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Compare Peripheral Nerve Blocks for Analgesia Following a Total Knee

Chart Review to Compare Peripheral Nerve Blocks for Analgesia Following a Total Knee

Replacement

Tracy Kelly

Submitted as Partial Fulfillment for the Doctor of Nursing Practice Degree

Regis University

April 25, 2020

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Executive Summary

A Retrospective Chart Review to Compare Two Peripheral Nerve Blocks for Analgesia

Following a Total Knee Replacement

Problem: Pain after a total knee replacement (TKR) can be severe. The most commonly used pain management 24 hours after surgery is administration of intravenous opioids, which by itself does not always provide adequate post op pain relief (Otten, C. & Dunn, K. 2011; Kerr, D. 2008; Jenstrup, M.T et al 2011). With the current opioid crisis, controlling pain without opioids whenever possible is essential.

Purpose: To analyze whether a combination block of an adductor canal block with intra-articular infiltration (AII) or an adductor canal block (ACB) alone can provide enough pain relief that there will be minimal or no need to use opioids for pain relief 24 hours TKR post-surgery.

Goal: To decrease opioid requirement to relieve pain 24 hours post TKR surgery.

Objective: To compare efficacy to reduce opioid requirement 24 hours post TKR surgery between an AII or an ACB alone.

Plan: A quality improvement convenience sample retrospective chart review.

Outcomes and Results: Sixty charts were reviewed, 30 for men and 30 for women and further divided by men and women that received AII or an ACB prior to undergoing TKR surgery block (N=15 men and 15 women for AII and for ACB). There was a significant decrease ($p=0.015$) in reported pain with the AII block (N=30) than with the ACB block (N= 30). All participants in the AII group had a recording of pain score of 0 compared to six participants in the ACB group with an initial pain score of two and 15 participants in ACB group with an initial pain score of three.

Acknowledgements

First and foremost, I give all honor and glory to God. I dedicate this work to my parents and children. Thank you for your constant support, understanding, encouragement and love. I am very grateful to my children, Traviston and Terrell, for your patience and sacrifice over the last three years. You have allowed me to pursue my doctoral degree and reach this pinnacle of academic achievement.

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Problem Recognition and Definition

Problem Statement

While a total knee replacement (TKR) is one of the most common and successful interventions performed annually to treat pain in the affected joint, post-surgery opioids are often required to treat the pain associated with this procedure. Pain after a TKR can be severe and the most commonly used pain management following a TKR is IV administration of opioids in which by itself does not provide adequate post op pain relief (Otten & Dunn, 2011; Kerr, 2008; Jenstrup et al. 2011). With the opioid crisis, controlling pain without opioids whenever possible is essential.

The United States is currently experiencing an opioid epidemic. According to the Center for Disease Control (CDC) (2018), almost 400,000 people died from an overdose involving any opioid, including prescription and illicit opioids from 1999-2017. In 2017, more than 70,000 deaths were the result of drug overdose with more than 68% of the 70,000 deaths involving an opioid. On average, 130 Americans die each day from an opioid overdose, according to the CDC (2018). Overdose deaths from opioids, such as fentanyl, have increased almost six times since 1999. Therefore, controlling pain without the use of opioids is essential.

The review of literature explained that there were many types of regional anesthetics available for postoperative pain management following a TKR. However, little appeared to be known as to what type or combination of regional anesthetics provided the best pain control with the least amount of side effects. The purpose of this quality improvement was to analyze whether a combination block of an adductor canal block with intra-articular infiltration or an adductor canal block alone provided enough pain relief that there would not be a need to use opioids or their use would be at a minimum to relieve pain.

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Project Question and PICO

Will there be a decreased use of opioids for pain relief in the first 24 hours following a TKR with a combined intra-articular injection/adductor canal block compared to an adductor canal block alone?

Population. Men and women undergoing primary total knee replacement who have received adductor canal blocks and adductor canal blocks with intra-articular injection. Age range 50-75. Inclusion criteria included BMI of 30 or less. Co-morbidity of hypertension was accepted. Surgery time of two hours or less was included.

Intervention. Retrospective Chart Review (RCR) in which pre-recorded patient-centered data was used to answer above research question.

Comparison. Compare the efficacy of adductor canal/intra-articular infiltration and adductor canal alone peripheral nerve blocks.

Outcome. To determine through RCR that an adductor canal block or an adductor canal block with intra-articular infiltration would decrease use of opioids in the first 24 hours following a total knee replacement.

