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Pectoralis Nerve Block Compared to Thoracic Paravertebral Nerve Block in the Mastectomy Patient: Evidence-Based Practice Recommendations

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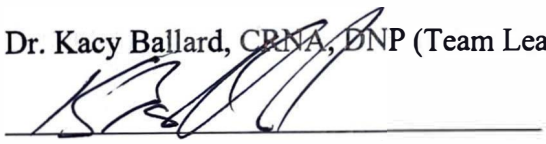

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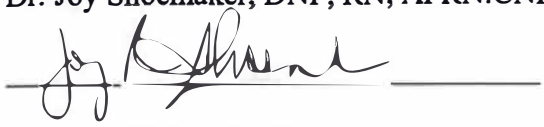

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Abstract

Patients undergoing a mastectomy are at increased risk of becoming opioid dependent. Most patients undergoing a mastectomy are diagnosed with breast cancer, and the use of opioids is known to aid in cancer metastasizing due to the suppression of the body's natural killer cells. In addition, regional anesthesia, also known as a nerve block, has long provided a reduction in sensation by blocking the nerve pathway, thus numbing the feeling of pain in the operative area. The Pectoralis nerve block (PECS) and the Thoracic Paravertebral block (TPVB) are used in patients undergoing a mastectomy to help reduce the severity of pain that the body perceives. These nerve block aid in the reduction of supplemental analgesia postoperatively, allowing a lower number of opioids to be consumed. The project's primary purpose is the development of evidence-based clinical recommendations which can be utilized to reduce the intensity of perceived pain for patients undergoing a mastectomy. The recommendations will be determined by selecting which nerve block provides the most significant reduction in the visual acuity scale (VAS) score. Along with the longest time from when the surgery is completed to when the patient first asks for supplemental analgesia by comparing multiple randomized control trial articles comparing the two nerve blocks. The project includes a plan for implementing these evidence-based practice recommendations through education and training, monitoring outcomes, and providing changes to the recommendations if the results are not desirable.

Keywords: Mastectomy, Radical, Modified Radical, PECS block, TPVB, pain

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Introduction

Cancer can be defined as a disease in which a portion of the body's cells grow uncontrollable. Breast cancer affects nearly 12% of females in the United States, and almost all breast cancer patients will need a mastectomy as a part of their treatment regimen (Lee et al., 2017). A mastectomy removes breast tissue to eliminate cancerous tissue (American Cancer Society, n.d.). Mastectomy is associated with a considerable amount of acute postoperative pain; if the pain is neglected, it will lead to chronic post-mastectomy pain (Ahmed et al., 2022). Pain is often treated postoperatively with opioid-based medication to help relieve painful stimulation for the patient. Unfortunately, roughly 6-8 percent of opioid-naïve patients undergoing noncancer procedures develop new and persistent opioid use (Lee et al., 2017). The combination of pain caused by the cancer added to the pain caused by the mastectomy can be difficult for a person to deal with.

Opioid use in the United States has trended toward an all-time high; in 2019, an estimated 10.1 million people over the age of 12 misused opioids (U.S. Department of Health and Social Services, n.d.). Not only are opioids misused by nearly 10.1 million people in the U.S., but opioids also have significant adverse side effects concerning cancer reoccurrence (Tripolt et al., 2021). Regional nerve blocks are one method of reducing the pain perceived by the patient. Regional anesthesia is the practice of introducing a local anesthetic via a needle directly beside the nerve. The local anesthetic then blocks the specific nerve's electrical signal, rendering that part of the body that never innervates senseless. The use of the pectoralis nerve block and the thoracic paravertebral nerve block have both proved to provide some reduction in opioid use as

well as perceived pain in mastectomy surgeries (Hamed et al., 2020). Blocking a nerve impulse can be a largely effective way to help someone suffering from pain become insensible to that sensation.

Significance to the Profession

Opioids cause a release of endorphins creating a sense of reduced pain and increased sense of pleasure creating an addictive combination. As mentioned previously, opioid use in the United States has trended toward an all-time high; in 2019, an estimated 10.1 million people over 12 years of age misused opioids (U.S. Department of Health and Social Services, n.d.). With breast cancer affecting nearly 12% of females in the United States and survivability rates increasing in females with a breast cancer diagnosis, increased opioid consumption is a growing concern (Lee et al., 2017). In addition, mastectomy is associated with a considerable amount of acute postoperative pain; if the pain is neglected, the acute pain will lead to chronic post-mastectomy pain (Ahmed et al., 2022). Not only are opioids misused by nearly 10.1 million people in the U.S., but opioids also produce significant adverse side effects, such as lowering natural killer cells' response to cancer cells and allowing potential cancer reoccurrence or metastasis (Tripolt et al., 2021). Natural killer cells contain an enzyme that can kill tumor cells as well as cells infected with a virus.

