proposed budget assessment (see Figure 1). The educational presentation development as well as presentation delivery, data collection, and data analysis were performed by the project manager, and thus incurred no cost. Purchase of SPSS software was required for data analysis and incurred a cost of $69 to the project manager. Expert subject matter consultation with the facility's anesthesia leadership team acquired an additional predicted cost of $1,536. All educational presentation materials including handouts, room location, computer, and projector were donated by outside donors or provided free of cost by the implementation facility. Each donor had no financial gain by supplying these resources.

An unanticipated expenditure included providing anesthesia staff with a complimentary breakfast during the educational presentation as a token of appreciation. This incurred an additional cost of $98 to the project manager.

Chapter 5: Leadership and Management

Organizational Culture

The culture of an organization reflects the mission, vision, values, and beliefs of the organization and is a strong predictor of the organization's success and ability to adapt and change. An organization's culture may impede or promote change. Organizational culture, unfortunately, can be one of the most difficult aspects for the doctorally prepared nurse to influence on translating evidence into practice (Williams, 2016). An organizational assessment is a strategy that can be employed to understand the strengths and weaknesses of an organization prior to implementation of a doctoral project. The Institutional and Organizational Assessment (IOA) model serves to evaluate four areas: the organizational environment, motivation, capacity, and performance (Lusthaus et al., 2002). Assessing each area allows for organizations to identify strengths and weaknesses that affect their overall performance. Mercy Health Fairfield's motivation, including its mission, values, culture, and ability to adapt, was assessed prior to project development to determine viability of the doctoral project.

Organizational Motivation: Mission, Vision, Values, and Culture

The mission of Mercy Health Fairfield includes improving the health and well-being of communities, especially the underserved, poor, and ill, through the compassion and ministry of Jesus. The organization's vision is to serve by doing God's work while maintaining values of respect for human dignity, service with integrity and compassion, and delivery of high-quality care ("Our Mission," n.d.). The mission and values have motivated and inspired employees towards a shared purpose and was evident through the project manager's direct observation of the anesthesia and surgical staff's attitudes and interactions.

The culture allows an organization to actualize its mission (Lusthaus et al., 2002). Mercy Health Fairfield embodies a culture of acceptance, compassion, and respect for human life while delivering high-quality, effective, and efficient care ("Our Mission," n.d.). This was evident through a democratic shared governance leadership style in which opinions were valued and respected and positive conflict management and constructive feedback occurred. Collaboration, change, and innovation were also encouraged. The anesthesia leadership at Mercy Health Fairfield encouraged open dialogue in which anesthesia staff could freely offer constructive feedback without fear of retribution. This allowed for brainstorming of evidence-based solutions that were acceptable to anesthesia leadership and staff alike. This culture encouraged anesthesia staff to take pride, accountability, and ownership in their work while promoting a culture of excellence.

Organizational Culture Alignment with Doctoral Project

The anesthesia leadership and staff at Mercy Health Fairfield was dedicated to delivering high-quality, effective care through utilization of evidence-based practice recommendations and resources. Anesthesia staff were continually encouraged to embrace change in practice and function at the highest level to ensure positive patient outcomes. Positive regard for leadership and job satisfaction were evident through the project manager's interactions with anesthesia staff. Continual exposure to change and an emphasis on adaptability and excellence in anesthesia services allowed this doctoral project to be positively welcomed by facility anesthesia leadership and staff.

The culture embodied by the anesthesia staff at Mercy Health Fairfield proved to be a strong motivating and beneficial factor for development and implementation of this doctoral project. Evidence-based change was embraced with minimal resistance or hesitation from

anesthesia leadership and staff alike. The project manager was treated as an equal, and professional opinions were encouraged and valued. Support and mentorship from individuals that had a strong background in translating evidence-based change into practice allowed for a smooth, seamless transition between project phases.

Change Strategy

Once the organizational culture and structure was assessed, a change theory was identified to guide project planning and intervention. Lewin's Change Theory (Lewin, 1951), frequently utilized for quality improvement projects, was chosen as the project's guiding change theory. Lewin's (1951) theory identifies driving and restraining forces which counter one another to maintain a current state of equilibrium or maintenance of the "status quo." Driving forces must overcome restraining forces as organizations move through the three theoretical phases (unfreezing, changing/moving, and refreezing) to enable change and disrupt equilibrium.

During unfreezing, the problem is identified to motivate change and the current equilibrium state is disrupted by increasing driving forces and reducing restraining forces towards change (White, 2016). The moving/changing phase occurs when an organization moves towards and embraces change and a new equilibrium. The final phase, refreezing, occurs when change has been fully implemented, adopted, and sustained, and driving and restraining forces re-equilibrate (White, 2016). Throughout each phase, driving and restraining forces must be assessed and collaboration must occur to address barriers, integrate new ideas, and solidify change.

For this project, the retrospective chart audit identified current facility preemptive analgesic performance, including patient outcomes. The retrospective chart audit data supported the project need and overall potential benefit for key stakeholders (i.e. anesthesia staff, patients,

facility), which served as a strong motivating and support factor for facility anesthesia leadership and staff. This key step led to the unfreezing project phase. As a crucial step in Lewin's Change Theory, a force field analysis (Appendix N) was then performed to identify project driving and restraining forces with actions required to address or enhance each force (White, 2016). Driving and restraining forces were continually addressed throughout all phases with a strong focus on frequent communication and interdisciplinary collaboration with the project team and stakeholders.

During the moving/changing project phase, the baseline preemptive analgesic chart audit data and educational presentation was delivered to facility anesthesia staff. This highlighted driving and restraining forces and the current evidence-based practice knowledge gap. Open, frequent dialogue among the project manager, project team members, anesthesia leadership, and anesthesia staff allowed for identification of further restraining forces with suggestions to overcome these forces. A prospective post-intervention chart audit was performed to assess facility readiness for the refreezing phase. This audit identified whether change occurred and if project-related change was likely to be habitual and sustainable. Evaluation of the refreezing stage occurred beyond the project timeframe through routine education and compliance assessments performed by facility anesthesia leadership.

Leadership Style

To successfully implement a doctoral project, one must embody a strong leadership role while gaining support and motivating others towards a shared vision. A transformational leader fosters a sense of ownership, empowerment, and commitment in his or her followers to achieve a goal and facilitate change (Fischer, 2016). The ability to engage followers through open, honest dialogue and frequent collaboration while encouraging personal and collective growth are the

hallmarks of a strong transformational leader (Grossman & Valiga, 2013). Highlighting the individual and collective strengths within a group while acknowledging and addressing weaknesses is of paramount importance in moving a group towards a shared vision or goal.

The leadership styles of the project manager, facility chief nurse anesthetist, and facility chief anesthesiologist were that of transformational leaders. These leadership styles led to a positive working relationship between project team members. Consistent, honest dialogue between team members fostered an environment in which the project manager was able to assume a transformational leadership role. Discussion of difficult subjects, such as preemptive analgesic compliance rates and potential project barriers, was embraced and encouraged. Weaknesses of the project manager, including lack of familiarity with facility processes and protocols, were recognized, and countered with support and guidance from the facility leaders. Both the project manager and facility leaders assumed the leadership role when specific individual strengths were required, while the other assumed a followership support role. This exchange of positions allowed the project manager to grow not only as a leader, but as a follower as well. This positive working relationship kept project tasks on schedule and led to successful and timely implementation of the project.