Project Significance, Scope and Rationale

The cost of healthcare has dramatically increased due to the current opioid epidemic, particularly for inpatient hospitalizations and emergency room visits. To decrease the opioid crisis the United States is currently facing, a Retrospective Chart Review was conducted to analyze whether an adductor canal block or an adductor canal block with intra-articular infiltration provided enough analgesia to eliminate or decrease the requirement of Morphine IV post operatively within the first 24 hours for one of the most common and painful procedures done today which is a TKR. The use of one of the above blocks ultimately aid in eliminating or

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at least decreasing the use of postoperative opioids to control pain increases the quality of care that is delivered to the patient and can increase patient satisfaction. The patient that requires no or limited opioids can potentially have increased quality of life.

Literature Review

Balance between analgesia and side effects (BASE) theory. The BASE theory is a concept described as patient satisfaction with pain relief and absence of medication side effects which is a high-quality care goal to provide to patients (Good, 1998). BASE Theory is used in this study because the population of interest are alert adults, severe pain is typical after a TKR, pain after a TKR is inadequately controlled by a single modality, and pain medication side effects may prevent administration of additional analgesics and increasing dosages.

Diffusion of innovation. Diffusion of innovation theory for clinical change first discussed by Gabriel Tarde is a valuable change model in improving clinical practice as suggested by Kaminski (2011). Kaminski (2011) explained why some clinical actions are adopted rapidly and why some are put into practice slowly. The review of the theory showed “there is a need to prospectively test the assumptions of the model in the healthcare environment using a rigorous experimental design” (Sanson-Fisher, 2004, S56). The report on this theory has shown that this theory has been utilized in different settings. This theory is relevant in this study because it can be applied in any clinical setting that needs change. This theory contributes to the discipline of nursing by presenting concepts that can be examined in increasing chances of guidelines being implemented. This theory presents elements within its theory that allows the practitioner to examine what could make implementing change successful.

Goal attainment. The Theory of Goal Attainment by Imogene King in 1960s, as stated by Petiprin (2016), described an interpersonal relationship in which the patient grows and

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develops to attain certain life goals. The success of attaining post op pain relief with decrease use of opioids following a TKR relies on one of the propositions of the Goal Attainment theory in which appropriate information is communicated to the patient followed by mutual goal setting and then achievement. Accurate information regarding the efficacy of peripheral nerve blocks to decrease the need for post op opioids allows the patient to make an informed decision and agree to receive the regional block to achieve the goal of receiving adequate pain relief following a total knee replacement without the use of opioids.

Theoretical foundation. TKR is associated with severe postoperative pain, affecting the rehabilitation, hospital stay, and patient satisfaction, according to Sardana, Burzynski, and Scuderi (2019, p. 183). The administration of opioids to manage acute pain postoperatively following a TKR is common. Effective analgesia is essential to early postoperative recovery. Effective postoperative pain relief can be achieved with an adductor canal block as well as intra-articular infiltration at the surgical site reducing the overall opioid consumption within the first 24 hours following a TKR (Kampitak et al., 2017; Sardana et al., 2018; Shengchin, Hungchen, Chihwen, Chingfeng, & Hsini, 2015). Numerous authors found Morphine intravenously (IV) was the most common opioid used following TKR (McNamee, Convery, & Milligan, 2001; Carli et al., 2003; Jenstrup et al., 2011; Jeger et al., 2012; Kerr & Kohan, 2008).

Alternative techniques, such as adductor canal blocks and/or intra-articular infiltration, are strategies that can aid in the reduction of opioid usage following a TKR (Kerr & Kohan, 2008; Masaracchia, Herrick, Barrington, Hartmann, & Sites, 2017; Oseka, & Pecka, 2018; Lund, Jenstrup, Eger, Sorensen, & Dahl, 2010; Zinkus, et al., 2017; Rodriguez-Merchan, 2017).

Intra-articular infiltration and adductor canal blocks are practical, safe, and simple in providing effective analgesia for post operatively pain relief in the first 24 hours following TKRs

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(Bengisum, Salviz, Darcin, Suer, & Ates, 2010; Jenstrup, et al., 2011; Rodriguez-Merchan, 2017; Affas, Nygard, Stiller, Wretenberg, & Olofsson, 2011; Kerr & Kohan, 2008).

