FASCIA ILIACA COMPARTMENT BLOCKS FOR PATIENTS WITH ACUTE HIP FRACTURE

by

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As members of the DNP Project Committee, we certify that we have read the DNP project prepared by Kaitlin Nicole Tilton, titled Fascia Iliaca Compartment Blocks for Patients with Acute Hip Fracture and recommend that it be accepted as fulfilling the DNP project requirement for the Degree of Doctor of Nursing Practice.

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Final approval and acceptance of this DNP project are contingent upon the candidate's submission of the final copies of the DNP project to the Graduate College.

I hereby certify that I have read this DNP project prepared under my direction and recommend that it be accepted as fulfilling the DNP project requirement.

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DEDICATION

To my dear husband, Ryan. Thank you for devoting the past three years to support me on this journey. I love you, *Habibi.*

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ABSTRACT

Purpose. The purpose of this quality improvement (QI) project was to increase anesthesia provider utilization of the fascia iliaca compartment block (FICB) for perioperative pain management in patients with acute hip fractures through an educational workshop and development of a clinical practice guideline (CPG).

Background. At a Level I trauma center in south Texas, opioids continue to be the primary source of perioperative pain management among geriatric patients with acute hip fracture. Currently, no standard pain management protocol exists for this special population. Optimizing quality pain control while limiting opioid-related adverse effects presents a unique challenge for the anesthesia provider, as both adverse effects and uncontrolled pain produce unfavorable problems in this population, resulting in prolonged hospital stay and increased costs (Bordi 2018; Castillon et al., 2017).

Methods. This doctor of nursing practice (DNP) project was completed by three DNP-Nurse Anesthesia (NA) students whom each had a role in organizing this educational workshop. A CPG was developed by the students and evaluated by a group of certified registered nurse anesthetists (CRNAs) in Arizona. The educational workshop included a PowerPoint (PPT) presentation and hands-on FICB regional training. A pre- and post-education survey, proficiency quiz, and 30-day follow up survey were used to measure knowledge and whether this project resulted in a practice improvement. A convenience sample of 30 CRNAs employed at this facility were invited to participate in this one-day educational workshop.

Results. A total of 17 (57%) CRNAs participated on the day of the educational workshop. Data from pre- and post-education surveys demonstrated a significant increase in knowledge (24%)

and intent to utilize (24%) FICB in the perioperative setting. The 30-day follow-up survey had a limited response (n=5) compared to initial participants (n=17), but the results showed anesthesia providers (80%) utilized the CPG, thirty days following education. All 30-day follow-up survey participants (100%) acknowledged that the educational workshop was beneficial.

Conclusion. The educational workshop was useful in increasing implementation of the FICB for pain management among patients with hip fractures. Future projects should focus on sustainability of evidence-based practices and barriers to implementation.

INTRODUCTION

A peripheral nerve block is a form of regional anesthesia utilized to block the sensation and transmission of pain signals in a specific region of the body. It is most commonly used to manage perioperative pain, as effects can be seen within minutes and last up to eight hours (Dalens et al., 1989; Pinson, 2015). Current evidence supports and recommends using a fascia iliaca compartment block (FICB) for pain control in patients presenting with acute hip fractures (Hsu et al., 2018; Wang et al., 2017). This doctor of nursing practice (DNP) project was a group effort carried out by three senior DNP nurse anesthesia (NA) students. These three project managers (PMs) hypothesized that educating anesthesia providers on FICBs and how to implement them would increase FICB use and adoption as standard practice for patients with acute hip fractures.

Background Knowledge

Among the geriatric population, accidental falls are the number one cause of injury and injury-related deaths (Centers for Disease Control and Prevention [CDC], 2016a). As of 2016, the Centers for Disease Control and Prevention (CDC) reported over 95% of hip fracture injuries occur due to falling and over 300,000 older adults, aged 65 and older are hospitalized annually as a result (CDC, 2016b). In the United States (US), hip fracture rates are the highest globally and are estimated to cost 12 billion dollars annually (Casey et al., 2017; Dhanwal et al., 2011). Several factors contribute to the high-cost burden, including inpatient admissions, outpatient visits, physician care, home medical equipment, skilled nursing facilities, home health care, rehabilitation, and hospice (Adeyemi & Delhougne, 2019). A 2019 retrospective database analysis revealed inpatient, and skilled nursing facility admissions made up 76.3% of total hip-

fracture-associated costs (Adeyemi & Delhougne, 2019. Furthermore, a study by Weycker et al. (2016) determined the cost of an average hospital stay for patients with hip fractures was $14,744 with an average inpatient admission duration of 5.6 days.

Although immediate surgical fixation of hip fracture is recommended in this population, surgical delays can occur due to lack of surgical provider availability or need for preoperative clearance (Ma et al., 2018). Opioids are most commonly used to provide pain management to this population during the perioperative period (Haines et al., 2012). Frequent opioid administration, with standard adult dosing, can produce detrimental side effects in the older adult population including, delirium, cardiovascular compromise, and respiratory depression resulting in increased hospital length-of-stay (LOS) and increased costs (Haines et al., 2012; Makhoul, 2019b). Alternatively, the risk of harmful side effects from opioid medications may cause providers to limit their usage, resulting in uncontrolled pain during the perioperative period. Uncontrolled pain can also produce adverse neurologic, cardiovascular, and respiratory effects. These adverse effects include delirium, dysrhythmias, myocardial ischemia, atelectasis, and hyperventilation, which contribute to prolonged recovery and increased costs (Bordi, 2018; Castillon et al., 2017).

A study by Hamilton et al. (2019) revealed peripheral nerve blocks were associated with a decrease in hospital LOS and associated inpatient costs. As the population's median age increases, hospitals will see an increase in hip fracture rates, and the economic burden will continue to grow (Wennberg et al., 2019). Optimal pain control must be a top priority in this population in order to enhance patient outcomes, reduce prolonged recovery, and decrease health

care costs associated with increased hospital LOS. Current literature recommends the use of FICBs for pain control in patients suffering from an acute hip fracture.

Fascia Iliaca Compartment Block

The FICB is a type of regional anesthetic that provides localized anesthesia and analgesia to the anteromedial portion of the thigh and medial portion of the lower leg (Odom-Forren & Brady, 2018). The fascia iliaca compartment is a potential space within the groin that sits anterior to the femoral and lateral femoral cutaneous nerves (Dalens et al., 1989). The primary goal of an FICB is to block nerve conduction of the femoral, lateral femoral cutaneous, and obturator nerves, and provide localized analgesia to the patient with a hip-related injury for up to eight hours (Dalens et al., 1989; Pinson, 2015). Although previous studies have deemed a volume of 30ml to 40ml of anesthetic as necessary to ensure adequate spread to all three nerves, a recent study by Xu et al. (2020), determined the potential space of the fascia iliaca compartment holds about 23ml and suggest a volume greater than 20ml may overflow the fascia iliaca compartment.

While the literature varies on the type of femoral nerve blockade utilized for hip fracture pain, FICB is thought to be a safer block when compared with a femoral nerve block (FNB) and 3-in-1 FNB (Hsu et al., 2018; Wang et al., 2017). The traditional FNB technique targets the femoral nerve through injection directly around the femoral nerve itself (Ritcey, 2016). The safety of FNB administration has been questioned due to the femoral nerves' proximity to major vessels (Wang, Sun, Wang, & Hao, 2017). The 3-in-1 block is similar but includes the use of distal pressure during injection, which theoretically moves the injected anesthetic upwards in an

attempt to provide additional blockade to the obturator and lateral femoral cutaneous nerves (Ritcey, 2016).

The FICB is unique in that it indirectly targets the femoral, obturator, and lateral femoral cutaneous nerves. This method allows for injection into the fascial plane that sits superiorly to these three nerves. Similar to other blocks in this region, the provider must be cognizant of surrounding structures, such as the femoral artery and vein. Direct visualization of the needle and fascial target under ultrasound should be obtained prior to administration of local anesthetic. While the fascial plane is a potential space that presents a more substantial and less complicated target for the administering provider, careful attention should be paid to surrounding structures to decrease risk of adverse events (Hsu et al., 2018; Wang et al., 2017).

Local Problem

This project was originally developed for emergency department (ED) providers at a small community hospital on the island of Hawaii. However, due to implementation challenges as a result of COVID-19, this project was revised to meet the needs of anesthesia providers at a hospital in south Texas. In 2016, it was reported that 19,789 patients in the state of Texas were diagnosed with acute hip fractures (Texas Department of State Health Services, 2016). According to the Texas Department of State Health Services (2016), this hospital in south Texas saw 96 cases of hip fracture, averaging about eight hip fractures per month during 2016.

Perioperative pain management at this facility is managed by anesthesia providers who have knowledge and experience of the most up-to-date information regarding pain. These providers acknowledged that opioid use presents unique challenges for the geriatric population, and currently, no standard pain management protocol exists for patients with acute hip fractures.

After discussion with anesthesia providers at this hospital, it was identified that provider skill level with regional blockade varies and understanding FICB administration is only well-understood by a handful of providers. The PMs hypothesized that a clinical practice guideline (CPG) would be useful in increasing utilization of an FICB, resulting in improved pain control and decreased pain management variability for this population. Among anesthesia providers, critical stakeholders for this project included orthopedic surgeons, registered nurses (RNs), and patients with hip fractures.

Intended Improvement

Project Purpose

The purpose of this quality improvement (QI) project was to increase anesthesia provider utilization of the FICB for perioperative pain management in patients with acute hip fractures through an educational workshop and development of a CPG.

Project Question

Will anesthesia providers at a Level I trauma center in south Texas, caring for patients with acute hip fractures, adopt and implement FICBs for pain management following an educational workshop and development of a CPG?

Project Objectives

The primary objectives of this project were to change current practice by increasing the use of FICB in the perioperative setting, increase provider knowledge in block administration, and increase provider intent to utilize regional anesthesia for those presenting with acute hip fractures. Pre-education and post-education surveys were used to evaluate if these aims were

met. A secondary aim of this project included the use of the developed CPG as a provider reference tool.

Theoretical Framework

The theoretical framework forming the basis of this project is Kolcaba's *theory of comfort*, first described by Katherine Kolcaba in the 1990s. Kolcaba (1992) describes comfort as a basic human need that is complex and multifaceted (Malinowski, 2002). Due to its complex nature, Kolcaba aimed to provide a framework for helping individuals achieve optimal comfort (1992).

Kolcaba (2002) describes comfort as a two-dimensional state of strengthening achieved through three stages – including relief, ease, and transcendence; and four contexts – including physical, psychospiritual, environmental, and sociocultural (Figure 1). She explains when a patient achieves comfort in one stage or context, this increases the achievement of comfort in another context (Kolcaba, 1992). On the contrary, when discomfort occurs in one stage or context, this precipitates discomfort in other stages (Kolcaba, 1992). The interrelationships between these stages and contexts are what creates optimal or suboptimal holistic comfort (Kolcaba, 1992).

Relief is defined as a state of alleviation from discomfort, *ease* is synonymous with a state of contentment, and *transcendence* is described as the ability or willingness to rise above a discomfort or problem (Kolcaba, 2001; Kolcaba & Wilson, 2002). Kolcaba (2003) explains the achievement of each state may occur separately or consecutively. In some cases, a lack of relief may impede transcendence. For example, a patient may not be able to achieve the ability to overcome the discomfort without bringing pain relief to a more tolerable level (Kolcaba, 2003).

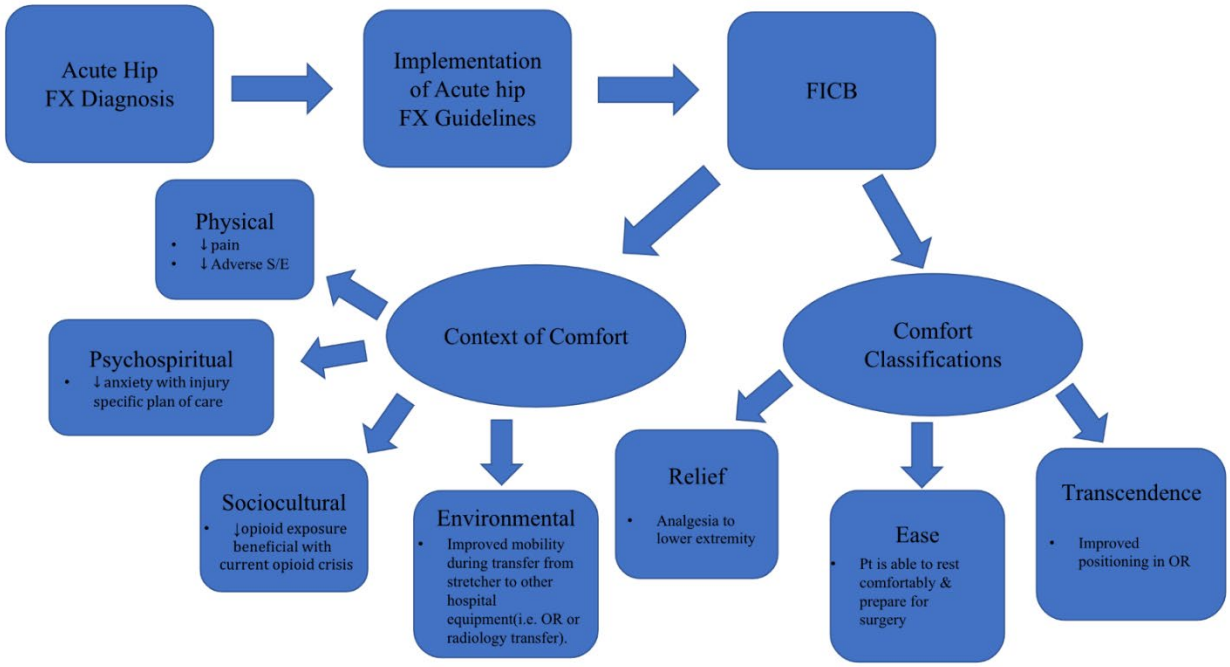
In other cases, a patient may not have pain and not require relief but may be dealing with depression, in which case they require transcendental comfort (Kolcaba, 1992).

The development of a guideline for implementation of FICB in patients who present with hip fracture aims to provide patients with *physical* pain relief. Physical discomfort includes a sensation or mechanism in which homeostasis is disrupted (Kolcaba & Wilson, 2002). The physical discomfort experienced with hip fractures can precipitate discomfort in the three other contexts described by Kolcaba and Wilson (2002). In addition to physical pain, patients with hip fractures must deal with concerns about factors surrounding their acute hip injury, including surgery, hospital stay and duration, decreased mobility, rehabilitation, and fear of future falls. These concerns create *psychospiritual* disruption, which Kolcaba (2003) defines as impairment in one's self-concept, inducing anxiety, stress, and loss of control (Kolcaba, 2003). Psychospiritual comfort can also be disrupted due to cognitive impairment produced by frequent use of opioid drugs typically used to treat pain. Frequent positioning, noise, bright lights, and chaos in the hospital setting can precipitate *environmental* discomfort. Stigmas surrounding standard pain control with opioid use can create *social* discomfort for hip fracture patients (Kolcaba, 2003).

All four contextual factors described by Kolcaba can be applied to this project (Figure 1). The physical domain primarily guides the FICB intervention, while the psychospiritual, sociocultural, and environmental are secondary components affected by FICB intervention. When provided with localized analgesia, patients have increased comfort and opportunity to achieve transcendence, or the ability to overcome the many discomforts surrounding their acute situation.

Figure 1

Application of Kolcaba's Theory of Comfort



Note: Adapted from "Comfort Care: A Framework for Perianesthesia Nursing," by Kolcaba & Wilson, 2002, *Journal of Perianesthesia Nursing, 17*(2), 102-114.

Literature Synthesis

Evidence Search

A comprehensive literature search was completed using the PubMed, Cumulated Index to Nursing and Allied Health Literature (CINAHL), and Embase databases. In an attempt to narrow the search for recent evidence on the use of FICB and hip fractures, a combination of terms were utilized, including "fascia iliaca," "hip," and "fracture." The search included articles published within the last five years. Between the three databases, 268 articles were produced. Of these 268 articles, 78 were duplicates and were eliminated. The remaining articles were screened, and an additional 149 articles were eliminated due to lack of relevance to FICB and hip fracture,

specifically including studies focused on local anesthetics, femoral nerve blocks, and 3-in-1 blocks. The remaining 41 articles pertinent to FICB and hip fracture were appraised, and 28 more were eliminated as they focused on combination blocks, the non-preoperative period, or the use of a continuous catheter. Twelve studies were selected and synthesized for this project, including six randomized-controlled trials (RCTs), three systematic reviews, and three meta-analyses (Appendix H). The American Academy of Orthopaedic Surgeons (AAOS) *Management of Hip Fractures in the Elderly: Evidence-Based Clinical Practice Guideline and the Irish Association for Emergency Medicine Clinical Guidelines* were also selected for appraisal of evidence resulting in 14 total evaluated sources.