Anesthesia providers have the potential to play a pivotal role in the opioid crisis. Anesthesia providers use opioids several times throughout a surgical case. Anesthesia will use opioids during induction to help blunt the sympathetic response to laryngoscopy and before incision time to achieve the same effect of blunting the sympathetic response to incision. Anesthesia providers may also use small doses throughout the surgical case when they notice what can be interrupted as pain in increased vital signs. There is some question as to whether or

not sympathetic spikes should be treated, given the patient is fully anesthetized, meaning they are not comprehending or going to remember these events. The addition of regional anesthesia, also known as nerve blocks, has and will continue to play an essential role in the reduction of pain as well as opioid use perioperatively. Regional anesthesia is the practice of introducing a local anesthetic via a needle directly beside the nerve. The local anesthetic then blocks the specific nerve's electrical signal, rendering the part of the body that the nerve innervates senseless. The use of the pectoralis nerve block and the thoracic paravertebral nerve block have both proved to provide some reduction in opioid use as well as perceived pain in mastectomy surgeries (Hamed et al., 2020). Anesthesia providers can render the body senseless, allowing surgery without the patient being aware of the intensity of the ongoing surgery. Regional anesthesia can allow that senseless feeling to continue after general anesthesia has been stopped.

The pectoralis nerve block and the thoracic paravertebral nerve block are used to reduce sensation in the anterior chest and are commonly used in mastectomy surgeries. The paravertebral nerve block is performed by introducing a needle into the back of the patient. Then into the paravertebral space and injects local atheistic around the nerve root resulting in ipsilateral somatic and sympathetic blockade of several thoracic dermatomes (Hamed et al., 2020). In comparison, the pectoral block is performed on the anterior side of the patient by introducing a needle into the facial plan where the nerves lie between the pectoralis major and minor muscles as well as between the pectoralis minor muscle and serratus anterior muscle blocking medial and lateral pectoral nerves in addition to lateral branches of the intercostal nerves (Hamed et al., 2020). The pectoralis nerve block and the thoracic paravertebral nerve block provide the same senselessness but by a different origin.

The effectiveness of these blocks varies from technique to technique, and many studies have been conducted. They are being performed to determine the most effective approach to reducing perceived pain and opioid use. It is anticipated that the pectoralis nerve blocks I and II will provide better relief of pain as perceived by the patient intraoperatively and postoperatively, requiring fewer doses of opioids with lower pain scores and more consistent comfort.

This project aims to define the most effective regional nerve block with evidence-based practice guidelines for pain control and opioid reduction, particularly for patients undergoing a mastectomy. If it is determined that the pectoralis nerve block, compared to the paravertebral nerve block, provides better intraoperatively and postoperative pain relief, appropriate recommendations will be composed to help influence anesthesia practice to serve this patient group better. Opioids can have detrimental effects on patients undergoing mastectomies for breast cancer treatment, including cancer reoccurrence and metastasized tumors (Tripolt et al., 2021). Therefore, reducing opioid use and providing adequate pain relief is essential and could benefit this patient group. The cost difference between the two nerve blocks is minimal, and providing patients with such a regional block will offer no immediate cost benefit to the patient or the health system. The main focus is on improving pain management for patients undergoing mastectomies postoperatively in order to provide comfort and decreased opioid use. By doing so, mastectomy patients will have a lower risk of cancer return or metastasis and less chance of opioid addiction (Lee et al., 2017). In addition, the nerve blocks aim to lower postoperative VAS scores and the frequency and time to supplemental analgesia requests.

PICO(T) Question & Problem Statement

Opioid use during and after surgery to treat pain has been a standard of practice since its first use in the 1860's on the battlefield. Opioid use in the United States has trended

toward an all-time high (U.S. Department of Health and Social Services, n.d.). Surgery is often very stimulating and painful, requiring opioids during and after the surgery, often with continued use of opioids far beyond the surgical pain timeline (Lucia et al., 2021). Anesthetists have the opportunity to provide patients with alternative therapies, such as regional nerve blocks. Nerve blocks are performed to reduce pain perceived by the patient and supplemental analgesia requirements postoperatively.

