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Healthcare Practitioner Education, Implementation of Clinical Guidelines, and Narcotic

Use in the Surgical Patient

Rebekah O. Filson

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Abstract

Background: The prevalence of opioid abuse in the United States is high and associated with a surge in mental illness, emergency department visits, hospitalizations, readmissions after discharge, and unintended overdose deaths. Previous research identifies orthopedics as a significant contributor to the crisis, most notably total knee replacements. Inconsistencies with provider education throughout the US may be contributing to the opioid epidemic.

Objective: To explore the correlation between provider knowledge and decreased patient-reported use of opioids and to determine knowledge gaps for development of provider education.

Clinical Question: Does increased provider knowledge decrease patient-reported use of opioids?

Method: A retrospective, cross-sectional descriptive design was used for this quality improvement project. Lewin's Theory of Change was used to guide the implementation. Use of the KnowPain-12 survey to assess provider knowledge. Patient-reported opioid use completed via FORCE-Therapeutics.

Results: Ten providers participated in the project. One hundred percent identified as male, 80% were above the age of 45 years of age, 50% practiced as an orthopedic surgeon for more than 20 years, and 80% stated they received, participated, or taught pain medication education in the previous five years. A total of 1482 patient records were reviewed. Records were separated into two groups: total hip and total knee surgical replacements, there was no significant difference between laterality of procedure, age, or sex between the patient groups. Higher provider knowledge was moderately positively

correlated (0.56) with overall opioid consumption postoperative week zero through six in total knee arthroplasty patients and weakly positively correlated (0.24) in total hip arthroplasty. However, at various time points throughout postoperative day zero through six, opioid consumption was negatively correlated with provider knowledge. Additional findings indicate higher provider knowledge was negatively correlated with NSAIDs, anti-inflammatories, and VAS pain.

Conclusion: Overall, the results did not confirm a clear consistent correlation between patient-reported opioid use and provider-specific knowledge. Further research is recommended with a larger sample size or providers and patients.

Keywords: Care, Preoperative*, Preoperative provider education, opioid crisis

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Healthcare Practitioner Education, Implementation of Clinical Guidelines, and Narcotic Use in the Surgical Patient

Background/Significance

The estimated costs of the opioids crisis in 2015 were almost \$504 billion (The White House, 2017). Nearly 120 people died every day from an illness related to opioids in 2016 (Kahn et al., 2019). Provider education is a critical factor in addressing the growing issues related to the opioid crisis (Seymour et al., 2017). The United States Food and Drug Administration (USFDA) established a partnership of collaborating experts to create and execute new prescribing practices and awareness to address the opioid crisis (Kahn et al., 2019).

Numerous unintended consequences of opioid addiction extend the immediate surgical recovery period (Klueh et al., 2018). Economic costs include postoperative care and subsequent management of opioid dependence and lost wages from missed employment (Hah et al., 2017). Opioid consumption and dependency are independent risk factors for readmission and return to postoperative patients' operating room (Hah et al., 2017).

One of the most effective ways to prevent unintended deaths due to an overdose is with the medication naloxone. Abuse of prescription medications continues to increase and is correlated directly with the cost of naloxone. A recommendation for providers was to discharge patients with a prescription for naloxone in addition to any narcotic/opioids. According to the Substance Abuse Research of Alliance (SARA), Georgia Prevention Project (2016), the increase of opioid and synthetic drug abuse resulted in a \$40.08 per dose increase in 10 years (Langford & Wrenn, 2016).

Problem Statement

The economic impact of prescription-related overdoses in the United States reached almost \$80 billion annually (Hah et al., 2017). Georgia has experienced increased opioid use since 2010, rising over 200% (Georgia Department of Health [GDH], n.d). The result has been a surge in people with mental illness, emergency department visits, hospitalizations, readmissions after discharge, and unintended overdose deaths (GDH, n.d.). Georgia ranks 11th in the nation for states with the most prescription opioid overdose deaths (Langford & Wren, 2016). The highest number of deaths are reported in urban areas (GDH, n.d.). Past reporting has shown orthopedics has been one of the most significant contributors to opioid prescriptions, most notably from total knee replacements (Trasolini et al., 2018).

The opioid epidemic is considered a national emergency. Unfortunately, it is a consistent problem expanding numerous years in various forms (Langford & Wren, 2016). Beyond the immediate post-operative risks of addiction, there is also an economic cost, including surgery and postoperative care, subsequent costs of dependence, and lost wages from missed employment (Hah et al., 2017). Increased drug-related emergency room visits in rural and urban areas are related to opioid use and abuse (GDH, n.d.). Traditionally, total joint replacements were commonplace surgical procedures to have multiple narcotic pain medications ordered in the perioperative and postoperative period (Bicket et al., 2017; Halawi & Lieberman, 2018).

A literature search was completed reviewing practitioner education and prescribing opioids. There is an increase in preoperative and intraoperative opioid use and abuse of opioids (Zhao & Davis, 2019). A focused approach using a multimodal analgesia pathway (MMAPs) led to decreased narcotics perioperatively with provider practices (Ibrahim et al., 2013). The use of

medications postoperatively using the MMAPs protocol should assist with a correlating decrease of patient-reported narcotics consumption.

Clinical Question

The Clinical Question for this DNP project is: Does increased provider knowledge decrease patient-reported use of narcotics? The proposed clinical project aimed to determine if increased provider education resulted in increased provider knowledge, the creation of clinical guidelines, alternative pain management strategies, and decreased patient-reported use of narcotics?

Purpose of the Project

Orthopedics has been at the forefront of surgical methodologies and procedures. As with other service lines, orthopedics has been less attentive to opioids/narcotics long-term effects relative to pain management (Trasolini et al., 2018). The current pain medication recommendations with total joint replacements vary by prescribing physicians and regions (Boylan et al., 2018). The project's goal was to determine if a negative correlation was found between the provider knowledge assessment and patient-reported use of pain medications. A negative correlation using the Pearson's correlation coefficient methodology would show increased provider knowledge correlated with decreased patient reported opioids. Additional areas of interest investigated a possible correlation of the same provider group and patient-reported use of acetaminophen and non-steroidal anti-inflammatory drugs (NSAIDs).

Literature Review

Search Strategy

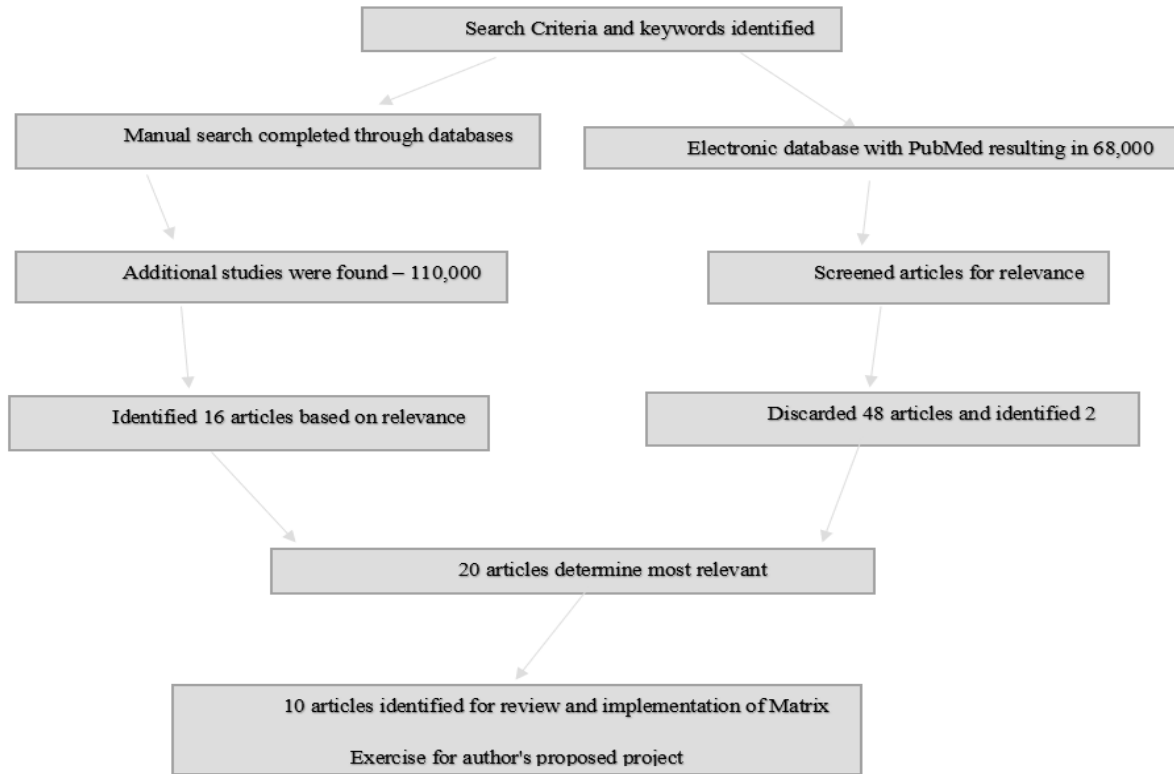
The literature search was accomplished using the following databases: CINAHL, Medline, PubMed, Academic Search Complete, Cochrane Database Review, and the Advisory Board. Supplementary searches were completed using reference lists of articles found. The search terms used by the author included: Opioids, Preoperative Provider Education, Decrease Narcotics, Opioid Crisis, Preoperative Education with Algorithms, Care, Preoperative*, Abuse, Narcotic*, Care, Preoperative*, Arthroplasty, Replacement* and Arthroplasty, Replacement, Hip/ED*.

The SI used the search terms individually and distinctly to find the most interesting articles and determined to be appropriate to the subject material. When using the PubMed Medical Subject Headings (MeSH), criteria, full-text link, academic essays, primary English language, or a translated English version and primary research studies and timeframe 2007 – 2020, a span of 13 years. Total joint replacement patients are most commonly above 18 years of age; no age limit was applied to the search criteria. Additional reviews were found using the references of articles that were of initial interest. See Table 1 that characterizes the critical search terms, including MeSH, search engines, databases, and other sources used to complete a literature search and review.

Search Results

A total of ten articles were selected related to the project, clinical question, multidisciplinary team, importance of the electronic health record (EHR), and provider education. The exclusion of studies that did not emphasize the orthopedic population, specifically total joint replacement surgery, did not apply to the clinical question and research in other countries with implications specific to the area. The opioid crisis is a recent phenomenon that has not been tested extensively in orthopedic practice.

Figure 1



The grading of recommendations, assessments, development, and evaluations (GRADE) is used as a criterion to appraise the research articles and studies. This approach was a popular evaluation tool for literature reviews (Goldet & Howick, 2013). GRADE methodology is unique in the three-prong approach utilized to appraise the literature. The "quality and whether or not to recommend" is measured, a review of each outcome for quality, and the fulfillment of standards, based on this approach evaluation of the studies was completed (Goldet & Howick, 2013, pp. 50-51).