Comprehensive Appraisal of Evidence

Pain Management

Of the 12 studies selected, eight studies demonstrated FICB was significantly superior in managing fracture-related pain when compared with systemic intravenous (IV) analgesics (Guay et al., 2017; Hong & Ma, 2019; Hsu et al., 2018; Kacha et al., 2018; Pasquier et al., 2019; Pinson, 205; Steenberg & Møller, 2018; Wennberg et al., 2019b). Four sources reported FICB was more effective in controlling movement-related pain, such as with positioning, when compared with systemic analgesics alone (Guay et al., 2017; Hsu et al., 2018; Kacha et al., 2018; Steenberg & Møller, 2018). FICB was associated with decreased positioning-related pain and was responsible for a reduction in time to perform spinal anesthesia preoperatively (Steenberg & Møller, 2018). Two studies also reported FICB administration resulted in significantly less preoperative systemic opioid consumption (Hong & Ma, 2019; Steenberg & Møller, 2018). This was evidenced by decreases in average morphine dose consumption from 7.42 mg to 4.11 mg

($p=0.03$), 6 mg to 0 mg ($p<0.01$), and 5mg to 0 mg ($p=0.03$) (Steenberg & Møller, 2018). Zhang & Ma (2019) evaluated the use of FICBs with patients undergoing total hip arthroplasty and reported the FICB was superior in controlling pain for up to 24 hours after FICB implementation. Of the 12 studies, FICBs were never found to be less effective in managing pain when compared with systemic IV analgesics.

The pain management recommendations included in the AAOS CPG were based on six high strength studies and one moderate strength study (Makhoul, 2019a). Of the seven studies, six evaluated the use of regional blockade, and one evaluated the use of neuraxial blockade for pain management (AAOS, 2014). The regional technique varied among the six studies, with four of the studies utilizing the FICB (AAOS, 2014; Makhoul, 2019a). Regional blockade was found to significantly reduce preoperative pain in all six studies (AAOS, 2014).

Analgesic-related Side Effects

While two of the 12 studies reported no difference in adverse effects, several studies demonstrated that FICB implementation led to decreased opioid-related side effects. Hsu et al. (2018) reported no difference in hemodynamic effects when comparing FICBs to IV analgesics. Wennberg et al. (2019a) reported no changes or improvements in cognitive status with the FICB. However, four studies concluded use of the FICB resulted in decreased incidence of nausea and vomiting, delirium, reduction in oxygen saturation, sedation, and hemodynamic instability, commonly seen with opioid pain management (Kacha et al., 2018; Ma et al., 2018; Pinson, 2015; Zhang & Ma, 2019).

Reduced Hospital Length-of-Stay

Two sources reported that FICB implementation significantly reduced hospital LOS (Ma et al., 2018; Zhang & Ma, 2019). Five of the eight studies evaluated by Zhang and Ma (2019) demonstrated decreased LOS in subjects who received analgesia with an FICB ($p<0.05$). Ma et al. (2018) reported hospital LOS was decreased by four days ($p=0.001$) in patients who received an FICB.

Strengths of Evidence

Currently, there is a wealth of high-quality literature available on FICBs and pain management. All studies evaluated for this project were comprised of RCTs, systematic reviews, meta-analyses, and CPGs published within the last five years. Of the six RCTs evaluated, only one had a sample size of fewer than 50 participants. All other RCTs had close to 100 participants or more. All of the studies demonstrated FICBs are effective for hip fracture-related pain control and associated with better patient outcomes. The literature is not controversial and does not indicate FICB worsens fracture-related pain.

Weaknesses of Evidence

It is evident that the FICB is optimal for hip fracture-related pain control; however, inconsistencies in the type of local anesthetic and volume used varied among the studies. Currently, the literature is inconclusive as to which local anesthetic provides the most optimal pain control. Additionally, the FICB technique used varied among studies, which may have also produced inconsistencies in the findings. Some studies discussed the use of ultrasound-guided technique while other studies utilized the landmark technique. It has been argued that use of the landmark technique may alter the safety and efficacy of FICBs (Hong & Ma, 2019).

Gaps and Limitations

Of the studies evaluated, only one source addressed the necessary time to implement an FICB. While one systematic review addressed the average time to place an FICB was around six minutes, other studies did not address the time to implement (Steenberg & Møller, 2018). Time is a crucial element in the health care environment. It would be beneficial for future studies to include this information, as time is a critical factor when considering stakeholder buy-in for implementation. Additionally, it has been suggested that an FICB is safer than an FNB or 3-in-1 FNB. However, there was limited discussion regarding safety variability between ultrasound and landmark technique for this specific block. Further studies are needed to confirm the risk reduction associated with FICB (Hsu et al., 2018; Wang et al., 2017).

METHODS

Project Design

This QI group project was completed by three PMs (Appendix F). It was designed as an educational intervention that included the development of a CPG, educational presentation, and hands-on training. Data were analyzed using quantitative methods through pre-and post-education surveys, as well as a follow-up survey, all comprised of open- and close-ended questions.

This project allowed anesthesia providers to receive the most up-to-date evidence on hip fracture pain management and learn the necessary skills required to implement an FICB. The PMs anticipated provider knowledge and intent to utilize FICB would increase, following education and training. The developed CPG was implemented as a reference tool, inclusive of

the most recent evidence-based recommendations. Use of this tool was evaluated through a 30-day follow-up survey.

Model for Implementation

The conceptual model that guided this QI project was the *model for improvement* developed by Associates in Process Improvement (Institute for Healthcare Improvement [IHI], 2020). This model is comprised of two distinct components and serves to provide a guideline for change initiation and testing in the clinical environment (IHI, 2020). The first forms the foundation for a change and is made up of the following three questions: (1) What are we trying to accomplish? (2) How will we know that a change is an improvement? (3) What change can we make that will result in improvement? (IHI, 2020). These questions required the PMs to establish a measurable goal and define what change would be made in order to achieve the goal (IHI, 2020). The second component is comprised of a plan-do-study-act (PDSA) cycle, which is a process that guides the project members to test a change, make adjustments, and re-test the change as often as needed (IHI, 2020).

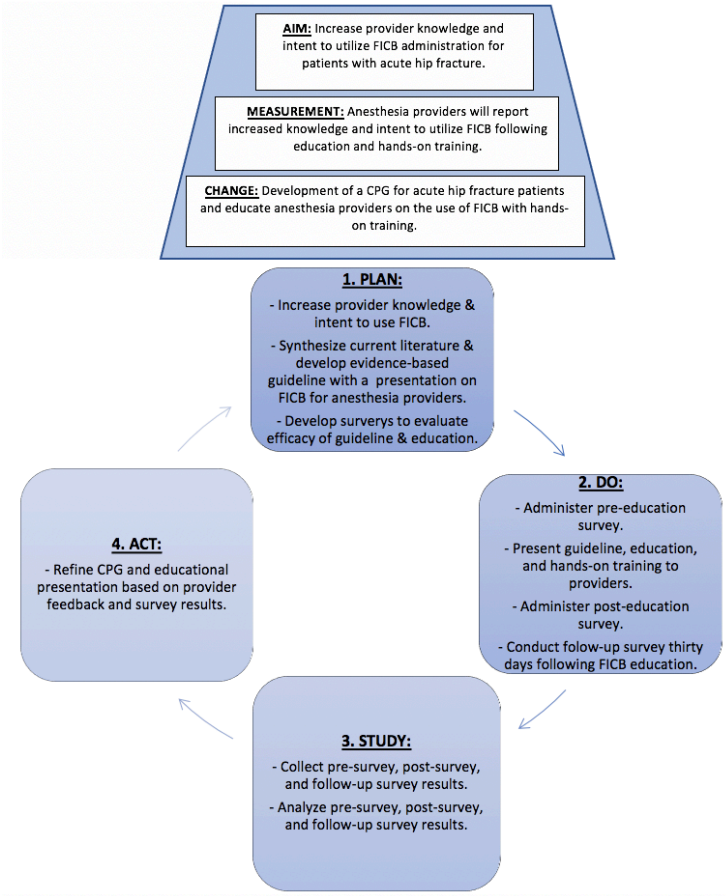
The application of the model to this project can be found in Figure 2. This project aimed to increase provider knowledge and intent to utilize FICB administration for patients presenting with acute hip fractures. Increased knowledge and intent to use an FICB as part of a pain management plan was evaluated by comparison of pre-education and post-education survey findings. The changes made included the development of a CPG and delivery of an education and hands-on training session.

The '*Plan'* stage of the PDSA cycle was comprised of a synthesis of evidence, development of a CPG, creation of an educational presentation, set-up of a hands-on training,

and development of multiple surveys. The '*Do'* stage included the administration of a pre-education survey, delivery of an educational workshop, and administration of a post-education and follow-up survey. Collection and analysis of all surveys encompassed the '*Study'* stage. Lastly, the '*Act'* stage involved the refinement of the CPG and educational presentation based on provider feedback and survey results. A future DNP student undertaking this project, or an extension of this project would allow for additional PDSA cycles to be completed.

Figure 2

Concepts from the Model of Improvement and Plan-Do-Study-Act



Concepts developed by Associates in Process Improvement as it relates to this DNP project. Adapted from *"The Improvement Guide: A Practical Approach to Enhancing Organizational Performance (2nd ed.)," by* G.L. Langley, R. Moen, K.M. Nolan, T.W. Nolan, C.L., Norman, & L.P. Provost, 2009. Copyright 2009 by San Francisco, CA: Jossey-Bass Publishers; 2009.

Setting and Stakeholders

The setting in which this project was implemented was a large, 530-bed hospital functioning as a Level I trauma center in south Texas (American College of Surgeons, n.d.; DHR Health, n.d.a). This physician-owned hospital focuses on providing comprehensive, around the clock, high-quality trauma care to the communities surrounding the U.S. southern border (American College of Surgeons, n.d.). As of 2019, it was designated a Level I trauma center, making it the first hospital in the region to offer highly specialized surgical trauma care to the surrounding communities (DHR Health, n.d.a). In addition to providing 24-hour emergency services, this hospital offers services in a variety of specialties including but not limited to orthopedic, maternal, bariatric, transplant, pediatric, neuroscience, cardiology, rehabilitation, and surgical care services (DHR Health, n.d.b.).

This project was in alignment with this hospital's mission and commitment to process improvement. Anesthesia provider adoption of this practice change was critical to its success. Buy-in was addressed by presenting patient benefits and barriers including time constraints. Key stakeholders included anesthesia providers, orthopedic surgeons, RNs, and patients. Site authorization was obtained by the facility (Appendix A) and project implementation began following Institutional Review Board (IRB) approval from The University of Arizona and the hospital (Appendix A).

Planning the Intervention

Each PM made individual and group contributions to project planning and implementation (Appendix F). *Project manager A* developed the educational PPT presentation that described FICB and the most recent literature that supports its use. The 30-minute

presentation addressed how to determine patient eligibility for regional analgesia, how an FICB is administered, and how to manage complications related to local anesthetics. *Project manager B* developed pre-education, post-education, and 30-day follow up surveys that were used to evaluate the presentation, hands-on training session, and use of the CPG. *Project manager C* organized the hands-on training session and volunteered as the live model for ultrasound scanning. Originally, the hands-on training was to be taught by an expert in regional anesthesia, however due to COVID-19, the hands-on training was modified. Each participant was allotted 15 minutes for hands-on training. The educational workshop lasted approximately 4 hours. All three PMs developed the 5-question proficiency quiz administered following the workshop.

The PMs developed a CPG based on the most recent available literature, the AAOS CPG, and the Irish Association for Emergency Medicine CPG. The CPG was evaluated by a group of Arizona CRNAs (n=5) to determine if it was a quality CPG. The CPG was evaluated by the Appraisal of Guidelines Research & Evaluation – Recommendation Excellence (AGREE-REX) tool (Figure 3). Anonymous AGREE-REX scores were received about eight weeks after sending the CPG to the Arizona CRNAs. Revisions were made to the CPG to include recommendations from tool evaluators.

On the day of the event, a pre-education survey (Appendix D) consisting of two demographic and 11 knowledge-based questions was handed out in person to each participant prior to the PPT presentation. Participants were asked to complete the survey within 10 minutes and to not write their name on the survey. Surveys were collected by a PM prior to the start of the presentation. Following pre-education survey administration, the 30-minute educational presentation was presented via PPT along with the developed CPG. Following the presentation,

the four-hour hands-on training session was implemented. The PMs were educated on the FICB by an experienced regional block CRNA employed at the facility. However, on the day of the workshop, the CRNA was not able to attend. A stand-by CRNA was available by phone for questions as the PMs taught participants how to identify pertinent anatomy under ultrasound and simulated the direction of needle placement with in-plane technique. The hands-on session allowed providers to identify pertinent anatomy, find the correct fascial plane for local anesthetic dispersal, and get familiar with their facility's ultrasound equipment. Following the educational workshop, PM-C administered a post-education survey (Appendix D) and five-question quiz to each provider (Appendix D). Participants were asked to complete the two surveys prior to leaving the workshop.

AGREE-REX Tool

The AGREE-REX Tool (Figure 3) is made up of three domains and nine items that are used to evaluate the quality of a developed guideline (AGREE-REX Research Team, 2019). The first domain focuses on clinical applicability, which encompasses the evaluation of evidence, applicability to users, and applicability to patients and populations (AGREE-REX Research Team, 2019). The second domain focuses on values and preferences, which helps the AGREE-REX tool user consider the values and preferences of target users, patients, decision-makers, and guideline developers (AGREE-REX Research Team, 2019). Lastly, the third domain emphasizes implementability, which evaluates the goals and purpose of the guideline as well as its application to the local setting (AGREE-REX Research Team, 2019).

Each item within each domain is scored using two evaluation statements (AGREE-REX Research Team, 2019). The first statement for each item is used to evaluate quality (AGREE-

REX Research Team, 2019). The tool user must rank quality based on a seven-point Likert scale (Figure 4); seven indicates the *highest quality*, and one means *lowest quality* (AGREE-REX Research Team, 2019). The second statement for each item is used to evaluate the CPG's suitability for use (AGREE-REX Research Team, 2019). A seven-point Likert scale is also used with statements, with seven indicating *strongly agree* and one stating *strongly disagree* (AGREE-REX Research Team, 2019). At the end of the tool, the user must answer two questions regarding the entire guideline. The first question asks the user to indicate whether or not they recommend the use of the CPG in *an appropriate context* (AGREE-REX Research Team, 2019). The second question asks the user to indicate whether or not the CPG is relevant for use *in their context* or *setting* (AGREE-REX Research Team, 2019). For both questions, the user can select one of the following: *yes, yes with modifications,* or *no* (AGREE-REX Research Team, 2019). An overall score is calculated by adding each of the item scores, then scaling the total as a percentage of the maximum possible score (AGREE-REX Research Team, 2019).

Currently, there are no specific scores that indicate a certain level of quality or applicability of a CPG (AGREE-REX Research Team, 2019). The practice setting and relevant criteria should guide the CPG appraisal (AGREE-REX Research Team, 2019). It is recommended that minimum quality and applicability scores be determined by setting stakeholders before CPG appraisal (AGREE-REX Research Team, 2019).

Figure 3

AGREE-REX Tool

Domains	Items
1 – Clinical Applicability	1 – Evidence 2 – Applicability to Target Users 3 – Applicability to Patients and Populations
2 – Values and Preferences	4 – Values and Preferences of Target Users 5 – Values and Preferences of Patients/Populations 6 – Values and Preferences of Policy/Decision-Makers 7 – Values and Preferences of Guideline Developers
3 – Implementability	8 – Purpose 9 – Local Application and Adoption

Adapted from "The Appraisal of Guidelines Research & Evaluation – Recommendation Excellence (AGREE-REX)," by AGREE-REX Research Team, 2019. *AGREE-REX Recommendation Excellence,* p. 5.

Participants and Recruitment

There are 30 CRNAs employed at this facility. One week prior to the event, PM-B placed the participant letter (Appendix C) and training flyer (Appendix C) in the anesthesia lounge for participant recruitment. A disclosure form (Appendix B) was provided to the participants prior to the initiation of the pre-education survey. The disclosure form informed the participants of what to expect from the educational workshop and project, explained there were no foreseeable risks involved with participation, and disclosed that participation was voluntary. Participants were informed that refusal to participate or the choice to withdraw was not associated with any penalty.

