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AN OBJECTIVE STRUCTURED CLINICAL EXAMINATION (OSCE) FOR PEC-II AND INTRAPEC BLOCK FOR BREAST AUGMENTATION SURGERY

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AN OBJECTIVE STRUCTURED CLINICAL EXAMINATION (OSCE) FOR PEC-II

AND INTRAPEC BLOCK FOR BREAST AUGMENTATION SURGERY

by

Roland Colburn and Kaleb Smith

A Doctoral Project
Submitted to the Graduate School,
the College of Nursing and Health Professions
and the School of Leadership and Advanced Nursing Practice
at The University of Southern Mississippi
in Partial Fulfillment of the Requirements
for the Degree of Doctor of Nursing Practice

Committee:

Dr. Nina McLain, Committee Chair
Dr. Mary Jane Collins

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ABSTRACT

Ultrasound-guided regional anesthesia techniques are valuable tools for anesthesia providers to learn and implement in their practice. Two specific blocks that student registered nurse anesthetists (SRNAs) need to utilize are PECS-II and the Intrapec block for reconstructive breast augmentation and mastectomies. Teaching these blocks to SRNAs in the clinical setting may be difficult as they will be under higher pressure to perform since they will be practicing on live patients. Understanding this stress led to a review of the current Nurse Anesthesia Program (NAP) curriculum at The University of Southern Mississippi (USM) and found a gap in the education, which an Observed Structured Clinical Examination (OSCE) for the PECS-II and Intrapec block would fill.

Development of the OSCE was completed utilizing the current EBP. Upon completion, quantitative and qualitative data were obtained, and an overall evaluation survey provided participants the opportunity to evaluate the OSCE as a whole. While there was a slight reduction in quantitative scoring regarding the Intrapec Block, the qualitative and survey data suggest that the instructional material was effective and useful.

ACKNOWLEDGMENTS

DEDICATION

Roland Colburn

I would like to dedicate this doctoral project to my family and friends who have been there to support me throughout this process and the years leading up to it. I would like to thank my wife and our little girl Zada. Those two ladies have become the center of my world and all I do is for them. Finally, I would like to thank everyone in the 2023 Nurse Anesthesia Program of Southern Mississippi, and a huge shout out to my doctoral project partner, Kaleb Smith.

Kaleb Smith

This dedication represents my appreciation for so many people in my life who have brought me to this point. A special thanks to my family and friends who always pushed me to strive for more and never doubted my capability to get here. To my doctoral project partner Roland Colburn, Committee Chair Nina Mclain, and Committee Member Mary Collins, thank you for being so patient with me to complete this. To the USM NAP Faculty, I want to formally thank you for taking a chance on me and allowing me to change my life. Finally, to my NAP class of 2023 colleagues, it has been an absolute pleasure getting to know each and every one of you. I know I have made friends for life.

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LIST OF ABBREVIATIONS

BPG.	Best Practice Guideline
CRNA	Certified Registered Nurse Anesthetist
DNP	Doctor of Nursing Practice
EBP	Evidence-Based Practice
ERAS	Enhanced Recovery After Surgery
IRB	Institutional Review Board
MAC	Monitored Anesthesia Care
NAP	Nurse Anesthesia Program
NSAID	Non-Steroidal Anti-inflammatory Drug
OFA	Opiate Free Anesthesia
OSCE	Objective Structured Clinical Examination
PMm	Pectoralis Major Muscle
Pmm	Pectoralis Minor Muscle
SA	Serratus Anterior
SRNA	Student Registered Nurse Anesthetist
USM	The University of Southern Mississippi

CHAPTER I – INTRODUCTION

Breast augmentation surgery is one of the fastest-growing surgeries in America. Patients will either have new implants placed or revisions on previous implants. The University of Southern Mississippi's (USM) Nurse Anesthesia Program (NAP) requires Student Registered Nurse Anesthetists (SRNA) to complete a DNP project to finish their doctoral training. This DNP project will be centered around developing a regional anesthesia plan for breast augmentation surgery as an educational module to teach Best Practice Guidelines. Research shows that a combination of PECS-II and Intrapec blocks will accomplish this goal. The implications of this DNP project include reducing intraoperative and postoperative pain, reducing opiate consumption, providing safer anesthesia, improving patient recovery, and optimizing patient satisfaction (Aarab et al., 2021; Blanco et al., 2012; Kline et al., 2020).