Interprofessional Collaboration

A positive working relationship with frequent communication and interprofessional collaboration amongst project team members is crucial through each stage of doctoral project development and implementation. The first step in developing this level of collaboration was the assembly of the project team. The project team consisted of the doctoral student as the project manager along with the project manager's doctoral and anesthesia advisors, Dr. Carolyn Yoder and Dr. Gregory Louck respectively. Dr. Yoder and Dr. Louck served as mentors to guide the

project manager to successful completion of each project stage. Dr. Kevin Hartwig, chief anesthesiologist, and Matt Toller, chief CRNA, served as project facility leadership support persons, as well as subject matter experts and practice mentors.

Initial team communications included project problem identification through retrospective chart audit findings, review of supporting literature with evidence-based practice recommendations, development of a specific project intervention, and formation of realistic, achievable project goals and outcomes that aligned with the facility's goals. Meeting these major project milestones required frequent interdisciplinary collaboration, guidance, and input from all project team members. This required minimum bi-monthly communication with team members, whether in-person, via e-mail, or video conference. Each project team member remained dedicated, respectful, flexible, and maintained a vested interest in the project's success.

In the later stages, the project manager relied heavily on Dr. Yoder for guidance navigating IRB application and manuscript development. The project manager also required assistance from Dr. Hartwig and Mr. Toller to allocate of facility resources for project implementation and to support during project intervention with their leadership presence. Each team member's flexibility and dedication to the project's objectives and goals were evident through their patience, frequent communication, mutual respect, and interdisciplinary collaborative efforts. This exemplary model of teamwork led to timely project implementation and successful completion of this doctoral project.

Conflict Management

A prudent transformational leader must anticipate potential problems, especially when instituting change. The ability to preemptively identify potential barriers to change allows for productive communication and use of resources and supports to address issues before they occur.

One of the common consequences of implementation of any change is conflict. Conflict has traditionally been viewed as negative, yet positive conflict can be an instigator for change and help to identify issues that promote growth, adaptability, collaboration, and positive working relationships (Grossman & Valiga, 2013). If conflict is not quickly addressed, group visions and goals can be easily abandoned with more time focused on the conflict than on actions aimed at moving towards set goals.

Even though mild, this doctoral project was not developed without a healthy level of conflict. Creation of the force field analysis (Appendix N) allowed the project manager to identify potential driving and restraining forces that could facilitate or hinder project progression. Driving forces were capitalized upon while restraining forces were addressed early through specified actions to avoid unnecessary conflict. The most notable conflict was the lack of recommendations for gabapentin as a preemptive analgesic within the facility's current ERAS protocol. The lack of this recommendation was noted early during the literature review project phase. Early discussion of literature review findings and evidence-based practice recommendations with Dr. Hartwig allowed for constructive, respectful dialogue. It was decided that the recommendation of gabapentin would not be added to the protocol due to inconsistencies in the literature. Anesthesia providers were educated regarding literature recommendations and encouraged to use their best judgement as to appropriate patient populations that could benefit from preoperative gabapentin prescribing yet cautioned about potential risks found in the literature. The ability for the project team to avoid interjecting personal beliefs and instead rely on evidence to make an informed decision allowed for positive, productive, and respectful conflict resolution.

An additional source of conflict during the project intervention educational presentation was concern from the nurse anesthetists in attendance regarding attending anesthesiologists ordering preoperative preemptive analgesics in a timely manner. This led to constructive dialogue amongst the anesthesia providers present with Dr. Hartwig leading the discussion. Suggestions were made including open communication between the attending anesthesiologist and nurse anesthetist regarding patient care, reiteration of preemptive analgesic recommendations via verbal and e-mail communication, and distribution of presentation materials for those unable to be present. Dr. Hartwig's transformational leadership style with a focus on open, honest dialogue allowed for team to brainstorm solutions acceptable to not only anesthesia leadership, but the individual anesthesia providers the leaders served.

Many restraining forces identified in the force field analysis as potential barriers and sources of conflict ultimately did not manifest as anticipated. Frequent project team communication regarding project progress, needs, and expectations, especially with facility anesthesia leadership, maintained team member engagement and kept the project a priority on all members' agendas. This allowed for fluid progression through project stages without inconsistencies, conflict, or delays. Resistance from anesthesia staff, preoperative staff, and surgeons was an unfounded concern because the project was warmly welcomed from all parties involved. Ultimately, conflict that did occur encouraged positive dialogue that led to the development of healthy working relationships, professional growth, and positive outcomes.

Chapter 6: Discussion

Impact of Project

The purpose of this doctoral project was to provide evidence-based education to increase knowledge and awareness of preemptive analgesic guideline recommendations; identify, address, and overcome barriers to preemptive analgesic ordering as a means to improve ordering compliance rates; improve patient postoperative pain-related outcome indicators in patients undergoing robotic laparoscopic gynecologic and urologic abdominal surgery at Mercy Health Fairfield. Overall positive gains in provider knowledge were made despite not achieving project aims and outcomes. The project manager inferred that these positive knowledge gains in preemptive analgesic prescribing practices led to overall increases in anesthesia provider preemptive analgesic prescribing in the project's patient population. Following project intervention, preemptive analgesic prescribing became the standard of practice at Mercy Health Fairfield. This standard of practice change will remain sustainable as anesthesia leadership at Mercy Health Fairfield are dedicated to providing routine education and evidence-based practice updates for current anesthesia staff and intend to educate all new hires regarding ERAS protocols and preemptive analgesic recommendations.

Even though patient postoperative pain-related project aims were not achieved following project intervention, the project manager inferred that when appropriately prescribed, preemptive analgesics presented minimal pain-related outcome risk for patients undergoing robotic laparoscopic gynecologic and urologic surgical procedures. This doctoral project revealed additional research is required to definitively identify the role of preemptive analgesic prescription in the potential improvement of patient postoperative pain-related outcomes.

The progression of this doctoral project from planning through implementation phases served to successfully demonstrate mastery of the Doctor of Nursing Practice (DNP) Essentials. The ability to master the DNP Essentials reveals the capability of the doctoral student to successfully implement change and advance nursing practice. Construction of the project PICO(T) questions and extensive literature review achieved mastery of DNP Essential I: Scientific Underpinnings for Practice. Performing organizational and budget assessments and collaborating with project stakeholders to develop project goals achieved DNP Essential II. Constructing the project's IRB proposal and project manuscript as well as data collection and analysis achieved DNP Essentials III and IV. Interprofessional collaboration with project team members and facility contacts was crucial in achieving mastery of DNP Essential VI. Lastly, dissemination of project findings achieved DNP Essential VII: Advanced Nursing Practice.

Decisions and Recommendations

This doctoral project revealed increased provider compliance with evidence-based guideline recommendations is possible through providing education and addressing identified and perceived barriers to recommendation use in practice. Anesthesia-based knowledge and evidence-based practice recommendations are ever evolving with rapid day-to-day change. It is the anesthesia provider's responsibility and duty to remain abreast of these recommendations and alter his or her practice based on these recommendations. It is unrealistic to assume anesthesia providers can individually remain well-informed and competent with every change, and thus employer or facility-provided education should serve as an additional knowledge source. Routine education is recommended, whether through webinars, online learning, peer-reviewed journal article review, staff meeting presentations, etc., to all facility anesthesia staff at Mercy Health Fairfield as a means to increase evidence-based practice utilization and improve overall patient

outcomes. If indicated, the project manager recommends that chart auditing and reporting be incorporated as a motivational component for evidence-based change as a method to assess overall anesthesia provider compliance and patient outcome progress towards set goals.