GRADE scoring is a consistent process to assess literature and studies. The research evaluated by this process measures evidence, population, outcomes, perceived or real bias with

the analysis (Holger et al., 2013). This methodology considered the evidence and additional rationale to determine the scoring. Randomized control trials (RCT) are chosen as the highest level of studies. Study findings can be adjusted considering the study's power based on confidence levels while balancing risk versus benefits with patient outcomes (Goldet & Howick, 2013). GRADE criteria apply a metric to determine if the evidence's quality is high, moderate, low, or very low based on evidence confidence. (Holger et al., 2013). The trust level can be subjective based on the author's ability to convince the audience. The research's actual grade can be increased or decreased based on any partiality in the review (Holger et al., 2013).

Figure 2 is an example of the stepwise approach from *Understanding GRADE: An Introduction*, which is used to determine the level of evidence, the quality assigned, and finally, the recommendations for use.

Figure 2

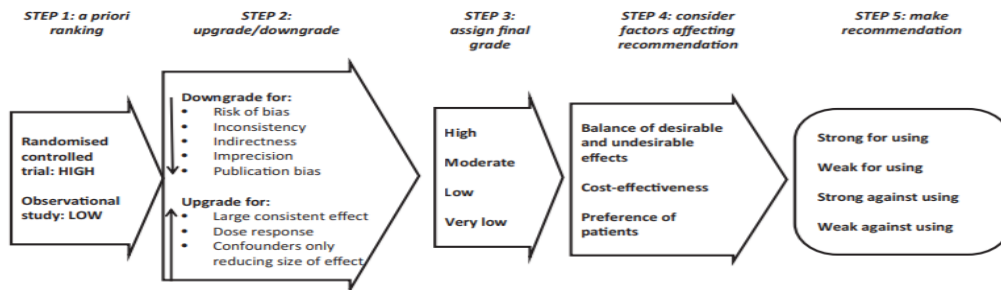


Figure 1 How GRADE is used to make recommendations; steps 1 to 3 are repeated for each critical outcome.

Reprinted from *"Understanding GRADE: An Introduction"* (Goldet & Howick, 2013 p.52).

Each article was evaluated utilizing the Nursing Evidence Hierarchy. A review of this hierarchal evidence ranking was critical. A practitioner should not use just one item to recommend practice changes or enhancements. Multiple ways to rank evidence were applied (Schmidt & Brown, 2019). There are seven levels to the hierarchal evidence rankings ascending

from tier seven to one. The following is a descending list of the importance of the nursing evidence hierarchy (Schmidt & Brown, p.409, Figure 15-1). Level one are meta-analysis', systematic review of random controlled trials (RCTs) and clinical practice guidelines. Level two studies are randomized control trials, level three are RCTs with randomization (quasi-experimental). Cohort and case-controlled studies are level four studies. Level five are systematic reviews of descriptive and qualitative studies, also known as meta-synthesis. Single descriptive and qualitative studies, case series, or case reports are considered level six. Finally, level seven are expert opinions or traditional literature reviews (Schmidt & Brown, p.409). This literature review included qualitative, quantitative, meta-analysis, expert advice, literature review, randomized control trials, experimental, and quasi-experimental.

Table 1

Search Strategy

Search Criteria	Key Words
Key Search Terms Used	Medical Subject Headings (MeSH) terms were obtained from PubMed (EBSCO), resulting in the following keywords: Care, Preoperative*, Abuse, Narcotic*, Care, Preoperative*, Arthroplasty, Replacement* and Arthroplasty, Replacement, Hip/ED*
Years/Language	12 years/English/Full-Text link
Search Engines	Google
Databases	PubMed, CINAHL, Cochrane Review, Medline, Academic Search Complete, Advisory Board
Government and Regulatory Agencies	Advisory Board (www.advisoryboard.com)

Other Bibliographies

Table 2

Database and Key Terms

Database	Search Terms	Results (Number & Type of Studies Located)	Dates Searched
CINHAL	Opioids, Preoperative Provider Education, Decrease Narcotics, Opioid Crisis, Preoperative Education with Algorithms	Seven articles accepted Level II: 3 Level III:1 Level V: 1	10-10-19 – 10-19-2019
PubMed/MedLine	Care, Preoperative*, Abuse, Narcotic*, Care, Preoperative*, Arthroplasty, Replacement* and Arthroplasty, Replacement, Hip/ED*	article accepted Level IV: 1	10-10-19 – 10-19-2019
Academic Search Complete	Opioids, Preoperative Provider Education, Decrease Narcotics, Opioid Crisis, Preoperative Education AND Algorithms	Two articles accepted. Level II: 1 Level IV: 1	10-10-2019 – 10-19-2019
Advisory Board	Provider Education Total Joint Replacement	0 article accepted	10-12-2019 – 10-19-2019
Cochrane Database Review	Education, Abuse, Narcotic* Reference list from other articles	Two articles accepted Level I: 2	10-20-2019

Review and synthesis of the literature

Research regarding opioid prescription reduction strategies increased in the past years due to the opioid crisis focused on perioperative patients. The literature review considered the contributing areas of the opioid issue from a total joint replacement concentration. These issues include pain management plan options, the pharmacy team members' assistance, drug monitoring programs, electronic reporting and engagement, and pain management options during the intraoperative period.

Provider Education

Provider knowledge is crucial to address the opioid crisis through patient education and appropriate prescribing (Schnell & Currie, 2016). Provider education is inconsistent and varied nationally and internationally (Boylan et al., 2018). Georgia ranks 11th in the nation for states with the most prescription opioid overdose deaths (Langford & Wren, 2016). The first article was a level III high-quality qualitative study (Boylan, 2018). An essential area evaluated project was the current state (Boylan, 2018). Healthcare is moving towards a bundled payment, quality-driven reimbursement model. This trend seems to be incredibly impactful with the surgical populations due to the wide variation of protocols and approaches. Pain management is no different. The study reviewed practitioner habits regarding pain management prescriptions throughout all orthopedics. There was considerable variation noted within each specialty and region. An essential factor to consider is a lack of formal education for surgeons or general providers. Without training, there is no standard expectation regarding narcotic prescriptions, and extreme variation in practice contributes to the opioid epidemic.

The second article, a quasi-experimental study, focused on a program that incorporated provider education at no cost to the provider. An organized approach to education for providers

is shown to be effective. The study is of high quality and demonstrated an educational approach improved knowledge, attitudes, and confidence with safer opioid prescribing (Kahn et al., 2019). Further research and more flexible options for this type of education are needed.

The third article evaluated a structured and methodical strategy to support recommendations for decreasing opioids prescriptions (Kee et al., 2016). This research was an expert opinion and review of the literature and evidence-based tools. An analysis of the study and the possibility of devices led the authors to conclude there was no current clear framework for opioid prescribing or timeframe postoperatively. Many surgeons prescribed medications extending to 12 months postoperatively. The review's recommendations were to decrease the deadline to three months postoperatively or initiate a consult with a pain specialist. They were implementing a drug monitoring program so all providers would know all medications that were currently on the patient's profile. Educate the provider, so they are equipped to inform the patient regarding the unanticipated adverse outcomes with opioids after surgery (Kee et al., 2016).

The fourth article was a meta-analysis that resulted in a literature review due to limitations (Lovecchio et al., 2017). Although classified as a literature review, it is a high-quality study. This article highlighted the wide variation in pain medication prescribing and recommendations. The authors reviewed and exposed the historical approach with orthopedics to proactively prescribe and encourage opioid medications. Another area evaluated was the need to continue the multimodal analgesia approach to the post-discharge period. Recommendations were made to establish a process to monitor (preferably electronically) medications currently ordered and refilled by the patients. These recommendations would help determine a patient's unique or naive experience with opioids (Lovecchio et al., 2017). The authors identified the

need for more research in this area. This article was of note due to similar findings in a previous study regarding the need for monitoring of communication of prescriptions (Kee et al., 2016).

The final article is a literature review with expert opinion and is considered a good quality study. This study focused on provider education for alternative pain management methods. The proposed solutions recommended an electronic medical record for prescription drug monitoring support (Seymour et al., 2017). The conclusion was orthopedics should take the lead to reverse the opioid crisis. Surgeons should collaborate with state and national agencies to utilize protocols to decrease opioid usage and increase alternative options (Seymour et al., 2017).

Multidisciplinary Team

The FDA established a partnership of collaborating experts to create and execute new prescribing practices in 2019 (The White House, 2015). A multidisciplinary team facilitates access and collaboration of every aspect of patient care delivery (Chisholm-Burns et al., 2019; Hanna et al., 2019). Patients benefit from multiple specialties and teamwork when a multidisciplinary team approach is incorporated (Chisholm-Burns et al., 2019). Chisholm-Burns et al. (2019) research study emphasized the importance relative to interdisciplinary team inclusion. Noteworthy is the integration of pharmacists to reduce the impact of the opioid crisis as part of the healthcare team. This study is considered high-quality. Pharmacists are prepared and should be involved with decision-making and risk assessment/education with patients. Pharmacy involvement in conjunction with a team approach results in decreased opioid prescriptions (Chisholm-Burns et al., 2019). Hanna et al. (2019) emphasized the impact of the multidisciplinary team on pain management. The hospital involved with this quasi-experimental study utilizes a one-system model with established referral systems and a mature center for perioperative optimization. This program identifies complicated patients through their entire

surgical journey. The results might be confounding compared to a newer program without an established multidisciplinary team (Hanna et al., 2019).

Specific Medication Approaches

Three additional reference studies are emphasizing the importance of medication utilization and preparedness of the surgical patient. An initial article documents an approach design to decrease postoperative pain but showed no differences in long-term management or patient satisfaction (Lasse et al., 2007). The study was a double-blinded placebo-controlled trial medication study, randomized into two groups. The question posed whether using a periarticular injection using non-steroidal medications, muscle relaxers, and steroids makes a difference in long-term pain management. A medication cocktail was administered postoperatively immediately and then through a catheter for 24 hours postoperatively. Evidence-based tools were used to evaluate the studies. This study determined a short-term difference in pain management, joint stiffness, and patient satisfaction, although no long-term difference was noted (Lasse et al., 2007).

Another study, which was triple blinded, documented the use of duloxetine in a periarticular injection along with oral medication applying the MMAP protocol. (YaDeu et al., 2016). The authors hypothesized that using this medication in a periarticular injection would decrease pain at a two-week timeframe. This medicine-specific approach shows duloxetine did not reduce pain during ambulation, rest, or flexion compared to the control group. The results reviewed the pain score on day 14 with ambulation. There was no difference noted in pain management during the three critical areas investigated (YaDeu et al., 2016).

Preoperative education

Total hip and knee replacement programs discussed the importance of completed preoperative joint education. A meta-analysis of data within the Cochrane central register of controlled trials showed no clear evidence that preoperative education offers benefits over regular or usual care (McDonald et al., 2014). Preoperative education is emphasized as a critical step to prevent complications and readmissions. The study showed no correlation between preoperative education and positive outcomes; this highlights the importance of literature reviews.

Implications to practice

Strategies to reduce opioids reduction are a complicated path. The application of medications perioperatively, a multidisciplinary approach, and provider education are among the cornerstones for success. A review of aspects of the methodology for opioid reduction reveals there is not currently enough evidence. Orthopedics has a unique opportunity to transform the paradigm (Boylan et al., 2018; Seymour et al., 2017; Trasolini et al., 2018). The next step to assist with the opioid crisis was to identify patients at increased risk for abuse or misuse of pain medications (Riddle et al., 2010.; Sullivan et al., 2009). The Joint Commission (TJC) has increased its awareness of the next steps in the opioid crisis (Kahn et al., 2019).