Problem

Surgery can be viewed as strategic, precise trauma to benefit the body as a whole. Trauma is inherently painful. In the United States, the incidence of cosmetic surgery has increased by 50% from 1997 to 2020 (*Surgical and Nonsurgical Cosmetic Procedures,*2021). This increase alone has introduced a higher demand for opiate medication due to intraoperative and postoperative pain, contributing to an ongoing opiate epidemic (Everson et al., 2020)

Background of the Problem

Intraoperative and postoperative pain treatment can be targeted in many ways. Traditionally, the approach revolves around using high-dose opiate medication to blunt noxious sensory pathways. With the opioid epidemic, enhanced recovery after surgery

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(ERAS) protocols have been adopted to reduce or remove the usage of these medications (Everson et al., 2020). Regional anesthesia plays a key role in this protocol. Ultrasound has enabled this practice to advance in safety and efficacy, therefore expanding its role in the clinical setting (Barrington & Uda, 2018). This expansion has moved into the realm of breast surgery. A novel approach, modified from a pre-existing PECS-I block, was designed by Rafael Blanco which improved cutaneous dermatome coverage for breast surgery and named it the PECS-II Block (Blanco et al., 2012). These two blocks allowed for intraoperative and postoperative muscle compliance and pain mitigation (Aarab et al., 2021). Today, with increased usage of electrocautery, muscle compliance has become harder to control with the PECS-I block, leading to intraoperative and postoperative muscle spasms. The Intrapec block has been developed to adapt to modern surgical tools and further improve upon the PECS-I block (Kline et al., 2020; Kline, 2018).

Statement of the Problem

The problem statement for creating Best Practice Guideline education modules for the PECS-II and Intrapec Blocks is, at present, there are no self-guided education modules to objectively assess student performance of the PECS-II and Intrapec Blocks. The SRNA's are highly motivated to establish new opportunities to improve patient outcomes and satisfaction. The PECS-II has significant data supporting its efficacy in reducing pain in the T2-T6 dermatome region (Aarab et al., 2021; Blanco et al., 2012). The Intrapec block is a modern, novel approach that aims to improve upon the PECS-I block and has been shown to cause intraoperative muscle compliance and prevention of postoperative muscle spasm pain, even with the use of electrocautery (Kline et al., 2020; Kline, 2018). Combining these regional anesthesia techniques poses a unique pathway to

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reduce patient pain while also reducing opioid need, subsequently combatting the opiate epidemic at a public health scale (Everson et al., 2020).

Significance of the Problem

The problem statement for creating Best Practice Guideline education modules for the PECS-II and Intrapec Blocks is, at present, there are no self-guided education modules to objectively assess student performance of the PECS-II and Intrapec Blocks. The SRNA's are highly motivated to establish new opportunities to improve patient outcomes and satisfaction. The PECS-II has significant data supporting its efficacy in reducing pain in the T2-T6 dermatome region (Aarab et al., 2021; Blanco et al., 2012). The Intrapec block is a modern, novel approach that aims to improve upon the PECS-I block and has been shown to cause intraoperative muscle compliance and prevention of postoperative muscle spasm pain, even with the use of electrocautery (Kline et al., 2020; Kline, 2018). Combining these regional anesthesia techniques poses a unique pathway to reduce patient pain while also reducing opioid need, subsequently combatting the opiate epidemic at a public health scale (Everson et al., 2020).

The primary stakeholders affected by this DNP project will be participants of the Best Practice Guideline education module. For the students, the improvement is made by revamping the educational materials used to teach established and novel regional anesthesia techniques. For the CRNAs, the improvement is made by reducing post-operative opioid usage and enabling the opportunity for safer, less invasive anesthesia through Monitored Anesthesia Care (MAC) strategies as opposed to general anesthesia if they choose to employ it (Eubanks et al., 2019; Hakim & Wahba, 2019). The patients are the ultimate stakeholders because of the impact this will have on them. Finally,

employers will benefit by promoting the most up-to-date medical techniques to address their issues.

<div align="center">Available Knowledge</div>

Pain

Negative feedback loops exist throughout the human body. The ugly truth is: that pain exists as an evolutionary alarm to stop an action or resolve an issue. Despite being necessary, it is the anesthesia provider's job to systematically target the different phases of the pain pathway to provide adequate analgesia. Hall & Hall (2021) explain that pain progresses along four subsequent pathways: transduction, transmission, modulation, and perception. Transduction is the process where damaged, broken cells release a myriad of chemicals, like arachidonic acid, which get metabolized by different enzymes to propagate inflammatory mediators. Steroids and non-steroidal anti-inflammatory drugs (NSAIDs) work in this realm by preventing this conversion and limiting the release of inflammatory mediators. This, in turn, reduces communication during the transmission phase.