An additional recommendation specific to this doctoral project would be to perform supplementary statistical testing on survey responses and patient pain-related chart audit data to add strength and depth to the project findings. Even though many of the project aims and associated outcome/indicator goals were not achieved, performance of additional statistical testing may reveal significant differences in project outcome data.

Limitations of the Project

One of the major limitations of the project previously mentioned in the Chapter 4 is that multiple factors influence a patient's perception of pain, narcotic requirements, and PACU time to discharge postoperatively. Preemptive analgesic prescribing is one evidence-based factor that can potentially influence these postoperative patient pain-related outcomes. Additional factors require consideration and evaluation to assess if preemptive analgesic prescribing definitively affects these patient outcomes. These relationships require rigorous controlled studies in the project's patient population to devise a definitive conclusion.

An additional limitation of the project is that the form of educational presentation utilized during project implementation (i.e. PowerPoint presentation) may not be an adequate educational resource for all adult learners. A formal presentation may benefit some learners, yet other learners may benefit from alternative educational techniques such as hands-on or self-guided learning. A mixed method approach may have proved more beneficial than a singular, formal educational presentation.

Application to Other Settings

From an educational perspective, this project design can be applied to other settings in which decreased advanced provider compliance and barriers to evidence-based guidelines and protocol utilization are identified. The use of education as a tool to increase evidence-based guideline adherence is strongly rooted in supporting literature which demonstrates its success. This project also revealed successful positive increases in guideline recommendation adherence and adds to the body of existing literature supporting education as a tool to increase provider knowledge, awareness, and adherence. A mixed-method approach to provider education can also be used to attain adherence to facility-based and national organization guidelines and protocols.

An additional application of this project includes utilization of preemptive analgesics in other surgical populations in which ERAS protocols are implemented. Some of these additional surgical populations include cardiothoracic, orthopedic, and obstetric surgical populations. The project's evidence-based literature, design, and findings could be applied and studied in these surgical populations as well. Application to other settings and patient populations can add to the existing body literature supporting ERAS protocols and preemptive analgesia and potentially address gaps noted within this body of literature to advance anesthesia practice.

Strategies for Maintaining and Sustaining

As previously mentioned, the anesthesia leadership at Mercy Health Fairfield remains dedicated to providing anesthesia staff with routine evidence-based ERAS and preemptive analgesic updates via e-mail communication and monthly staff meetings. Educational handouts were given to each participant during project intervention to refer to if questions arose or if a refresher on information was required. Additional handouts were given to anesthesia leadership to distribute to providers not in attendance and to new hires. The anesthesia leadership remains

committed to educating new hires on facility ERAS protocols and preemptive analgesic recommendations to maintain project viability and sustainability.

Five months following project intervention, the project manager disseminated findings to the facility anesthesia leadership and staff at a monthly staff meeting. The positive project gains and patient outcomes data served as a strong motivating factor to maintain preemptive analgesic ordering compliance. Positive project regard and feedback from facility anesthesia leadership and staff alike left the project manager hopeful that the project left a lasting impact and will lead to sustainable, positive educational and compliance gains in the future not only in preemptive analgesic ordering practices, but with additional evidence-based practice initiatives as well.

Lessons Learned

The project manager attributes the success of this doctoral project to strong support from the project team members, facility anesthesia leadership, and facility staff. The project manager learned quickly that interprofessional collaboration, frequent communication with project team members, and a thorough, timely project plan was critical in fluid progression through project stages and for successful completion. Importantly, the project manager's vision for the project aligned with the needs and goals identified by the facility anesthesia leadership. The shared vision led to mutual goals and a positive working relationship in which conflict was minimal yet managed quickly and professionally.

A difficult lesson learned for the project manager was that the project aims and projected outcomes must align with proposed methods of measurement. Late in the project's analysis, the project manager identified that additional statistical testing could add strength to the project's findings, yet the supplementary tests did not align with the project's aims and projected outcomes. The project manager entertained the idea of adding additional project aims and

outcomes yet realized this addition may hinder timely project completion. In retrospect, adding or editing the project's aims and outcomes and performing additional statistical testing on patient outcome and survey data could have added additional support to the project's data analysis inferences.

Chapter 7: Conclusion

Potential Project Impact on Health Outcomes Beyond Implementation Site

The project results add to the current body of evidence-based research supporting use of education to increase provider compliance with guideline and protocol recommendations and promote anesthesia provider utilization of preemptive analgesics in major surgical populations. Publishing the project manuscript within the DNP project repository can allow future doctoral candidates to replicate or modify the project to further add to this body of knowledge and positively impact patient outcomes in the future.

Adding further statistical analysis to enhance project findings could render the project manuscript a potential candidate for submission to a peer-reviewed journal, such as the American Association of Nurse Anesthetists' *AANA Journal*, for potential publication. The ability for wide-spread distribution of project findings allows for knowledge acquisition with the potential to modify personal practice to align with evidence-based interventions to ultimately improve patient outcomes.

Health Policy Implications of Project

While this doctoral project did not lead to direct health policy initiatives, the project's literature review and findings could serve to encourage other healthcare facilities to adopt and implement ERAS guidelines and protocols with recommendations for preemptive analgesics in patients undergoing major surgical procedures. These evidence-based interventions serve to improve patient outcomes and decrease anesthesia providers' contributions to the opioid epidemic in the United States. These initiatives can indirectly impact health policy surrounding the opioid crisis by enlightening not only anesthesia providers but the public to the risk of postoperative opioid abuse and addiction and the associated physical and financial impact.

Increased positive awareness could lead to support of health policy aimed at decreasing this burden in the United States.

Proposed Future Direction for Practice

From a local perspective, the project manager proposes that the anesthesia providers and new hires at Mercy Health Fairfield receive routine education regarding evidence-based practice guidelines to maintain compliance and improve patient outcomes. The anesthesia leadership are encouraged to continually adopt evidence-based ERAS guidelines and protocols with preemptive analgesic recommendations for additional surgical populations, such as cardiothoracic and joint replacement populations.

From a national perspective, it is proposed that facilities adopt ERAS guidelines and protocols with preemptive and multimodal analgesic recommendations to improve functional recovery, decrease adverse event risk, and increase patient satisfaction postoperatively. A key aspect in adoption of any evidence-based practice guideline recommendation is gaining provider awareness, support, and routine incorporation into daily practice. Providing frequent education and analyzing patient outcomes are evidence-based strategies to improve and sustain compliance with guideline recommendations. Routine education through multiple avenues (i.e. online learning, journal review, in-person presentations, etc.) should become standard to change practice and improve patient outcomes.