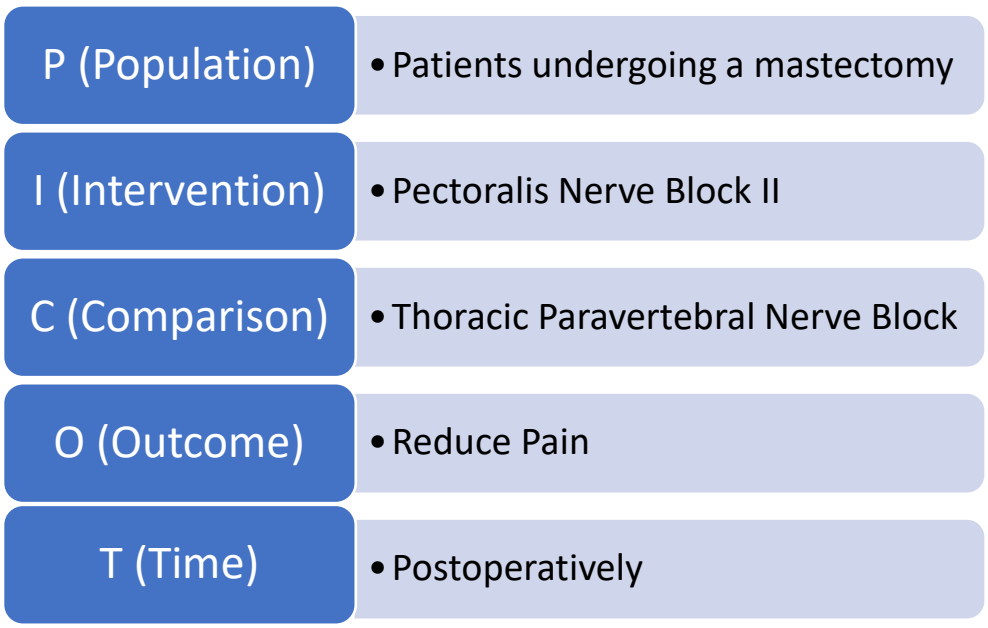
The opioid epidemic is having a significant negative effect on the United States. Around 10 million Americans admitted to misusing opioids in 2015 (Lee et al., 2017). Surgery contributes to increased opioid use (Tripolt et al., 2021). Roughly 6-8 percent of opioid-naïve patients undergoing noncancer procedures develop new and persistent opioid use (Lee et al., 2017, p. 4042). Patients with cancer have a significantly higher risk of developing postoperative opioid addiction. On average 10% of opioid-naïve cancer patients undergoing curative-intent surgery developed continuing opioid use (Lee et al., 2017). Breast cancer affects roughly 12% of females in the United States (American Cancer Society [ACS], 2019). With survivability rates increasing in females with a breast cancer diagnosis, increased opioid consumption is also seen as a concern. The survivability rate has increased in Caucasian women by 16% and African American women by 21% from 1977 to 2015. Many, if not most, of these women will need a mastectomy during their treatment (ACS, 2019). Treating postoperative pain is a difficult balance of postoperative pain expectations by the patient.

The first mastectomy was performed in 1804 by a Japanese surgeon under general anesthesia. A mastectomy can cause significant perioperative pain requiring opioids during and after surgery (Lucia et al., 2021). Opioid abuse is not the only notable side effect; opioids have been proven to suppress natural killer cells within the human body, increasing the chance of

cancerous cells returning (Lucia et al., 2021). The most used treatment for postoperative pain after a mastectomy is an opioid-containing medication that involves inherent risk (Lucia et al., 2021). Regional anesthesia is also used to help reduce the pain perceived by the patient during the perioperative period (Tripathy et al., 2019). There are several approaches to regional anesthesia in treating pain for a mastectomy. Within these approaches, some are more successful in providing a longer duration of relief, more consistent effect relief, and lower pain scores according to patients causing lower opioid use (Tripolt et al., 2021). The goal for anesthesia providers to is to provide patients with the safest and most pain free experience possible.

It is important is realize that opioids do have some significant risks and side effects incorporated with their use. Opioid use has many side effects, including addiction and immunosuppression (Tripolt et al., 2021). These side effects are especially problematic in the breast cancer population. Patients undergoing a mastectomy require significant pain relief during and after surgery, increasing the risks and side effects opioids provide (Lee et al., 2017). It is the significant side effects along with the intense pain that a mastectomy can cause that creates an absolute need for additional methods of pain management.

PICOT



(P) In patients undergoing a mastectomy, (I) how does a pectoralis nerve block II, (C) compared to a thoracic paravertebral nerve block, (O)reduce pain, (T) postoperatively?

Objectives

The pain of a mastectomy may be considered unbearable, leading to an avoidance of life saving surgery. Mastectomies are an incredibly stimulating and painful experience for patients requiring high doses of opioids perioperatively (Hamed et al., 2020). Opioids can have detrimental effects on patients undergoing mastectomies for breast cancer treatment, including cancer reoccurrence and metastasized tumors (Tripolt et al., 2021). Adding regional nerve blocks reduces the amount of pain perceived by the patient and the associated sympathetic response. The pectoralis nerve block and the thoracic paravertebral nerve block are used to reduce sensation in the anterior chest and are commonly used in mastectomy surgeries. Employing nerve blocks as an anesthetic adjunct in these patients could substantially decrease the pain experienced in the acute postoperative period, reduce opioid usage, and avoid the risks associated with other regional anesthetic techniques.

The first objective is to review and synthesize the literature, ensuring the pectoralis nerve block and the thoracic paravertebral nerve block effectively reduce postoperative pain scores as perceived by the patients. The second objective is to compare which nerve block provides the lower mean postoperative pain score as perceived by the patients. The third objective is to research which nerve block is most effective at reducing opioid use postoperatively. Once a nerve block is proven to reduce postoperative opioid requests and consumption, a plan will be made to implement either the pectoralis or thoracic paravertebral nerve block in future mastectomy anesthetic plans. The next objective will be to evaluate the theoretical strategy and then make appropriate adjustments to this plan as a plan, do, check, and act implementation scenario (*Plan-Do-Check-Act Cycle (PDCA Cycle)*, 2016).

Literature Review and Methods Summary

A clinical question related to mastectomies, PECS block, and Thoracic Paravertebral blocks was formatted using the PICOT problem statement approach. Various databases were then searched, such as Academic Search Complete, Cumulative Index of Nursing and Allied Health Literature (CINAHL), and Medline. These databases were used to gather information related to the PICOT statement. Keywords and BOOLEAN operators included Pec block, paravertebral block, and mastectomy or breast surgery. Search restrictions and filters had a publication date within the last five years, 2016-2022, full-text articles, English language, and peer-reviewed.