Conceptual Framework

Lewin's Theory of Planned Change (LTPC) is a valuable change theory for the proposed DNP project. Lewin's TPC has three main stages: unfreezing, change or movement, and refreezing (Shirey, 2013). The proposed clinical project determines if increased provider education, improved knowledge, the creation of clinical guidelines, and alternative pain

management strategies decreased the consumption of opioid narcotics in the surgical total joint population (Schnell & Currie, 2018).

Lewin's model for change is appropriate for the proposed DNP project. LTFC incorporates a multifaceted yet straightforward approach to change management. An important pre-step to implementing Lewin's theory would be to use the force field analysis (FFA) theory to determine the rationale the team incorporates with the current postoperative pain management method. Lewin utilized FFA to explain the aspects of an environment that chose any situation (Shirey, 2013).

Conceptual/Theoretical Framework: Overall

Stages of Lewin's Theory of Planned Change

The first step of Lewin's theory planned change (LTFC) model was unfreezing and applied to assess the current environment and needed transformation (Shirey, 2013). This first step considered vital stakeholders and team members who support or challenge the project (Kritsons, 2005; Shirey 2013). The change agent must learn how to establish relationships, earn trust, and show the value of change (Kritsons, 2005).

Lewin's second step, change, focuses on determining the execution of the "plan of action" (Shirey, 2013). The project's change stage will be multifaceted as it requires communication with team members to aid in calming any fears or doubts that arise due to proposed changes. Implementation of the plan requires preparation, education, buy-in, support, tracking, analysis, and feedback to participants in the proposed amendment. Apprehension is natural with the implementation of changes to practices and procedures which have been in place for many years. An explanation of the change's value needs to occur with the team members regarding how it improved and streamlined workflow and positively impacted patient care (Kritsons, 2005).

The third and final stage, refreezing, is the essential final stage of the theory. Refreezing should be the permanent structure to formalize the process or project as the new normal for the team. Implementing this aspect should make it a new part of the philosophy of the care of the population. The change theory's refreezing element is necessary to guarantee the change is maintainable and permanent (Shirey, 2013). This stage's vital aspect is to support the team members to ensure they do not regress into previous patterns and habits. A hands-on approach is often helpful to identify barriers the team might feel impedes the change's permanency. Although it is vital to highlight this is the new normal, there should be an openness to change with any innovative evidence in the future.

Many change projects fail without the implementation of this type of stepwise approach. Assumptions are made; teams accept and readily implement a change in the healthcare environment simply because leadership has determined it needs to happen. Over time these projects usually are not sustained as people regress to old practices and habits. One argument is refreezing should not occur as change is active and multifaceted. A closer review of Lewin's theory's recommendations demonstrates Lewin referred to the refreezing step as prevention to return to the previous model or practices (Burnes, 2004).

Conceptual/Theoretical Framework: Key Concepts

National recommendations and narcotic usage with total joint replacement surgeries and general orthopedic procedures revealed a need to question current practices with total joint surgery narcotic prescribing and patient use (Bicket et al., 2017). The Fast-Track total joint program followed the LTPC model to make recommendations to decrease opioids (Shirey, 2013). The implementation of the MMAPs guidelines, rapid recovery model, and rapid mobilization required provider and multidisciplinary team education, tracking of protocol

implementation, and support from the team. Team meetings discussed revised recommendations, provider's thoughts, and feedback.

A "knowledge transition in the clinical practice" was needed (Manchester et al., 2014, p.88; Shirey, 2013). The literature review determined orthopedics was a lead contributor to the abuse of narcotics in the US (Kee et al., 2016; Klueh et al., 2018; Trasolini et al., 2018). The literature highlighted inconsistent and non-existent provider knowledge as a critical component of opioid overprescribing (Halawi & Lieberman, 2018; Schnell & Currie, 2018; Seymour et al., 2017). Provider adoption was required for a consistent approach with postoperative pain management.

The change/movement phase was the next step to evaluate the Fast-Track program (Burnes, 2004; Shirey, 2013; Manchester, 2014). The movement or change phase agreed with the utilization MMAPs approach the total joint patient (Shirey, 2013). This phase required education and data analysis with team meetings for feedback and discussion of opportunities for improvements (OFIs). After completing these steps, the team moved to the final refreezing phase (Shirey, 2013). The recommendations became part of the process for all total joint patients. As part of the agreed process – data collection processes were implemented and agreed upon for concurrent and retrospective data review and analysis. FORCE – Therapeutics worked with key team members to develop a method to collect the patient-reported data regarding narcotic use. LTPC is a valuable tool to review practice in the healthcare setting in a concurrent methodology and retrospectively for this specific project to evaluate the program (Shirey, 2013; Manchester et al., 2014). LTPC assists with an organized inquiry and evaluation of current practice and recommendations for implementing evidence-based practice if gaps were noted (Manchester et al., 2014).

The LTPC model's utilization retrospectively evaluated the program and recommended future steps for improvements, assessment of the program, the multidisciplinary team, and each step of the process (Manchester et al., 2014). This project used the LTPC model to determine if the current practice agreed with the literature. The first phase of this project included an evaluation of the opioid prescription issue and how it contributed to the overall opioid problem observed nationally (Baker, 2017; Bicket et al., 2017; Boylan et al., 2018; Chilsom-Burns et al., 2019; Glowacki, 2015; Golladay et al., 2017; Hah et al., 2017; Hanna et al., 2019; Halawi & Lieberam, 2018; Ibrahim et al., 2013; Kahn et al., 2019; Klueh et al., 2018; Lamplot et al., 2014; Langford & Wren, 2016; Riddle et al., 2010; Schnell & Currie, 2018; Seymour et al., 2017). Collaboration with the providers determined current practice, knowledge level (KnowPain-12 survey), and the patient-reported data already collected.

This step was the unfreezing stage of my project (Manchester, 2014). Data analysis did not align with the literature findings. The providers had varying levels of knowledge per the KnowPain-12 survey, and there was a lack of correlation of their expertise and patient-reported opioid use. The movement phase was not completed due to time constraints with this specific project. There was no consistency in the data findings; therefore, additional steps are needed to move past the second LTPC phase.

Although some providers stated they had not received any formal education, their knowledge results did not differ significantly with their group and patient-reported narcotics use. Some providers who scored the lowest with the knowledge assessment had the lowest amount of reported narcotics usage. This group of providers' scores did correlate knowledge with the NSAID/Acetaminophen patient use, which confounded the results even further. The providers have received their findings.

The next steps for the movement phase are scheduled meetings with each provider to discuss the results and determine the best next steps to convert to practice (Manchester et al., 2014). Individual patient assessments, amounts of narcotics written immediately postoperatively, risk assessment of patients at increased risk for opioid abuse, and specific prescribing recommendations might be helpful to move to the completion of the movement stage (Bicket et al., 2017; Cheattle, 2021; Glowacki, 2015; Golladay et al., 2017; Hah et al., 2017; Hanna et al., 2017; Halawi & Lieberman, 2018; Manchester et al., 2014; Kee et al., 2016, Klueh et al., 2018; Riddle et al., 2010; Schnell & Currie, 2018; Trasoloni et al., 2018). The completion of LPC's movement stage and initiation of the refreezing phase will go beyond this initial project.

Project Design

Use of the PICOT method, recommendations were based on the following: P – the population is the Orthopedic providers and anesthesiologist; I – the intervention is the knowledge of the education received and the creating of guidelines supporting alternative pain management strategies. Does increased healthcare practitioner education increase understanding and highlight possible alternative pain modalities and decrease postoperative narcotics use? Provider opioid education increases awareness of alternative pain management options, reduces opioid prescriptions and use; C – comparison 'standard of care' (opioids prescribing); O – outcome, a decrease in the number of patient-reported narcotics used postoperatively relates to an increased provider knowledge score; and T – time, the providers will receive a survey to complete to test their knowledge of pain management using the KnowPain-12 management knowledge survey (Gordon et al., 2014). The results were compared with the guideline revisions and patient-reported medication usage during May 2019 – May 2020. The KnowPain-12 survey determines the healthcare provider's knowledge of pain management (Gordon et al., 2014). The provider's

demographics and education received in the past five years were added to the interview. This survey and the results were anonymous. The results of the knowledge survey of the providers were compared with patients' reports of opioid use and pain management.

Education can take many forms - formal, informal, collegial, and interdisciplinary. I would like to articulate any of these educational formats to enhance postoperative surgical pain management modalities and strategies. The providers' knowledge was tested through the KnowPain -12 survey (Gordon et al., 2014). In the latter part of 2014, a multidisciplinary team was formed to create a 'Fast Track' total joint program with one group of providers and an anesthesia champion. Key team members met regularly to discuss every component of the total joint patient care. The team focused their approach on different aspects of preoperative and postoperative. The team created guidelines for pain management requiring the support of all members of the provider team.

The final stages of the current approach were revised three additional times in 2019. Data were collected using the electronic patient platform FORCE from May 2019 through May 2020 regarding patient-reported narcotic use after discharge at different time frames. The KnowPain-12 survey determines the level of pain management knowledge with the providers. I worked separately with a statistician at FORCE-Therapeutics and GSU. We compared retrospective aggregate patient-reported data with guideline implementation from the previous year.

Current Improvements

The approach to anesthesia and pain medications relative to the orthopedic population has been dramatically affected by the heightened attention to the opioid crisis. Healthcare providers have increased focus on the preoperative use of a multimodal analgesia pain management pathway (MMAPs) (Golladay et al., 2017; Ibrahim., 2013). Many total joint programs and

providers have implemented MMAPs in partnership with anesthesiologists to decrease narcotics pre-and postoperatively (Lamplot et al., 2014; Trasolini et al., 2018). MMAPs focus is reducing narcotics with the increased use of steroids, non-steroidal medications, periarticular, intravenous injections, and muscle relaxers (Zhao et al., 2019). Even with this enhanced focus, many orthopedic surgeons continue to overprescribe medications. A large percentage of providers do not appear to look for alternative methods for pain control. However, patients with fewer narcotics do better than those prescribed opiates following total joint surgery (Nota et al., 2015).

MMAPs were implemented years ago with a specific total joint practice focused on decreasing the average length of stay and discharging patients home instead of a rehabilitation facility. The multidisciplinary team continued to make changes and enhance the program. An area identified which needs additional attention is the pain medication regimen postoperatively (Halawi & Lieberman, 2018).

Methodology

Implementation/Evaluation

The site is a community hospital system in the state of Georgia. A community assessment supports an organization's efforts to improve the population it serves (ASTHO, 2019). It is projected the care received from this organization is almost 40% of the state's population. This project included nine orthopedic surgeons and one anesthesiologist who collaborated with the team to implement a rapid recovery model. The community health needs assessment (CMNA) identifies this hospital-owned physician group expands over nine counties within their approximate location. The median age of this population is approximately 36 years old. The population's racial breakdown is 84% Caucasian and African American and 48% of the state's Hispanic community. The populace is more educated, wealthier, and has a higher household

income than its average population. Access to a primary care physician is higher among these healthcare residents than in the rest of the state. Access to a primary care physician (PCP) can be a determining factor for the community's health (NSH).