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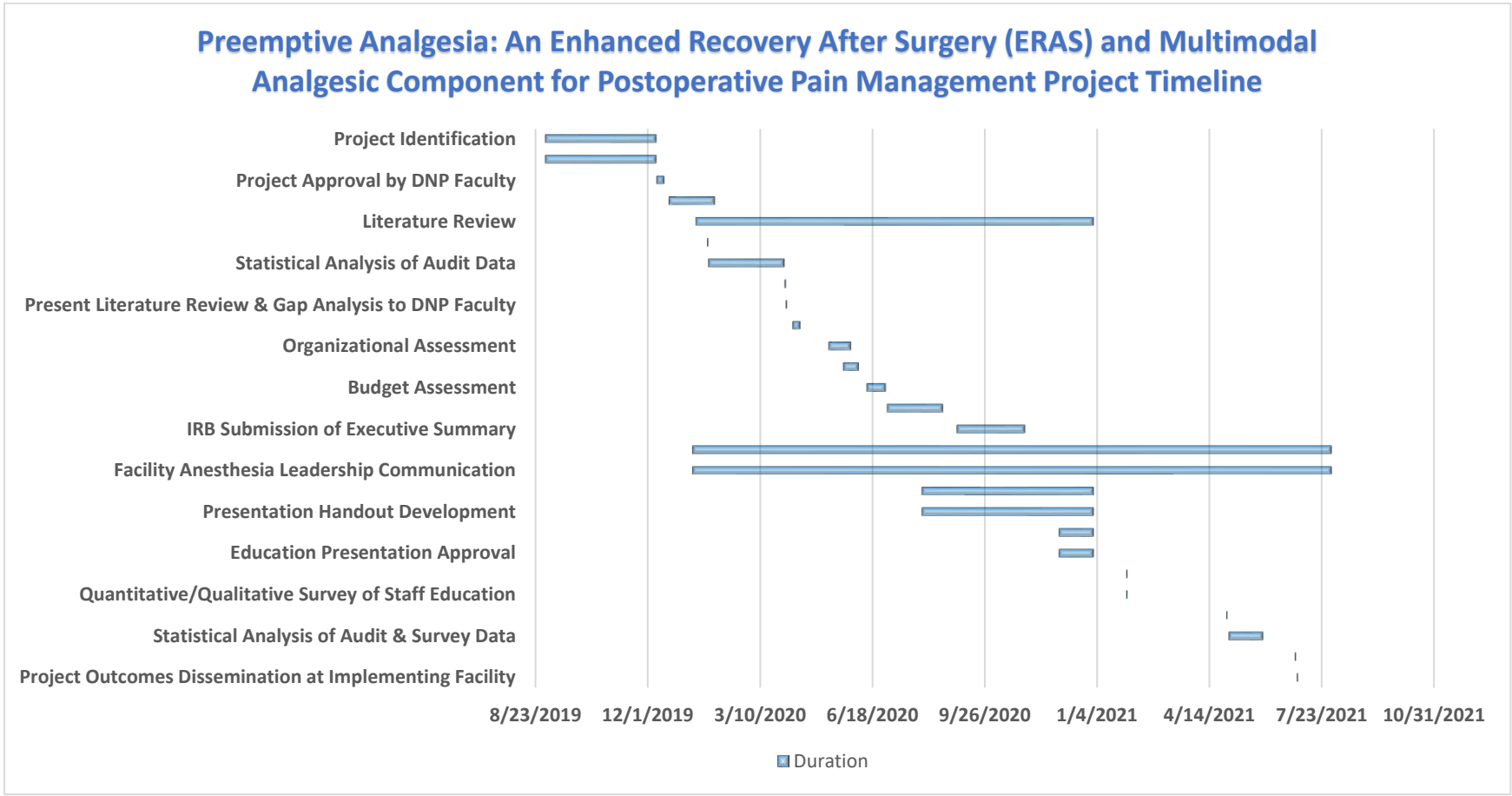
Appendices

Appendix A

Project Timeline



Appendix B

Project Informed Consent

Informed Consent

Preemptive Analgesia: An Enhanced Recovery After Surgery (ERAS) and Multimodal Analgesic Component for Postoperative Pain Management

Introduction and Purpose: I am Tia Zdych, a Student Registered Nurse Anesthetist (SRNA) from the University of Saint Francis in Fort Wayne, Indiana. With oversight from my doctoral project advisor Dr. Carolyn Yoder, I am implementing a quality improvement doctoral project providing education to anesthesia providers regarding the use of preemptive analgesic strategies in adult surgical patients undergoing elective laparoscopic abdominal urologic and gynecologic surgery. The purpose of this project is to evaluate anesthesia provider awareness, knowledge, and compliance rates with ordering preemptive analgesia and resulting measurable patient outcomes in these surgical populations following educational in-service. Your participation in this project will serve to potentially improve preemptive analgesic agent and facility/national organizational guideline knowledge base, ability to identify appropriate surgical population candidates, improve comfort in ordering and usage, and potentially improve patient-related postoperative pain outcomes.

Procedures: Prior to an educational presentation, a pre-survey will be provided to evaluate your current knowledge base regarding preemptive analgesic strategies, current facility/national organizational guidelines, comfort level, and personally identified facilitators and barriers to use. This pre-survey will take approximately ten minutes to complete. Following the survey, a thirty-minute educational in-service detailing preemptive analgesic usage with associated risks, benefits, and recommendations will be provided. Time will be given following the presentation for addressing questions, barriers and facilitators to use, and concerns. Following the in-service, an additional post-survey will be distributed to evaluate knowledge and comfort level pertaining to preemptive analgesia and its usage. This post-survey will take approximately five minutes to complete. The total participation time is 45 minutes. One- and two-months following education, a chart audit will be performed to assess overall facility anesthesia provider preemptive analgesic ordering compliance rates and associated patient outcomes (i.e. initial postoperative pain score, total narcotic doses, and time to discharge in PACU recovery phase). Provider-specific compliance information will not be collected via chart audit or reported. This follow-up data will be analyzed and distributed to anesthesia leadership and all participants within 60 days of second chart audit.

Potential Risks and Benefits: There are no identified risks to the anesthesia provider participating in this quality improvement project. The potential anesthesia provider benefits of this quality improvement project are increased knowledge and comfort regarding evidence and related benefits and risks of preemptive analgesic usage and improved identification of appropriate surgical populations in which preemptive analgesia can be utilized. A secondary potential anesthesia provider benefit is overall improved patient outcomes following administration of anesthesia. Open honest communication is encouraged and there will be no punitive action for voicing of personal opinions or beliefs. Only overall facility anesthesia

provider preemptive analgesic ordering compliance and patient outcomes will be collected via chart audit and evaluated. Anesthesia provider-specific compliance and patient outcomes will not be collected via chart audit or reported, and thus there is no risk of punitive action.

Safeguards and Confidentiality: Anesthesia provider confidentiality will be maintained via anonymity of surveys and chart audit data. Each survey is anonymous and will have no individual identification information in which the individual can be identified directly or indirectly (i.e. name, sex, age, provider type). Chart data collection will follow Health Insurance Probability and Accountability Act (HIPAA) guidelines and will not include any individual provider or patient-specific identifiable information. Chart review data will be collected by the project team leader and entered into a SPSS dataset for statistical analysis. The dataset will be stored on the password protected University of Saint Francis OneDrive and only accessible to the project team leader. Data encryption is not required as no identifiable information will be present in the dataset. The SPSS dataset will only be shared with project team members if needed for clarification purposes. Final project data will be reported in aggregate form and distributed to the Mercy Health Fairfield anesthesia leadership and staff and the University of Saint Francis doctoral faculty and students, and thus individual survey and chart information will remain confidential and nonidentifiable.

Freedom to Withdraw: Participation in this quality improvement project is voluntary, and you are free to withdraw participation at any time without penalty. A signed copy of this consent will be given to you.