The PICOT question is as follows: (P) In patients undergoing a mastectomy, (I) is a pectoralis nerve block II, (C) compared to a thoracic paravertebral nerve block, (O) more effective at pain reduction, (T) postoperatively. This PICOT question guided the literature review and any Boolean phrases. Through the systematic review, 31 articles were found. In addition, the

Academic Search Complete database provided nine results, the CINAHL database provided six results, and the Medline database provided 16 results.

The remaining 31 articles were appraised in comparison to the PICOT question. Various inclusion and exclusion criteria were created based on the PICOT question to narrow the articles to exceedingly relevant. The inclusion criteria included mastectomy procedures, pectoralis nerve block II, and randomized controlled trials. After appraising the 31 articles and applying the inclusion and exclusion criteria, it was determined that six articles appropriately answered the PICOT question.

Purpose

This evidence-based practice review aims to gather current evidence to produce recommendations that will provide anesthesia providers with sound evidence-based practice methods for their anesthesia care of mastectomy patients. In addition, recommendations on using nerve blocks in mastectomy patients are administered to help relieve postoperative pain and analgesic requirements in mastectomy patients.

Scope and Importance

This is a retrospective randomized control trial literature review and guideline development. This project will evaluate regional nerve block intervention and its efficacy in reducing VAS scores and postoperative supplemental analgesic requirements in patients undergoing a mastectomy.

Background

Variables

The scholarly project will focus on patients undergoing a mastectomy, their perceived postoperative VAS score, and their requested supplemental analgesia requirements in the post

anesthesia care unit. In addition, this evidence-based practice literature review and guideline development will focus on evaluating which block provides patients with the most pain relief for the most extended duration. The patients range in age from 18-80, body mass index of less than 40kg/m2 and an American Society of Anesthesiologists (ASA) score of 1-3.

Incidence/Statistics

As stated above, breast cancer affects nearly 12% of females in the United States (Lee et al., 2017). An estimated 6-8 percent of opioid-naïve patients with noncancer procedures develop new and persistent opioid use; this number increases in cancer-containing scenarios (Lee et al., 2017). Opioids are misused by an estimated 10.1 million people in the United States; however, opioids also have significant adverse side effects concerning cancer reoccurrence (Tripolt et al., 2021).

Summarizing the Evidence: The Literature Review for Nerve Blocks and Mastectomies

A mastectomy is performed to remove cancerous cells and to lower the risk of breast cancer spreading. A mastectomy is a surgery to remove breast tissue and cancerous cells leading to acute postoperative pain. If the pain is neglected, it may lead to chronic post-mastectomy pain, reducing the quality of life (Ahmed et al., 2022). The benefits of regional anesthesia include decreased intraoperative opioid use, reduced postoperative nausea, vomiting, and prolonged pain relief (Ahmed et al., 2022). The pectoralis nerve block can be separated into two blocks, PECS 1 and PECS 2. The PECS 1 block anesthetizes the medial and lateral pectoral nerves. With the addition of the PECS 2 block, the medial and lateral pectoral nerves are blocked as well as the lateral branches of the intercostal nerves (Hamed et al., 2020). The randomized control trials within these articles addressed patients undergoing a modified radical mastectomy to manage breast cancer. The patients within these six studies ranged in age from 18-80, with a BMI of less

than 40kg/m2 and an ASA score of 1, 2, or 3. The blocks were administered in two different groups, and the groups were separated at random.

The random groups in all studies received the same induction process for their general anesthesia within that study. The blocks in each group were performed uniformly with the same local anesthetic and adjunct, along with visualization under ultrasound. All of the randomized control trials recorded the patients' visual analog scale (VAS) score postoperatively as one way of measurement and comparison, as well as the time from the block until the first request for supplemental analgesia.

Ahmed et al. (2022) found a significantly lower VAS score for the PECS group compared to the TPVB group and a longer time before first requesting supplemental analgesia. Hamed et al. (2020) showed a lower VAS score in the group that received the PECS block, with statistically significant differences between the groups at 1 hour, 2 hours, and 4 hours postoperatively. Hamed et al. (2020) also found the PECS group to have a more extended time from the block until the first request of analgesia. Joshi et al. (2019) found that postoperative analgesia requirements were higher in the TPVB when compared to the PECS block, and the time until the first requested analgesia was also longer in the PECS block. The VAS score was also significantly lower in the PECS group at postoperative hours 6, 12, and 24, according to Joshi et al. (2019). Kilhari et al. (2016) found no difference in pain scores postoperatively. They also did not see a significant difference in the time from the block until the first analgesia requirement postoperatively. Singarirya et al. (2019) proved that, again, the PECS blocks provided lower VAS scores and a more extended time from the block until the first request of analgesia when compared to the TPVB. Tripathy et al. (2019) proved that both the PECS block and the TPVB are just as effective as the other in providing low VAS scores and longer times

before the first analgesia requirement; however, they did not find a significant difference between the two groups.

Addressing Gaps

The scholarly project seeks to determine the effectiveness of interventions in improving VAS scores postoperatively and the duration of time before the first request for supplemental analgesia. The pectoralis nerve block and the thoracic paravertebral nerve block will be compared. In addition, this literature review looks at which regional nerve block has the most statically significant evidence backing its use as the superior block, providing the most pain relief possible to mastectomy patients postoperatively.