The inclusion criteria for the educational presentation included anesthesia providers who voiced interest in learning the FICB for improving pain management in patients with hip fractures. Four RNs working in the preoperative and postoperative areas were invited to the presentation as they play a significant role in advocating for pain management, assisting

providers with block placement, managing pain, and monitoring for related side effects. Registered nurses were excluded from the hands-on training as well as from the surveys and quiz.

Consent and Ethical Considerations

Before the initiation of this project, the hospital's IRB and the University of Arizona IRB reviewed this project and deemed it "not human research." The disclosure statement (Appendix B) and recruitment letter (Appendix C) were provided to all participants prior to the initiation of the project, and participation was voluntary. Participants were asked not to disclose any personal identification information such as name or date of birth when completing the surveys. All survey information, as well as proficiency quiz results, were entered directly into Qualtrics by the PMs and they were the only individuals with access to the results. No other individuals had access to project data.

Data Collection

Data collection was completed through a four-step process, including 1) an in-person pre-education survey, 2) post-education survey, 3) proficiency quiz, and 4) 30-day online follow-up survey. The pre-education survey (Appendix D) was administered and collected prior to the educational workshop and the post-education survey (Appendix D) and proficiency quiz (Appendix D) were administered and collected at the conclusion of the educational workshop. Thirty days following the workshop, a 30-day online follow-up survey (Appendix D), developed in Qualtrics, was sent to the chief CRNA for disbursement to all participants. This process was intended to maintain anonymity of all follow-up survey participants. Results automatically populated into Qualtrics. To determine the surveys' reliability and readability, all project

managers, the project committee chair, and two project committee members reviewed the developed surveys before survey dispersal.

Pre-Education Survey

The pre-education survey (Appendix D) was made up of two demographic and 11 knowledge-based questions. Three open-ended Likert-type questions were used to gather professional demographic data and experience with FICB administration. One close-ended dichotomous question and eight open-ended Likert-type statements were used to collect data regarding FICB administration. For example, the participant had the option to select *strongly disagree, disagree, agree, or strongly agree*, for possessing the anatomical knowledge necessary to perform an FICB. The participant had the same response options for statements that addressed possessing the necessary technical skills to perform an FICB and intent to utilize FICB in practice. The survey also included statements that evaluated provider confidence level in performing an FICB and treating drug-related side effects.

Post-Education Survey

The post-education survey (Appendix D) included twelve of the fourteen questions included in the pre-education survey to determine if a change was made with education implementation. Participants were instructed to complete the paper survey after they finished the hands-on training portion of the workshop. Surveys were deposited in a file folder on a table in the anesthesia room and collected by the PMs following completion of the workshop.

Proficiency Quiz

The proficiency quiz (Appendix D) was comprised of five questions evaluating provider knowledge of topics addressed in the educational workshop. Questions evaluated understanding

of anatomy, complications, pharmacology, and contraindications associated with an FICB. This quiz was administered along the post-education survey following workshop completion.

Thirty-day Follow-Up Survey

The 30-day follow-up survey (Appendix D) was comprised of three closed-ended and three open-ended questions. This survey evaluated the use of the developed CPG 30 days following project implementation and barriers to FICB implementation. The 30-day follow-up survey was emailed to the chief CRNA, who forwarded the survey to all CRNAs, and asked those who attended the workshop to fill out the survey within one week.

Data Analysis

The PMs utilized descriptive statistics to analyze quantitative data. All quantitative data from the pre-and post-education surveys and the proficiency quiz was manually entered into Qualtrics for analysis. All 30-day follow-up survey results were automatically populated into Qualtrics via online survey distribution. Data were displayed using bar charts, percentages, and frequencies. Pre-and post-education survey results, demonstrating greater than a 20% increase, revealed a significant improvement. Data were analyzed separately by each PM to remove the incidence of bias. Analysis methods and results were discussed and agreed upon by all three PMs to promote consistency among findings.

RESULTS

Outcomes

Five tools consisting of a CPG scoring sheet, pre-education survey, post-education survey, proficiency quiz, and follow-up survey were used to evaluate data for this project.

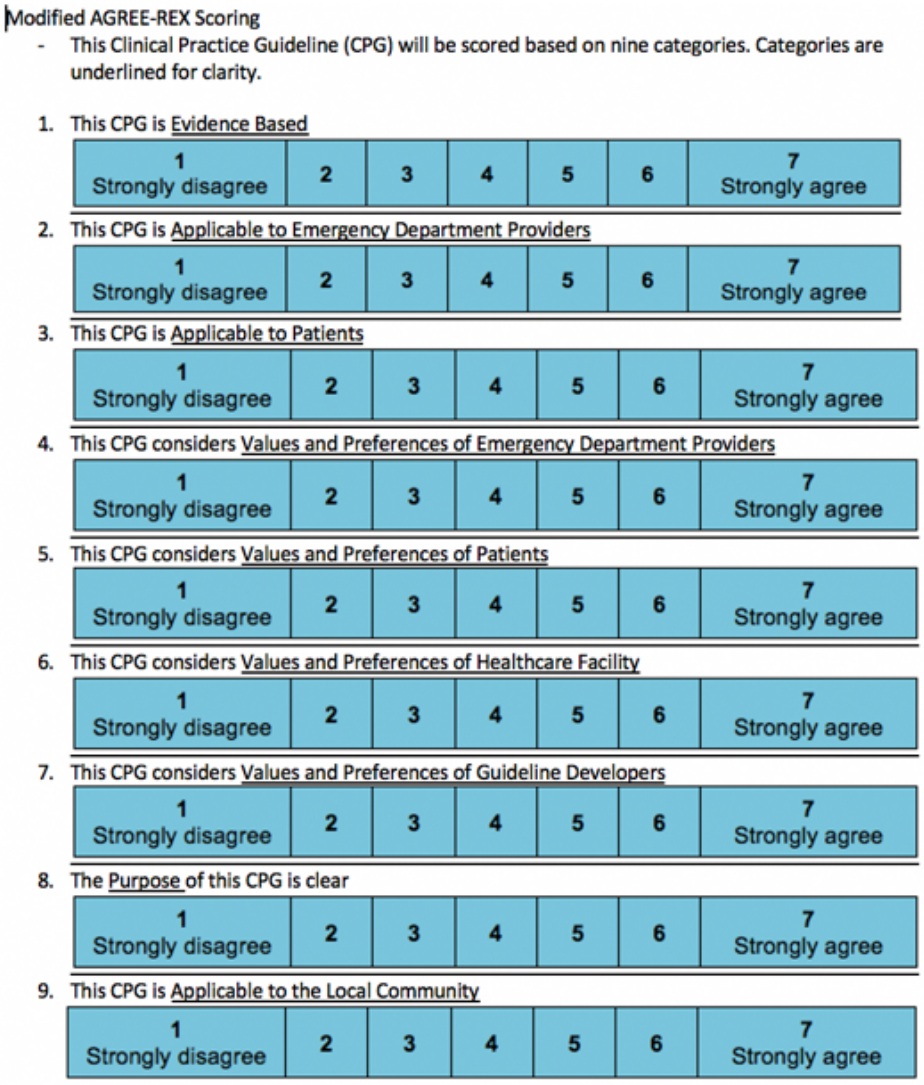
AGREE-REX Guideline Grading Scores

The AGREE-REX tool was utilized by Arizona CRNAs (n=5) to evaluate the developed CPG for quality prior to project implementation. Evaluators assigned a score (ranging from '1' [strongly disagree] to '7' [strongly agree]) to each of the nine items (Figure 4). Domain 1 (clinical applicability) was scored by items one through three, domain 2 (values and preferences) was scored by items four through seven, and domain 3 (implementability) was scored by items eight and nine (Table 1). The maximum total score for each item was added together, then divided by the highest possible score for each item.

A high-quality domain score was determined to be a score greater than 70%, while a low-quality score was determined to be less than 30% (AGREE-REX Research Team, 2019). A score less than 70% but greater than 30% indicated moderate-quality (AGREE-REX Research Team, 2019). The CPGs' clinical applicability and implementability were determined to be of high quality as indicated by scores of 87.7% and 76.6%, while alignment with values and preferences was determined to be of moderate quality, as evidenced by a score of 47.5% (Table 1). All five evaluators recommended the CPG for clinical use (Table 1). In the comments section, four of the five appraisers indicated that dosing and administration of lipid emulsion in treatment for local anesthetic systemic toxicity (LAST) be included within the CPG. Revisions were made to include dosing and administration for lipid emulsion. Additionally, revisions were made to tailor the guideline toward anesthesia providers to account for the evolution of the project to the new site.

Figure 4

AGREE-REX Tool Result



Modified AGREE-REX Scoring

- This Clinical Practice Guideline (CPG) will be scored based on nine categories. Categories are underlined for clarity.

1. This CPG is Evidence Based

1 Strongly disagree	2	3	4	5	6	7 Strongly agree

2. This CPG is Applicable to Emergency Department Providers

1 Strongly disagree	2	3	4	5	6	7 Strongly agree

3. This CPG is Applicable to Patients

1 Strongly disagree	2	3	4	5	6	7 Strongly agree

4. This CPG considers Values and Preferences of Emergency Department Providers

1 Strongly disagree	2	3	4	5	6	7 Strongly agree

5. This CPG considers Values and Preferences of Patients

1 Strongly disagree	2	3	4	5	6	7 Strongly agree

6. This CPG considers Values and Preferences of Healthcare Facility

1 Strongly disagree	2	3	4	5	6	7 Strongly agree

7. This CPG considers Values and Preferences of Guideline Developers

1 Strongly disagree	2	3	4	5	6	7 Strongly agree

8. The Purpose of this CPG is clear

1 Strongly disagree	2	3	4	5	6	7 Strongly agree

9. This CPG is Applicable to the Local Community

1 Strongly disagree	2	3	4	5	6	7 Strongly agree

Overall, I would recommend this CPG be used under appropriate contexts. YES NO

Additional comments:

Table 1

AGREE-REX Tool Final Scores

Domain 1: Clinical Applicability

	Item 1	Item 2	Item 3	Total
Appraiser 1	6	6	7	19
Appraiser 2	6	6	6	18
Appraiser 3	6	6	6	18
Appraiser 4	7	7	7	21
Appraiser 5	6	6	6	18
Total	31	31	32	94

94-15/ 105-15 → 79/90 = 87.7% *High Quality*

Domain 2: Values & Preferences

	Item 4	Item 5	Item 6	Item 7	Total
Appraiser 1	4	4	4	6	18
Appraiser 2	4	6	6	N/A	16
Appraiser 3	3	3	3	6	15
Appraiser 4	1	1	1	6	9
Appraiser 5	4	4	4	7	19
Total	16	18	18	25	77

77-20/ 140-20 → 57/ 120 = 47.5%. *Moderate Quality*

Domain 3: Implementability

	Item 8	Item 9	Total
Appraiser 1	5	5	10
Appraiser 2	6	5	11
Appraiser 3	6	5	11
Appraiser 4	6	6	12
Appraiser 5	6	6	12
Total	29	27	56

56-10/ 70-10 → 46/60 = 76.6%. *High Quality*

Would you recommend this CPG used under appropriate context?

Appraiser 1: Yes
Appraiser 2: Yes
Appraiser 3: Yes
Appraiser 4: Yes
Appraiser 5: Yes

Pre-Education Survey Results

The Likert-type statements, which made up both the pre-education and post-education surveys, allowed participants to select from four different answers including *strongly disagree,*

disagree, agree, or strongly agree. Results were reported as a total percentage by totaling answers that designated *agree* and *strongly agree.*

Pre-education demographic survey results revealed all participants (n=17) identified as CRNAs (Figure 5). Number of years in practice was distributed over 0-15 years with only 5% (n=1) reporting greater than 20 years of experience (Figure 6). Some 88% of participants (n =15) reported currently using ultrasound for regional nerve blocks (Figure 7) and 82% (n=14) reported already having knowledge regarding the FICB (Figure 8). Despite these findings, 64% of participants (n=11) reported performing zero FICBs within the last six months (Figure 9).

While 82% (n=14) of participants reported being able to identify appropriate patients for an FICB (Figure 10) and select a proper drug concentration (Figure 12), only 70% (n=12) reported ability to identify correct anatomy to perform the block (Figure 11). Ninety-four percent (n=16) described ability to treat significant complications of regional anesthesia including local anesthetic systemic toxicity (LAST) (Figure 15). Only 59% (n=10) reported likelihood to actually perform an FICB (Figure 13). Lastly, 65% (n=13) felt a CPG would be useful in increasing the likelihood of FICB administration for patients with acute hip fracture (Figure 16).