Inquiries: Once the quality improvement project is complete, I would be glad to give the results to you. In the meantime, if you have any questions, please contact me at:

Tia Zdych
1777 East 105th Avenue
Crown Point, Indiana 46307
(219)508-1293
zdychtm@cougars.sf.edu

If you have any complaints about your treatment as a participant in this project, please call or write:

IRB Chairperson
University of Saint Francis
2701 Spring Street
Fort Wayne, Indiana 46808
(260)399-7700
Administration email: irb@sf.edu

I have received an explanation of this project and agree to participate. I understand that my participation in this project is strictly voluntary.

Name _____ Date _____

This quality improvement project has been approved by the University of Saint Francis' Institutional Review Board for the Protection of Human Subjects for a one-year period.

Appendix C

University of Saint Francis IRB Approval Form

University of Saint Francis
Institutional Review Board
Human Subjects Review Committee/ACUC/IBC
Institutional Review Board Approval Form

Protocol Number: 16004548728-HSRC

Review by (underline one): HSRC ACUC IBC

Date Reviewed: 10/12/2020
Principal Investigator: Tia Zdych
Faculty Advisor: Dr. Carolyn Yoder
Protocol Title: Preemptive analgesia an enhanced recovery after surgery (ERAS) and multimodal analgesic component for postoperative pain management
Study Site(s): Mercy Health Fairfield Hospital

Type of Proposal:
Original research
Replication or extension of previous research
Quality Improvement/Evidence-Based Practice Project

Items submitted for review:
☒CITI Certificate
☒Initial protocol
☒Abstract
☒Informed Consent Form (if applicable)
☒Approval letter from outside institution – Mercy Health Fairfield
☒Other – explain: pre/post survey, demographic survey, approval to modify and use published survey;

Type of Review:
☒Full Review
☐Expedited Review
☐Exempt Review

Approval:
☒Approval granted on 10/12/2020
☐Approval granted on _____ for a period of one year.
☐Conditional approval* granted on _____ for a period of one year.
☐Not approved*
☐IRB approval is not required:
☐Other

*Comments: _____

The committee performing this review is duly constituted and operates in accordance and compliance with local and federal regulations and guidelines.

Stephanie Oetting	*Stephanie Oetting*	10/12/2020
Printed Name (Chair or designee)	Signature	Date

IRB Committee Approval Form sjo 10/12/2020

Appendix D

CITI Program Certificate: Information Privacy Security (IPS)

CITI PROGRAM

Completion Date 25-Mar-2020
Expiration Date N/A
Record ID 34898997

This is to certify that:

Tia Zdych

Has completed the following CITI Program course:

Information Privacy Security (IPS) (Curriculum Group)
Researchers (Course Learner Group)
1 - Basic Course (Stage)

Under requirements set by:

University of Saint Francis

CITI
Collaborative Institutional Training Initiative

Verify at www.citiprogram.org/verify/?wb1891b3e-3516-4a04-8c3c-8e301a5cfd68-34898997

Appendix E

CITI Program Certificate: Public Health Research

CITI PROGRAM

Completion Date 25-Mar-2020
Expiration Date 25-Mar-2023
Record ID 34899000

This is to certify that:

Tia Zdych

Has completed the following CITI Program course:

Public Health Research (Curriculum Group)
Public Health Research (Course Learner Group)
1 - Basic (Stage)

Under requirements set by:

University of Saint Francis

CITI
Collaborative Institutional Training Initiative

Verify at www.citiprogram.org/verify/?wce355e18-3dec-4fbf-ac38-beee9de27edf-34899000

Appendix F

CITI Program Certificate: Social and Behavioral Responsible Conduct of Research

CITI PROGRAM

Completion Date 27-Mar-2020
Expiration Date 27-Mar-2023
Record ID 34898998

This is to certify that:

Tia Zdych

Has completed the following CITI Program course:

Not valid for renewal or certification through CME. Do not use for TransCelerate mutual recognition (see Completion Report).

Social and Behavioral Responsible Conduct of Research (Curriculum Group)
Social and Behavioral Responsible Conduct of Research (Course Learner Group)
1 - RCR (Stage)

Under requirements set by:

University of Saint Francis

Collaborative Institutional Training Initiative

Verify at www.citiprogram.org/verify/?w39ce3740-3bf9-4f92-9595-4dd6c48a2b54-34898998

Appendix G

CITI Program Certificate: Social & Behavioral Research – Basic/Refresher

Appendix H

CITI Program Certificate: Social and Behavioral Research Best Practices for Clinical Research

Appendix I

Letter of Support from Project Facility

August 31, 2020

To the University of Saint Francis Institutional Review Board:

This letter is being written in support of University of Saint Francis NAP/DNP Tia Zdych's Doctor of Nursing Practice Scholarly Project entitled Preemptive Analgesia: An Enhanced Recovery After Surgery (ERAS) and Multimodal Analgesic Component for Postoperative Pain Management. The anesthesia leadership at Mercy Health Fairfield supports the aims of the DNP Scholarly Project to:

- Increase anesthesia provider knowledge of preemptive analgesic recommendations, guidelines, and protocols
- Increase anesthesia provider preemptive analgesic ordering compliance prior to laparoscopic robotic gynecologic and urologic surgical procedures
- Evaluate associated postoperative pain outcomes as they relate to preemptive analgesic prescribing practices

The anesthesia leadership at Mercy Health Fairfield is committed to providing time for an educational presentation to anesthesia staff, allowing distribution of surveys to staff, and allowing access to electronic medical records for collection of project compliance and outcomes data. Mercy Health Fairfield does not require the DNP Scholarly Project to go through the hospital's institutional review board (IRB).

Please feel free to contact me with any questions regarding our support of this quality improvement project.

Sincerely,

Matt Toller MSN, RN, CRNA

Chief CRNA
Mercy Health Fairfield Hospital
(937)638-8706
matt.toller@northstaranesthesia.com

Appendix J

Demographic Survey

Demographic Questionnaire:

1. Age: _____

2. Gender: _____

3. Highest Level of Education (check one):

____ Master's of Science in Nursing (MSN)

____ Doctor of Nursing Practice (DNP)

____ Doctor of Philosophy (PhD)

____ Doctor of Medicine (M.D.)

____ Doctor of Osteopathic Medicine (D.O.)

4. Number of Years in Anesthesia Practice: _____

5. Number of Years Practicing at Mercy Health Fairfield: _____

6. Do you Routinely Order Preoperative Preemptive Analgesia for Robotic Surgical Procedures? (check one):

☐ Yes

☐ No

Appendix K

Pre- and Post-Intervention Survey

Preemptive Analgesia in Robotic Gynecologic and Urologic Surgery Survey

Amended with permission from Larson's (2004) Attitudes Regarding Practice Guidelines Instrument