This orthopedic practice started at one of the smaller, more rural campuses with one orthopedic surgeon, one anesthesia champion, and an interdisciplinary team led by a clinical nurse specialist (CNS). This surgeon group expanded to include ten orthopedic surgeons specializing in total hip and knee replacement surgery. This rural county's practice may correlate with more insured residents and is designated one of the nation's wealthiest counties (Stilwel, 2020).

This team implemented a fast-track program for their total hip and knee replacement patients, focusing on teamwork and superior outcomes. The fast-track program focuses on the perioperative stay of the patient. Rapid recovery and mobilization are critical areas of focus postoperatively. This practice was chosen due to practitioner engagement and the use of cutting-edge technology. Statistics showed total joints replacements, specifically total knee replacements, were significant contributors to the opioid epidemic (Trasolini et al., 2018). The practice reports the patient population far exceeds the immediate county area. There were 12,983 unique patient encounters and 3,943 unique surgical encounters in 2019. The home addresses of the patients extend into all areas of the state, from rural to urban. Many patients advise they live in states other than where the practice and healthcare organization are located.

Key individuals involved in the project include Sarah M. Killian, DNP, RN, NEA-BC, Clinical Associate Professor, Byrdine F. Lewis College of Nursing and Health Professions, skillian@gsu.edu, Megan Freeman, PharmD, BCPS, Director, Pharmacy Clinical Operations,

Northside Hospital Pharmacy, Rebekah Filson, MS, RN, ACNS-BC, ANP-BC, Georgia State DNP, and the research team at FORCE Therapeutics.

Implementation/Evaluation: Subjects

This project has two separate participant groups: patient group and provider group. Convenience sampling was used for this method of data collection (Shantikumar, 2018).

Patient participation totaled 1482 patients, 772 total hip patients, and 710 total knee replacements. The provider group was 10, one anesthesia champion, and nine orthopedic surgeons. The provider number met the goal for the group. The orthopedic surgeon team performed approximately 2000 primary elective total joint patients from May 2019 – May 2020. Inclusion criteria were patients who had an elective primary total hip or knee replacement between May 2019-May 2020 who answered the FORCE – Therapeutics survey regarding pain medication taken postoperatively. The provider criteria for inclusion are providers who are members of the provider team and one anesthesia champion who agreed to participate in this project.

Exclusion criteria were patients who did not have an elective primary total joint surgery (hip or knee), patients who did not answer the FORCE Therapeutics survey, patients with electronic access, and patient refusal.

The provider group exclusion were providers not members of the group nor work with the team as the anesthesia champion and provider refusal. The anesthesiologist responses were compared to the clinical guideline revisions and patient-reported pain management and medication used as the anesthesia champion.

The research team observed Georgia State University's restrictions and relevant government or public health authorities in research activities. Provider interviews were offered in

person, virtually, or over the telephone. Meetings were scheduled in advance in conference rooms that allowed for social distancing at least 6 feet apart. If providers requested in-person meetings, masks were worn during the entire interview process.

Implementation/Evaluation: Recruitment

The SI did not need to take any additional steps to recruit for the patient group. The patient group was already recruited through the FORCE team. Data collection regarding patients who answered the surveys through FORCE started in May 2019 and ended in May 2020. I worked with the FORCE statistician and research team member to obtain the aggregate de-identified patient results. The FORCE research team sent the data using an encrypted and password-protected data file. I kept this data in a password-protected electronic format.

The inclusion and exclusion criteria will ensure the participants had surgery, completed the survey, and were providers in the same group who performed the surgical procedure. The electronic communication using the Georgia State University (GSU) IRB-approved recruitment script, the rationale, and the need for participation to recruit for the provider group was utilized. There was a follow-up email if no response after five business days from the initial email. To encourage participation, additional emails were forwarded for a total of five emails. I also contacted the provider through telephonic communications after the initial email requests were sent.

Implementation/Evaluation: Setting

Each provider interview took place in the provider office or a private conference room area, and two were conducted over the phone. The informed consent form (ICF) was reviewed and signed before moving forward with survey questions. The offices averaged roughly 15 miles for each travel time, totaling at least 150 minutes in travel. The patients completed their

responses electronically through the FORCE Therapeutics data application before this project began.

Implementation/Evaluation: Evaluation of Resources/Budget

The cost of gas at the time of the survey administration was approximately \$1.90 a gallon. I projected to spend \$285 in gas and transportation for the project. Two of the interviews were conducted over the telephone; the actual amount spent on travel was approximately \$200. Packets were made for the providers comprising the (ICF), demographics, and KnowPain-12 survey. A pack of paper for my printer cost was approximately \$5, and ink \$50, totaling \$55.00. The additional approximate time spent for these first steps of the project was travel and meetings with the providers totaling approximately 300 minutes. FORCE did not charge an additional cost for statistician support.

Implementation/Evaluation: Instrument/Tools

The tools used for the project were the FORCE Therapeutics survey, the KnowPain-12 survey, and the provider demographics surveys. FORCE therapeutics has an existing (HIPPA) compliant relationship with the patient who participates, the hospital system, and the involved physicians. There are current agreements and confidentiality processes in place for the patients who join FORCE. I worked with the research department at FORCE to obtain the patient responses in a de-identified, aggregate format. Patient surveys were sent to patients four weeks leading up to surgery weekly, then once a day for the first postoperative week, and weekly during the second through six-week timeframe postoperatively. Patients completed the survey four weeks leading up to the surgery, once a day for the first post-op week, weekly for four weeks. The patient responses were collected before starting this project and completed for

patients who had surgery from May 2019 – May 2020. Provider knowledge of pain management is an important step to decrease the prevalent opioid epidemic in America (Gordon et al., 2014).

The KnowPain-12 survey assessed provider pain management expertise (Gordon et al., 2014). Administration of the survey assessment to each provider to capture the responses. The KnowPain-12 survey is based on the KnowPain-50 pain management knowledge survey (Harris et al., 2008). This survey measured provider "knowledge, attitudes, and beliefs in pain assessment, treatment plans, and management" (Harris et al., 2008, p. 542). The KnowPain-50 is a lengthy survey and lacks provider participation due to the time required to complete (Gordon et al., 2014; Harris et al., 2008). The survey KnowPain-50 demonstrated internal consistency using Cronbach's alpha statistic measurement; the alpha was .77 -0.85 for the KnowPain-50 study (Harris et al., 2008).

To create the KnowPain-12 survey a team of specialists in pain management was organized to evaluate and determine a comparable tool to decrease the time required to complete yet still showed reliability (Gordon et al., 2014). The decision to include specific questions based on the survey tool's sensitivity changes knowledge and understanding of patients' ability to tolerate pain medications and the need for pain medication (Harris et al., 2008). "Cronbach's alpha statistic was used to estimate the internal consistency of the KnowPain-12 survey" (Gordon et al., 2014 p.521). The KnowPain-12 "demonstrated adequate internal consistency with an alpha of 0.67" (Gordon et al., 2014 p. 521). Cronbach's alpha's normal threshold is at a minimum alpha of .70 (Gordon et al., 2014). Cronbach's alpha just below the threshold justifies use with a reliability analysis with this project. A rigorous statistical analysis was performed with the KnowPain-12 survey and found it to be "adequately reliable" per the evaluation team (Gordon et al., 2014). Both the KnowPain-50 the KnowPain-12 use a 6-point Likert scale (Strongly Agree

to Strongly Disagree) (Gordon et al., 2014). Rensis Likert developed the Likert scoring system in 1932 (Encyclopedia Britannica, 2021). With the KnowPain-12 scores increased knowledge level is reflected in higher overall scores (Gordon et al., 2014). Some of the questions in the KnowPain-12 survey utilized a reverse scoring system. It is a concise and straightforward survey with meaningful data for the providers. The KnowPain-12 survey required approximately ten minutes for each provider to complete.

Implementation/Evaluation: Intervention

I met (in person or over the telephone) with each provider and used the (GSU) IRB-approved recruitment script, discussed the project's details. After obtaining voluntary consent and a signature for the ICF, I scheduled a time to complete the survey. The entire survey included KnowPain-12 and a separate demographics survey (see Table 4) of the provider and reported education over the past five years. Each item of the study and demographics were read to the provider over the telephone, or in-person and responses were recorded with pen and paper. One provider asked to review the KnowPain-12 survey and complete it himself. I was available for questions and clarification as needed. Responses were recorded with pen and paper during the survey with the provider.

Implementation/Evaluation: Data Collection

The data was transferred into a Microsoft™ Excel spreadsheet. The identifying information of each provider was not recorded or shared as part of the project. The practitioners were given an assigned provider code to share their information. A full breakdown of provider demographics responses can be found in Table 3 (Appendix F). Each provider's overall response was scored based on their KnowPain-12 responses. The FORCE Therapeutics statistician,

Georgia state university statistician and research team were contacted to compile patient responses. The statistician also calculated the KnowPain-12 results as a second verification. Printed copies of the data were kept in a secure and locked cabinet; all the data was transmitted to an electronic format in a password-protected computer file. FORCE research department provided secure patient data. The information from FORCE was transmitted securely to an electronic file and kept in a secure password-protected computer. The MMAPs guidelines remained in an electronic format in a password-protected computer program. The provider's survey was the KnowPain-12 survey (Gordon et al., 2014) as a knowledge assessment. I reviewed the MMAPs guidelines approved by the team throughout the years 2019 – 2020. Patient surveys were previously collected by FORCE during the surgeries for May 2019 – May 2020 timeframe. Preoperative and postoperative patient surveys determined the patient's reported use of narcotics or other pain management medications and patients reported pain levels. Patients were asked regarding narcotics consumption with examples of oxycodone, Ultram, Tramadol, and Dilaudid for patient reference. The identifying information of each provider was not recorded nor shared as part of the project. The practitioners were provided with a code if they want their information after the study is completed.

Implementation/Evaluation: Components of Analysis

The data gathered from the provider responses with the KnowPain-12 survey, demographics survey, the clinical guideline revisions, and the patient responses from FORCE Therapeutics were compared to determine any correlation. I met regularly with the research team at FORCE and scheduled meetings with the statisticians. MMAPs clinical guidelines were updated three times in 2019 and were reviewed along with the patient responses and provider scoring. The clinical question was tested to determine if increased provider knowledge and

education regarding pain management differed with patient-reported pain management medications. The FORCE statistician used the Pearson correlation coefficient. The FORCE research team, statistician, and SI worked together and separately for data analysis.

Methods and Statistical Analyses

Provider and patient response data were matched by unique provider identifiers and merged into a single database and entered into an electronic data analysis tool. Statistical analyses were performed using the SAS University Edition (Cary, NC), one of the industry-standard statistical software packages in healthcare. Validating a potential relationship between Provider KnowPain-12 scores and pre/postoperative narcotics consumption, anti-inflammatory, acetaminophen consumption, VAS, and Pearson's correlations were performed under the assumption of normal distribution and linearity. A linear relationship was considered high (strong) if the correlation coefficient value was 0.5 – 0.8, moderate if it lies between 0.3 and 0.5, weak if it was 0.1 - 0.3. There is no relationship if the correlation coefficient is 0 – 0.1. The α -level was .05.