Systematic review and meta-analysis of randomized controlled trials showed ages of patients studied were from 40 to 105 years old (Sardana et al., 2018, p.183-184). However, Kampitak et al. (2017), found the average age for study participants was 60-70 with an average BMI 25-28. Pain scores for patients who received adductor canal block ranged from .4 to 5.2 on a 10-point scale and for patients who received intra-articular infiltration were 0 to 6 on a 10-point scale. Morphine consumption measured at 24 hours for patients who received adductor canal blocks was from 6.0 +/- 9.4 to 81.0 +/- 29.2. Morphine consumption for patients who received intra-articular injections were from 3.6 +/- 8.0 to 73.0 +/- 35.8 (Sardana et al., 2018; Kampitak et al., 2017). Research showed that there was a significant decrease in the consumption of postoperative Morphine as well as decreased pain scores with the use of adductor canal blocks and intra-articular infiltration (Marques et al., 2014; Kerr & Kohan, 2008; Rodriguez-Merchan, 2017; Jenstrup, et al., 2011; Allen, Liu, Ware, Nairn, & Owens, 1998).

Forty-one articles were reviewed, sixteen articles were included in research. Databases searched included Medline, CINAHL, and Google Scholar. Search terms included regional blocks, adductor canal block, intra-articular infiltration, and total knee replacement. Four articles were level one, which is a systematic review, on a seven-tiered level evidence scale. Nine articles were level two, which is randomized control trial. Two articles were level four, which were case control. One article was level five, which was a descriptive study.

Market and Risk Analysis

Strengths. The support of the chief anesthesiologist and colleagues at current facility. Total knee replacement is a common procedure performed at current facility. There has been

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discussion amongst colleagues regarding different techniques available to patients to decrease hospital stay and improve physical therapy sessions. Therefore, there is support for study to be performed. Access to files/records and computer to search key words such as procedure of Total Knee Replacement.

Weaknesses. Limited time frame to perform study which could affect sample size and increase risk for a type two error. Cost of supplies to perform peripheral nerve blocks that may have limited or decreased the number of peripheral blocks performed. Knowledge of whether peripheral nerve block was performed by a novice provider which could skew data for effectiveness in decreasing opioid use would not be immediately known. Older records could not be computerized which added time to gathering necessary data.

Opportunities. The support of multiple organizations such as the World Health Organization, U.S. Department of Health and Human Services, National Institute of Health, Center for Diseases to search ways to decrease inappropriate opioid use that could lead to addiction. A long-term goal for the opportunity to decrease use of opioids and side-effects associated with opioid usage with the potential to decrease cost of care could be considered, although, beyond the scope of this study.

Threats. Unknown knowledge if surrounding facilities were performing certain peripheral blocks associated with total knee replacement routinely. Therefore, future clients could have procedure performed at other facilities which would be a threat to current facility.

Driving, Restraining and Sustaining Forces

The need to provide information as to whether an adductor canal block alone or in combination with intra-articular infiltration to patients who are undergoing a total knee replacement is necessary in the effort to decrease the use of opioids to treat post op pain for those

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patients. Driving forces include the need to provide alternative treatment of pain to opioids, knowing the skills of anesthesia provider, if provider had the proper equipment, and documentation in the charts reviewed.

Restraining forces included lack of access to adequate number of records and providers performing different blocks making it difficult to compare. Restraining forces also included documentation of level of pain unclear. Sustaining forces included the low-cost risk/benefit analysis, the retrospective study had minimal risk to patients and care providers and answering the question as to how to decrease post op opioid use.

Need, Resources, Feasibility

Post-operative pain following a TKR may have a detrimental impact on postoperative recovery by delaying early mobilization and prolonging hospital stay (Burzynski & Scuderi, 2019). Severe postoperative pain is also associated with significant complications including myocardial ischemia, decreased pulmonary function, increased risk of infection, and the development of chronic pain (Mariano & Perlas, 2014). Postoperative pain may also affect the mental status of elderly patients, causing delirium or an anxiety disorder. The adverse effects of inadequate pain relief could delay the recovery of functional capacity for activities of daily living or the return to the workforce. Providing a regional block could eliminate or decrease the above adverse effects as well as increase the quality of care that is delivered to patients.

Administration of regional blocks is feasible with cooperation from all stakeholders. Adequate skill level of anesthesia providers must be ensured. Ultrasound machine usage training and regional anesthesia block seminars could be provided to assist in increasing skill level of anesthesia providers. Regarding the legality of administration, a written consent must be obtained before performing a regional block.