Figure 5

Professional Demographics of Participants

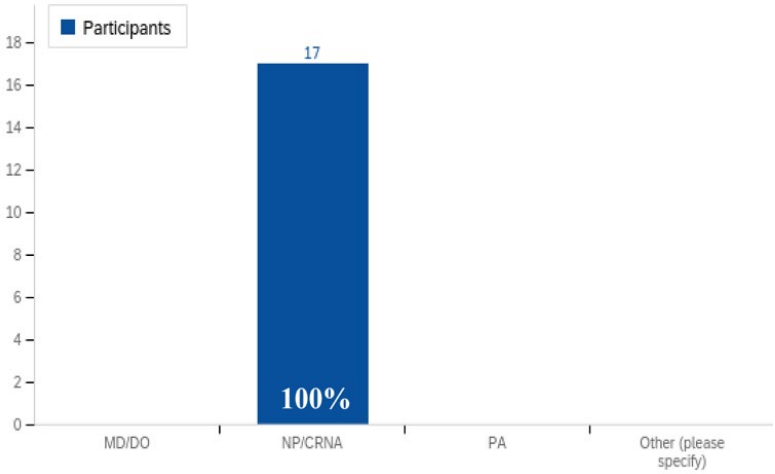


Figure 6

Years of Anesthesia Practice

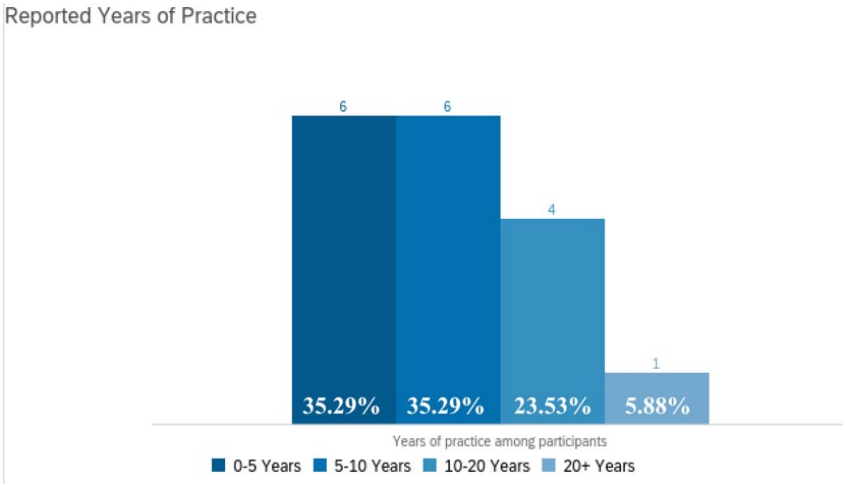


Figure 7

Current Use of Regional Blocks

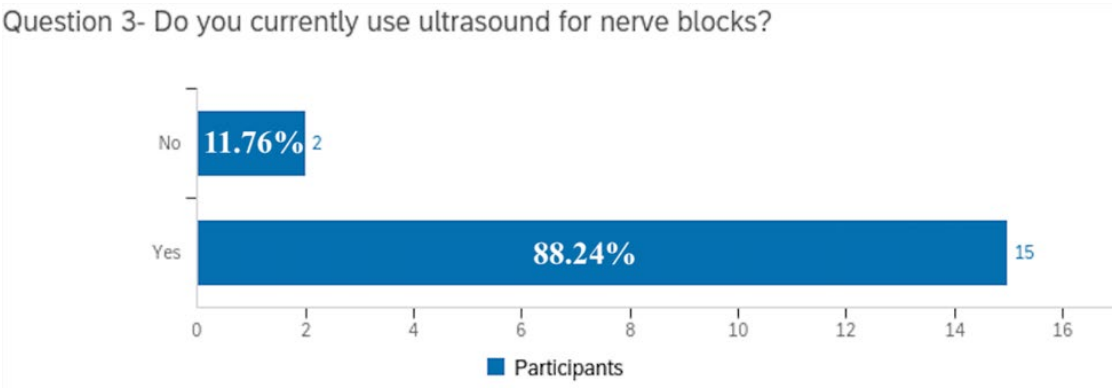


Figure 8

Participants who Know of FICB

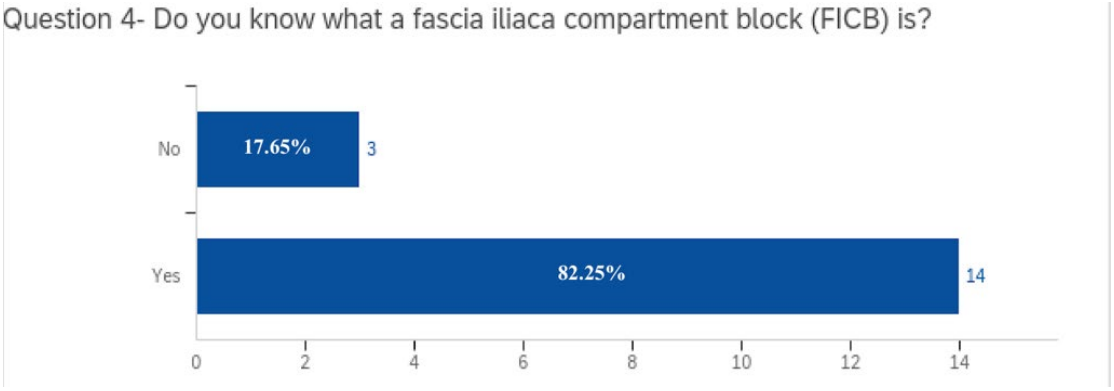
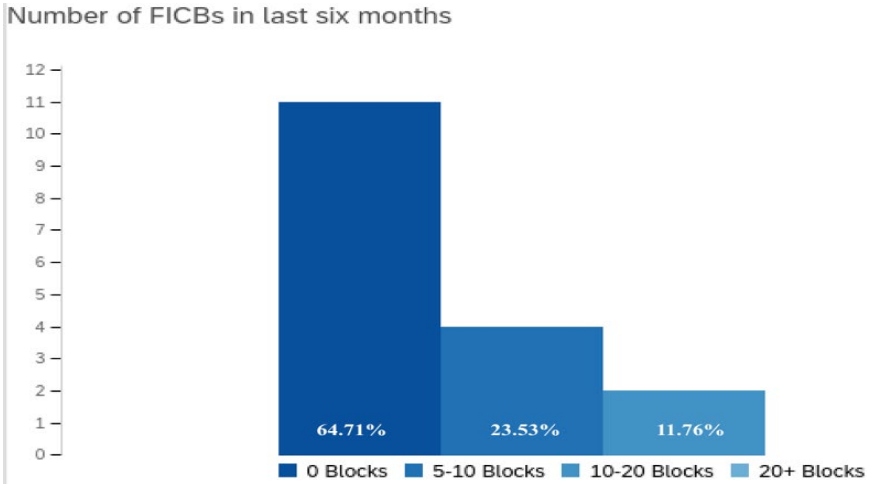


Figure 9

Number of FICBs Completed Over Past Six Months



Post-Education Survey Results

Following the educational workshop, post-education survey results revealed 100% (n=17) of participants felt they could properly identify the appropriate patient for FICB (Figure 10). Most (94%; n=16) felt they possessed the anatomical knowledge to both perform the block (Figure 11) and select the appropriate drug and concentration (Figure 12). Some (82%; n=14) reported likelihood to perform an FICB on a patient with hip fracture (Figure 13), while 94% (n=16) reported increased confidence in performing the block (Figure 14). All participants (n=17) reported feeling comfortable with treating complications including LAST (Figure 15) and felt a CPG would increase FICB administration among patients with acute hip fracture (Figure 16).

Figure 10

Identification of Appropriate Patients for FICB

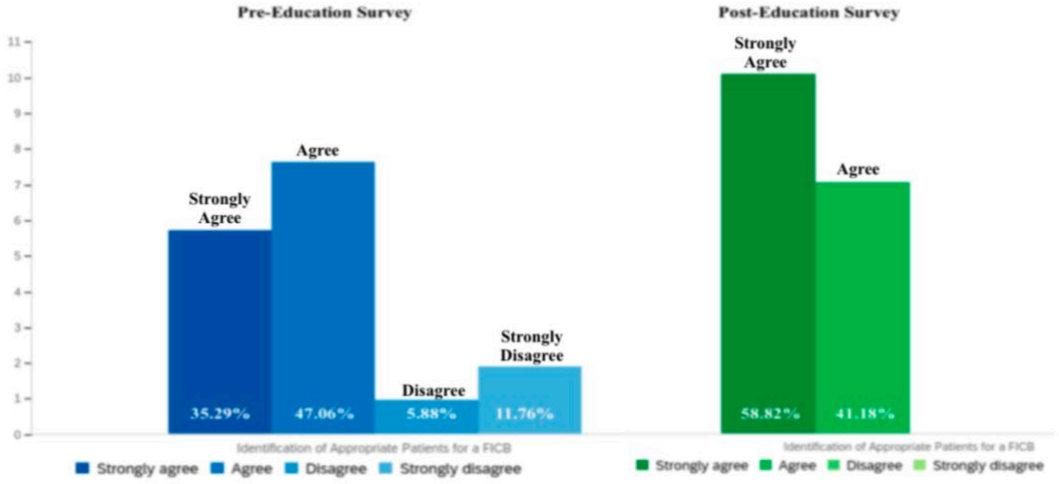


Figure 11

Anatomical Knowledge to Perform an FICB

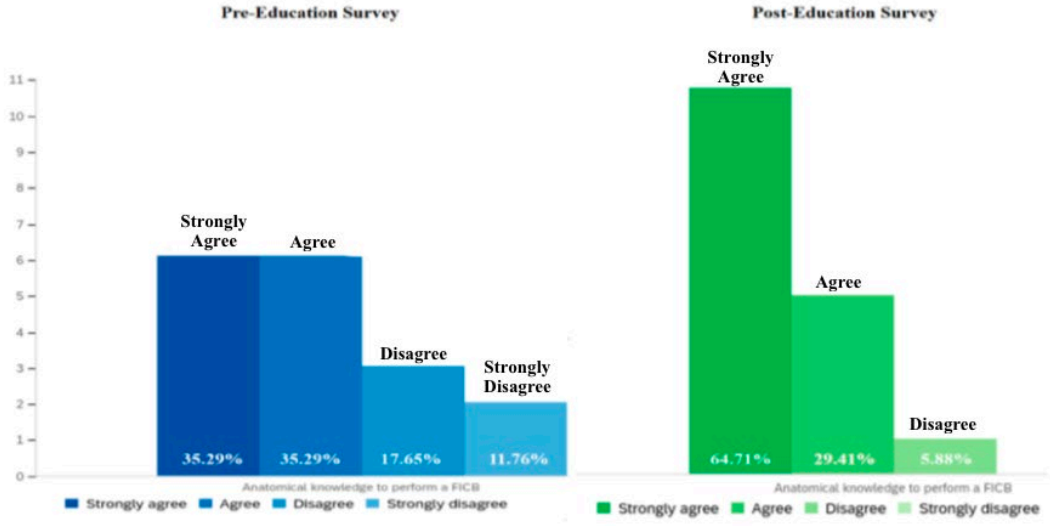


Figure 12

Comfort in Selecting Appropriate Drug and Concentration

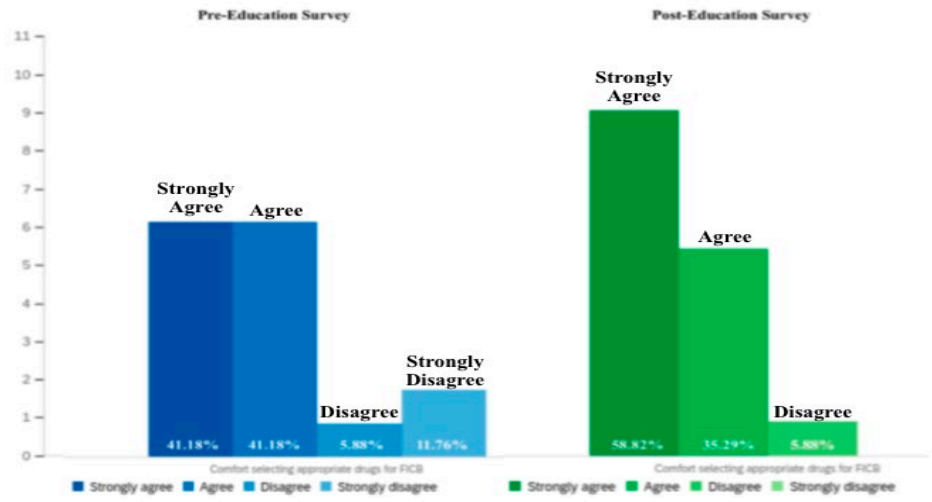


Figure 13

Likelihood to Perform an FICB

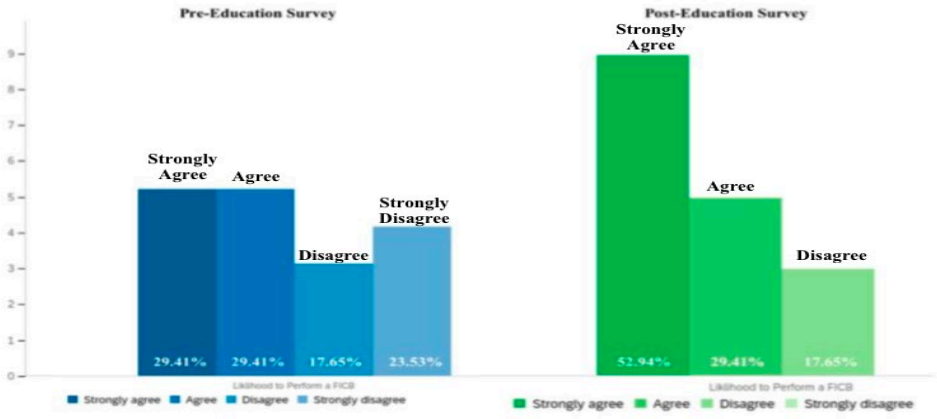


Figure 14

Confidence in Ability to Perform FICB

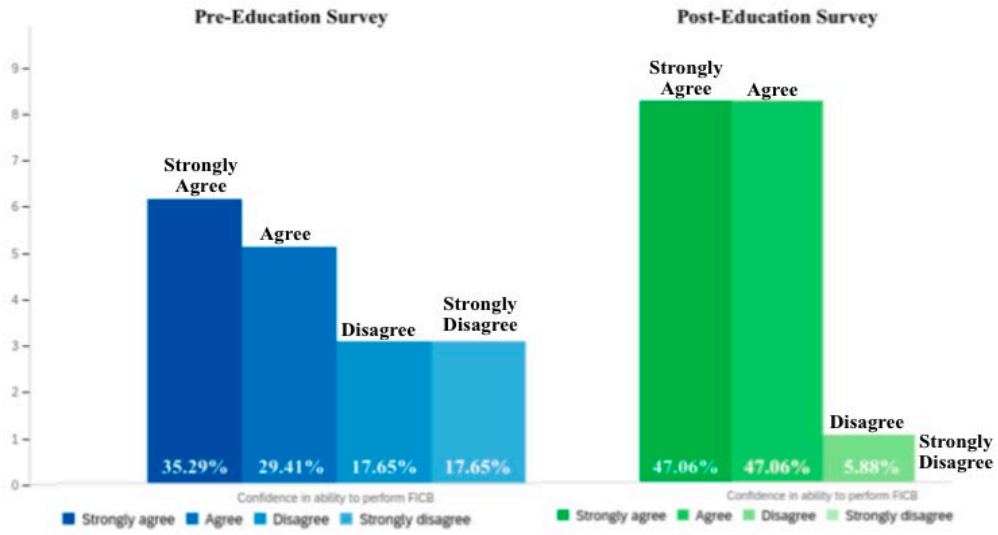


Figure 15

Comfort Level in Treatment of Complications

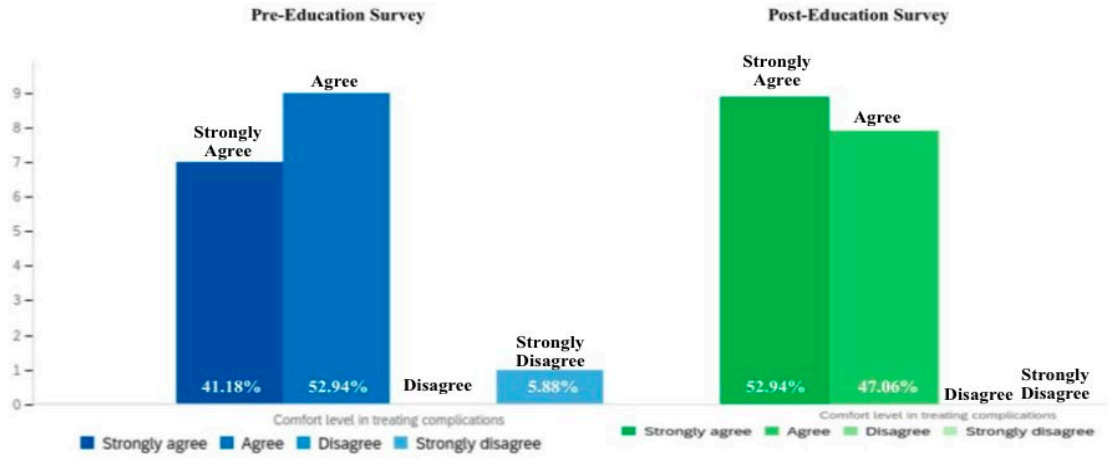
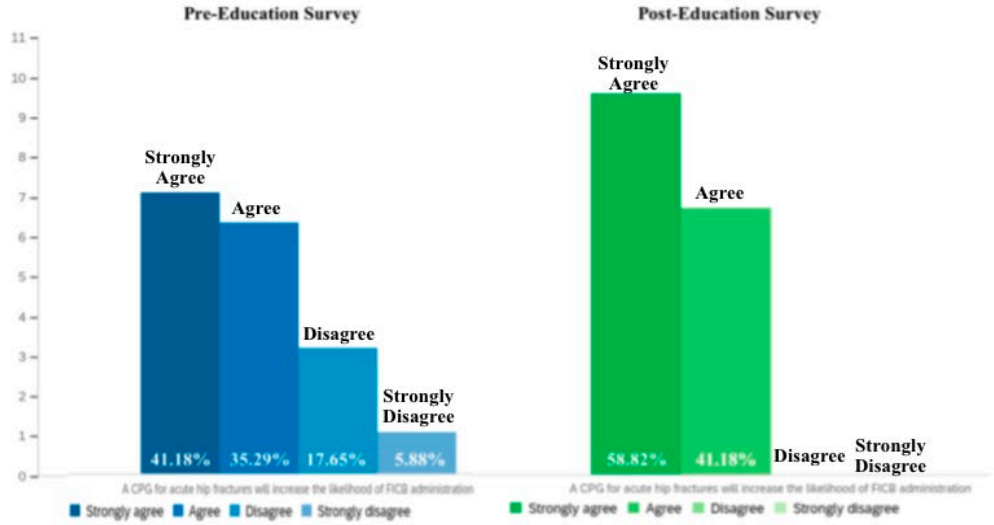


Figure 16

CPG Influence on FICB Administration



Proficiency Quiz Results

Following the educational workshop, participants were asked to complete a five-question proficiency quiz (Table 2). All participants answered two out of five questions correctly. Ninety-four percent of participants (n=16) selected correct answers regarding nerves blocked with the FICB (Table 2). Only 76% of participants (n=13) were able to correctly identify signs and symptoms regarding LAST and correct dosage of local anesthetic (Table 2).

Table 2

Proficiency Quiz Results

Which of the following is NOT an absolute contraindication for FICB?

#	Scoring	Answer	Bar	Response	%
1	✓	Pregnancy		16	94.12%
2	✗	Patient refusal		1	5.88%
3	✗	Severe coagulopathy		0	0.00%
4	✗	Infection at site		0	0.00%
		Total		17	100.00%

Select the nerves that are blocked with a FICB (select 3):

#	Scoring	Answer	Bar	Response	%
1	✓	Femoral nerve		16	94.12%
2	✓	Lateral femoral cutaneous nerve		17	100.00%
3	✗	Ilioinguinal nerve		1	5.88%
4	✗	Iliohypogastric nerve		0	0.00%
5	✓	Obturator nerve		17	100.00%
6	✗	Sciatic nerve		0	0.00%
		Total		51	100.00%

Which of the following signs or symptoms are associated with local anesthetic systemic toxicity (LAST)?

#	Scoring	Answer	Bar	Response	%
1	✗	Tinnitus		2	11.76%
2	✗	Numbness of the lips		0	0.00%
3	✗	Seizure		0	0.00%
4	✗	Hypertension		2	11.76%
5	✓	All of the above		13	76.47%
		Total		17	100.00%

True of False: WHen treating LAST, the initial bolus dose of 20% intralipid emulsion is 1.5 ml/kg over one minute.