Results

Baseline Characteristics

Full baseline characteristics can be found in Appendix F. The demographics survey required approximately two minutes to complete. There were no significant differences between patient age, procedure laterality, or gender at baseline. All orthopedic providers in this study were Caucasian, married, and identified as males. Two providers were between the ages of 30 and 45, and the remaining eight were over 45 years of age. Five providers have greater than 20 years of experience, two providers had 15-20 years of experience, two providers 11-15 years of experience, two 15-20 years, and one had six-ten years of experience. All providers were

primarily English speaking, only three reported being proficient in a second language. There was a difference in provider volume. Two providers performed 67% of the surgeries during this timeframe. Seven of the ten providers stated they were either an MD leader or an active participant in the MMAPs guideline creation. Only one provider responded they did not follow the MMAPs guidelines but did not have an adverse attitude towards the guidelines.

Patient results were reported based on the procedure, total hip versus total knee arthroplasty. Total patients included in the survey was N=1482, of the total N=772 total hip arthroplasty (THA), and N=710 total knee arthroplasties (TKA). The mean age of THA patients 63.8 years and 67.5 years for TKA; 43% of the THA and 46% of TKA were male. The laterality of the surgery was 58% of THA and 53% of TKA were on the right versus the body's left side.

Narcotics

Total Knee Arthroplasty (TKA): There was a moderate correlation with KnowPain-12 Scores at postoperative day (POD) one ($r = .43$, $p < .0001$), POD three and four ($r = .41$, $p < .0001$) with a strong relationship at POD five ($r = .52$, $p < .0001$), and POD seven ($r = .53$, $p < .0001$), all were statistically significant. There was a moderate correlation with KnowPain-12 Scores preoperatively and week one postoperative ($r = .46$, $p < .0001$). There was a weak relationship at postoperative week two ($r = .11$, $p = 0.0017$). There was a high correlation with KnowPain -12 Scores at week three ($r = .53$, $p < .0001$), four ($r = .56$, $p < .0001$) and five postoperatively ($r = .64$, $p < .0001$). Narcotic consumption was highly correlated with total postoperative narcotic consumption ($r = .56$, $p < .0001$) all findings were statistically significant.

Total Hip Arthroplasty (THA): A strong correlation with KnowPain-12 Scores at POD zero ($r = .51$, $p < .0001$), moderately correlated at POD one ($r = .47$, $p < .0001$), POD three ($r = .39$, $p < .0001$) and POD six ($r = .33$, $p < .0001$). Narcotic consumption

was highly correlated with KnowPain-12 Scores at week three postoperative ($r = .57, p < .0001$) and negative at week six postoperative ($r = -0.51, p < .0001$), all findings were statistically significant (See Table 4).

Providers did not report consistent types of education, and there was no correlation between the patient's reported narcotic usage and providers who received an education during the timeframe. There was no evident correlation between the points in time of revisions to the MMAPs guidelines and patient-reported pain scores.

Table 4

	POD 0	POD 1	POD 2	POD 3	POD 4	POD 5	POD 6	POD 7	PREOP NARC	WK 1	WK 2	WK 3	WK 4	WK 5	WK 6
TKA															
Narcotics	0.27	0.43	0.25	0.41	0.41	0.52	0.23	0.53	0.48	0.46	0.11	0.53	0.56	0.64	0.29
THA															
Narcotics	0.51	0.47	0.22	0.39	0.19	0.15	0.33	0.10	-0.27	0.30	-0.11	0.57	0.31	0.10	-0.51

Anti-Inflammatory Medication

Total Knee Arthroplasty (TKA): A moderate correlation was noted with KnowPain-12 POD zero ($r = -0.41, p < .0001$), one ($r = -0.35, p < .0001$), three ($r = -0.42, p < .0001$), six ($r = -0.49, p < .0001$) and seven ($r = -0.43, p < .0001$), statistically significant. A moderate correlation with KnowPain-12 was identified preoperatively ($r = .45, p < .0001$) and a strong correlation week two postoperatively ($r = -.42, p < .0001$), and a strong correlation at week five ($r = .56, p < .0001$) postoperatively – all statistically significant.

Total Hip Arthroplasty (THA): A strong correlation, statistically significant finding with KnowPain-12 POD one ($r = -.66, p < .0001$), two ($r = -.66, p < .0001$), three ($r = -.52, p < .0001$), four ($r = -.64, p < .0001$), five ($r = -.72, p < .0001$), six ($r = -.62, p < .0001$) and seven ($r = -.63, p < .0001$). Anti-Inflammatory medications were moderately correlated with KnowPain-12 preoperatively ($r = .35, p < .0001$), week two ($r = -.54, p < .0001$), three ($r = -.40, p < .0001$) and

four ($r = -.39, p < .0001$) postoperatively these findings transitioned between positive and negative correlation (See Table 5).

Tylenol

Total Knee Arthroplasty (TKA): A strong correlation, statistically significant finding with KnowPain-12 correlation with KnowPain-12 POD one ($r = -.59, p < .0001$) and POD three ($r = -.50, p < .0001$), four ($r = -0.51, p < .0001$), five ($r = -.54, p < .0001$), and highly correlated POD two ($r = -.70, p < .0001$). Tylenol was moderately correlated with KnowPain-12 and the second postoperative ($r = -.35, p < .0001$) week.

Total Hip Arthroplasty (THA): A moderate correlation, statistically significant finding with KnowPain-12 correlation with KnowPain-12 Tylenol was correlated with KnowPain-12 POD one ($r = -.33, p < .0001$), two ($r = -0.31, p < .0001$), and four ($r = -.39, p < .0001$), six ($r = -.40, p < .0001$) and a strong correlation on POD five ($r = -.69, p < .0001$) and seven ($r = -0.51, p < .0001$) (See Table 5).

VAS Pain (Visual Analog Scale)

Total Knee Arthroplasty (TKA): A strong correlation, statistically significant finding with KnowPain-12 correlation with VAS Pain at POD two ($r = -.61, p < .0001$), three ($r = -.50, p < .0001$), and four ($r = -.57, p < .0001$). VAS Pain moderate correlation at POD five ($r = -.42, p < .0001$), six ($r = -.38, p < .0001$), and seven ($r = -.42, p < .0001$).

Total Hip Arthroplasty (THA): VAS Pain – A strong correlation, statistically significant finding with KnowPain-12 at POD zero ($r = -.71, p < .0001$), four ($r = -.55, p < .0001$) and moderately correlated with KnowPain-12 Scores at POD seven ($r = -.49, p < .0001$). A moderate correlation, statistically significant with KnowPain-12 at six weeks postoperative ($r = -.43, p < .0001$) (See Table 5).

Table 5

TKA															
	POD 0	POD 1	POD 2	POD 3	POD 4	POD 5	POD 6	POD 7	PREOP	WK 2	WK 3	WK 4	WK 5	WK 6	WK 12
Anti-inflammatory	-0.41	-0.35	-0.53	-0.42	-0.40	-0.51	-0.49	-0.43	0.45	-0.42	0.05	0.14	0.56	-0.26	
Tylenol	0.18	-0.59	-0.70	-0.50	-0.51	-0.54	-0.36	-0.32	0.20	-0.35	-0.17	-0.24	-0.11	-0.15	
VAS	0.16	-0.34	-0.61	-0.50	-0.57	-0.42	-0.38	-0.42						0.08	0.07
THA															
	POD 0	POD 1	POD 2	POD 3	POD 4	POD 5	POD 6	POD 7	PREOP	WK 2	WK 3	WK 4	WK 5	WK 6	WK 12
Anti-inflammatory	-0.15	-0.66	-0.66	-0.52	-0.64	-0.72	-0.62	-0.63	0.35	-0.54	-0.40	-0.39	-0.20	-0.32	
Tylenol	-0.05	-0.33	-0.31	-0.59	-0.39	-0.69	-0.40	-0.51	0.21	-0.31	-0.02	0.26	-0.12	-0.06	
VAS	-0.71	0.20	-0.07	-0.31	-0.55	-0.14	-0.04	-0.49						-0.43	-0.12

Significance and/or Implications for Clinical Practice

Discussion

The aim of this project was to answer the Clinical Question: Does increased provider knowledge decrease patient -reported use of opioids? Provider volume is an inherent limitation to the study as it may affect patient outcomes and the possibility of correlation with patient narcotic use and provider knowledge. Two providers performed 67% of the surgical procedures, possibly confounding the correlation results.

The relationship between provider knowledge and patient reported opioid use among total joint replacement patients was investigated using Pearson Correlation Coefficient. Among THA and TKA and narcotic/opioid use there was a moderate to strong correlation with provider knowledge and patient reported opioid use, with a range of $r = .11$ through -0.51 , $n = 710$ and 772 , $p < .0001$. Among THA and TKA and NSAID/Acetaminophen use there was a moderate to strong correlation with provider knowledge and patient reported opioid use with a range of $r = -.33$ and $-.72$, $n = 710$ and 772 , $p < .0001$. Among THA and TKA and VAS use there was strong

correlation with provider knowledge and patient reported opioid use $r = -.38$ and $-.71$, $n = 710$ and 772 , $p < .0001$.

Results were varied and conflicted between provider knowledge and narcotic consumption in total hip and total knee replacement procedures. One potential factor in contradictory results is the pain profiles between the two procedures; total knee replacement procedures generally see more postoperative pain in the first week, which can cause more opioid consumption. A secondary finding of additional medications including acetaminophen and anti-inflammatories and provider knowledge correlation did see statistically significant results. Providers with more knowledge, defined by the Know Pain-12 assessment, saw a decrease in patient medication consumption.

Based on the TKA and THA group results, we conclude higher provider knowledge does not necessarily equate to lower opioid consumptions with moderate to high positive Pearson's correlations. A correlation that showed a negative relationship was needed to show the expected findings of higher provider knowledge correlating to decreased patient reported opioid consumption. TKA and THA groups were statistically significant with a $p < .0001$. Based on the TKA group results, we would conclude higher provider knowledge does equate to lower acetaminophen and NSAID consumption. Additionally, providers with higher KnowPain-12 scores had lower patient-reported VAS pain.

The completed literature review correlated surgical procedures, namely total joint replacements with inconsistent, and varied pain management, and lack of provider knowledge as a major contributor of the opioid crises (Boylan et al., 2018; Schnell & Currie, 2016; Seymour et al., 2017; & Trasolini et al., 2018). The importance of the multidisciplinary team with an inclusion of a pharmacist, implementation of MMAPs, consistent provider ordering, and

alternative pain management strategies were highlighted with my findings (Boylan et al., 2018; Chisolm-Burns et al., 2019; Hanna et al., 2019; & Trasolini et al., 2018).

Limitations

Some of the limitations to this study are the following: this study was completed with one provider group of nine surgeons, two providers performed 67% of the procedures. I did not include the practice Advanced Practice Providers (APPs) in this study due to the state of Georgia's restrictions on certain narcotic medications at the time. However, due to the ongoing debate to obtain full prescriptive authority in the state and the influence with the patient's perioperative course, future studies and projects would benefit from their inclusion. The provider team involved with this project implemented a MMAP before the project started and had a consistent team approach to pain management. A multidisciplinary team was already established and might have confounded individual provider knowledge regarding opioids due to the focus on NSAIDs and Acetaminophen.