Please rate the extent to which you agree or disagree with each of the following statements by checking one box for each question:	**Strongly disagree**	**Disagree**	**Somewhat disagree**	**Somewhat agree**	**Agree**	**Strongly agree**
1. I am familiar with Mercy Health Fairfield/Northstar Anesthesia's ERAS protocols for robotic gynecologic and urologic surgical procedures.	☐	☐	☐	☐	☐	☐
2. I am familiar with the preoperative preemptive analgesic medication recommendations in Mercy Health Fairfield/Northstar Anesthesia's ERAS protocols for robotic gynecologic and urologic surgical procedures.	☐	☐	☐	☐	☐	☐
3. I am familiar with the ERAS Society's preoperative preemptive analgesic guideline recommendations for patients undergoing gynecologic and urologic surgical procedures.	☐	☐	☐	☐	☐	☐
4. I am familiar with the American Pain Society's preoperative preemptive analgesic guideline recommendations for postoperative pain management.	☐	☐	☐	☐	☐	☐
5. I am knowledgeable of preoperative preemptive analgesic medications and their use to decrease postoperative pain.	☐	☐	☐	☐	☐	☐
6. I feel competent ordering preoperative preemptive analgesic medications for my patients.	☐	☐	☐	☐	☐	☐
7. If I follow ERAS guideline preemptive analgesic recommendations, it is likely that patient narcotic requirements will decrease.	☐	☐	☐	☐	☐	☐
8. If I follow the preemptive analgesic guideline recommendations, it is likely that patients' postoperative pain will decrease.	☐	☐	☐	☐	☐	☐
9. Conflicting evidence hinders my use of preemptive analgesic medications.	☐	☐	☐	☐	☐	☐
10. Guidelines and protocols help standardize care and improve patient outcomes.	☐	☐	☐	☐	☐	☐
11. Guidelines and protocols interfere with my personal autonomy and limit my practice.	☐	☐	☐	☐	☐	☐

The most important *factor* for me that did or would influence me to implement preemptive analgesic usage in patients undergoing robotic gynecologic and urologic surgery is:

The most important *barrier* for me to implementing preemptive analgesic usage in patients undergoing robotic gynecologic and urologic surgery is:

Appendix L

Larson's (2004) Attitudes Regarding Practice Guidelines Instrument

Attitudes Regarding Practice Guidelines

The purpose of this survey is to identify those factors that help or hinder clinicians to use practice guidelines.

My Profession: (1) Nursing ___ (2) Medicine ___ (3) Other (specify) ___

Score*	Part 1. Please rate the extent to which you agree or disagree with each of the following statements regarding clinical practice guidelines IN GENERAL	Strongly disagree	Disagree	Somewhat disagree	Somewhat agree	Agree	Strongly agree
+	1. I am familiar with the practice guidelines in my field.	☐	☐	☐	☐	☐	☐
–	2. There are so many guidelines available that it is nearly impossible to keep up.	☐	☐	☐	☐	☐	☐
+	3. In my field, I find practice guidelines readily available.	☐	☐	☐	☐	☐	☐
–	4. I don't have the time to stay informed about available guidelines.	☐	☐	☐	☐	☐	☐
–	5. Guidelines are too "cookbook" and prescriptive.	☐	☐	☐	☐	☐	☐
+	6. Practice guidelines are practical to use.	☐	☐	☐	☐	☐	☐
–	7. Generally, practice guidelines are cumbersome and inconvenient.	☐	☐	☐	☐	☐	☐
–	8. Guidelines are difficult to apply and adapt to my specific practice.	☐	☐	☐	☐	☐	☐
+	9. In this organization, practice guidelines are important.	☐	☐	☐	☐	☐	☐
+	10. Guidelines improve patient outcomes.	☐	☐	☐	☐	☐	☐
–	11. Generally, the costs of practice guidelines outweigh the benefits.	☐	☐	☐	☐	☐	☐
–	12. Guidelines interfere with my professional autonomy.	☐	☐	☐	☐	☐	☐
–	13. Generally, I would prefer to continue my routines and habits rather than to change based on practice guidelines.	☐	☐	☐	☐	☐	☐
–	14. I am not really expected to use guidelines in my practice setting.	☐	☐	☐	☐	☐	☐
–	15. Publishing practice guidelines increases the risk of malpractice liability.	☐	☐	☐	☐	☐	☐
+	16. Guidelines help to standardize care and assure that patients are treated in a consistent way.	☐	☐	☐	☐	☐	☐
+	17. In my practice setting, there is sufficient administrative support and resources to allow the implementation of practice guidelines.	☐	☐	☐	☐	☐	☐
+	18. Patients are generally aware of practice guidelines related to their condition	☐	☐	☐	☐	☐	☐
Score*	**Part 2. This section relates specifically to the CDC's Hand Hygiene Guideline published in 2002. Please rate the extent to which you agree or disagree with each of the following statements regarding the Hand Hygiene Guideline SPECIFICALLY.**						
	1. I am familiar with the Hand Hygiene Guideline and its recommendation. (*NOTE: If you are not familiar with this Guideline, skip to the last question, #22.*)	☐	☐	☐	☐	☐	☐
+	2. The Hand Hygiene Guideline is readily accessible if I want to refer to it.	☐	☐	☐	☐	☐	☐
+	3. If we follow the recommendations of the Guideline in our practice setting. It is likely that nosocomial infection rates will decrease.	☐	☐	☐	☐	☐	☐
–	4. If I follow the recommendations of the Guideline, it is likely that my hands will be in worse shape (e.g., drier, more skin damage).	☐	☐	☐	☐	☐	☐
–	5. The costs of the Hand Hygiene Guideline outweigh the benefits.	☐	☐	☐	☐	☐	☐
+	6. I have confidence that the developer of the Guideline is well qualified and knowledgeable about hand hygiene.	☐	☐	☐	☐	☐	☐
+	7. The recommendations of the Guideline are relevant to my patient population.	☐	☐	☐	☐	☐	☐
+	8. The person I report to expects me to use the Guideline.	☐	☐	☐	☐	☐	☐
+	9. The Guideline is based on sound scientific evidence.	☐	☐	☐	☐	☐	☐
–	10. It is not really practical to follow the Guideline recommendations.	☐	☐	☐	☐	☐	☐
–	11. I do not wish to change my hand hygiene practices, regardless of what the Guideline recommends.	☐	☐	☐	☐	☐	☐
+	12. I feel competent using alcohol hand products in accordance with the Guideline recommendations.	☐	☐	☐	☐	☐	☐
–	13. My patients prefer to see me do a traditional handwash.	☐	☐	☐	☐	☐	☐
–	14. There are other guidelines regarding hand hygiene that conflict with this one.	☐	☐	☐	☐	☐	☐
–	15. I don't have the time to use this Guideline.	☐	☐	☐	☐	☐	☐

Score*	Part 2. This section relates specifically to the CDC's Hand Hygiene Guideline published in 2002. Please rate the extent to which you agree or disagree with each of the following statements regarding the Hand Hygiene Guideline SPECIFICALLY.	Strongly disagree	Disagree	Somewhat disagree	Somewhat agree	Agree	Strongly agree
+	16. I have access to the necessary supplies and equipment to use the Guideline.	☐	☐	☐	☐	☐	☐
+	17. If I don't use the Guideline, I may be liable for malpractice.	☐	☐	☐	☐	☐	☐
–	18. The Guideline is cumbersome and inconvenient.	☐	☐	☐	☐	☐	☐
+	19. I personally have implemented the recommendations of the Hand Hygiene Guideline.	☐	☐	☐	☐	☐	☐
	20. For me, the most important *factor* that did or would influence me to implement the hand hygiene guideline is:						
	21. For me, the most important *barrier* to implementing the hand hygiene guideline is:						
	22. In your work setting, what percentage of the time do you use waterless alcohol-based products for hand hygiene?	___Never ___Rarely (<10% of time) ___Sometimes (10%-50% of time) ___Almost always (>90% of time)					

***Scoring:**

	Strongly disagree	Disagree	Somewhat disagree	Somewhat agree	Agree	Strongly agree
+	0	1	2	3	4	5
–	5	4	3	2	1	0

Appendix M

Authorization for Instrument Use

ZM

Zdych, Tia M
Sat 7/25/2020 7:59 PM
To: ELL23@columbia.edu

Good Evening Dr. Larson,

My name is Tia Zdych and I am a doctoral nursing student at the University of Saint Francis in Fort Wayne, Indiana. My DNP degree focus is in anesthesia for a future career as a nurse anesthetist. My doctoral project involves assessing anesthesia providers' knowledge, perceived barriers, and adherence to Enhanced Recovery After Surgery (ERAS) guidelines (specifically preemptive analgesic ordering practices) in surgical patients undergoing laparoscopic gynecologic and urologic surgical procedures. My aim is to address identified barriers through provider education to improve adherence to the guideline recommendations in order to improve patient-specific postoperative pain outcomes.