#	Scoring	Answer	Bar	Response	%
1	✓	True		17	100.00%
2	✗	False		0	0.00%
		Total		17	100.00%

For a 70kg patient, what volume of 0.25% levobupivacaine is appropriate for injecton?

#	Scoring	Answer	Bar	Response	%
1	✗	45 mL		4	23.53%
2	✗	10 mL		0	0.00%
3	✓	60 mL		13	76.47%
4	✗	20 mL		0	0.00%
		Total		17	100.00%

Thirty-day Follow-up Survey Results

Out of 17 participants, only five took part in completing the online 30-day follow-up survey. Of the five participants, four (80%) reported utilizing the developed CPG within the last 30 days and 15 FICBs were reported to have been completed (Table 3). All participants (100%;

n=5) reported they found the educational workshop beneficial to their department and the CPG would be useful in other clinical areas such as an emergency department (ED) setting.

Table 3

Thirty-day Follow-up Survey Results

Have you utilized the hip fracture pain management clinical practice guideline (CPG) in the last thirty

#	Answer	Bar	Response	%
1	Yes		4	80.00%
2	No		1	20.00%
	Total		5	100.00%

Following the training on fascia iliaca compartment blocks (FICBs), how many FICBs have you performed in the last thirty days?

Text Entry
2
1
0
2
10

Do you think your department benefited from this educational training?

#	Answer	Bar	Response	%
1	Yes		5	100.00%
2	No		0	0.00%
	Total		5	100.00%

Would you recommend the developed CPG for use in other clinical areas such as an emergency department (ED) setting?

#	Answer	Bar	Response	%
1	O Yes		5	100.00%
2	O No		0	0.00%
	Total		5	100.00%

Please list any barriers to FICB administration that you have encountered:

Text Entry
Doctor preference and time constraints
Surgeon preferance

What recommendations would you make for future education on FICBs?

Text Entry
Educating old surgeons and physicians and information dissemination facility based for opioid free anesthesia and pain management
none

DISCUSSION

Summary

This QI project aimed to increase the number of anesthesia providers trained in FICB administration and the likelihood of implementing this block for patients with acute hip fractures. As previously described, systemic opioid drugs often used during the perioperative period for pain control in patients with hip fractures produce negative side effects among the geriatric population. In an effort to improve pain management and overall acute care for this population, an educational workshop and CPG that focused on the use of regional anesthesia were developed for anesthesia providers.

Interpretation

Key findings of this project included an increase in anatomical knowledge and selection of appropriate drug and concentration, likelihood to implement FICB for this population, and confidence in block administration following an educational workshop on FICB. Thirty days following the intervention, 80% (n=4) of participants reported use of the developed CPG. The educational workshop was found to be beneficial for the anesthesia department and the CPG was recommended to be used in settings such as an ED.

Implications

The open-ended questions within the pre-education, post-education and 30-day follow-up surveys revealed consistent concerns among participants. Providers reported that barriers to implementation included surgeon preference or agreement and availability of time to implement the FICB. Future work on FICB implementation should focus on specific education tailored to

surgeons to facilitate an interdisciplinary focus on improving pain management. Specific factors to address which may increase surgeon buy-in include hospital LOS and patient satisfaction.

Limitations

Several limitations were noted for this project, including the COVID-19 pandemic, results from the AGREE-REX tool, and results from the 30-day follow-up survey. Due to the COVID-19 pandemic, the PMs were required to change the project's site only a few weeks before implementation was intended to take place. This prolonged the preparation period for the project, including acquiring IRB approval from the new site.

As previously stated, this project was initially developed for ED providers at a community hospital in Hawaii. Arizona anesthesia providers utilized the AGREE-REX tool to evaluate the developed CPG before the project site change. Although the AGREE-REX evaluation's purpose was to make changes before CPG distribution, scores would have been more meaningful if the original CPG had focused on applicability and values and preferences of anesthesia providers rather than ED providers. Additionally, only four of the five appraisers placed a score for item 7 of the AGREE-REX tool (Figure 4). For this reason, the total score for *values and preferences* of the CPG was significantly lower, determining the CPG was of *moderate quality* for alignment with values and preferences.

Only five of 17 participants (29%) responded to the online 30-day follow-up survey. While follow-up findings were positive for utilization of CPG and FICB administration in the last 30 days, PMs were unable to determine the significance of these results due to limited participation. The PMs may have engaged a more significant number of participants with an in-person 30-day follow-up survey. A greater response would have helped determine the utilization

of this block and barriers to implementation. The PMs concluded that in-person follow-up would be the best option for future projects to secure maximal participation.

DNP Essentials Addressed

This DNP project fulfilled many of the DNP essentials required by the American Association of Colleges of Nursing (AACN) and the University of Arizona College of Nursing.

DNP Essential I: Scientific Underpinnings for Practice

Scientific underpinnings for practice focus on integrating nursing science with science-based theory to enhance and improve health and health care delivery (American Association of Colleges of Nursing [AACN], 2006). Kolcaba's *theory of comfort* served as the basis of this project. Inclusion of the FICB in a pain management protocol for patients with hip fractures aimed to enhance physical comfort through relief of physical pain (AACN, 2006; Kolcaba, 2003).

DNP Essential II: Organizational and Systems Leadership for Quality Improvement and Systems Thinking

This quality improvement project aimed to improve care for all patients with hip fracture presenting to the Level I trauma facility by standardizing pain control through a CPG. As previously discussed, consideration of the FICB for pain control was not standard practice at this facility. Pain control for this population varied based on anesthesia provider preference and experience. DNP Essential II was fulfilled by evaluating evidence-based literature on best pain control practices and creating a CPG appropriate for clinical use. Sustainability for this system change must be cultivated through several PDSA cycles (AACN, 2006; IHI, 2020).

DNP Essential III: Clinical Scholarship and Analytical Methods for Evidence-Based Practice

This DNP project began with developing a clinical question and subsequent research and evaluation of available literature. The PMs critically appraised high-quality evidence to formulate a consensus on the use of FICBs for hip fracture patients (AACN, 2006). Findings were then used to develop a QI project for a Level I trauma center in south Texas to integrate evidence-based methods to improve patient outcomes (AACN, 2006). DNP Essential III was fulfilled by critical appraisal of existing literature, developing a QI project, and distributing findings in the clinical setting (AACN, 2006).

DNP Essential VI: Interprofessional Collaboration for Improving Patient and Population Health Outcomes

DNP Essential VI is centered on the idea that patients within today's complex healthcare system receive optimal care when experts from multiple disciplines are involved in the development and implementation of patient care (AACN, 2006). The PMs utilized a variety of communication methods to educate future CRNA colleagues. An in-person presentation using PowerPoint for visual aid was used to educate CRNAs on evidence-based pain management recommendations. A CPG was developed as a reference tool for providers at this hospital.

DNP Essential VIII: Advanced Nursing Practice

DNP Essential VIII includes the practitioners' ability to design and evaluate therapeutic interventions as well as guide, mentor, and support nursing colleagues in achieving excellence in practice (AACN, 2006). The PMs developed a CPG and educational workshop, then evaluated its usefulness in improving anesthesia provider practice. Additionally, the PMs used this project

to educate fellow nursing colleagues on up-to-date, evidence-based pain management practices and support best practices for enhancing patient outcomes.

Conclusion

Caring for patients with acute hip fractures presents unique perioperative considerations for the anesthesia provider. While opioid-containing drugs can improve pain management, adverse effects including delirium, cardiovascular depression, and respiratory depression are unfavorable in this population (Haines et al., 2012; Makhoul, 2019b). Sparing use of opioids results in uncontrolled pain requiring optimal pain management alternatives (Bordi, 2018; Castillon et al., 2017). It is necessary providers are able and willing to provide analgesic modalities best supported by current literature in order to optimize perioperative pain control among older patients with hip fractures.

Current evidence supports the use of FICB for improved analgesia in geriatric patients with hip fractures. The results from this QI project determined that an educational workshop on FICB for analgesia helped increase provider knowledge and intent to utilize FICB in the clinical setting. Additionally, a CPG focused on identifying appropriate patients for and implementing an FICB increased the likelihood of administration as part of a perioperative pain management plan.

Plan for Sustainability

Further adoption of the FICB for patients with hip fractures is dependent on education and buy-in from surgeons. This QI project's rigor could have been enhanced with hands-on training by an expert in regional anesthesia. The PMs recommend that future projects on FICBs at this site include a tailored educational piece for surgeons to increase interdisciplinary buy-in.

Plan for Dissemination

An executive summary containing specific results of this project was emailed to the chief of anesthesia following the project's commencement. Results from this project will be presented at the 2021 Arizona Association of Nurse Anesthetists (AZANA) Sun and Fun virtual conference via poster presentation (Appendix I).

APPENDIX A:

SITE AUTHORIZATION LETTER / PERMISSION LETTERS / THE UNIVERSITY OF ARIZONA INSTITUTIONAL REVIEW BOARD DETERMINATION LETTER / HOSPITAL IRB APPROVAL LETTER

[redacted]
Edinburg, TX 78539

September 23, 2020

University of Arizona Institutional Review Board
Office of Human Subjects
1618 Helen St.
Tucson, AZ 85721

Please note that Ms. Chrisanna Roberts, Kaitlin Tilton, and Jenna Hernandez, University of Arizona CRNA Doctor of Nursing Practice students, have permission to do their DNP project at [redacted] They plan to present information to anesthesia providers and educate them about Fascia Iliaca Compartment Blocks for patients who are admitted with acute hip fractures. They plan on presenting the information in person and will evaluate provider knowledge. They will be organizing a hands-on regional workshop.

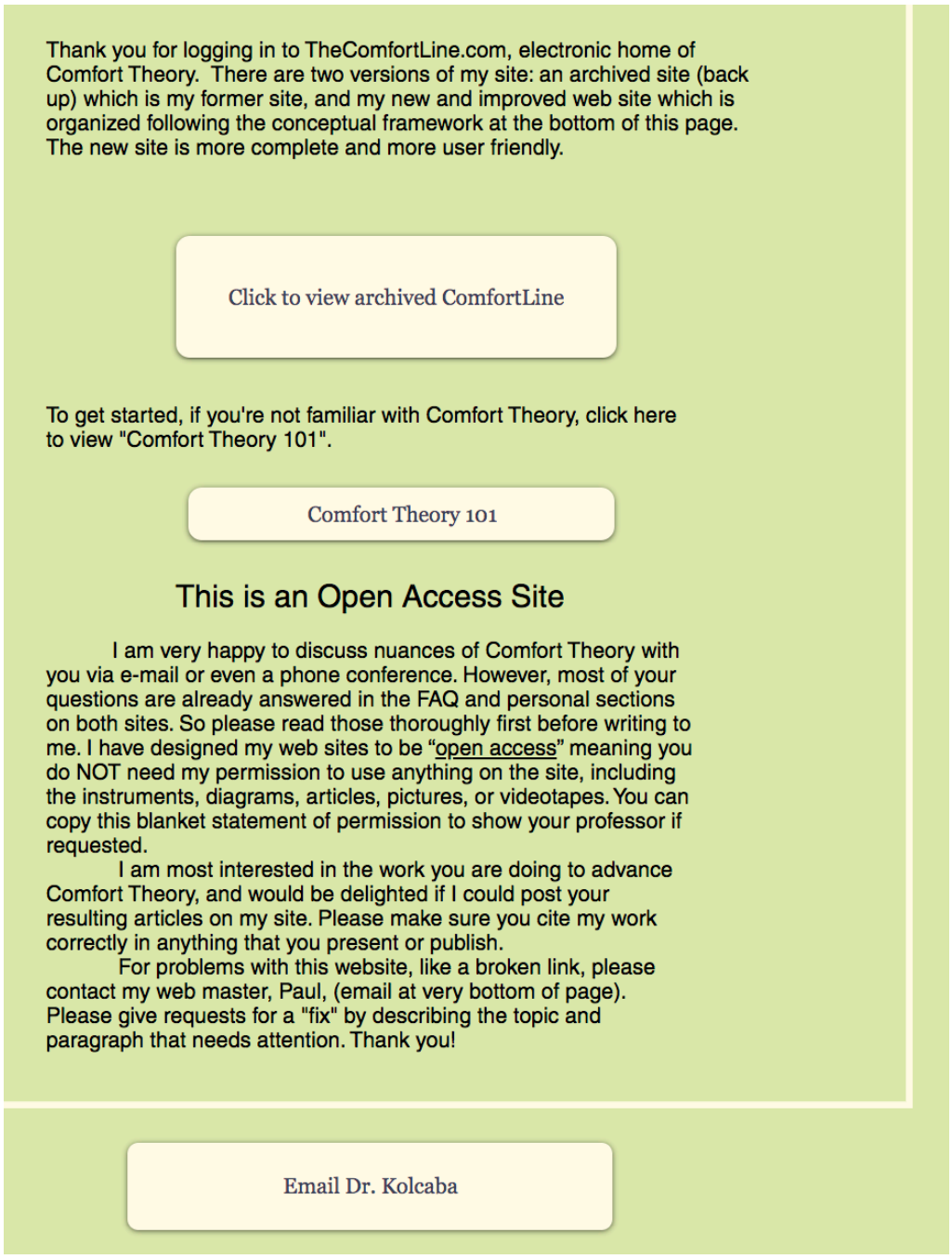
This is a quality improvement project. The goal is to improve pain management for patients presenting with acute hip fractures. Permission is granted for 6 months following my approval.

The University of Arizona has determined this project is Not Human Research. The University of Arizona CRNA students have agreed to provide my office a copy of the [redacted] IRB approval form prior to the start of this project.

If there are any questions, please contact me at [redacted].

[redacted], CRNA
Chief CRNA
[redacted]

Permission to Use Kolcaba's Theoretical Framework Figure



Thank you for logging in to TheComfortLine.com, electronic home of Comfort Theory. There are two versions of my site: an archived site (back up) which is my former site, and my new and improved web site which is organized following the conceptual framework at the bottom of this page. The new site is more complete and more user friendly.

Click to view archived ComfortLine

To get started, if you're not familiar with Comfort Theory, click here to view "Comfort Theory 101".