Practice Implications

Practice implications for this project are varied. One of the areas is the importance of the interdisciplinary teams with pharmacy, medical and surgical providers, anesthesia, nursing and rehabilitation services involved (The White House, 2015; Chisolm-Burnes et al., 2019; Hanna et al., 2029). The inclusion of the electronic health record to track medications and the providers that prescribe them is another area of focus (Lovecchio et al., 2017). The future implications of a universal tracking system for patients are invaluable tools to assist with higher risk patients (Lovecchio, et al., 2017). Providers' attitudes and knowledge regarding pain management strategies impacts the patients reported satisfaction and pain management as evident with the VAS and provider knowledge correlations in this study (Langford & Wren, 2016; Schnell &

Currie, 2016). Provider knowledge is key to identify alternative pain management strategies and decrease the number of opioids (Langford & Wren, 2016; Schnell & Currie, 2016). The value of orthopedic surgery, especially total joint replacements are long-term functional benefits after the surgery, increased quality of life, and pain management. An evaluation of multimodal pain management strategies should include a preoperative risk assessment, perioperative medications offered and discharge education.

Plan for Dissemination

I would like to present these findings at the National Association of Orthopedic nursing conference and webinars for collaboration. Poster presentations and pain management meetings would be of interest to present and work collaboratively with experts in this field. An invitation to the pain management team at the clinical site was extended to the SI.

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Appendix A – Provider Demographic Survey

Appendix B – Informed Consent

Appendix C – Updated Project Timeline

Appendix D – Patient Demographics

Appendix E – Table 4: KnowPain-12 Provider Results broken down by question

Appendix F – Final revision of Multimodal analgesia pathway (MMAP)

Appendix G – Evidence Matrix Table

Appendix A

Provider Demographic Survey tool

Age

What is your age?

- A. 0 - 15 years old
- B. 15 - 30 years old
- C. 30 - 45 years old
- D. 45+
- E. Prefer not to answer

Gender

To which Gender do you most identify with?

- A. Male
- B. Female
- C. Transgender male
- D. Transgender Female
- E. Gender variant/nonconforming
- F. Other
- G. I would prefer not to say

Race/Ethnicity

Please specify your ethnicity.

- A. Caucasian
- B. African American

C. Latino or Hispanic

D. Asian

E. Native American

F. Native Hawaiian or Pacific Islander

G. Two or More

H. Other/Unknown

I. Prefer not to say

Marital Status

Are you married?

A. Yes

B. No

C. Prefer not to say

Level of Education

What is the highest degree or level of education you have completed?"

A. Some High School

B. High School

C. Bachelor's Degree

D. Master's Degree

E. Ph.D. or higher

F. Trade School

G. Prefer not to say

Which languages are you capable of speaking fluently? (Check all that apply)

- A. English
- B. Spanish
- C. Portuguese
- D. French
- E. Mandarin
- F. Arabic
- G. Other
- H. Prefer not to say

Years of Practice as a Healthcare Provider

- A. 0 – 5 years
- B. 6 – 10 years
- C. 11 – 15 years
- D. 15 – 20 years
- E. More than 20 years
- F. Prefer not to say

Have you participated in pain management courses, webinars, conferences, independent study, or multidisciplinary team internal education in the past five years?

- A. Yes
- B. No

C. Prefer not to say

Have you been involved in the creation, revisions, and/or the acceptance of the clinical guidelines with your team for pain management (MMAPs)?

A. I was an MD leader in this

B. I was an active participant

C. I was not involved but was aware

D. I follow the guidelines when they seem like a good idea

E. I have not been involved but aware when they change or modified

F. What is MMAPs?

Appendix B

Georgia State University

Byrdine F. Lewis School of Nursing and Health Professions

Informed Consent – Providers

Title: Healthcare practitioner education, Implementation of clinical guidelines, and narcotics use in the surgical patient

Investigator: Dr. Sarah Killian, DNP, RN, NEA-BC, Megan Freeman, PharmD, Rebekah Filson, Georgia State University DNP Student

Purpose

The purpose of the research study is to show if knowledge, education, and clinical guidelines affect patient opioid use in postop total joint surgeries. You are asked to participate because you are part of the provider team and have created ways to decrease narcotic use. A total of 10 doctors will be invited to participate in this study. The results of 1500 patient responses will be included.

Procedures

If you decide to take part, there is one survey that should take less than 25 - 30 minutes of your time. This can be completed via telephone or in person with Rebekah Filson to record the

answers you give. Your personal details will not be shared. There will be initial demographics questions and then a survey of 12 questions.

Patient responses from FORCE Therapeutics about medication use from May 2019 – May 2020 will be compared to the physician surveys and the Multimodal Analgesia Pathway (MMAPs) guidelines (2019) used by this team

- Rebekah Filson will be the only person who will be able to know which information is yours. You can get a copy of the information at the end of the study if you wish. No one will know your answers.

Future Research

We will not ask for any additional consent for you for future research with this information

Risks

In this study, you will not have any more risks than you would in a normal day of life. The research team will observe restrictions imposed by Georgia State University and relevant government or public health authorities in the conduct of research activities.

Benefits

This study is not designed to benefit you personally. Our hope is to gain information about how provider education can lead to the creation of guidelines and decreased narcotic use.

Alternatives

The alternative to your participation in this research project is the decision not to participate.

Voluntary Participation and Withdrawal

You do not have to be in this research study. If you decide to be in the research study and change your mind, you have the right to drop out at any time. You may refuse to take part or stop at any time; this will not cause you to lose any benefits to which you are otherwise entitled. You may choose to skip any question.

Confidentiality

We will keep your records private to the extent allowed by law. The following people and entities will have access to the overall information you provide:

- Rebekah Filson, Student Investigator, Dr Sarah Killian, Principal Investigator
- Northside Hospital Institutional Review Board
- GSU Institutional Review Board
- Office for Human Research Protection (OHRP)

We will use a number rather than your name on research study records. The information you provide will be stored in a locked office and firewall-protected computers. Paper recorded information will be destroyed as soon as it is transferred to a secure computer.

When we present or publish the results of this study, we will not use your name or other information that may identify you.

- Any information or additional questions you send via email will not be secure. We will not collect IP addresses for any part of this research study.

- If a future presentation is used, we will not identify physicians.

Privacy

- Your privacy will be kept to the extent allowed by law.
- We will remove all information that can identify you.
- While we are doing this research study the team may use only the personal information that you have given us – for example but not limited to age, gender, ethnicity, education, years of experience, education specific to this topic received in the past 5 years. They will look at it so they can work on this research study. We may also share your results with the Northside Hospital and/or the Georgia State University Institutional Review Board (IRB). This research may be shown to other researchers. This research may be published, but we will take steps to make sure that you cannot be identified.

Contact Information

Contact Sarah Killian, DNP, RN, NEA-BC at 404-413-1208 , skillian@gsu.edu or Rebekah

Filson, MS, RN, ANP-BC, ACNS-BC, at 404-938-8476, risom1@student.gsu.edu

- If you have questions about the study or your part in it
- If you have questions, concerns, or complaints about the study
- If you think you have been harmed by the study

If you have any questions about your rights, concerns, or complaints about the research please

contact the GSU Office of Human Research Protections at 404-413-3500 or irb@gsu.edu

Consent

We will give you a copy of this consent form to keep.

You can save a copy of the form for your records or Rebekah Filson can give you a copy

If you agree to participate in this research study, please continue with the survey

Signature:

Date:

<p>Reach out to FORCE for patient results (after GSU IRB approval)</p> <p>The SI will work with the research department at FORCE to obtain the patient data.</p> <p>Surveys were sent to patients four weeks leading up to surgery weekly, then once a day for the first postoperative week, and weekly during the second through six-week timeframe postoperatively. Patients were expected to complete the survey at four weeks leading up to the surgery, once a day for the first post op week, and then weekly for four weeks.</p> <p>(Moran et al, 2020 p. 175)</p>	<p>8/31</p> <p>Determine number of patient participants up to the goal of 1500</p>	<p>Follow up discussions with FORCE</p> <p>9/1</p> <p>9/10</p> <p>9/20</p>						
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<p>Initial emails to providers and obtain IRB approved consent forms. Clinical Practice Model Framework (CPM) framework to break silos and work collaboratively (Moran et al, 2020 p.195).</p>	<p>8/27 Ten providers Nine surgeons and One anesthesiologist</p>							
<p>Reach out to providers who have not answered the initial request. Clinical Practice Model Framework (CPM) framework to break silos and work collaboratively (Moran et al, 2020 p.195).</p>	<p>8/27 8/29 8/30 9/9 9/10 9/11 9/16 9/21</p>							
<p>Finalize packets for the providers for review with SI. IRB approved consent form, Demographics survey, KnowPain-12 survey, Provider ID number (assigned by SI)</p>	<p>8/29 8/30 (if needed)</p>							

<p>Meet with providers for in-person discussion or schedule telephone/Face Time calls.</p> <p>The SI will read each question with the Provider and record responses over the telephone or in-person to the paper copy of the surveys. Responses will be recorded with pen and paper during the survey with the provider. The SI will transfer the data into an Excel or comparative electronic tool.</p> <p>(Moran et al, 2020 p.197)</p>	<p>8/31</p> <p>9/3</p> <p>9/9</p> <p>9/10</p> <p>9/14</p> <p>9/15</p> <p>9/16</p>							
<p>Meet with chair and co-chair (person, email or by phone) (Moran et al., p. 199)</p>	<p>8/31</p> <p>9/30</p> <p>(multiple additional emails)</p>	<p>10/6</p> <p>10/20</p> <p>(multiple additional emails)</p>						

Data Transcription	8/31 9/23	10/1 – 10/30						
Meet with FORCE team and statistician	Additional multiple emails	Additional multiple emails						
Enter information into initial Excel format or determine from statistician electronic format (SAS).								
Reach out to statistician for data analysis and assistance (Moran et al, 2020 p.197).		10/15 – 10/29	11/6 11/7 11/9					
Preliminary Conference: Sample Conference 1						2/1	3/1	
Continue Data Analysis		10/19 10/21						
Develop final report						TBD	TBD	

Appendix D

Patient Demographics	N	Procedure Laterality (% Right)	Age	Gender (% Male)
Total Hip Replacement	772	58%	63.8	43%
Provider A	49	69%	60.8	45%
Provider B	341	55%	64.6	44%
Provider C	22	60%	59.5	59%
Provider D	46	48%	64.9	49%
Provider E	62	62%	61.7	39%
Provider F	34	62%	59.9	38%
Provider G	177	60%	64.3	41%
Provider H	29	59%	66.9	41%
Provider I	12	67%	61.4	42%
Total Knee Replacement	710	53%	67.5	46%
Provider A	77	57%	66.0	49%
Provider B	306	52%	69.0	47%
Provider C	19	63%	64.3	42%
Provider D	43	34%	64.3	51%
Provider E	21	43%	67.3	43%
Provider F	33	66%	64.8	48%
Provider G	161	58%	67.8	45%
Provider H	33	42%	67.0	21%
Provider I	17	59%	64.5	53%
Grand Total	1482	56%	65.6	44%

Appendix E

Table 4: KnowPain-12 Provider Results broken down by question

Provider Demographics	N
Age	10
0-15 years	0
15-30 years	0
30-45 years	2
45+	8
Prefer not to answer	0
Gender	10
Male	10
Female	0
Transgender Male	0
Transgender Female	0
Gender Variant/Nonconforming	0
Other	0
I would prefer not to say	0
Race/Ethnicity	10
Caucasian	10
African-American	0
Latino or Hispanic	0
Asian	0
Native American	0
Native Hawaiian or Pacific Islander	0
Two or More	0
Other/Unknown	0
Prefer not to say	0
Marital Status	10
Yes	10
No	0
Prefer not to say	0
Level of Education	10
Some High School	0
High School	0
Bachelor's Degreee	0