Through an exhaustive literature search, I discovered your instrument of Attitudes Regarding Practice Guidelines to assess provider barriers to adherence to CDC recommended hand hygiene guidelines. This tool aligns with the aims and proposed outcomes of my project. With your permission, I would be grateful and honored to modify and utilize your tool to fit the aims and outcomes of my project.

Thank you for your consideration of the modification and use of your instrument.

Kind regards,

Tia Zdych BSN, RN, SRNA
University of Saint Francis
zdyctm@cougars.sf.edu
(219)508-1293

LL

Larson, Elaine L. <ell23@cumc.columbia.edu>
Sun 7/26/2020 7:00 AM
To: Zdych, Tia M

WARNING: This email originated from outside of USF. Do **NOT** click links or attachments unless you recognize the sender and know the content is safe.

Of course. Do you have a copy from the publication?

Elaine Larson
Ell23@columbia.edu

Appendix N

Force Field Analysis

Forces		
Driving Forces (For)	**Restraining Forces (Against)**	**Action to be Taken**
Experienced clinical leaders dedicated to EBP and quality care delivery		Maintain frequent (biweekly at minimum) e-mail and telephone communication regarding project progress, planning, and EBP findings. Seek advice/guidance when needed.
Mentorship from anesthesia leadership and doctorally prepared CRNAs		Maintain frequent open dialogue (biweekly at minimum) regarding project progression for professional advice and guidance.
Magnet recognition with shared governance leadership structure and focus on quality improvement, EBP, and staff engagement		Involve anesthesia and OR department staff in project decision making. Potentially form QI team involving anesthesia, preop, and PACU staff to increase engagement and interest in project. Utilize project as an initiative beneficial for Magnet recertification.
Prior successful anesthesia department attempts at quality improvement initiatives (examples: expansion of robotic surgical program, ERAS program implementation with improved patient outcomes)		Form connections with individuals involved in prior QI initiatives. Utilize these resources to discuss project progression for professional advice, guidance, and facility navigation.
Advanced technology, infrastructure, and financial stability		Assess physical resources (access to medications, location, preoperative staff to patient ratios) to determine feasibility of project and potential barriers. Speak with

		preop and anesthesia management to determine necessary project resources and availability.
No incurred facility cost with potential for measurable quality care patient outcome improvements, reduction in overall patient care cost, and improved patient satisfaction		Budget neutral and potential positive outcomes as a motivating factor and beneficial force for project implementation when discussing project with leadership and management.
	Large organizational network with potential for decreased project priority	Frequent organizational contact/mentor communication (minimum biweekly) to maintain open dialogue regarding project importance, needs, progress, and timeline.
	ERAS protocol in infancy and not up to date with current guideline recommendations	Present literature review and EBP guidelines for current ERAS and preemptive analgesic recommendations to anesthesia leadership. Promote dialogue, answer any questions, and provide articles supporting need for guideline change.
	Preoperative and PACU provider knowledge deficits regarding ERAS protocols and preemptive analgesic usage	Educational inservice during monthly staff meeting reviewing purpose, supporting literature, and recommendations with open dialogue regarding questions, concerns, and perceived barriers.
	Potential resistance from anesthesia staff and surgeons Negative project perceptions and/or personal beliefs	Educational inservice during monthly staff meeting reviewing purpose, supporting literature, and recommendations with open dialogue regarding questions, concerns, and perceived barriers.
	Timeline limitations/delay in project implementation	Maintain continual dialogue with anesthesia

		leadership/mentors to ensure timeline coincides with department schedule. Develop a timeline and implementation plan. Involve anesthesia leadership in timeline planning to ensure schedules and implementation expectations align.
	Emerging concepts with inconsistencies in supporting evidence	Continual review of evidence-based research studies, journal articles, professional organization recommendations, etc. for up to date guidelines. Frequent communication of findings to anesthesia leadership team/mentors. Update literature review as emerging evidence is published. Educational inservice during monthly staff meeting to present current EBP and open dialogue to questions, concerns, and barriers to use.

Tables

Table 1

Project Aims, Outcome Indicators, and Associated Measures

Aim 1: Increase anesthesia provider knowledge in preemptive analgesic ordering practices.
Outcome/Indicator 1a: Following project intervention, anesthesia provider self-report of knowledge of preemptive analgesic protocols/guidelines will increase by an average of 30%.
Outcome/Indicator 1b: Following project intervention, anesthesia provider awareness of national organization and facility preemptive analgesic protocols will increase by an average of 30%.

Aim 2: Increase anesthesia provider preemptive analgesic ordering compliance prior to laparoscopic robotic gynecologic and urologic surgical procedures.
Outcome/Indicator 2a: One month following project intervention, anesthesia provider preemptive analgesic ordering compliance in patients undergoing laparoscopic robotic gynecologic and urologic surgical procedures will increase to 60%.
Outcome/Indicator 2b: Two months following project intervention, anesthesia provider preemptive analgesic ordering compliance in patients undergoing laparoscopic robotic gynecologic and urologic surgical procedures will increase to 75%.

Aim 3: Improve patient associated postoperative pain outcomes as they relate to preemptive analgesic prescribing practices.
Outcome/Indicator 3a: Two months following project intervention, average PACU postoperative narcotic use in patients undergoing laparoscopic gynecologic and urologic surgical procedures will decrease by 15%.
Outcome/Indicator 3b: Two months following project intervention, average initial PACU postoperative pain scores in patients undergoing laparoscopic robotic gynecologic and urologic surgical procedures will decrease by 15%.
Outcome/Indicator 3c: Two months following project intervention, PACU time to discharge will decrease by an average of 10 minutes in patients undergoing laparoscopic robotic gynecologic and urologic surgical procedures.