Once peripheral nerves sense these inflammatory mediators, an impulse is sent down the nerve to the spinal cord which is sent to the brain to be perceived as "pain". Communication from the site of injury to the spinal cord is known as the transmission phase. An action potential will travel down a nerve, changing the polarity inside the nervous tissue by opening and closing voltage-gated sodium channels. Regional anesthesia works by targeting specific nerves and restricting the sodium channel system, therefore neutralizing the communication from the injury site to the spinal cord.

Regional Anesthesia

One of the primary goals for anesthesia providers is being able to mitigate pain. Regional anesthesia, also known as "nerve blocks", provides a unique capability to have targeted pain relief without the addictive risk associated with opiate medications. Nerves work by opening and closing different sodium and potassium gates to shift the electrical charge inside the nervous tissue. A sudden stimulus will cause the nerve to depolarize, sending a wave of depolarization down the length of the nerve to communicate to its target. This stimulus is done through a phenomenon called "Saltatory Conduction" in which sodium hops across the outside of myelin sheaths to the next Node of Ranvier and opens the voltage-gated sodium channel that lies within it (Hall & Hall, 2021). Opening this gate uses a high-to-low concentration gradient of sodium to force it inside the nerve, raising the electrical charge and cascading the depolarization wave down the line. Regional anesthesia is a specialty that targets those sodium channels with local anesthetic medication to stop this progression to temporarily end the nerve impulse. Overall, this local anesthetic provides superior analgesia and has a safer, more effective risk profile when done under direct visualization with ultrasound (Gelfand et al., 2011; Richman et al., 2006).

Local Anesthetics

The working unit of nerve blocks is the local anesthetic medication being used to target the nerve that is to be blocked. This class of medication works by allowing the molecule to remove a hydrogen ion, therefore becoming nonionized and able to diffuse across the cell membrane. Once inside the endoneurium, the pH around the molecule suddenly changes and it becomes ionized again, wishing to escape the nerve. The only

opening is the nearby voltage-gated sodium channel, to which it becomes lodged and

bound to the alpha subunit, blocking the passage of sodium through the channel (Hadzic,

2022). The duration of the medication is determined by the level of protein binding it has

until it detaches and is transported to nearby blood vessels and sent through systemic

circulation to be eliminated.

Breast Augmentation Surgery

As stated earlier, breast augmentation surgery is one of the fastest-growing

cosmetic procedures in America. Factors like scar location, implant size, implant

composition, and final implant position are considered, and an incision site is located

either inframammary, periareolar, transaxillary, or transumbilical (Coombs et al., 2019).

The implant will be placed either above or below the pectoralis major muscle after

considering appearance, shape, feel, pain, and progression over time. The most common

method places the implant beneath the pectoralis major muscle and may include a

dissection through the fascia to allow parenchymal movement and reduce breast ptosis

(Coombs et al., 2019).

PECS-II

The PECS-II Block aims to numb the T2-T6 dermatome plane from the nipple

line to the mid-axilla. The PECS-II Block does this by targeting two main nerve groups:

the thoracic intercostal nerves coming from T2-T6, namely the intercostobrachial nerve

and the long thoracic nerve which lies between the serratus anterior and pectoralis minor

(Blanco et al., 2012; Hadzic, 2022). Local anesthetic is to be deposited in the fascial

plane between the pectoralis minor and serratus anterior at the level of the fourth rib,

using hydro dissection to facilitate adequate coverage of the medication. Begin the