Master's Degree	0
Ph.D or Higher	10
Trade School	0
Prefer not to say	0
Languages	13
English	10
Spanish	1
Portuguese	0
French	1
Mandarin	0
Arabic	0
Other	1
Prefer not to say	0
Years of Practice as a Healthcare Provider	10
0-5 years	0
6-10 years	1
11-15 years	2
15-20 years	2
More than 20 years	5
Prefer not to say	0
Pain Management Education	10
Yes	8
No	2
Pain Management Clinical Guidelines Involvement	10
I was an MD leader in this	2
I was an active participant	5
I was not involved but was aware	0
I follow the guidelines when they seem like a good idea	1
I have not been involved but aware when they change or modified	2
What is MMAPs?	0

Appendix F

MMAPs

<p>PO Meds</p> <p>Lyrica 150 mg po (Decrease to 75 mg only if frail)</p> <p>(If on Gabapentin, Lyrica is still preferred)</p> <p>Pepcid 20 mg po</p>	<p>ACB</p> <p>EXPAREL 133 mg (10 ml) + 5 ml 1/4% Bupiv (plain)</p> <p>Or, 15 ml Bupiv 1/4% plain (Block at artery mid-Sartorius)</p> <p>iPACK</p> <p>20 ml 1/4% Bupiv w epi</p>	<p>Surgery</p> <p>Tylenol (1000 mg po hs)</p> <p>Fluids (push po fluids hs and until 2 hours preop)</p>
<p>SEDATION for block</p> <p>NO FENTANYL</p> <p>Versed 1-5 mg Ketamine (by anesthesia)</p> <p>Void just before SAB/ Block</p>	<p>ISB</p> <p>EXPAREL 133 mg (10 ml) For 2-3 days</p> <p>EXPAREL 266 mg (20 ml) For 4-6 days</p>	<p>Intra-op</p> <p>Propofol sedation (for spinals) IV Fluid Goal - 1 L LR For EBL > 500, consider 500 Albumin 5%</p> <p>If pt on chronic narcotics, recommend Methadone 10 iv</p>
<p>Spinal - Iso-baric</p> <p>(Protocol for knees and hips)</p> <p>Chloroprocaine 1% (ASC) 4.2 ml <1hr</p> <p>Mepiv 1.5% (for same day discharge)</p> <p>2.6 ml (39 mg) - < 1 hour 2.8 ml (42 mg) - 1.0 hour 3.0 ml (45 mg) - 1.5 hours* (most common) 3.3 ml (50 mg) - 2 hours* (most common) 4.0 ml (60 mg) - 2.5 hours</p> <p>Bupiv 0.5% (if not same day discharge)</p> <p>2.0 ml (10 mg) - 2.5 - 3 hours 3.0 ml (15 mg) 3-4 hours</p>	<p>MMAp</p> <p>Ofirmev 1000 mg Decadron 0.15 mg/kg Ketamine 0.25 mg/kg Toradol 15 - 30 mg @ end</p> <p>Avoid if Creatinine \times 1.4</p> <p>Max forced \downarrowBP is \downarrowMMAp by 20%</p> <p>No Robinul, Benadryl or Narcotics</p>	
<p>General</p> <p>Lido / Prop induction - usually LMA O2 / N20 (~ 70%) / Sevo (+PEEP - 5cm)</p> <p>Shoulder Replacements- (some hips) may need OETT and relaxation</p> <p>NO NARCOTICS, NO BENADRYL</p> <p>Zofran prophylactic 4 mg only for GA (shoulders) otherwise, only use to treat N/V</p> <p>If pt on chronic narcotics, recommend Methadone 10 mg IV</p>	<p>Surgeon</p> <p>TXA, ABS- (by surgeon order)</p> <p>Peri-Articular injection (surgeon option)</p> <p>#1 Bupiv 3/8% w/ epi, 30 ml (+/-) Toradol 30mg, Depomedrol 80mg OR</p> <p>#2 Exparel 266 mg (20 ml) 30 ml Bupiv 1/4% plain + NS qs 60-120 ml, (don't use EXPAREL in both PAI and ACB Blocks)</p>	
<p>PACU Pain- Reasonable / Tolerable / Terrible</p> <p>NO DEMEROL, NO PHENERGAN, NO BENEDRYL, NO NARCOTICS (w/o direct order from MDA)</p> <p>ROBAXIN 1,000 mg iv before narcotics if needed for pain. Zofran for N/V.</p> <p>Fentanyl 25 mcg (mr X3) is initial narcotic option (should be needed in < 10-20% of pts)</p>		

Appendix G

Evidence Matrix Table

Boylan, Matthew R, Suchman, Kelly I, Slover, James D, & Bosco, Joseph A. (2018). Patterns of Narcotic Prescribing by Orthopedic Surgeons for Medicare Patients. <i>American Journal of Medical Quality</i> , 33(6), 637-641				Grade Level of Evidence: Level III; High Quality
Hypothesis/ Questions	Design	Sample	Measurement	Results/Implications
Are there defined guidelines, recommendations (formal or informal) for narcotic prescribing in Orthopedics in general or sub-specialty	Qualitative, using: Prescriber Public Use File provider with valid National Provider Identifier (NPI) and Medicare claims data.	Medicare beneficiaries in 2014 participating in the Medicare Part D prescription drug program. Drilled down based on commonly used operative procedure codes for billing and reimbursement.	Orthopedic providers who prescribed a minimum of one narcotic (Schedule I or II). Surgeons and specialty identified. Analyzed top 10% percentage of prescriptions by the provider. "To decrease outliers influencing variation in prescribing habits, the study used medians Plotted on a heat map due to location Statistical analysis created using SAS version 9.4 (SAS Institute, Cary, North Carolina)".	Total orthopedic surgeons – median for prescriptions for opioids/narcotics – 8.2 days. Divided among sub-specialty: Hand Surgeons – shortest timeframe Spine surgeons – most extended timeframe Sports Medicine and Trauma surgeons among the highest to prescribe narcotics/opioids. Variation among all specialties and areas. The top 10% were responsible for almost half of narcotic prescriptions written. Limitations: Data reported at the prescriber level, not the patient level. Identification of surgeon subspecialty based on most billed procedure codes. Surgeon demographics nor historical prescribing methods included in the analysis. There is a lack of consistency or clear guidance in opioid prescribing among orthopedic surgeons in the United States, regardless of state or subspecialty.
Chisholm-Burns, Marie A, Spivey, Christina A, Sherwin, Erin, Wheeler, James, & Hohmeier, Kenneth. (2019). The opioid crisis: Origins, trends, policies, and				Grade Level of Evidence:

<p>the roles of pharmacists. <i>American Journal of Health-system Pharmacy: AJHP.</i>, 76(7), 424-435.</p>				<p>Level II; High Quality</p>
Hypothesis/ Questions	Design	Sample	Measurement	Results/Implications
<p>What is the current involvement with pharmacists to help address the prescription opioid crisis? Would increased involvement by pharmacists assist with this national crisis?</p>	<p>Quasi-experimental</p>	<p>Pharmacists in the United States – literature and prescribing review</p>	<p>Review the involvement of the pharmacist in the following areas as it relates to opioid prescribing: risk assessment and screening, patient and community education and outreach regarding pain medication, storage and disposal.</p>	<p>Prescription Drug Monitoring Programs (PDMPs) are state-specific and electronic databases that track narcotic prescription and usage.</p> <p>There is a lack of consistency with state-mandated electronic databases for pharmacists to utilize.</p> <p>Pharmacists are prepared and can partner with other healthcare team members to provide education and direction to patients.</p> <p>When Pharmacists are involved with decision making and risk assessment/education with patients, there has been a decrease in narcotic prescribing.</p>
<p>Hanna, M. N., Speed, T. J., Shechter, R., Grant, M. C., Sheinberg, R., Goldberg, E., ... Williams, K. (2019). An Innovative Perioperative Pain Program for Chronic Opioid Users: An Academic Medical Center's Response to the Opioid Crisis. <i>American Journal of Medical Quality</i>, 34(1), 5–13. https://doi.org/10.1177/1062860618777298</p>				<p>Grade Level of Evidence: Level II; Good Quality</p>
Hypothesis/ Questions	Design	Sample	Measurement	Results/Implications
<p>Does a multidisciplinary team approach make a difference with pain management?</p>	<p>Quasi-experimental</p>	<p>The Preoperative Pain Program at Johns Hopkins</p>	<p>Patients enrolled were evaluated in 1 to 2 weeks of discharge over a 12-week timeframe.</p> <p>Implementation of a multidisciplinary approach.</p> <p>Utilization of titration of medication weaning while offering patient support with managing expectations, consultations, and education.</p>	<p>Limitations – One system model Johns Hopkins is an established referral center with a mature and established Acute Pain Service, internal medicine MD and other multidisciplinary groups available for consultation.</p> <p>The hospital has a center for perioperative optimization that can identify complicated patients from the beginning.</p> <p>There may be confounding results if compared to a new program that established the multidisciplinary team for the start of the program.</p>

Kahn, N., Chappell, K., Regnier, K., Travlos, D. V, & Auth, D. (2019). <i>A Collaboration Between Government and the Continuing Education Community Tackles the Opioid Crisis: Lessons Learned and Future Opportunities</i> . https://doi.org/10.1097/CEH.0000000000000231				Grade Level of Evidence: Level II; High Quality
Hypothesis/ Questions	Design	Sample	Measurement	Results/Implications
<p>Would an increase and consistent continuing education (CE) opportunity for providers increase the awareness and safety of prescribing long-acting and extended-release narcotic medications?</p> <p>Would this education result in decreased narcotic prescribing?</p>	Pretest and Posttest Quasi-experimental	<p>Providers in the United States that would accept the offering of education at little or no cost</p> <p>A synchronized endeavor for providing continuing education.</p> <p>A national organization involving medicine, nursing, dentistry, pharmacy, and physician assistants.</p> <p>Continuing Education accreditors and the FDA engaged in the discussion Accreditation Council for Continuing Medical Education (ACCME). Food and Drug Administration (FDA).</p>	<p>REMS-compliant CE activities in various online and face-to-face formats, with live events offered in every region of the country.</p> <p>Live Course Live Internet course Live regularly scheduled series Enduring material – internet Enduring material – other Performance Improvement.</p> <p>"The FDA determined a Risk Evaluation and Mitigation Strategies (REMS) program. The product manufacturers make training available at low or no cost".</p>	<p>2014 – 2018</p> <p>One hundred nine accredited providers CE reported 892 Risk Evaluation and Mitigating Strategies (REMS) -compliant activities educating almost 400,000 learners across the country.</p> <p>Providers involved reported 100% of their actions were designed to change learners' competence level; 95% were evaluated for those changes. 83% were designed to improve performance 60% were intended to change patient outcomes, 8% of activities were assessed for patient outcomes differences.</p> <p>Data shows REMS-compliant CE improved knowledge, attitudes, confidence, and self-reported clinical practice in safer opioid prescribing.</p> <p>More flexibility to address multiple specialties and provider needs — development of education for providers and non-providers.</p> <p>Integration of an outcome focus design. More research needed in this area.</p>
Kee, JR, J., Kee, R., Smith, C., & Barnes. (n.d.). Recognizing and Reducing the Risk of Opioid Misuse in Orthopedic Practice. <i>Journal of Surgery Orthopedics Advances</i> , 25(4), 238-243				Grade Level of Evidence: Level IV; Good Quality
Hypothesis/ Questions	Design	Sample	Measurement	Results/Implications