Comfort Theory 101

This is an Open Access Site

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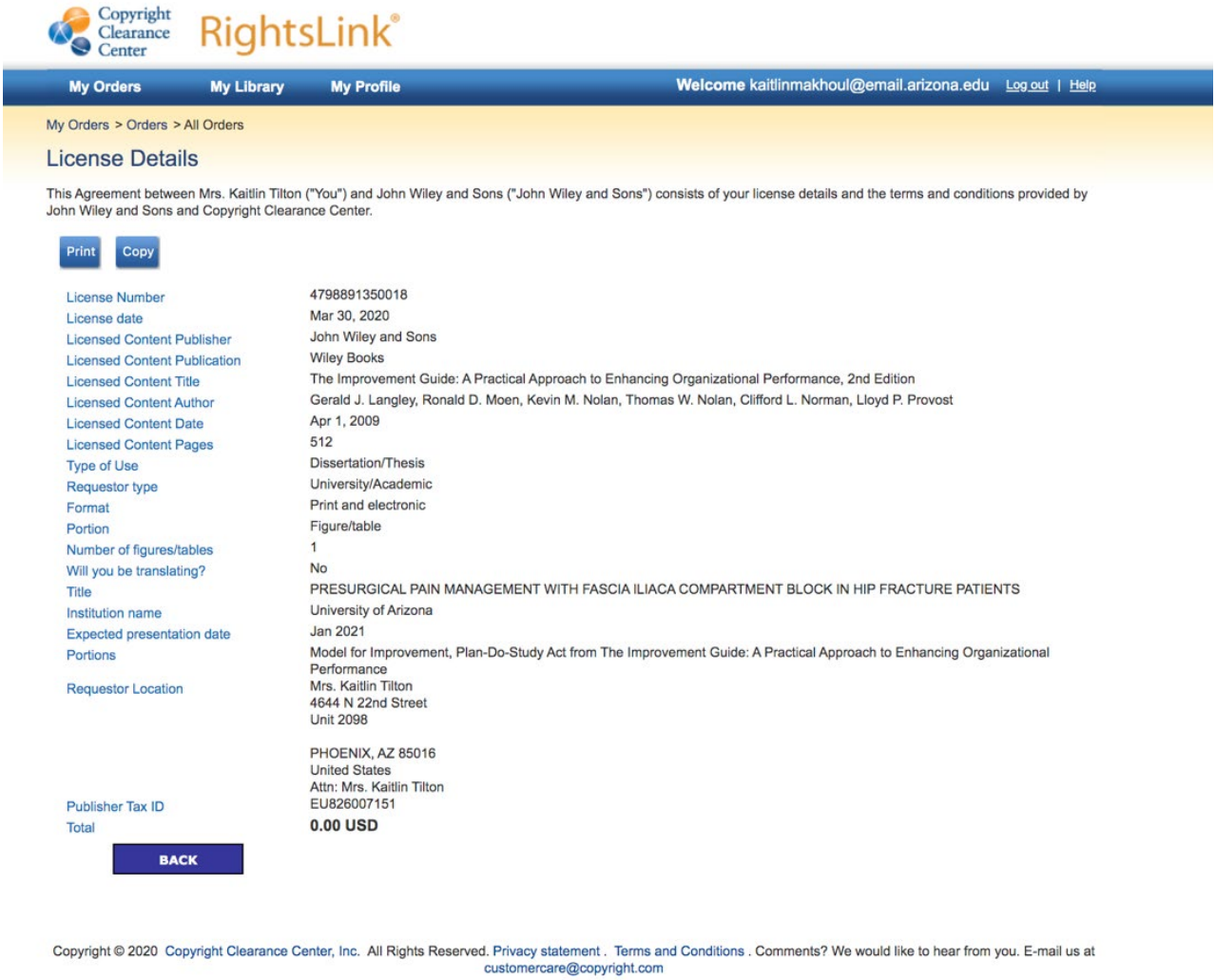
Email Dr. Kolcaba

Permission to Use the IHI Model for Improvement Figure



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Title	PRESURGICAL PAIN MANAGEMENT WITH FASCIA ILIACA COMPARTMENT BLOCK IN HIP FRACTURE PATIENTS
Institution name	University of Arizona
Expected presentation date	Jan 2021
Portions	Model for Improvement, Plan-Do-Study Act from The Improvement Guide: A Practical Approach to Enhancing Organizational Performance
Requestor Location	Mrs. Kaitlin Tilton 4644 N 22nd Street Unit 2098 PHOENIX, AZ 85016 United States Attn: Mrs. Kaitlin Tilton
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University of Arizona IRB Approval Letter

THE UNIVERSITY OF ARIZONA
Research, Discovery & Innovation

Human Subjects Protection Program

1618 E. Helen St.
P.O.Box 245137
Tucson, AZ 85724-5137
Tel: (520) 626-6721
http://rgw.arizona.edu/compliance/home

Date:	August 06, 2020
Principal Investigator:	Kaitlin Nicole Tilton
Protocol Number:	2008916356
Protocol Title:	Fascia Iliaca Compartment Blocks for Patients with Acute Hip Fracture
Determination:	Human Subjects Review not Required

Documents Reviewed Concurrently:

HSPP Forms/Correspondence: *TiltonRobertsHernandez IRB Determination 07 29 20.pdf*

Regulatory Determinations/Comments:

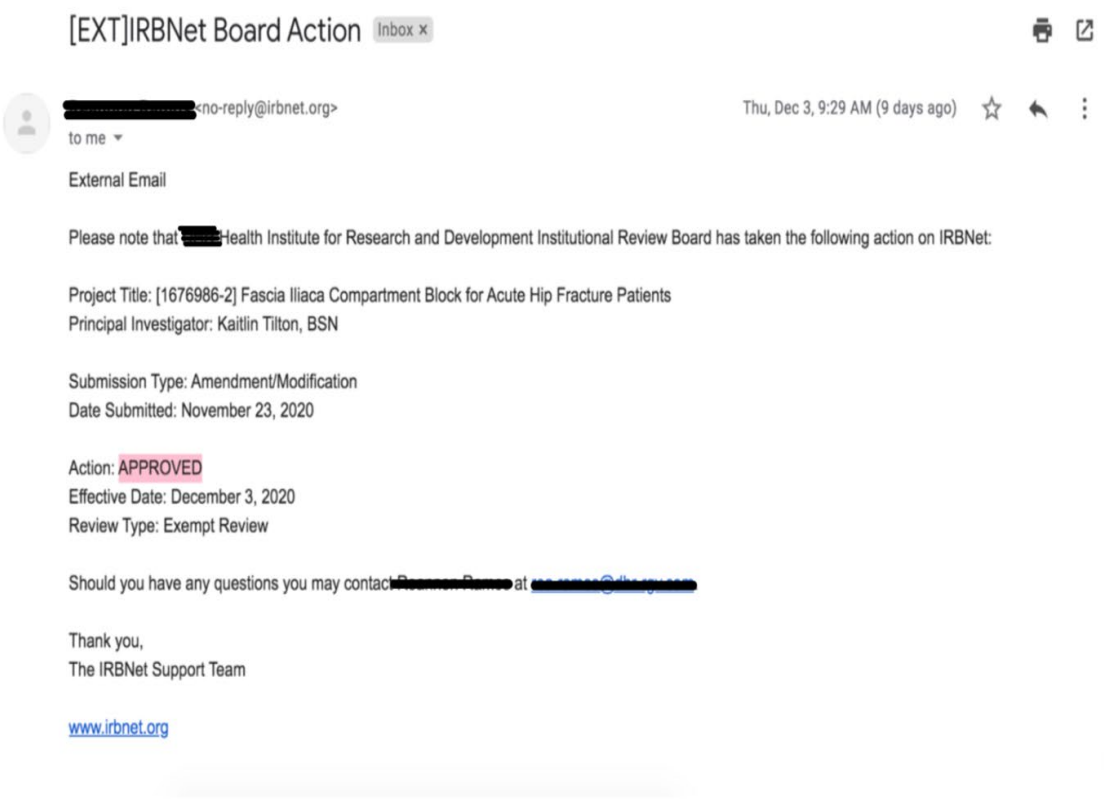
- Not Research as defined by 45 CFR 46.102(l): As presented, the activities described above do not meet the definition of research cited in the regulations issued by U.S. Department of Health and Human Services which state that "Research means a systematic investigation, including research development, testing, and evaluation, designed to develop or contribute to generalizable knowledge. Activities that meet this definition constitute research for purposes of this policy, whether or not they are conducted or supported under a program that is considered research for other purposes. For example, some demonstration and service programs may include research activities. For purposes of this part, the following activities are deemed not to be research."

The project listed above does not require oversight by the University of Arizona.

If the nature of the project changes, submit a new determination form to the Human Subjects Protection Program (HSPP) for reassessment. Changes include addition of research with children, specimen collection, participant observation, prospective collection of data when the study was previously retrospective in nature, and broadening the scope or nature of the study activity. Please contact the HSPP to consult on whether the proposed changes need further review.

The University of Arizona maintains a Federalwide Assurance with the Office for Human Research Protections (FWA #00004218).

Hospital IRB Approval Letter



[EXT]IRBNet Board Action Inbox ×

[redacted]<no-reply@irbnet.org> Thu, Dec 3, 9:29 AM (9 days ago)

to me

External Email

Please note that [redacted]Health Institute for Research and Development Institutional Review Board has taken the following action on IRBNet:

Project Title: [1676986-2] Fascia Iliaca Compartment Block for Acute Hip Fracture Patients
Principal Investigator: Kaitlin Tilton, BSN

Submission Type: Amendment/Modification
Date Submitted: November 23, 2020

Action: APPROVED
Effective Date: December 3, 2020
Review Type: Exempt Review

Should you have any questions you may contact [redacted] at [redacted]

Thank you,
The IRBNet Support Team

www.irbnet.org

APPENDIX B:

CONSENT DOCUMENT (DISCLOSURE FORMS)

Presurgical Pain Management with Fascia Iliaca Compartment Block in Hip Fracture Patients

Kaitlin N. Tilton, BSN, RN, Jenna R. Hernandez, BSN, RN, CCRN, Chrisanna M. Roberts,

BSN, RN, CCRN

The purpose of this project is to increase provider proficiency in the administration of a fascia iliaca compartment block (FICB) in order to integrate evidence-based pain management and improve patient outcomes.

If you choose to take part in this project, you will be asked to take a pre-education and training survey, watch a 30-minute PowerPoint presentation, participate in hands-on practice, and complete two follow-up surveys. It will take approximately 5 minutes to complete each survey. There are no foreseeable risks associated with participating in this project and you will receive no immediate benefit from your participation. Survey responses are anonymous.

If you choose to participate in the project, participation is voluntary, refusal to participate will involve no penalty or loss of benefits to which you are otherwise entitled. You may withdraw at any time from the project. In addition, you may skip any question that you choose not to answer. By participating, you do not give up any personal legal rights you may have as a participant in this project. You agree to have your responses used for this project.

For questions, concerns, or complaints about the project, you may email Kaitlin N. Tilton, BSN, RN at kaitlinmakhoul@email.arizona.edu, Jenna R. Hernandez, BSN, RN, CCRN at jennahernandez@email.arizona.edu, or Chrisanna M. Roberts, BSN, RN, CCRN at chrisannaroberts@email.arizona.edu.

Appraisal of Acute Hip Fracture Pain Management Clinical Practice Guideline Using AGREE-REX Tool

Kaitlin N. Tilton, BSN, RN, Jenna R. Hernandez, BSN, RN, CCRN, Chrisanna M. Roberts, BSN, RN, CCRN

The purpose of this appraisal is to evaluate the quality of the developed clinical practice guideline focused on acute hip fracture pain management with the use of fascia iliaca compartment blocks.

If you choose to take part in this appraisal, you will be asked to review and score the clinical practice guideline using the AGREE-REX tool. It will take approximately one to two hours to discuss and grade the clinical practice guideline. There are no foreseeable risks associated with participating in this project and you will receive no immediate benefit from your participation. Grading tool responses are anonymous.

If you choose to participate in the project, participation is voluntary, refusal to participate will involve no penalty or loss of benefits to which you are otherwise entitled. You may withdraw at any time from the project. In addition, you may skip any question that you choose not to answer. By participating, you do not give up any personal legal rights you may have as a participant in this project.

For questions, concerns, or complaints about the project, you may email Kaitlin N. Tilton, BSN, RN at kaitlinmakhoul@email.arizona.edu, Jenna R. Hernandez, BSN, RN, CCRN at jennahernandez@email.arizona.edu, or Chrisanna M. Roberts, BSN, RN, CCRN at chrisannaroberts@email.arizona.edu

APPENDIX C:

RECRUITMENT MATERIAL (RECRUITMENT FLYER, RECRUITMENT EMAIL)

REGIONAL ANESTHESIA BLOCK WORKSHOP

FASCIA ILIACA COMPARTMENT BLOCK
FOR ACUTE HIP FRACTURES

- Use of point of care ultrasound
- Introductory lecture on anatomy for fascia iliaca compartment block
- Introductory lecture on indications, contraindications, local anesthetic dosages, and complications
- Live scanning demonstration
- Q&A session

Dear Participant,

You are invited to participate in an educational session involving the use of fascia iliaca compartment blocks for acute hip fracture patients. This session will include a PowerPoint presentation, hands-on practice, and review of an acute hip fracture guideline to be used at your facility. Educational material and guideline content have been adopted from current literature within the last five years, the American Academy of Orthopedic Surgery recommendations, and the Irish Association for Emergency Medicine Clinical Guideline. You are being asked to participate based on your professional practice involving the care of acute hip fracture patients.

Participation in this educational session is voluntary, with no known risks. Personal identifiers and participant feedback will be anonymous and confidential. Your feedback can be used to modify site-specific practice guidelines and future scholarly projects.

This educational session and acute hip fracture guideline recommendations have been organized by student registered nurse anesthetists Jenna Hernandez, Kaitlin Tilton, and Chrisanna Roberts as part of their Doctor of Nursing Practice Capstone Project. Your decision to decline or stop participation at any time will be respected and will not affect any future relationship with the University of Arizona.

If you have any questions or concerns before, during, or after participating in this project, please contact Kaitlin Tilton at kaitlinmakhoul@email.arizona.edu or (480) 216-5205.

Thank you for your participation in our DNP Capstone Project,

Kaitlin Tilton, BSN
Jenna Hernandez, BSN, CCRN
Chrisanna Roberts, BSN, CCRN

APPENDIX D:

EVALUATION INSTRUMENTS (PRE-EDUCATION SURVEY / POST-EDUCATION SURVEY / FICB PROFICIENCY QUIZ / 30-DAY FOLLOW-UP SURVEY)

Pre-education Survey

Please circle which answer you agree with most

1. Which healthcare profession do you identify with most?

1. MD/DO 2. NP/CRNA 3. PA 4. Other _____

2. How many years have you been practicing?

1. 0-5 years 2. 5-10 years. 3. 10-20 years 4. 20+ years

3. Do you currently use ultrasound for nerve blocks?

1. Yes 2. No

4. Do you know what a fascia iliaca compartment block is?

1. Yes 2. No

5. How many FICBs have you performed in the last 6 months?

1. 0 2. 5-10 3. 10-20 4. 20+

6. I can identify the appropriate patients for a fascia iliaca compartment block (FICB).

1. Strongly Disagree 2. Disagree 3. Agree 4. Strongly Agree

7. I have the anatomical knowledge to perform an FICB.

1. Strongly Disagree 2. Disagree 3. Agree 4. Strongly Agree

8. I possess the technical skills to perform an FICB.

1. Strongly Disagree 2. Disagree 3. Agree 4. Strongly Agree

9. I feel comfortable selecting the appropriate drug and concentration necessary for an FICB.

1. Strongly Disagree 2. Disagree 3. Agree 4. Strongly Agree

10. I am likely to perform an FICB on a patient with an acute hip fracture.

1. Strongly Disagree 2. Disagree 3. Agree 4. Strongly Agree

11. I feel confident in my ability to safely perform an FICB.

1. Strongly Disagree 2. Disagree 3. Agree 4. Strongly Agree

12. I feel comfortable treating complications associated with regional anesthesia, including local anesthetic systemic toxicity.

1. Strongly Disagree 2. Disagree 3. Agree 4. Strongly Agree

13. A clinical practice guideline designed specifically for patients with acute hip fractures will increase the likelihood of FICB administration.

1. Strongly Disagree 2. Disagree 3. Agree 4. Strongly Agree

14. Please list any limitations or concerns that you have with implementing the current guideline at your facility:

Post-education Survey

Please circle which answer you agree with most

1. Which healthcare profession do you identify with most?

1. MD/DO 2. NP/CRNA 3. PA 4. Other _____

2. How many years have you been practicing?

1. 0-5 years 2. 5-10 years. 3. 10-20 years 4. 20+ years

3. Do you currently use ultrasound for nerve blocks?

1. Yes 2. No

4. I can identify the appropriate patients for a fascia iliaca compartment block (FICB).

1. Strongly Disagree 2. Disagree 3. Agree 4. Strongly Agree

5. I have the anatomical knowledge to perform an FICB.

1. Strongly Disagree 2. Disagree 3. Agree 4. Strongly Agree

6. I feel comfortable selecting the appropriate drug and concentration necessary for an FICB.

1. Strongly Disagree 2. Disagree 3. Agree 4. Strongly Agree

7. I am likely to perform an FICB on a patient with an acute hip fracture.

1. Strongly Disagree 2. Disagree 3. Agree 4. Strongly Agree

8. I feel confident in my ability to safely perform an FICB.

1. Strongly Disagree 2. Disagree 3. Agree 4. Strongly Agree

9. I feel comfortable treating complications associated with regional anesthesia, including local anesthetic systemic toxicity.

1. Strongly Disagree 2. Disagree 3. Agree 4. Strongly Agree

10. A clinical practice guideline designed specifically for patients with acute hip fractures will increase the likelihood of FICB administration.

1. Strongly Disagree 2. Disagree 3. Agree 4. Strongly Agree

11. Please list any limitations or concerns that you have with implementing the current guideline at your facility:

12. List three items you learned today after watching this presentation that you did not know prior to the presentation:

FICB Proficiency Quiz

1. Which of the following is NOT an absolute contraindication for FICB?
a. Pregnancy
b. Patient refusal
c. Severe coagulopathy
d. Infection at the site

2. Select the nerves that are blocked with an FICB (select three):
a. Femoral nerve
b. Lateral femoral cutaneous nerve
c. Ilioinguinal nerve
d. Iliohypogastric nerve
e. Obturator nerve
f. Sciatic nerve

3. Which of the following signs or symptoms are associated with local anesthetic systemic toxicity (LAST)?
a. Tinnitus
b. Numbness of the lips
c. Seizure
d. Hypertension
e. All of the above

4. True or false: When treating LAST, the initial bolus dose of 20% intralipid emulsion is 1.5 mL/kg over one minute.
a. True
b. False

5. For a 70-kg patient, what volume of 0.25% levobupivacaine is appropriate for injection?
a. 45 mL
b. 10 mL
c. 60 mL
d. 20 mL

30-day Follow-up Survey

1. Have you utilized the hip fracture pain management clinical practice guideline (CPG) in the last thirty days?

a. Yes

b. No

2. Following the training on fascia iliaca compartment blocks (FICBs), how many FICBs have you performed in the last thirty days?