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Administration of a regional block is facilitated using an ultrasound machine to visualize landmarks and successfully administer the regional blocking agent. Providing a regional block, such as an adductor canal block with or without intra-articular infiltration, is less expensive than the alternatives, and the increase in patient satisfaction and facility or medical provider reputation is immeasurable.

Stakeholders and Project Team

Stakeholders include primary investigator, project chair, project mentor, patients who receive TKR, hospital administrators, colleague and medical suppliers. Hospital administrators were considered stakeholders due to the potential increase in revenue generated by increase patient admission. Medical suppliers were potential stakeholders due to receiving contract to supply facility with necessary supplies and equipment to perform regional blocks. The team included Dr. Lynn Wimett, project chair; Dr. Carol Harris, mentor; Ms. Tracy Kelly, the primary investigator; a statistician, and information technology expert.

Cost-Benefit Analysis

Table 1

Cost to Replicate the Study

Item	Projected Cost	Actual Cost
Primary investigator's time	\$80/hour x 80 hours = \$ 6,400.00	\$0
Whatever else someone might have to pay for including contacting previous patients if that was necessary to gain	\$50/hour x 40 hours = \$2,000.00	\$0

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access to their charts or duplication for data collection tools or cost of statistician		
Information technology Support	\$85.00 per unit times 5 units \$425.00	0
Printing costs	\$50.00	0
Total	\$8,875.00	0

Benefits

The potential savings in cost such as decreased hospital stay, decrease treatment of side effects from opioid administration or a resulting addiction, increase postop physical therapy, and increase patient satisfaction from the administration of a peripheral nerve block for treatment of total knee replacement is difficult to judge and beyond the scope of this study. However, the potential benefit of decreasing opioid use and increasing quality of life for TKR patients is unmeasurable.

Project Objectives

Vision. To eventually decrease the need for opioids for pain relief within the first 24 hours following a TKR.

Mission. To review retrospective charts to compare whether a combined intra-articular injection/adductor canal block or an adductor canal block alone will require decrease use of opioids within the first 24 hours following a TKR.

Goal. To drive the mission and eventually the vision to decrease or eliminate the use of opioids post operatively in patients following a TKR although, that is beyond this study.

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Objective. The primary objective of this study was to compare the use and amount of opioids and level of pain relief for patients in the first 24 hours post-op following a TKR in patients that receive a combination of intra-articular injection and adductor canal block to patients that receive only an adductor canal block.

Evaluation

This quality improvement project was a retrospective chart review designed to compare the required amount of opioid needed to control pain 24 hours post-operatively for those that received an intra-articular infiltration with adductor canal block with those that received only an adductor canal block to evaluate which regional block resulted in less need for opioids to control post-operative pain.

Logic Model

The Logic Model demonstrated that charts of patients that have received either combination adductor canal blocks with intra-articular infiltration or adductor canal blocks alone were reviewed with statistical analysis performed to analyze data/variables that were collected from chart reviews. Education was also provided to patients and nurses regarding the above blocks that were available and other multi-modal analgesia that could be utilized by patient care nurses (see Appendix A).

Definition of Variables

Population. Charts reviewed were selected by searching key words such as names of the four orthopedic physicians on staff, total knee replacements, intra-articular infiltration, and adductor canal blocks.

According to Polit (2010), power analysis helps the researcher plan on size of sample to minimize risk of a Type II error which is failure to reject a false hypothesis. A false hypothesis

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can also be viewed as a false negative. According to Brownlee (2018), it is common to design experiments with a power of 80% or better. To have a power of 80% or better means that there is 20% or less probability of failing to detect a significant difference when one does exist. Based on the statistical calculator from Selected Statistical Services Limited (2019) in which the confidence level is 90%, power of 80%, hypothesized difference of 15 and population variance of 1000 the recommended sample size is 55. The sample size for this retrospective chart review was 60.

This sample size was based on a confidence level of at least 90 percent as calculated per Selected Statistical Services Limited (2019). The sample size was divided into 30 patients who have received combine intra-articular infiltration and adductor canal block and 30 patients who have received only an adductor canal block. The sample included 30 males in which 15 of the males received adductor canal blocks and 15 adductor canal blocks with intra-articular infiltration. The sample size included 30 women with 15 who received adductor canal block and 15 who received adductor canal block with intra-articular infiltration. With a confidence level of at least 90 percent, the 60-sample size was enough to determine which method was more efficient in providing pain relief with decrease use of opioids post-operatively. Inclusion criteria included the co-morbidity of hypertension. Much of the population that was served at facility of testing had a common co-morbidity of hypertension.