<p>Does the use of clinical strategies and tools support medication recommendations and prescribing during the surgical patient's perioperative period?</p>	<p>Expert opinion and review of scientific literature and evidence-based and validated tools.</p> <p>The experts involved in this review are medical doctors in the orthopedic community with experience in research. Another MD is in the psychiatry department and is a beneficial reviewer of tools evaluating patients' behaviors.</p>	<p>Evaluation of tools for the orthopedic surgeon to use to assess patients for opioid risk and planning for the perioperative period and recommendations. There have been decreases in opioid-related mortality and excess prescriptions in states that allow providers to have viewing access to a complete record of patient's prescription narcotics.</p>	<p>Review of studies, tools, and evidence-based practice investigating risk factors for preoperative chronic opioid use and contributing factors.</p>	<p>Encourage and foster trust between provider and patient using a shared-decision making model.</p> <p>Implement a drug monitoring program to recognize patients that are a higher risk for abuse and misuse of narcotics will help with planning and pain management strategies.</p> <p>Currently, there is no exact recommended timeframe for postoperative narcotics.</p> <p>Recommendations of timeframe surgeons would manage patient pain. Beyond the specified timeframe (three months instead of the reportedly most common 12 months) would require the patient to obtain a pain clinic referral for a pain specialist to evaluate and provide care for that issue.</p> <p>Education to the patients is needed to emphasize opioid use leads to increased risk of complications and unintended post-surgical outcomes.</p>
<p>Lovecchio, F., Derman, P., Stepan, J., Iyer, S., Christ, A., Grimaldi, P., Kumar, K., Ranawata, A. (2017). Support for Safer Opioid Prescribing Practices. <i>Journal of Bone and Joint Surgery</i>, 99(22), 1945-1955</p>				<p>Grade Level of Evidence: Level III shifted to Level V, High Quality</p>
<p>Hypothesis/ Questions</p>	<p>Design</p>	<p>Sample</p>	<p>Measurement</p>	<p>Results/Implications</p>

<p>In a population that uses pain medications routinely, would the following changes in practice be helpful to decrease to use and abuse or opioid narcotics:</p> <p>State-mandated electronic reporting.</p> <p>Provider assessment of the patient-reported history of narcotic use and history of psychological stress or concerns/treatment.</p> <p>Consistency with recommendations for type and duration of medications procedure-specific postoperatively.</p>	<p>Initial approach Meta-Analysis became a literature review due to limitations</p>	<p>Summary of articles in orthopedic, plastic surgery, and anesthesia (Excluded Trauma patients). I am using PubMed and Google Scholar search engines.</p> <p>The author's goal initially was to perform a meta-analysis. This was impossible due to the report by the studies of opioid use as a secondary outcome.</p> <p>Literature was used to determine the high degree of variation for prescribing narcotics in the Orthopedic population.</p>	<p>Review of research to establish surgical type, postoperative prescribing, and the average patient-reported pain level.</p> <p>Comparison across the subspecialty of Orthopedics to determine any consistency or recommendations.</p> <p>The meta-analysis approach abandoned, and the authors completed a literature review due to the reporting of opioid use in the studies</p>	<p>There is wide variation seen in the orthopedic population in many areas:</p> <p>Pain medication ordered and recommended. Follow up prescriptions postoperatively. Ability to track opioids Preoperative narcotic/opioid use.</p> <p>Limitations of this study: Inability to determine the difference (if exists) with opioid naïve versus experienced patients.</p> <p>It is common within the orthopedic population to routinely order narcotic prescriptions proactively. Patients reported using no narcotic use after discharge – this finding question uses of narcotics automatically postoperatively with these patients.</p> <p>Identify a need to continue modifying the current multimodal analgesia plan extending beyond the initial pre and postoperative time frame and into the post-discharge period.</p> <p>Well-designed prospective studies are needed in the future.</p>
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<p>Lasse Juel Andersen, Thomas Poulsen, Bo Krogh & Tommy Nielsen (2007) Postoperative analgesia in total hip arthroplasty: A randomized double-blinded, placebo-controlled study on preoperative and postoperative ropivacaine, ketorolac, and adrenaline wound infiltration, Acta Orthopaedica, 78:2, 187-192, DOI: 10.1080/17453670710013663</p>				<p>Grade Level of Evidence: Level I, High Quality</p>
<p>Hypothesis/ Questions</p>	<p>Design</p>	<p>Sample</p>	<p>Measurement</p>	<p>Results/Implications</p>

<p>The authors evaluated the use of wound infiltration with ropivacaine, ketorolac, and adrenaline to determine if this would result in a decrease in postoperative pain.</p> <p>Orthopedics is considered one of the most painful procedures. Total joint replacement is often felt to be most pain day 2 or 3.</p>	<p>A randomized double-blinded, placebo-controlled study.</p>	<p>40 consecutive patients undergoing total hip replacement randomized into two groups.</p> <p>Double-blinded study</p>	<p>The results were analyzed using the non-parametric Mann-Whitney U test, Fisher's exact test, or Chi-squared test. A p-value of < 0.05 is statistically significant.</p> <p>The patients received wound infiltration at the end of surgery and through an intraarticular catheter 24 h postoperatively.</p> <p>The catheter placement at the end of surgery.</p> <p>One group received solutions of ropivacaine, ketorolac, and adrenaline. Patients in the control group were injected with saline instead. The observation period was six weeks.</p>	<p>There was a statistically significant difference in postoperative pain intensity in the treatment group versus the control group.</p> <p>The measurement was started at 4 hours postoperatively and extended to 2 weeks postoperatively.</p> <p>Two different EBP tools were used (VAS and WOMAC), and patients noted decreased pain scores in the treatment group. The treatment group also reached their minimum pain score much earlier than the control group.</p> <p>Not many differences were noted in long-term pain management, stiffness, or patient satisfaction between either group.</p>
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<p>YaDeau, J. T., Brummett, C. M., Mayman, D. J., Lin, Y., Goytizolo, E. A., Padgett, D. E., ... Westrich, G. (2016). Duloxetine and subacute pain after knee arthroplasty when added to a multimodal analgesic regimen. <i>Anesthesiology</i>, 125(3), 561-572. https://doi.org/10.1097/ALN.0000000000001228</p>				<p>Grade Level of Evidence: Level I, High Quality</p>
Hypothesis/Questions	Design	Sample	Measurement	Results/Implications
<p>The authors hypothesized that duloxetine's use for 15 days would reduce pain with ambulation at two weeks after total knee replacement surgery.</p>	<p>Triple blinded, randomized, placebo-controlled trial</p>	<p>Eligible patients aged 25 to 75 were English-speaking, followed the protocol, planned to have regional anesthesia, and discharged home or participating rehabilitation center.</p> <p>Patients were also excluded for the use of SNRIs or Duloxetine.</p> <p>One hundred six patients were randomized and analyzed on day 14.</p>	<p>In this triple-blinded, randomized, placebo-controlled trial, patients received either duloxetine or placebo for 15 days, starting from the day of surgery.</p> <p>Patients also received a comprehensive multimodal analgesic regimen, including neuraxial anesthesia, epidural analgesia, an adductor canal block, meloxicam, and oxycodone/acetaminophen as needed.</p> <p>The primary outcome was the pain score (0 to 10 numeric rating scale) with ambulation on postoperative day 14.</p>	<p>Duloxetine did not decrease pain during ambulation, at rest, or flexion.</p>
<p>McDonald S, Page MJ, Beringer K, Wasiak J, Sprowson A. Preoperative education for hip or knee replacement. <i>Cochrane Database of Systematic Reviews</i> 2014, Issue 5. Art. No.: CD003526. DOI: 10.1002/14651858.CD003526.pub3.</p>				<p>Grade Level of Evidence: Level II, High Quality</p>
Hypothesis/Questions	Design	Sample	Measurement	Results/Implications

<p>Total joint replacement is a major surgical procedure that can be physically and psychologically stressful for patients. It is hypothesized that education before surgery reduces anxiety and enhances clinically significant postoperative outcomes.</p>	<p>Metanalysis</p>	<p>Metanalysis of data Searched Cochrane Central Register of Controlled Trials (2013, Issue 5), MEDLINE (1966 to May 2013), EMBASE (1980 to May 2013), CINAHL (1982 to May 2013), PsycINFO (1872 to May 2013) and PEDro to July 2010. The authors searched individually <i>Australian Journal of Physiotherapy</i> (1954 to 2009) and reviewed the reference lists of included trials and other relevant reviews.</p>	<p>Two review authors independently assessed the trial quality and extracted data. Opposing outcomes were analyzed using risk ratios.</p> <p>The authors combined continuous outcomes using mean differences (MD) or standardized mean differences (SMD) with 95% confidence intervals (CI).</p> <p>Data were pooled using a random-effects meta-analysis when it was possible.</p>	<p>This review did not show clear evidence that preoperative education offers benefits over regular or usual care without preoperative education.</p> <p>There was no clear evidence preoperative education offered a benefit in reducing anxiety or pain, function, and unanticipated outcomes.</p> <p>People with depression or anxiety or unrealistic expectations may benefit from preoperative education based on their psychological or social needs.</p>
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<p>Seymour, R. B., Ring, D., Higgins, T., & Hsu, J. R. (2017, November 1). Leading the Way to Solutions to the Opioid Epidemic: AOA Critical Issues. <i>The Journal of Bone and Joint Surgery. American Volume</i>, Vol. 99, p. e113. https://doi.org/10.2106/JBJS.17.00066</p>				<p>Grade Level of Evidence: Level IV, Good Quality</p>
<p>Hypothesis/ Questions</p>	<p>Design</p>	<p>Sample</p>	<p>Measurement</p>	<p>Results/Implications</p>

<p>Orthopedic surgeons are among the highest prescribing providers of narcotics.</p> <p>This is considered a contributing factor to the opioid crisis in the United States</p> <p>If armed with education, alternative methods for pain management, and working collaboratively with patients to develop additional pain strategies, will Orthopedic surgeons lead the way to finding solutions to the opioid crisis?</p>	<p>Literature review, opinion of respected experts.</p> <p>Authors of previous orthopedic journals and leaders of their department of orthopedic.</p>	<p>Literature that reviewed pharmacologic options for pain management, bone, and soft tissue healing, pain relief, and psychology summary.</p>	<p>Proposed solutions for monitoring – Electronic Medical Record (EMR) support, Prescription Drug Monitoring Programs (PDMP), easy access, multidisciplinary team involvement, and providers' alerts.</p>	<p>Orthopedics can take a leading role in the issue of the opioid crisis.</p> <p>It will require additional work with state and national agencies, guidelines, and support for surgeons to utilize protocols that decrease the use of opioids and increase alternative options.</p>
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