Significance

The selected RCTs had 278 participants who received either a PEC block or a TPVB. The selected studies were published between 2016 to 2022. Patient demographics were similar in all studies, including ASA-scored patients from 1 to 3. The studies were all randomized on who would receive which block. Results were recorded using the VAS score and the time until the first requested supplemental analgesia. Many research articles concluded that the PECS block provided lower VAS scores compared to the TPVB. Only two of the six studies showed equal results when comparing opioid requirements postop between the two blocks. However, in those articles, the PECS block did prove to have a longer time until the first opioid was requested by the patient and given. One research article did show a faster onset time for the PECS block when compared to the onset time of the TPVB.

In summary, when the PEC block and the TPVB are compared in patients undergoing a mastectomy, the PEC block was shown to be equal in two of the six articles and largely favorable in four of the six articles. Patients who received the PEC block required less opioid and

non-opioid administration postoperatively. The PEC block patients also reported lower VAS scores with fewer results of hemodynamic changes with the block. The PEC block was shown to be the favorable block compared to the TPVB, showing improved patient analgesia and fewer supplemental analgesia requirements.

Conceptual Framework

The conceptual model utilized for the project is the Johns Hopkins Evidence-Based Practice Model. The evidence-based practice integrates scientific evidence into clinical decision-making to help solve healthcare-related problems (Dang et al., 2021). The Johns Hopkins Evidence-Based Practice Model provides an organized way for clinicians to apply current research and clinical knowledge to determine best practices and provide safe, high-quality care (Dang et al., 2021). The Johns Hopkins Evidence-Based Practice Model comprises three major components, inquiry, practice, and learning.

Inquiry

The Inquiry portion of the Johns Hopkins model aims to provide a foundation that includes a focused effort to examine a problem or issue identified through assessment, observation, and personal experience in the clinical setting (Dang et al., 2021). The identified problem will now have a focused effort to question, examine, and collect information. Inquiry or questions are aimed at improving everyday patient care by providing best practice that is safe, effective, timely, accessible, cost-effective, and high quality (Dang et al., 2021). The questions utilized for the project concern poor pain control for patients undergoing a mastectomy when comparing the pain relief effects of a Pectoralis block to a Thoracic Paravertebral Nerve block.

Practice

The Johns Hopkins model then looks at developing a practice question or research hypothesis based on the inquiry. The practice question utilized is: In patients undergoing a mastectomy, (I) is a pectoralis nerve block II, (C) compared to a thoracic paravertebral nerve block, (O) more effective at pain relief, (T) postoperatively. Evidence recovered from current research and clinical knowledge will guide best practices with a literature search and synthesis (Dang et al., 2021). Therefore, a literature search was conducted to determine an evidence-based approach to developing recommendations for using the nerve block that provided the most pain relief postoperatively to patients undergoing a mastectomy.

Learning

Within the learning phase of the Johns Hopkins model is translation. Translation requires the evidence found along with the practice question to be examined by peers to determine that the interventions are appropriate and safe (Dang et al., 2021). After such review, the practice question and recommendations will be placed into clinical practice, where they will be evaluated. Finally, the clinical data will be compared to preimplantation data to assure safety and to help guide evaluation and change (Dang et al., 2021). After reflection, the Johns Hopkins model starts over with inquiry in a continuous cycle to help ensure the safest, most relevant evidence-based practice is being carried out for the patients.

This model fits the project because it is a structured method for change and provides a systematic process for improving patient outcomes. The inquiry, practice, and learning steps will be utilized to implement the recommendations proposed for the project.

Purpose

This DNP evidence-based project aims to reduce supplemental analgesia requirements and postoperative VAS scores in patients who have and will be undergoing a mastectomy.

Methods

Sample/Setting

The setting for the project is a theoretical level 1 trauma inpatient hospital in the Mid-West region of the United States found in the inner-city, which offers surgical services. Specifically, this project was applied to the hospital's perioperative unit(s). The theoretical hospital already contains the equipment, staff, and resources necessary to implement the proposed recommendations. Patients undergoing surgery for a mastectomy who are candidates for a nerve block are the primary population affected. Anesthesiologists or CRNAs will provide anesthesia care for patients throughout the entire perioperative period of the patient's stay. Nursing staff in the PACU will be involved with carrying out the guideline that is in line with evidence-based practice by recording VAS scores and administering supplemental analgesia in the postoperative setting.

Project Implementation

Inquiry

The first step is to examine a problem or issue identified through assessment, observation, and personal experience in the clinical setting. Among the first steps are inquiring and communicating with stakeholders to determine the current standard of practice. Stakeholders that will be pivotal in data collection and assessment of current practice include the OR nursing clinical manager and educator. In addition, stakeholders such as the leaders of the anesthesia department will assist with the development of order sets and recommendation reviews. Other stakeholders include pharmacy, technical support, purchasing, legal, and billing. However, these departments are expected to have limited input due to the fact the current anesthesia practice of the evaluated nerve blocks is already in place at this institution.