Adductor canal blocks with intra-articular infiltration. Operating room records were reviewed and patients who had received Adductor canal blocks preoperatively with intra-articular infiltration performed intra operatively were classified as group A.

Adductor canal blocks. Operating room records were reviewed and patients that had received ACB preoperatively were classified as group B.

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Pain score levels. A numeric pain score on a 0-10 scale recorded before and after receipt of pain medication within the first 24 hours post operatively with a desired score of 0-3.

Pain medication. Morphine which included intravenous (IV) route and the amount that was delivered within the first 24 hours following a TKR. Morphine IV was a common opioid used postoperatively following a TKR, according to comprehensive literature review. Morphine IV of 5mg or less was desired. Data was collected at the interval level and the unpaired t-test was used to compute the differences with a p value set at 0.05, according to Polit (2010). Unpaired t-test compares two different subjects or groups

Duration of surgery. Surgery time is documented from point of incision by surgeon to close of incision by surgeon. The average time of surgery at current facility was two hours. The inclusion variable of surgery time was two hours or less. The longer the procedure, the more likely the patient would require more opioids post operatively according to Clarke, Soneji, Ko, Yun, and Wijesundera (2014).

Body Mass Index (BMI). BMI in the study was 30 or less. Liao, Huang, Chiu, and Liou, (2017, p.266) has suggested that Obesity can be associated with less than average rehabilitation and poor outcome at six-month check-up.

Gender. 30 males and 30 females were included in review.

Age. The common age range, according to Sardana et al. (2018, p.184), is 62-72. The age range in this review was age 50-70.

Methodology and Measurement

Protection of Human Rights

The protocol included that identification of any subject was not recorded, and that no linking list of any sort was retained that would enable someone to look up the code number

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assigned to a subject and determine the identity of that subject. Assignment of numerical value was given to data collected except for gender which was listed as male or female. Location of data collection was in a locked secure area that could only be assessed by a key. Identifiers will be destroyed after publication.

Validity and Reliability

The most common strategy used in retrospective chart review is the convenience sample (Vassar & Holzmann, 2013, p.12). By using this method, investigators can utilize medical information at their disposal which is practical especially involving smaller sample sizes. Numbers were assigned to quantify variables (see Appendix E).

Project Finding and Results

Participant Charts

Sixty charts that met inclusion criteria were reviewed and divided into men (30 charts) and women (30 charts) and between men (N=15) and women (N=15) that received either an adductor canal block/intra-articular infiltration(AII) or that received an adductor canal block (Acb) prior to undergoing TKR surgery.

Pain Scores

Pain was measured using a numerical pain score zero to ten scale with zero being no pain at all and ten being worst pain ever experienced.

Nine men in the Acb group (N=15) reported a pain level zero, two men reported a two level of pain and four men reported a pain level of three following the surgery. No women in the Acb group (N=15) reported a zero level of pain, while four women reported a two level of pain and eleven women reported a pain level of three on a pain scale of zero to ten (see Appendix D). Both men (N=15) and women (N=15) in the AII group, reported a zero-pain level. The Mann

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Whitney test compared the differences between pain scores for the group that had the AII block (N=30) and the group that had the Acb block. There was a significant decrease (.015) of the pain scores for those that had the AII block.

Table 2

Pain Scores

Subjects	Pain level 0	Pain level 2	Pain level 3	Combined Sig
Men Acb N=15	9	2	4	P= 0.015
Women Acb N=15	0	4	11	
Men AII N=15	15			P=0.015
Women AII N=15	15			