Table 2

Pre/Post-Intervention Survey Data Analysis

Question 1: I am familiar with Mercy Health Fairfield/NorthStar Anesthesia's ERAS protocols for robotic gynecologic and urologic surgical procedures (Aim 1, Outcome/Indicator 1b).
Average Pre-Intervention Response: 5.333 (Agree)
Average Post-Intervention Response: 5.538 (Agree to Strongly Agree)
Average Percent Change in Response: 3.8% increase in familiarity

Question 2: I am familiar with the preoperative preemptive analgesic medication recommendations in Mercy Health Fairfield/NorthStar Anesthesia's ERAS protocols for robotic gynecologic and urologic surgical procedures (Aim 1, Outcome/Indicator 1b).
Average Pre-Intervention Response: 5.273 (Agree)
Average Post-Intervention Response: 5.538 (Agree to Strongly Agree)
Average Percent Change in Response: 5.0% increase in familiarity

Question 3: I am familiar with the ERAS Society's preoperative preemptive analgesic guideline recommendations for patients undergoing gynecologic and urologic surgical procedures (Aim 1, Outcome/Indicator 1b).
Average Pre-Intervention Response: 4.818 (Somewhat Agree to Agree)
Average Post-Intervention Response: 5.462 (Agree)
Average Percent Change in Response: 13.4% increase in familiarity

Question 4: I am familiar with the American Pain Society's preoperative preemptive analgesic guideline recommendations for postoperative pain management (Aim 1, Outcome/Indicator 1b).
Average Pre-Intervention Response: 4.455 (Somewhat Agree)
Average Post-Intervention Response: 5.231 (Agree)
Average Percent Change in Response: 17.4% increase in familiarity

Question 5: I am knowledgeable of preoperative preemptive analgesic medications and their use to decrease postoperative pain (Aim 1, Outcome/Indicator 1a).
Average Pre-Intervention Response: 5 (Agree)
Average Post-Intervention Response: 5.308 (Agree)
Average Percent Change in Response: 6.2% increase in knowledge

Question 6: I feel competent ordering preoperative preemptive analgesic medications for my patient.
Average Pre-Intervention Response: 4.545 (Somewhat Agree to Agree)
Average Post-Intervention Response: 5.308 (Agree)
Average Percent Change in Response: 16.8% increase in competency

Question 7: If I follow ERAS guideline preemptive analgesic recommendations, it is likely that patient narcotic requirements will decrease (Aim 1, Outcome/Indicator 1a).
Average Pre-Intervention Response: 5.273 (Agree)
Average Post-Intervention Response: 5.615 (Agree to Strongly Agree)
Average Percent Change in Response: 6.5% increase

Question 8: If I follow the preemptive analgesic guideline recommendations, it is likely that patients' postoperative pain will decrease (Aim 1, Outcome/Indicator 1a).
Average Pre-Intervention Response: 5.273 (Agree)
Average Post-Intervention Response: 5.615 (Agree to Strongly Agree)
Average Percent Change in Response: 6.5% increase

Question 9: Conflicting evidence hinders my use of preemptive analgesic medications.
Average Pre-Intervention Response: 2.455 (Disagree)
Average Post-Intervention Response: 2.615 (Disagree to Somewhat Disagree)
Average Percent Change in Response: 6.5% increase

Question 10: Guidelines and protocols help standardize care and improve patient outcomes.
Average Pre-Intervention Response: 5.727 (Agree to Strongly Agree)
Average Post-Intervention Response: 5.769 (Agree to Strongly Agree)
Average Percent Change in Response: 0.7% increase

Question 11: Guidelines and protocols interfere with my personal autonomy and limit my practice.
Average Pre-Intervention Response: 2.364 (Disagree)
Average Post-Intervention Response: 2.538 (Disagree to Somewhat Disagree)
Average Percent Change in Response: 7.4% increase

Table 3

Pre/Post-Intervention Chart Audit Data Analysis

Indicator: Preemptive analgesic ordering compliance (Primary PICOT, Aim 2, Outcome/Indicator 2a and 2b)
Pre-Intervention Compliance Rate: 44%
Post-Intervention Compliance Rate at One Month: 73%
Post-Intervention Compliance Rate at Two Months: 71%

Pain-Related Outcome Indictor: Total PACU Narcotic Doses (Secondary PICOT, Aim 3, Outcome/Indicator 3a)
Average Pre-Intervention Total PACU Narcotic Doses: 1.99
Average Post-Intervention Total PACU Narcotic Doses: 1.97
Average Percent Change in Total PACU Narcotic Doses: 1% decrease post-intervention

Pain-Related Outcome Indictor: Initial PACU pain score (Secondary PICOT, Aim 3, Outcome/Indicator 3b)
Average Pre-Intervention Initial PACU Pain Score: 5.035
Average Post-Intervention Initial PACU Pain Score: 5.419
Average Percent Change in Initial PACU Pain Score: 7.63% increase in initial PACU pain score post-intervention

Pain-Related Outcome Indictor: PACU time to discharge in minutes (Secondary PICOT, Aim 3, Outcome/Indicator 3c)
Average Pre-Intervention PACU Time to Discharge: 96.28 minutes
Average Post-Intervention PACU Time to Discharge: 90.91 minutes
Change in Average PACU Time to Discharge: 5.37 minutes decrease post-intervention

Figures

Figure 1

Project Expenses and Potential Benefit/Loss

DNP Project Budget

Legend: Direct Costs; Indirect Costs; In-Kind Costs

Project Expenses				
Salaries and Wages	**Description**	**Year 1**	**Year 2**	**Total**
DNP Project Manager	DNP Student Leading Project	0	0	0
Anesthesia Department Manager (Anesthesic	6 One Hour Meetings @ $178/hr	1,068	0	1,068
Anesthesia Department Manager (CRNA)	6 One Hour Meetings @ $78/hr	468	0	468
Anesthesia Department Staff (CRNA & Anesth	30 Minute Educational Inservice at Manda	0	0	0
				0
Total Salary Costs		1536	0	1,536
Startup Costs	**Description**	**Year 1**	**Year 2**	**Total**
Prospective Chart Audit	Prospective Chart Audit Performed by Pro	0	0	0
Educational Presentation	Power Point Presentation Developed by P	0	0	0
Pre-post Survey	Pre-post Survey and Statistical Analysis Pe	0	0	0
Retrospective Chart Audit	Retrospective Chart Audit Peformed by Pr	0	0	0
Chart Audit Statistical Analysis	Performed by Project Manager X2	0	0	0
				0
Total Start Up Costs		0	0	0
Supplies and Materials	**Description**	**Year 1**	**Year 2**	**Total**
Educational Handouts	30 Handouts Donated	0	0	0
PowerPoint Presentation	Power Point Presentation Developed by P	0	0	0
Equipment for Presentation	Computer and Projector for Presentation	0	0	0
Presentation Location	Location for Educational Presentation	0	0	0
SPSS Program	Used for Statistical Analysis of Chart Audit	69	0	0
Total Supplies and Materials		69	0	69
Capital Costs (costs >2,000)	**Description**	**Year 1**	**Year 2**	**Total**
None	N/A	0	0	0
				0
				0
Total Capital Costs		0	0	0
Total Expenses		1605	0	1,605
Project Revenue	**Description**	**Year 1**	**Year 2**	**Total**
Reduced Length of Stay	1 Day X 1,000 Cases per year	0	0	0
Reduced Intraoperative Fentanyl Dosing	1 Vial Fentanyl X 1,000 Cases/Year	600	600	1200
Reduced Intraoperative Morphine Dosing	1 Vial Morphine X 1,000 Cases/Year	1320	1320	2640
Reduced Intraoperative Dilaudid Dosing	1 Vial Dialudid X 1,000 Cases/Year	640	640	1280
				0
Total Project Revenue		2560	2560	5120
Project Benefit/Loss				
Total Revenue		2560	2560	5,120
Less Expenses		1605	0	1,605
Total Project Benefit/Loss		955	2560	3,515