The next step is to identify the problem. The analysis will need to be done to ensure a gap in current practice compared to what is considered best practice. A gap analysis tool will be used to determine the types of nerve blocks used for patients undergoing a mastectomy and the patient's postoperative VAS score and time before first requested postoperative supplemental analgesia. Once a gap in practice is determined after synthesizing the evidence and comparing it to evidence-based best practices in the literature, a practice design change will be composed. The clinical problem identified within this project is inadequate pain reduction in mastectomy patients who have received a thoracic paravertebral nerve block compared to patients who received a pectoralis nerve block.

Current literature supports using the pectoralis nerve block in patients undergoing a mastectomy as the best practice in providing the most appropriate pain relief (Ahmed et al., 2022). Assessment of whether the practice change will be feasible for the facility will occur as well within this step. Assessing feasibility will require communication with the stakeholders to determine the process for developing order sets, the accessibility of all materials needed to perform the nerve blocks, creating handouts for nursing staff and anesthesia providers, and disseminating practice change to relevant staff members.

Practice

The next step is to design a practice change by working with stakeholders within the nursing and anesthesia departments. During this step, necessary resources, the need for education, and the intervention outcomes will be identified. When the need for education is determined, education will be provided via PowerPoint presentation, distributed via email, printed, and placed in break rooms. All providers within the perioperative area, including anesthesia and the nursing departments, will need to sign a paper stating they have received and

understand the education provided. The education provided to the anesthesia providers will describe in detail the pectoralis nerve block and how to perform the block. As for the nursing departments, the education will provide a brief overview of the nerve block with an in-depth review of the VAS score. The expected time allotment needed for each provider to review the educational material would be 20 minutes or less. The education period provided prior to implementation will be one month.

Learning

Next will be the implementation period. During the implementation period, all patients undergoing a mastectomy who do not have any contraindications for a nerve block will receive the pectoralis nerve block before surgery. The postoperative units will then collect data such as the patient's postoperative VAS score and the time until the first supplemental analgesia is requested. Implementation of the guideline will occur in months 2-3. After the 2-month implementation period, outcomes will be evaluated to determine the effectiveness of the change and whether the recommendations will be adapted, adopted, or rejected.

Project Facilitators

Project facilitators include the Chief Anesthesia provider, the OR nursing manager, and the educator. Secondary facilitators involve stakeholders in the legal, purchasing, billing, technical support, and ethics departments. These facilitators will be vital in assisting in communication and implementation. If the project is successful, these facilitators will be the staff members who assist in incorporating this into unit policy or standard of practice.

Timeline and Budget

Timeline

The project began in May of 2021 with the identification of a clinical problem and the beginning of a literature search. The development and presentation of this proposed project will take place from May 2021 through May 2024. The project, if implemented, would need to be reviewed by the Institutional Review Board. After the review board approves the project, the project would take an estimated 9-10 months to implement, with one month to communicate with and develop a plan with stakeholders. This time would include an assessment of current practice and identifying existing gaps in said practice for approximately two months. The data will be synthesized during this time, and new evidence-based recommendations will be developed. The implementation of the evidence-based recommendations will take one month. The recommendations will be followed for two months, with data collected concurrently. After implementing the recommendations, post-intervention data will be collected and sent out. Once all the data is collected, the data will be assessed by the DNP project leaders for two months. During this time, the leaders will assess the data, present the data to the facilitators and stakeholders, make recommendations, and devise a final write-up of the project's results. The project will then be defended and disseminated to the nursing faculty and students at Otterbein University.

Budget

The budget for the project will fall under two categories – financial (realized) and nonfinancial (unrealized) costs. The financial funding for the hospital to implement this project is expected to be under 800 dollars. The hospital is a level 1 trauma center that already owns the equipment required to implement the project with no need for further equipment to be purchased. Materials used to collect VAS scores and the time until the first request of analgesia supplementation will be recorded electronically in an already present electronic medical record.

During the inquiry portion of the project, an anticipated three one-hour meetings will need to be conducted. The participants in the first meeting called the “project orientation” would include the Chief Anesthesia provider and the OR nursing manager to review the project implementation with these departments. The estimated hourly cost of the Chief Anesthesia provider is 150 dollars per hour, and the estimated cost of the OR nursing manager is 45 dollars per hour, totaling 195 dollars for the project orientation meeting.

The next meeting called the “informatics planning” would consist of the Chief Anesthesia provider, the OR nursing manager, and an informatics specialist at 75 dollars per hour. The total cost of the informatics planning meeting would be 270 dollars. The informatics planning meeting agenda would include a discussion and construction of the VAS score, if not already present, and a timer that will record the time until supplemental analgesia is requested in the electronic medical record. The last meeting called “project finalization” will be held after the inquiry period of the project to review the results and discuss and finalize the implementation goals of the project. Members of the project finalization meeting will include the Chief Anesthesia provider, the OR nursing manager, the Informatics specialist, quality specialist at an hourly rate of 30 dollars. The total cost of the project finalization meeting will be 300 dollars. After the project finalization meeting, the project leaders will develop educational material at the expense of fewer than 20 dollars via PowerPoint presentation and email that is already available. The proposed education would be viewed on a computer at work or the employee's electronic device, adding no cost to the project.