Acb=Adductor canal block

AII= Adductor canal block with intra-articular infiltration

Pain scale: 0-10

Data Analysis

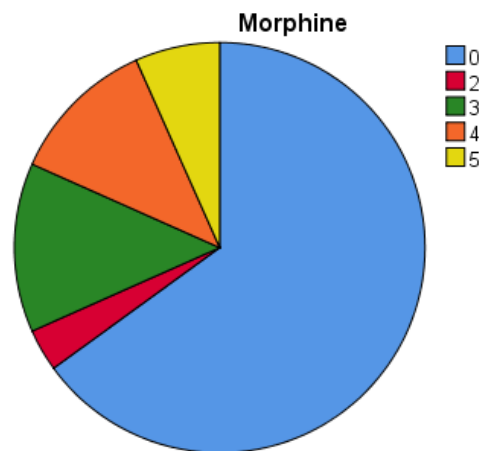
Since all members of the AII group had a pain score of zero during the first 24 hours following a total knee replacement, opioids were not required during that time frame; however, because women in the Acb group reported pain scores of two and three, they required Morphine IV. This suggested that the AII block was more effective to decrease the need for opioids to control pain, at least within the first 24 hours following TKR surgery than the Acb. Participants

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that had initially reported a pain level of two or above had decrease pain score zero to two one hour after administration of Morphine IV (see Appendix D). Most of the charts that were reviewed did not require administration of Morphine IV. The majority of required Morphine dosages were 3mg and 4mg. (see Figure 1).

Figure 1

Morphine dosages



Note. 39 charts- 0mg, 8 charts -3mg, 7 charts -4mg, 4 charts -5mg, 2 charts – 2mg

Discussion

The adductor canal block/intra-articular infiltration block appeared to have provided more pain relief than the adductor canal block alone; however, validity and reliability tests were not performed on this retrospective chart review. It is difficult to perform adequate tests of validity and reliability for a retrospective chart review. Wickson-Griffiths, Kaasalainen, Ploeg, and McAiney (2014) suggested though defining variables, inclusion, and exclusion criteria for the population of study could account for evaluating validity, but they also stated that overall, there were limited descriptions of measures used for evaluating the validity and especially the reliability of the retrospective chart review method due to limitations of a retrospective chart review. Therefore, results should be viewed with some caution.

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All participants in the AII group had a recording of pain score of zero compared to six participants in the Acb group with an initial pain score of two and 15 participants in the Acb group with an initial pain score of three. Participants who had an initial recording of two or above pain score had a decrease pain score 1 hour later after administration of Morphine IV (see Appendix D). The study did suggest an association between the studied blocks, pain scores and Morphine use with the AII block.

Limitations and Recommendations

Limitations

Though the sample size of 60 reached power (90%), a larger sample size would increase the chance of avoiding a Type II error. A more significant limitation was the retrospective chart review methodology that had limited established reliability and validity. The data available was an interpretation of outcome documented by the care provider and not directly self-reported by the patient. Not being able to review the PI's charts to decrease bias was also a limitation that could be considered an intervening variable that skewed the data. Finally, not controlling for provider efficacy in performing either block further limited the interpretation of the results.

Recommendations

Although this study provided statistical support that the AII block provided greater pain relief for 24 hours post TKR surgery than the Acb block for the population studied, the methodology had limited validity and reliability. It is recommended that further studies be done using valid and reliable tools to measure differences in efficacy between the two methods for pain relief following TKR surgery. It is also recommended that future studies include a larger sample size, greater control of extraneous variables and with different populations.

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Appendix A

Logic Model

DNP PROJECT- Will there be a decreased use of opioids for pain relief in the first 24hrs. post-op following a Total Knee Replacement with combined intra-articular injection and adductor canal block compared to adductor canal nerve block alone?

RESOURCES	ACTIVITIES	OUTPUTS	SHORT & LONG-TERM OUTCOMES	IMPACT
<i>In order to accomplish our set of activities we will need the following:</i>	<i>In order to address our problem or asset we will accomplish the following activities:</i>	<i>We expect that once accomplished these activities will produce the following evidence of service delivery:</i>	<i>We expect that if accomplished these activities will lead to the following changes in 1-3 then 4-6 years:</i>	<i>We expect that if accomplished these activities will lead to the following changes in 7-10 years:</i>
<ol style="list-style-type: none"> Charts of patients who have received adductor canal blocks and intra articular injections for Total Knee Replacements. Literature review on effectiveness of adductor canal blocks and intra-articular injection in decreasing post op pain in pts. receiving total knee replacements. Education Statistical Analysis 	<ol style="list-style-type: none"> Review charts and literature of patients who have received a combination adductor canal block and intra articular injection and patients who received only adductor canal block for total knee replacements Provide education to patients and Orthopedic nurses during total joint classes as it relates to benefits and risks of regional nerve blocks and 	<ol style="list-style-type: none"> There will be a comparison as to whether the combination of intra articular injection and adductor canal block produces more analgesia than an adductor canal block alone without the use of opioids in the first 24hours post-operatively in patients who have received a total knee replacement. 	<ol style="list-style-type: none"> Decrease use of opioids overall following a total knee replacement. Decrease in post op pain 24hrs. following total knee replacements. Increase in mobility associated with decrease pain within 24hrs. following total knee replacements. 	<ol style="list-style-type: none"> EBP in providing nerve blocks pre operatively to patients undergoing total knee replacements to decrease or eliminate the use of opioids post-operatively as standard of care. Pts. will be educated preoperatively about nerve blocks and other multimodal analgesia that is available for post op pain following total knee replacements. Orthopedic care nurses will have