_____

3. Do you think your department benefited from this educational training?

a. Yes

b. No

4. Would you recommend the developed CPG for use in other clinical areas such as an emergency department (ED) setting?

a. Yes

b. No

5. Please list any barriers to FICB administration that you have encountered:

_____

6. What recommendations would you make for future education on FICBs?

_____

APPENDIX E:

PARTICIPANT MATERIAL (FICB EDUCATIONAL PRESENTATION / FICB CLINICAL PRACTICE GUIDELINE)

FICB Educational Presentation

Fascia Iliaca Compartment Blocks for Patients with Acute Hip Fracture

Kaitlin N. Tilton BSN, RN
Chrisanna M. Roberts BSN, RN, CCRN
Jenna R. Hernandez BSN, RN, CCRN

THE UNIVERSITY OF ARIZONA College of Nursing

What is a Fascia Iliaca Compartment Block (FICB)?

Localized anesthesia to:

- Hip
- Anteromedial portion of the thigh
- Medial portion of the lower leg and foot

Used for:

- Hip fractures
- Hip arthroplasty

Fascia iliaca compartment = potential space, contains:

- Femoral nerve
- Lateral femoral cutaneous nerve
- Obturator nerve

Figure 1. NYSORA (2020). Expected distribution of fascia iliaca sensory block. *Ultrasound-guided Fascia Iliaca Block.* https://www.nysora.com/regional-anesthesia-for-specific-surgical-procedures/lower-extremity-regional-anesthesia-for-specific-surgical-procedures/ultrasound-guided-fascia-iliaca-block/

2

Literature Review

- Evaluation of 12 studies (within last 5 years)
  - Meta-analyses
  - Systematic reviews
  - Randomized-controlled trials
- FICB utilization:
  - Improved analgesia
  - Decreased opioid consumption
  - Decreased hospital length of stay
  - Decreased opioid-related side effects

3

Indications

ED Patient Presentation:

- Adult patient
- Radiographic images confirm acute hip fracture
- No absolute contraindications present
- Patient consents to regional block

4

Patient Eligibility Assessment

Obtain Labs

- CBC
- Coagulation studies
  - PT, PTT, INR
  - INR must be < 1.3

Examine patient

- Pain score
- Neurovascular examination
- Evaluate for contraindications

5

Contraindications

- Coagulopathy/Anticoagulant use
- Infection at site of injection
- Allergy to local anesthetic
- Preexisting neuropathy
- Previous femoral bypass surgery
- Uncooperative patient
- Patient refusal

6

Pre-procedure

- Ensure patient is appropriate candidate
- Obtain consent
- Standard ASA monitoring (telemetry, pulse ox, BP)
- Obtain IV access
- Gather equipment
- Time out

7

Essential Equipment

Supplies

- Ultrasound machine with a linear transducer (6–14 MHz), sterile sleeve, and gel
- Standard nerve block tray
- Syringes (40 mL, 3 mL)
- Block needle - A blunted or short-beveled needle (e.g. Tuohy or specialized nerve block needle).
- Chlorohexidine swab
- Sterile gloves
- Sterile ultrasound probe cover
- Lubricant gel
- Marking pen

Medication

- Ropivacaine (0.2% or 0.5%)
- Lidocaine (1-2%) - skin wheal

8

Relevant Anatomy

- Femoral vein
- Femoral artery
- Femoral nerve
- Fascia lata
- Fascia iliaca
- Fascia iliaca compartment
- Iliacus muscle
- Psoas Major
- Pectineus
- Adductor muscle

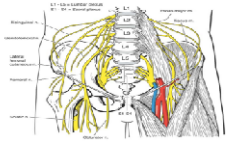


Figure 2. Kayser F., E., Denke J., W., & Terese T., H. (2016). Lumbosacral innervation of the hip. The lower extremity: Somatic blockade. *Anesthesia Key*. https://aneskey.com/the-lower-extremity-somatic-blockade/

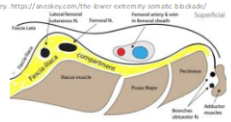


Figure 3. Harrington, J. (2019, September 18). Drawing of the relevant sono-anatomy when performing an ultrasound-guided femoral nerve block. Note that the fascia iliaca keeps the femoral nerve right next to the iliacus muscle. B. Ultrasound image of the same anatomy. The fascia iliaca (yellow dotted line) is the key structure to recognize when performing the block. Retrieved July 4, 2020, from https://www.acepnow.com/wp-content/uploads/2019/09/ACEP_0919_pg18a.png

9

Technique

- Position patient in supine position
- Disinfect skin–large enough area to cover probe scanning
- Prepare local anesthetics in syringes
- Don sterile gloves and place sterile ultrasound cover over probe
- Identify anatomy using linear ultrasound probe, scan the inguinal crease transversely to identify femoral artery
- Slide probe laterally, to identify fascia iliaca, iliacus muscle, fascia lata, and sartorius muscle

Figure 4 NYSORA (2020). Needle insertion for fascia iliaca block. *Ultrasound-guided Fascia Iliaca Block*.https://www.nysora.com/regional-anesthesia-for-specific-surgical-procedures/lower-extremity-regional-anesthesia-for-specific-surgical-procedures/ultrasound-guided-fascia-iliaca-block/

10

Technique

- Create a skin wheal using a 3 mL syringe and lidocaine
- Using an in-plane technique, insert the block needle and note a "pop" sensation as the needle pierces that fascia.
- Aspirate, to confirm negative aspiration, before instilling 2 ml of local anesthetic to ensure spread between the fascia and the iliopsoas muscle
- Aspirate after every 5 ml injected, for a total of 20-40 mL for adequate blockade

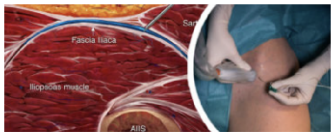


Figure 5. NYSORA (2020). Fascia iliaca block. *Ultrasound-guided Fascia Iliaca Block*.https://www.nysora.com/regional-anesthesia-for-specific-surgical-procedures/lower-extremity-regional-anesthesia-for-specific-surgical-procedures/ultrasound-guided-fascia-iliaca-block/

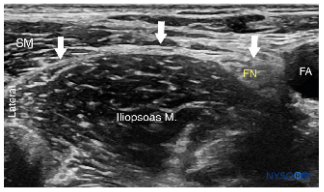


Figure 6. NYSORA (2020). Ultrasound image of the fascia iliaca. *Ultrasound-guided Fascia Iliaca Block*.https://www.nysora.com/regional-anesthesia-for-specific-surgical-procedures/lower-extremity-regional-anesthesia-for-specific-surgical-procedures/ultrasound-guided-fascia-iliaca-block/

11

Complications

- Hematoma
- Infection
- Nerve injury
- Intravascular injection
- Local anesthetic systemic toxicity (LAST)

12

Signs and Symptoms of LAST

- Perioral paresthesia
- Slurred speech
- Nausea/vomiting
- Tachycardia
- Hypertension or hypotension
- Arrhythmia
- Confusion
- Seizures
- Coma

13

LAST Treatment

- STOP infiltration
- If patient develops an arrhythmia
  - Consider amiodarone as first line for arrhythmias
  - For prolonged QRS –administer sodium bicarbonate 8.4% IV
  - For Torsades –give 2 gm magnesium IV
- Treat hypotension with fluid boluses
  - Avoid vasopressin, calcium channel blockers, beta blockers and local anesthetics
- Call for CODE team
- Ventilate with 100% fiO2
- Prepare for intubation
- PRN Benzodiazepines for seizures
- Administer 20% lipid emulsion
  - Administer 1.5 ml/kg (LBW) bolus over 1 minute
  - Follow with continuous infusion at 0.25 ml/kg/min
  - May repeat bolus every 5 minutes as needed up to 3 doses
  - Continue infusion for at least 10 minutes affter hemodynamic stability occurs
- Consider ECMO or CPB
- Admit to ICU for continued monitoring

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Harrington, J. (2019, September 18). Figure 1: A. Drawing of the relevant sonoanatomy when performing an ultrasound-guided femoral nerve block. Note that the fascia iliaca keeps the femoral nerve right next to the iliacus muscle. B. Ultrasound image of the same anatomy. The fascia iliaca (yellow dotted line) is the key structure to recognize when performing the block. Retrieved July 4, 2020, from https://www.acepnow.com/wp-content/uploads/2019/09/ACEP_0919_pg18a.png

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FICB Clinical Practice Guideline

Indications

Radiographic images confirm acute hip fracture

Evaluate for the following contraindications

- Coagulopathy/Anticoagulant use
- Inflammation or infection at site of injection
- Allergy to local anesthetic
- Preexisting neuropathy
- Previous femoral bypass surgery
- Uncooperative patient
- Patient refusal

Contraindications present

STOP: Continue with standard pain management

Contraindications NOT present

Proceed with algorithm

Obtain labs

CBC: **PLT must be > 100,000**

Coagulation studies (PT, PTT, INR): **INR must be < 1.3**

Assemble equipment

Syringes: 40 cc syringe and 3 cc syringe

Local anesthetic: Ropivacaine 0.2% or 0.5% + 1-2% lidocaine for skin wheal

Point of care ultrasound: Linear transducer 6-14 MHz

Block needle: Blunted or short-beveled needle e.g. Tuohy or specialized nerve block needle

- Chlorohexidine swab
- Sterile gloves
- Sterile ultrasound probe/sleeve cover
- Lubricant gel
- Marking pen

Pre-procedure

Obtain consent

Document pain score and neurovascular exam

Standard ASA monitoring (telemetry, pulse ox, BP)

Obtain IV access

Perform time out: Two staff members confirm correct site, verify consent is signed, address any allergies, verify lab values

Technique

Disinfect skin: Large enough area to cover probe scanning

Prepare local anesthetics in syringes

Don sterile gloves and place sterile ultrasound cover over probe

Identify anatomy using linear ultrasound probe, scan the inguinal crease transversely to identify femoral artery. Slide probe laterally, to identify fascia iliaca, iliacus muscle, fascia lata, and sartorius muscle

Create a skin wheal using a 3 mL syringe and lidocaine

Using an in-plane technique, insert the block needle and note a "pop" sensation as the needle pierces that fascia. Aspirate, to confirm negative aspiration, before instilling 2 ml of local anesthetic to ensure spread between the fascia and the iliopsoas muscle

Aspirate after every 5 ml injected, for a total of 20-40 mL for adequate blockade

Monitor for Complications

- Hematoma
- Nerve injury
- Intravascular injection
- Infection

Local anesthetic systemic toxicity (LAST)

Identify Signs & Symptoms of LAST

- Perioral paresthesia
- Arrhythmia
- Slurred speech
- Confusion
- Nausea/vomiting
- Seizures
- Tachycardia
- Coma
- Hypertension or hypotension

LAST treatment

STOP infiltration

If patient develops an arrhythmia – Consider amiodarone as first line for arrhythmias, for prolonged QRS – administer sodium bicarbonate 8.4% IV, for Torsades – give 2 gm magnesium IV

Treat hypotension with fluid boluses – Avoid vasopressin, calcium channel blockers, beta blockers and local anesthetics

Call for CODE team – ACLS: Limit individual epinephrine doses to < 1 mcg/kg (may reduce efficacy of lipid rescue in high doses)

Ventilate with 100% fiO2 – Prepare for intubation

Seizure suppression – Benzodiazepines, avoid propofol in patients having signs of cardiovascular instability (propofol's lipid content is too low to provide any lipid emulsion benefit)

Administer 20% lipid emulsion
- Administer: 1.5 ml/kg (lean body weight) bolus over 1 min
- Followed by 0.25 ml/kg/min
- May repeat bolus every 5 minutes as needed up to 3 doses

Continue infusion for at least 10 minutes after hemodynamic stability occurs

Consider ECMO or CPB

Admit to ICU for continued monitoring

APPENDIX F:

PROJECT MANAGER CONTRIBUTION (GROUP PROJECT RESPONSIBILITY FORM)

Group Project Responsibility Form

DNP Group Project Form

Each member of the group must meet all expectations of planning, implementation, and evaluation of the project, and be evaluated accordingly. Each student must have a leadership role in at least one component of the project and be held accountable for a deliverable. The following serve as illustrative examples:

a. The student serves as a vital member of an interprofessional team, implementing and evaluating a component of a larger project.

b. Students work on the same project, for example improving hand washing, across multiple units within the same organization or across multiple organizations.

c. Students focus on different aspects of improving diabetic outcomes of care by meeting criteria for guidelines for diabetes care such as eye exams, time frames for Hg A1-c screening, and foot care.

d. Students analyze and implement changes in state immunization policies to improve access to immunizations and increase immunization rates. (AACN, 2015)

Describe Project Overview and Implementation Site
Educating Anesthesia Providers on Implementation of Fascia Iliaca Compartment Blocks for Acute Hip Fractures Implementation Site: Doctors Hospital at Renaissance, Edinburg, Texas
Each student will write the DNP Project Proposal, please list the project question, theoretical framework and model for implementation agreed upon for the project
Purpose: This project aims to develop a clinical practice guideline (CPG) for hip fracture-related pain control and increase the number of providers trained in the administration of FICB in order to integrate evidence-based pain management and improve patient outcomes. **Project Question**: Will anesthesia providers at a hospital in south Texas, caring for patients with acute hip fractures, adopt and implement FICBs for pain management after an educational presentation, hand-on training workshop, and development of a CPG? **Theoretical framework:** Kolcalba's Theory of Comfort **Conceptual framework:** Model for Improvement
All students must have the same DNP Project Committee Members (Please list) **Committee Chair**: Sarah Torabi, DNP, CRNA **Committee Member 2**: Patty Daly, PhD, CRNA **Committee Member 3**: Kristie Hoch, DNP, CRNA

Requirements	Kaitlin Tilton	Chrisanna Roberts	Jenna Hernandez
Describe contributions to DNP Project Planning	1. Literature Search 2. In contact/communication with hospital research dept. for paperwork to be completed to start project.	1. Literature Search 2. In contact with Chief of Anesthesia regarding organization of the project.	1. Literature Search 2. In contact with anesthesia department in setting up FICB workshop and how to organize the "hands on" portion.
Describe **Individual** Contributions for: Project Implementation	1. Development of educational presentation about FICB to providers 2. Administration of pre-survey	1. Development of Pre- and Post-Survey questions 2. Develop recruitment emails/flyers and disclosure letter for participants.	1. Set up Educational event involving "hands on" workshop FICBs 2. Administration post-survey
Group Contributions for Project Implementation	1. Develop a guideline to be implemented at DHR 2. Present completed educational presentation 3. Tutorial on AGREE-REX tool	1. Develop a guideline to be implemented at DHR 2. Present completed educational presentation 3. Tutorial on AGREE-REX tool	1. Develop a guideline to be implemented at DHR 2. Present completed educational presentation 3. Tutorial on AGREE-REX tool
Describe **Individual** Contributions for: Project Evaluation	1. Development of proficiency quiz	1. Development of 30-day follow-up survey	1. Placement of all surveys into Qualtrics program
Describe Individual Contributions for: Data Analysis and Synthesis	1. Analyze pre and post-survey results.	1. Analyze 30-day follow up survey results	1. Use Qualtrics to graph all survey results
Student Signature	Kaitlin N. Tilton		

Each Student is responsible for:

1) Individual written DNP Project Proposal
2) DNP Project Proposal defense
3) DNP Project Final Paper
4) DNP Final poster presentation
5) DNP Final Defense

Each student will work within the group to:

1) Disseminate outcomes to stakeholders
2) Develop a plan for sustainability to present to stakeholders

Approved by DNP Project Committee Chair

Signature Sarah Tardi **Date:** 5-23-20

(Name) Sarah Tardi

APPENDIX G:

AGREE-REX CALCULATION OF SCORES

AGREE-REX Calculation of SCORES

Example: If five appraisers give the following sores for Domain 1 (Clinical Applicability):

If five appraisers give the following sores for Domain 1 (Clinical Applicability):

	Item 1	Item 2	Item 3	**Total**
Appraiser 1	5	6	4	**15**
Appraiser 2	6	6	3	**15**
Appraiser 3	4	7	5	**16**
Appraiser 4	5	5	4	**14**
Appraiser 5	4	6	4	**14**
Total	**24**	**30**	**20**	**74**

Maximum possible score = 7 (highest quality) x 3 (items) x 5 (appraisers) = 105
Minimum possible score = 1 (lowest quality) x 3 (items) x 5 (appraisers) = 15

The scaled domain score will be:

$$\frac{\text{Obtained score} - \text{Minimum possible score}}{\text{Maximum possible score} - \text{Minimum possible score}}$$

$$\frac{74 - 15}{105 - 15} \times 100 = \frac{59}{90} \times 100 = 0.6556 \times 100 = 66\%$$

When there is an opportunity for multiple appraisers to meet to discuss scores, users may choose to use a consensus approach to reach agreement about AGREE-REX item scores. This method is also appropriate. The consensus score should be then applied to the calculation described below.