Table 1

Specialty	Hourly Wage	Meeting Hours	Number of Meetings	Cost in Dollars
Chief of Anesthesia	$150	1	3	$450

OR Manager	$75	1	3	$225
Informatics Specialist	$75	1	2	$150
Quality Specialist	$30	1	1	$30
Total Meeting Cost				$855

Outcome Analysis

Data Collection

Data collection is vital in any evidence-based project assessment and implementation. Obtaining a gap analysis is critical in determining the need for change in comparison to the current best practice data. Obtaining current VAS scores and the time until the first supplemental analgesia request in mastectomy patients is the first step in determining whether or not a change needs to occur within the organization. Data will be collected via the electronic medical record already in place. Being able to use the electronic medical record will help to streamline the data analysis regarding the project. The data will be collected during the inquiry phase, which will consume approximately two months. After implementation, data will be collected again for another two months and then evaluated to determine the effectiveness of the change and whether the guideline will be adapted, adopted, or rejected.

Data Analysis

Upon finishing the pre-implementation gap analysis, the data will be analyzed to ensure that there is indeed a gap in the current practice compared to what is considered best practice. In order to consider a gap in current practice 50% of patients who are undergoing a mastectomy must not receive the pectoralis nerve block prior to surgery. By performing a gap analysis, it will ensure

the need for the project's implementation. After the new recommendations are implemented for two months, the data will again be analyzed and compared to the pre-implementation data. By performing another analysis, the project leaders will evaluate and ensure that the VAS scores does not indeed increase and that the time until first requested supplemental analgesia has not increased. If the new recommendations have raised these data points, the new recommendations will immediately be withdrawn and the previous practice re-implemented.

Conclusion

Mastectomies can be extremely stimulating and perceived as painful postoperatively creating discomfort for patients and increased and or dependent opioid use. Evidence within the literature supports the development of clinical evidence-based recommendations that encourage using the PECS block in patients undergoing a mastectomy compared to the TVPB. In addition, the literature illustrates that when both blocks are compared to each other in terms of a reduction in VAS score and time from the block until the first requested supplemental analgesia, the PECS block is the favorable block. A reduction in VAS scores is important in reducing total opioids administered to the patients, leading to a lower percentage chance of patients becoming opioid addicted and a lower chance of the patient's cancer spreading to another part of their body due to the reduced suppression of natural killer cells.

The project utilized a modeled approach based on the conceptual model, The Johns Hopkins Evidence-based practice model, to incorporate evidence from the literature into practice. Using the methods outlined within this project will allow the DNP project leader to analyze current practice habits and guidelines, identify gaps in practice, implement new evidence-based best practice recommendations, and review the efficacy of the recommendations concerning current clinical practice. The results of the literature review can permit facilitators

and stakeholders within an organization to create change in practice standards that are up to date with what is current in the literature, ensuring optimal patient pain relief and experience not only during their hospital stay but afterward as well.

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Appendix A

Literature Review Table

Citation	Conceptual Framework	Design / Method	Sample/Setting	Major Variables Studied and Their Definitions	Outcome Measurement	Data Analysis	Findings	Level of Evidence	Quality of Evidence: Critical Worth to Practice
Article 1: Comparative study between intraoperative and postoperative analgesic effect of ultrasound-guided thoracic paravertebral block versus pectoral nerve block in patients undergoing modified radical mastectomy: a randomized controlled trial									
(Ahmed et al., 2022)	N/A	Quantitative Study	30 female Patients undergoing modified radical mastectomy divided into two groups of 15.	IV1 = Age 18-65 IV2 = BMI less than 40 IV3 = ASA 2	VAS score, time before first pain medication requested.	Statistical Package for Social Science (IBM SPSS)	PECS group significantly lower postoperative pain scores as well as more time needed before first	Level = Randomized Control Trial	This study was limited by the lack of participants, a double-blind study with more participants could prove helpful. There is no

							rescue analgesia request when compared to the TVPB group.		greater risk in implementing this work at the current facility and such implementation would be feasible.
Article 2: Ultrasound-guided thoracic paravertebral block vs pectoral nerve block for postoperative analgesia after modified radical mastectomy									
(Hamed et al., 2020)	N/A	Quantitative Study	30 female Patients undergoing modified radical mastectomy divided into two groups of 15.	IV1 = Age 30-60 IV2 = BMI 25-35 IV3 = ASA 1-2	VAS score, time before first pain medication requested.	Statistical Package for Social Science (IBM SPSS) Mann-W	This study showed that PECS resulted in significantly longer duration of post operative	Level = Randomized Control Trial	This study is also limited by the lack of participants, a double-blind study with more participants could prove helpfu

						hitney test.	analgesia and less postoperative opioid consumption with lower VAS in the first 4 hours in comparison with PVB.		l. There is no greater risk in implementing this work at the current facility and such implementation would be feasible.
Article 3: Ultrasound guided paravertebral block vs. modified PECS block for modified radical mastectomy									
(Joshi et al., 2019)	N/A	Quantitative Study	30 female Patients undergoing modified radical mastectomy divided into two groups of 15.	IV1 = Age >18 IV2 = BMI <35 IV3 = ASA 1-2	VAS score, time before first pain medication requested.	SPSS-20 software (IBM) Student's t test or	VAS scores of patients in Group 1 (TPVB) were compara	Level = Randomized Control Trial	This study is also limited by the lack of participants, a double-blind