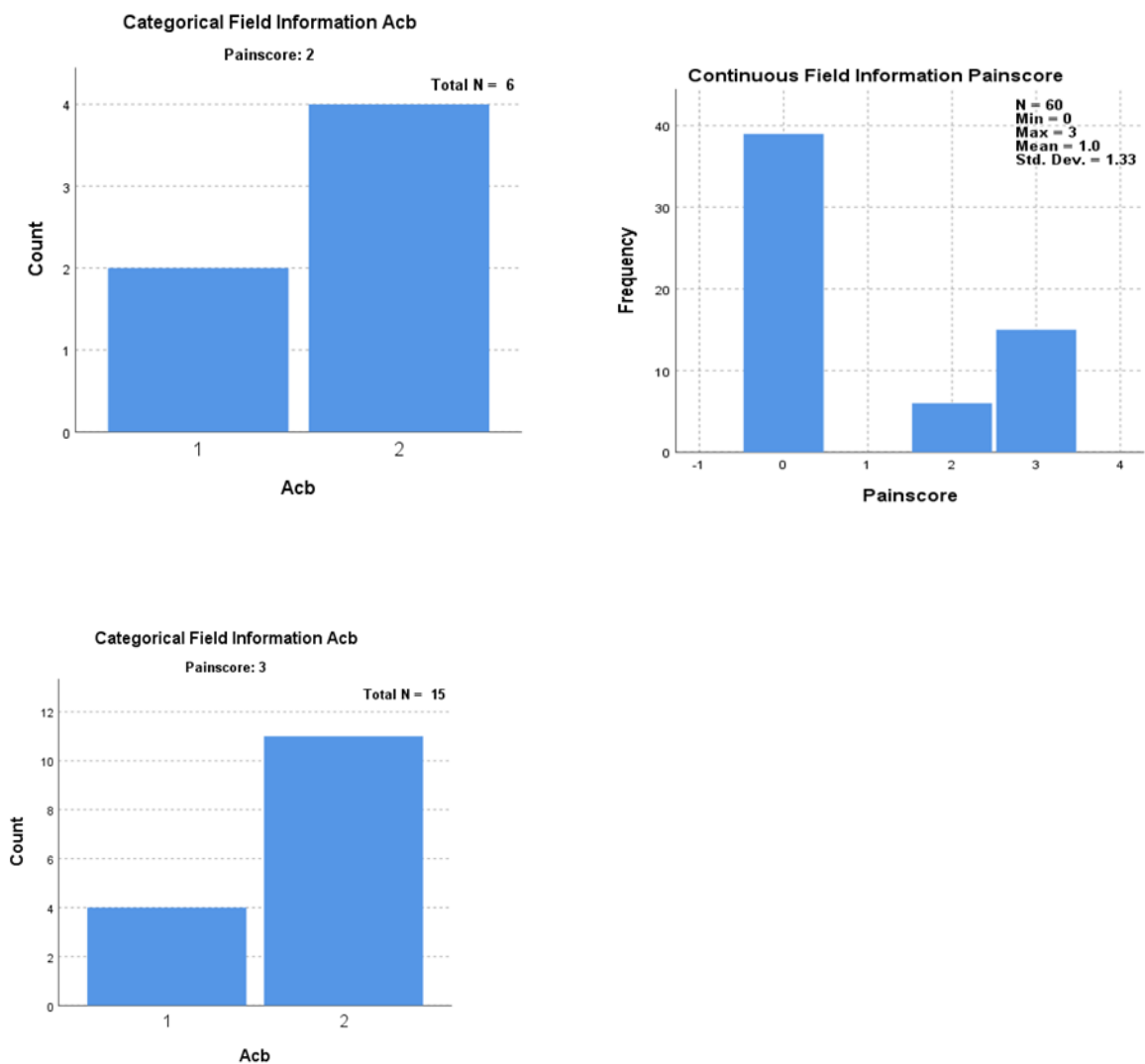
Appendix B

Systematic Review of Literature

Articles Reviewed	41 articles
Articles Included	16 articles
Databases	Medline, CINAHL, Google Scholar
Search Terms	Regional blocks, Adductor Canal Block, Intra-articular infiltration, Total Knee Replacement
Inclusion Criteria	English language, year >2000, TKR, Adductor canal block, Intra-articular infiltration
Exclusion Criteria	Femoral nerve block, epidural, spinal,

Appendix C

Male and Female Pain Scores in Acb Group



1=male; 2=female

Compare Peripheral Nerve Blocks for Analgesia Following a Total Knee

Appendix D

Pain Scores

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0	39	65.0	65.0	65.0
	2	6	10.0	10.0	75.0
	3	15	25.0	25.0	100.0
	Total	60	100.0	100.0	

Pain Scores One Hour Later

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0	55	91.7	91.7	91.7
	1	3	5.0	5.0	96.7
	2	2	3.3	3.3	100.0
	Total	60	100.0	100.0	

Compare Peripheral Nerve Blocks for Analgesia Following a Total Knee

Appendix E

Data Dictionary

VARIABLE NAME	DESCRIPTIONS	DATA FORMAT	DATA SOURCE	RESPONSE VALUE	LABELS	RESPONSE DISTRIBUTIONS/MARGINAL FREQ.	LOCATION OF DATA REPOSITORY
Group A	Pt. who rec'd adductor can blk w/ intra-articular infiltration	numerical	reviewed charts	1 thru 60	nominal	Group A	Secure area that requires key to access
Group B	Pt. who rec'd adductor cannal blk. Alone	numerical	reviewed charts	1 thru 60	nominal	Group B	Secure area that requires key to access
Post op Opioid	Morphine IV that is use immediate post-op to 1st 24hr. Post-op	numerical	reviewed charts	5mg or less	direct value-ratio	Group A and B	Secure area that requires key to access
Age	Age of participants	numerical	reviewed charts	50 to 70	direct age-nominal	Group A and B	Secure area that requires key to access
BMI	BMI of 30 or less	numerical	reviewed charts	30 or less	ordinal	Group A and B	Secure area that requires key to access
Gender	Gender of participant	text	reviewed charts	male or female	nominal	Group A and B	Secure area that requires key to access