If multiple appraisers reach consensus on scores for Domain 1 (Clinical Applicability):

If multiple appraisers reach consensus on scores for Domain 1 (Clinical Applicability):

	Item 1	Item 2	Item 3	**Total**
Consensus Score	4	6	4	**14**

$$\frac{\text{Obtained consensus score} - \text{Minimum possible score}}{\text{Maximum possible score} - \text{Minimum possible score}}$$

$$\frac{14 - 3}{21 - 3} \times 100 = \frac{11}{18} \times 100 = 0.6111 \times 100 = 61\%$$

APPENDIX H:

LITERATURE REVIEW GRID

Author(s)	Pub. Year	Title of Publication	Type of Study	Main Outcomes or Findings	Support for and or link to project
Cooper, A.L., Nagree, Y., Goudie,, A., Watson, P.R., Arendts, G.	2019	Ultrasound-guided femoral nerve blocks are not superior to ultrasound-guided fascia iliaca blocks for fractured neck of femur	Randomized Control Trial	N= 100 patients Double blind study, 48 participants received femoral nerve block, 52 participants received fascia iliaca compartment block. There was no statistical difference in the reduction of pain scores between the two blocks (p=0.41)	Femoral nerve block vs. FICB= equivalent analgesia effects in patients with neck of femur or proximal neck fracture. The femoral nerve block is not superior.
Guay, J., Parker, M. J., Griffiths, R., Kopp, S.	2017	Peripheral nerve blocks for hip fractures	Systematic Review	31 trials; n= 1760 participants (897 randomized to PNBs and 863 w/ no regional blockade); 373 participants show that peripheral nerve blocks reduced pain on movement within 30 minutes of block placement (standardized mean difference (SMD)	High-quality evidence shows that regional blockade reduces pain on movement within 30 minutes after block placement. Moderate-quality evidence shows reduced risk for pneumonia, decreased time to first mobilization and cost reduction

Author(s)	Pub. Year	Title of Publication	Type of Study	Main Outcomes or Findings	Support for and or link to project
				-1.41, 95% confidence interval (CI) -2.14 to -0.67; equivalent to -3.4 on a scale from 0 to 10; I2 = 90%; high quality of evidence); Two trials with 155 participants reported that peripheral nerve blocks also reduced time to first mobilization after surgery (mean difference -11.25 hours, 95% CI -14.34 to -8.15 hours; I2 = 52%; moderate quality of evidence). One trial with 75 participants indicated that the cost of analgesic drugs was lower when they were given as a single shot block (SMD -	of the analgesic regimen (single shot blocks).

Author(s)	Pub. Year	Title of Publication	Type of Study	Main Outcomes or Findings	Support for and or link to project
				3.48, 95% CI -4.23 to -2.74; moderate quality of evidence).	
Hong, H.K. & Ma, Y.	2019	The efficacy of fascia iliaca compartment block for pain control after hip fracture	Meta-Analysis	11 trials evaluating 937 patients	FICB decreases pain intensity, and morphine consumption More high quality RCT's are recommended
Hsu, Y.P., Hsu C., Bai, C.H., Cheng, S.W., Chen, C.	2018	Fascia iliaca compartment block versus intravenous analgesic for positioning for femur fracture patients before a spinal block: A PRISMA-compliant meta-analysis	Meta- Analysis	3 studies evaluating 141 patients	FICB is safe, and can provide adequate analgesia for positioning during spinal anesthesia There is no difference in hemody

Author(s)	Pub. Year	Title of Publication	Type of Study	Main Outcomes or Findings	Support for and or link to project
					namic effects when compari ng FICB to IV analgesi cs
Kacha, N., Jadeja, C., Patel, P., Chaudhari, H., Jivani, J., & Pithadia, V.	2018	Comparative Study for Evaluating Efficacy of Fascia Iliaca Compartment Block for Alleviating Pain of Positioning for Spinal Anesthesia in Patients with Hip and Proximal Femure Fractures.	Randomized, double blind, controlled prospective study	- n=100 - age 30-90 years - hip or proximal femoral surgery - Group 1, FICB was given half an hour before shifting the patients in operation theater with 30 ml of 0.25% ropivacaine, and in - Group 2, sham block was given with 30 ml normal saline. Each group included 50 patients. - 30min. after	FICB effectively provides analgesia for positioning for spinal anesthesia to patients in hip and proximal femur surgeries. FICB provides analgesia in postoperative period without having significant alteration in the hemodynamic profile of patients.

Author(s)	Pub. Year	Title of Publication	Type of Study	Main Outcomes or Findings	Support for and or link to project
				FICB, spinal anesthesia was given and patients' vitals were monitored before and after block, at the time of positioning for spinal anesthesia, intraoperative and postoperative periods.	
Ma, Y., Wu, J., Xue, J., Lan, F., & Wang, T.	2018	Ultrasound-guided continuous fascia iliaca compartment block for pre-operative pain control in very elderly patients with hip fracture: A randomized controlled trial.	A randomized controlled trial	-n= 98 very elderly patients with hip fractures, - Randomly assigned into 2 groups: -The control group, receiving traditional analgesia including 50 mg -Results: Scores for patients' satisfaction with the analgesic regimen in the preoperative period were greater in the	-US guided FICB was an effective method of providing analgesia for very elderly (>/=80 years old) with hip fracture - There was no difference in analgesia-associated side effects between groups. Duration of hospital stay of patients in the control group was significantly longer compared

Author(s)	Pub. Year	Title of Publication	Type of Study	Main Outcomes or Findings	Support for and or link to project
				study group compared with the control group (P<0.001).	with the study group (P=0.001). Patients in the study group were less likely to have increased complications compared with patients in the control group over the N2-N4 period (from preoperative period to after surgery; P=0.016).
Pasquier, M., Taffe, P., Hugli, O., Borens, O., Kirkham, K. R., & Albrecht, E.	2019	Fascia iliaca block in the emergency department for hip fracture: A randomized, controlled, double-blind trial.	A randomized, controlled, double-blind trial	-n=30 -over 70 years old - received prehospital morphine, were randomized to receive either an FICB using 30 ml of bupivacaine 0.5% with epinephrine 1:200,000 or a sham injection with normal saline. - The fascia iliaca block was	- At baseline, the fascia iliaca group had a lower mean pain score than the NS injection group, both at rest (difference = - 0.9, 95%CI [- 2.4, 0.5]) and on movement (difference=- 0.9, 95%CI [- 2.7;0.9]). - The same parallel change in pain scores over time was

Author(s)	Pub. Year	Title of Publication	Type of Study	Main Outcomes or Findings	Support for and or link to project
				administered by emergency medicine physicians trained to perform an anatomic landmark-based technique	observed over 24 h of follow-up (test of parallelism for patients at rest p = 0.82 and on movement p = 0.12). - Fascia iliaca block following anatomic landmarks may not provide supplementary analgesia for patients suffering from hip fracture, when low pain scores are reported after prehospital morphine. - Additional larger trials will help reach definitive conclusion
Pinson, S.	2015	Fascia Iliaca (FICB) block in the emergency department for	Systematic Review	- Efficacy of fascia iliaca block for providing analgesia for adults	- Comprised 2 randomized control trials, an audit, a

Author(s)	Pub. Year	Title of Publication	Type of Study	Main Outcomes or Findings	Support for and or link to project
		adults with neck of femur fractures: A review of the literature		with proximal femoral fractures when compared with standard management. -The potential for non-medical practitioners to deliver this block was also assessed. -Results: 179 papers were identified, of which 12 were included for review after eligibility sorting and removal of duplicates.	literature review, 5 cohort studies, NICE guidelines and an interventional uncontrolled trial. - The Cochrane library revealed no studies that met the search criteria. - 2 case reports detailing adverse outcomes were identified. - All papers showed FICB to have a similar or greater efficacy to systemic treatment, with fewer adverse side effects. -FICB is an effective method of providing analgesia in these patients without the undesirable side

Author(s)	Pub. Year	Title of Publication	Type of Study	Main Outcomes or Findings	Support for and or link to project
					effects of systemic opioids. Non-medical practitioners are capable of administering this block.
Steenberg, J. & Møller, A. M.	2018	Systematic review of the effects of fascia iliaca compartment block on hip fracture patients before operation	Systematic review	- Nine databases searched yielding 11 randomized & quasi-randomized controlled trials - All used loss of resistance FICB - n = 1062 - FICB compared with NSAIDs, opioids, & other nerve blocks - Analgesia consumption evaluated - Time to perform spinal anesthesia with block versus opioids - Time for block placement	FICB superior to opioids during movement ($p = 0.02$) - FICB resulted in lower preoperative analgesia consumption evidenced by decreases in mean morphine dose consumption from 7.42 mg to 4.11 mg ($p=0.03$), 6 mg to 0 mg ($p<0.01$), and 5mg to 0 mg ($p=0.03$) (Steenberg & Møller, 2018) - FICB resulted in longer time before first request for additional

Author(s)	Pub. Year	Title of Publication	Type of Study	Main Outcomes or Findings	Support for and or link to project
					analgesia (p=0.05) - FICB resulted in reduced time to perform spinal anesthesia (p<0.01) - High block success rate with few adverse effects
Wennberg, P., Møller, M., Herlitz, J., & Kenne Sarenmalm, E.	2019	Fascia iliaca compartment block as a preoperative analgesic in elderly patients with hip fractures – effects on cognition	Double-blind, randomized controlled trial	- n=127 - Intervention group FICB with ropivacaine; control received FICB injection with placebo - FICB added to IV morphine and paracetamol -Patients with no or moderate cognitive impairment received 50% more prehospital pain medication than patients with severe impairment	– FICB well tolerated in patients with hip fractures – No impact on cognitive status by a single FICB after hip fracture – FICB did not improve cognitive status

Author(s)	Pub. Year	Title of Publication	Type of Study	Main Outcomes or Findings	Support for and or link to project
				-Cognitive impairment has been reported to be a barrier to receiving adequate analgesia - Evaluation of perioperative effect of preoperative FICB on cognitive status - FICB did not affect cognitive status	
Wennberg, P., Norlin, R., Herlitz, J., Sarenmalm, E.K., Møller, M.	2019	Pre-operative pain management with nerve block in patients with hip fractures: A randomized controlled trial	Double-blind, randomized controlled trial	- n=127 - FICB intervention vs. placebo	- Patients obtained statistically and clinically significant further pain relief with pre-op FICB
Zhang, X.Y., Ma, J.B.	2019	The efficacy of fascia iliaca compartment block for pain control after total hip arthroplasty: a meta-analysis	Meta-analysis	- PubMed, Embase, Cochrane Library, & Chinese Wanfang database were evaluated - 8 RCTs included for meta-analysis	- Compared with placebo, FICB significantly reduced VAS pain scores at 1-8 hours, 12 hours, & 24 hours in

Author(s)	Pub. Year	Title of Publication	Type of Study	Main Outcomes or Findings	Support for and or link to project
				FICB reduced pain up to 24 hours, total morphine consumption, and length of stay in patients undergoing THA	patients undergoing total hip arthroplasty - FICB significantly decreased incidence of nausea & length of stay ($p<0.05$) - No significant difference between VAS pain score at 48h and risk of falls between FICB & control group ($p>0.05$)

APPENDIX I:

OTHER DOCUMENTS AS APPLICABLE TO THE PROJECT (POSTER PRESENTATION)

THE UNIVERSITY OF ARIZONA
College of Nursing

FASCIA ILIACA COMPARTMENT BLOCKS FOR PATIENTS WITH ACUTE HIP FRACTURE

Kaitlin Nicole Tilton, BSN, RN; DNP Chair: Sarah Torabi DNP, CRNA
Committee members: Kristie Hoch, DNP, CRNA, MS, RRT; Patricia Daly, PhD, FNP-BC, ENP-BC, FAANP

Abstract

Perioperative pain management for hip fractures among the geriatric population presents a unique problem for anesthesia providers. Frequent opioid administration can produce detrimental side effects in this older population, including delirium, cardiovascular compromise, and respiratory depression (Haines et al., 2012; Makhoul, 2019b). Uncontrolled pain can also produce adverse neurologic, cardiovascular, and respiratory effects (Bordi, 2018; Castillon et al., 2017). This group DNP project focused on educating anesthesia providers on the use of fascia iliaca compartment blocks (FICBs) as part of a standardized pain management regimen in patients presenting with acute hip fractures. An educational workshop and clinical practice guideline (CPG) was developed and disseminated for provider practice improvement.

Purpose

The purpose of this quality improvement project was to increase anesthesia provider utilization of the FICB for perioperative pain management in patients with acute hip fractures through an educational workshop and development of a clinical practice guideline.

Background

At a Level I Trauma Center in south Texas, opioids continue to be the primary source of perioperative pain management among geriatric patients. No standard pain management protocol existed for this population. Optimization of quality pain control while limiting opioid-related adverse effects presented a unique challenge for the anesthesia provider. Both adverse effects and uncontrolled pain may produce unfavorable problems in this population, resulting in prolonged hospital stay and increased costs (Bordi, 2018; Castillon et al., 2017). The FICB is a regional anesthetic that provides localized anesthesia and analgesia to the anterior and medial portion of the thigh and lower leg (Odom-Forren & Brady, 2018). Current literature supports the use of FICBs for pain control among patients with hip fracture as it is a safe block that can be quickly implemented and targets not one but three nerves, including the femoral, obturator, and lateral femoral cutaneous nerves (Hsu et al., 2018; Wang et al., 2017). Current literature also demonstrates that FICBs are useful in decreasing opioid consumption and hospital length-of-stay (Ma et al., 2018; Steenberg & Møller, 2018).

Methods

Kolcaba's Theory of Comfort served as the theoretical framework for this project. Relief from physical pain and the reduction of opioid-related side effects formed this projects' foundation (Kolcaba & Wilson, 2002). A CPG focused on FICB utilization was developed and evaluated by anesthesia providers at an Arizona hospital using the AGREE-REX tool. The revised CPG and an educational PowerPoint were presented to anesthesia providers at a hospital in south Texas. A hands-on regional workshop was organized for participants to practice this block. A pre-and post-education survey, proficiency quiz, and thirty-day follow-up survey were used to measure knowledge and whether this project resulted in practice improvement.

Figure 1

Application of Kolcaba's Theory of Comfort

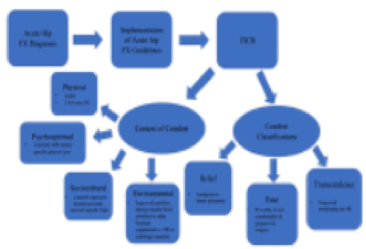


FIGURE 1. Application of Kolcaba's Theory of Comfort. Adapted from "Comfort Care: A Framework for Perianesthesia Nursing," by Kolcaba & Wilson, 2002, *Journal of Perianesthesia Nursing, 17*(2), 102-114.

Clinical Practice Guideline

Results

Participants (n=17) included certified registered nurse anesthetists (CRNAs) practicing at this facility. Data from pre-and post-education surveys demonstrated a significant increase in knowledge (24%) and intent to utilize (24%) FICB in the perioperative setting. The thirty-day follow-up survey had a limited response (n=5) compared to initial participants (n=17), but these results showed that anesthesia providers (80%) utilized the CPG 30 days following education. All 30-day follow-up survey participants (100%) identified that the educational training was beneficial, and the CPG would be useful in an emergency department (ED) setting.

Figure 2

Anatomical Knowledge to Perform an FICB

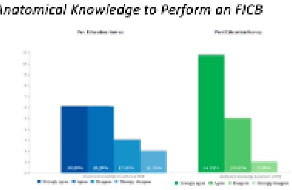
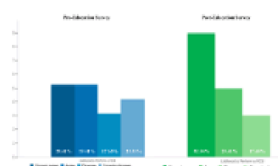


Figure 3

Likelihood to Perform an FICB



Conclusion

Current evidence supports the use of FICB for improved analgesia in geriatric patients with hip fractures. The results from this QI project determined that educational training on FICB for analgesia helped increase provider knowledge and intent to utilize FICB in the clinical setting. Additionally, a CPG focused on identifying appropriate patients for an FICB and implementing FICB increased the likelihood of administration as part of a perioperative pain management plan.

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