procedure by placing the ultrasound probe in a sagittal orientation in the deltopectoral groove. At this point, the probe is tilted with the probe head aiming towards the thorax. Once the axillary artery and vein are identified, the rib shadow positioned underneath is confirmed to be the second rib. The probe is then migrated caudally and laterally, counting rib shadows until the third and fourth ribs are in view.
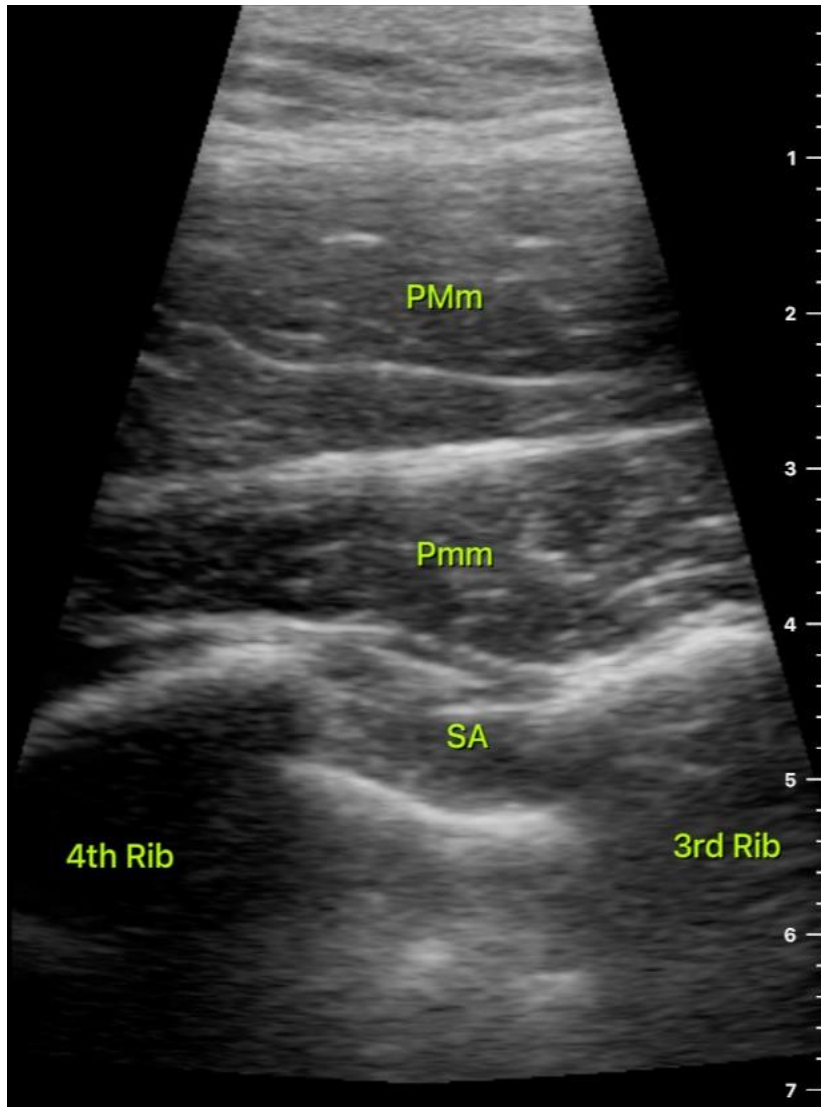
Figure 1. PECS-II Ultrasound Image.

The block needle is then placed, in-plane, down to the desired fascial layer to deposit 15-20ml of local anesthetic. This technique has been shown to significantly

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reduce opioid usage in postoperative days one through five by reducing overall pain ratings and improving patient satisfaction scores (Aarab et al., 2021; Karaca et al., 2019).