Length of Surgery	Surgery time less than 2hrs.	numerical	reviewed charts	2hr or less	ordinal	Group A and B	Secure area that requires key to access
Pain Score	VAS pain score less than 3	numerical	reviewed charts	0-3	ratio	Group A and B	Secure area that requires key to access

Context-Specific Database

Group A	Group B	Age	Gender	BMI	Morphine use post-op	Length of Surgery	Pain score

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Appendix F

Timeframe

Month	June 2019	July 2019	August 2019	September 2019	February 2020	March 2020	April 2020	May 2020
Proposal Written/oral	X							
IRB application & approval		X						
Implement program		X						
Data collection & analysis		X	X	X				
Final capstone written paper				X	X	X	X	
Oral defense							X	
Final submission to library for publication								X

Appendix G

Institutional Review Board Permission Letter

REGIS.EDU
Institutional Review Board

DATE: August 14, 2019

TO: Tracy Kelly
FROM: Regis University Human Subjects IRB

PROJECT TITLE: [1465668-2] A Retrospective Chart Review to Compare Peripheral Nerve Blocks for Analgesia Following a Total Knee Replacement

SUBMISSION TYPE: Amendment/Modification

ACTION: DETERMINATION OF EXEMPT STATUS

DECISION DATE: August 14, 2019

REVIEW CATEGORY: Exemption category # (4)

Thank you for your submission of Amendment/Modification materials for this project. The Regis University Human Subjects IRB has determined this project is EXEMPT FROM IRB REVIEW according to federal regulations 45.CFR46.101(b).

We will retain a copy of this correspondence within our records.

If you have any questions, please contact the Institutional Review Board at irb@regis.edu. Please include your project title and reference number in all correspondence with this committee.

This letter has been electronically signed in accordance with all applicable regulations, and a copy is retained within Regis University

Appendix H

Rush Health Systems Permission to Conduct the Study