						Mann Whitney	bly higher than Group 2 (PECS) at 6 hours and 12 hours. As well as patients requested pain relief first with TPVB when compared to PECS		study with more participants could prove helpful. There is no greater risk in implementing this work at the current facility and such implementation would be feasible.
Article 4: Efficacy of pectoral nerve block type II versus thoracic paravertebral block for analgesia in breast cancer surgery									
(Kulhari et al., 2016)	N/A	Quantitative Study	60 female patients divided into two groups of 30 one	IV1 = Age 18-80	NRS score, time before first pain	STATISTICA 10.	The PECS group sho	Level = Randomized	All though this RCT did involv

			group receiving the PECS block other TVPB	IV2 = BMI <35 IV3 = ASA 1-2	medication requested.	0 (StatSoft Inc., USA) SH apiro-wilk Test Mann-Whitney U-test	ws slightly however not statistically significant lower NRS scores as well as a longer period of time before requiring analgesia however this was also statistically not significant when	Control Trial	e 60 participants a larger study would be beneficial. There is no greater risk in implementing this work at the current facility and such implementation would be feasible.

							compared to the TPVB.		
Article 5: Comparison of efficacy of ultrasound-guided pectoral nerve block versus thoracic paravertebral block using levobupivacaine and dexamethasone for postoperative analgesia after modified radical mastectomy: A randomized controlled trial									
(Singariya et al., 2019)	N/A	Quantitative Study	Study included 40 female patients undergoing mastectomy divided into two groups one with PECS block intervention the other group with TPVB.	IV1 = Age 18-65 IV2 = BMI <40 IV3 = ASA 1-2	VAS score Time before first pain medication requested.	IBM SPSS software version 22.0 Students unpaired and paired t-test	Patients who received the PECS block recorded lower VAS scores when compare to the other group as well as less analgesia requ	Level = Randomized Control Trial	This RCT was beneficial in proving the statically significant difference in VAS scores when comparing PECS block to the TPVB. There is no greater risk in implementing this work at the

							irement.		current facility and such implementation would be feasible.
Article 6: Opioid-free anesthesia for breast cancer surgery: A comparison of ultrasound guided paravertebral and pectoral nerve blocks. A randomized controlled trial									
(Tripathy et al., 2019)	N/A	Quantitative Study	Study included 58 female patients divided into two groups of 29 each one receiving the PECS block the other the TPVB.	IV1 = Age Adult IV3 = ASA 1-3	VAS score, time before first pain medication requested.	N/A	The PECS group when compare to the TPVB group showed statically similar results as far as VAS score and anal	Level = Randomized Control Trial	Although this study included 58 participants a larger study would be beneficial to help extract more information. There is no greater risk in implementing this

							gesia requirement postoperatively.		work at the current facility and such implementation would be feasible.

Appendix B

Recommendations

Hospital X	Recommendations
TITITLE: Pectoralis Nerve Block compared to Thoracic Paravertebral Nerve Block in the Mastectomy patient: Evidence-based practice recommendations	**Number:**1-234
ISSUE Date:	**Effective Date:**
Developed/Revised By: Eric Boyer	
Reviewed By: Department of Anesthesiology	**Date Reviewed:**
Approved By:	

SCOPE: This Recommendation is in effect for the following Hospital X system business units: Hospital AAA

STATEMENT OF PURPOSE:

The purpose of this recommendation is to provide evidence-based practice recommendations regarding pectoralis nerve block compared to thoracic paravertebral nerve block in the mastectomy patient.

DEFINITIONS:

- Pictorials Nerve Block: The pectoral nerve (Pecs) block I and II are a novel technique to block the pectoral nerves, intercostal nerves 3 to 6, intercostobrachial nerves and the long thoracic nerve.
- Thoracic Paravertebral Nerve Block: The thoracic paravertebral block (TPVB) is a peripheral nerve block performed by injecting local anesthetic (LA) into the thoracic paravertebral space (TPVS). The TPVB targets spinal and sympathetic nerves, in order to produce an ipsilateral segmental somatic and sympathetic block.
- Mastectomy: Surgery to remove part or all of the breast. There are different types of mastectomy that differ in the amount of tissue and lymph nodes removed.

POLICY:

This recommendation applies to any patient undergoing a mastectomy who does not have a contraindication to a nerve block such as patient refusal and or a known allergy to local anesthetics. Practitioners who are providing care to the patient must evaluate each patient and determine the feasibility of performing the nerve block on each patient.

RECOMMENDATIONS:

1. Recommendation 1

    a. Patients undergoing any type of mastectomy shall be evaluated and administered a nerve block in an effort to reduce VAS scores.
2. Recommendation 2
    a. Any patient undergoing any type of mastectomy shall receive a Pectoralis Nerve Block prior to surgery as long as no contraindications such as patient refusal or local anesthetic allergy
3. Recommendation 3
    a. Patients VAS score shall be recorded in the EMR q30min for the first 1 post operatively and then every 2 hours until discharge
4. Recommendation 4
    a. All mastectomy patients should have the time when they first request supplemental analgesia documented in the EMR