Intrapec

The Intrapec Block is a novel approach to handling modern breast augmentation surgical strategies. This block causes muscle compliance in the pectoralis major. In doing so, it both prevents muscle spasm pain in the intraoperative and postoperative period and aids the surgeon by presenting an utterly flaccid muscle, thereby assisting in the creation of the implant pocket and reducing bleeding. Traditionally, muscle paralysis was handled by the PECS-I Block by targeting the lateral and medial pectoral nerve. By shifting to an Intrapec approach, the practitioner gains two advantages: muscle paralysis during electrocautery and a longer sustained block (Kline et al., 2020; Kline, 2018). Considering that the fascial plane is opened during pocket creation, the deposited local anesthetic from a PECS-I Block is freed to leave the desired space. Instead, the local anesthetic dose positioned within the muscle will be sustained even after pocket creation. Begin the procedure by placing the ultrasound probe infraclavicular and in the transverse plane. The goal is to concentrate the local anesthetic in the inferior and anterior portion of the pectoralis major muscle.
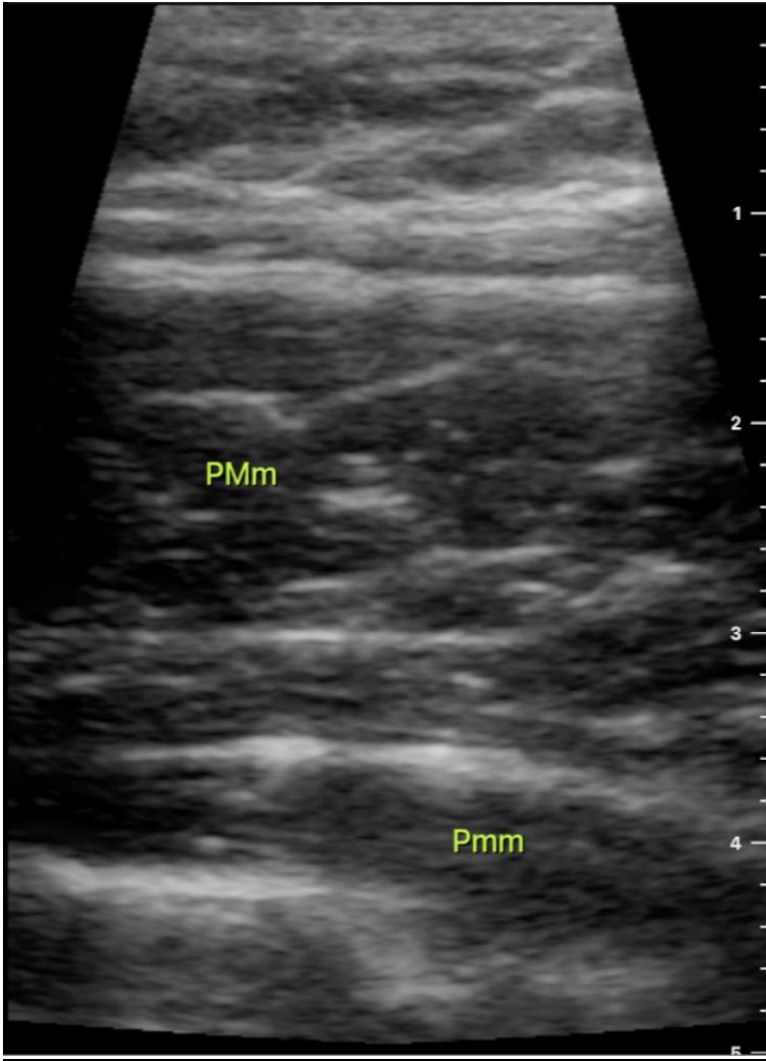
Figure 2. Intrapec Ultrasound Image.

The block needle is then placed, in-plane, down to the desired intramuscular point to deposit 10-15ml of local anesthetic. This novel technique still needs larger-scale studies for data accumulation, but early studies indicate reduced postoperative pain and muscle spasms within the first two days of recovery (Kline et al., 2020).

Complications

The risk profile has improved with the increased utilization of ultrasound, but peripheral nerve blocks still have risks. This process uses a medication to stop nerve

transmission so if that medication goes to an unintended nerve, its transmission will be blocked as well. In some areas of the body, this may have a trivial result but in others, it may cause hemiparalysis of the diaphragm, Horner's Syndrome, cardiac accelerator fiber blockade, etc. (Hadzic, 2022). Another risk is direct nerve damage from the injection needle causing anywhere from compression to complete shearing of the nerve fiber. Inadvertent vascular injection can result in bleeding, hematoma, or systemic uptake of local anesthetic. The systemic uptake risk is the most dangerous because it can target all body systems while causing seizures and cardiovascular collapse (Hadzic, 2022). While these complications are rare, they must be considered to promote patient safety.

Rationale

Regional anesthesia is not a new practice since it originated in 1894 via Von Frey's specificity theory (Everson et al., 2020). Now that ultrasonography has been widely adopted, the application of regional anesthesia has vastly expanded due to increased safety and more effective neuraxial techniques (Barrington & Uda, 2018). The PECS-II and Intrapec block are isolated explicitly due to their advantages in breast surgery. The PECS-II block is responsible for causing incisional analgesia for surgeries involving the T2-T6 dermatome region from the nipple line to the mid-axilla (Aarab et al., 2021; Blanco et al., 2012). The Intrapec block is responsible for muscle compliance and spasm prevention, secondarily aiding pain relief (Kline et al., 2020; Kline, 2018). Incorporating these two neuraxial strategies will revolutionize the anesthetic approach for breast augmentation surgery.

Framework and Theories

Considering the PECS-II and Intrapec blocks will be taught to practicing adults, the DNPl project will be designed to cater to adult learning methods. Hoke and Robbins (2005) found that "active, cooperative learning is a method to teach the critical thinking skills necessary for the transfer and use of classroom-acquired knowledge in the clinical setting" (p. 348). This method resulted in a three-point increase in average clinical grade compared to groups taught only by the lecture approach. Because of this significant advantage in teaching style, PECS-II, and Intrapec education will be done with an integrated presentation and ultrasound demonstration element.

Specific Aims

This DNP project aims to prepare nurse anesthetists to implement these regional anesthesia techniques safely and effectively. The SRNAs and Certified Registered Nurse Anesthetists (CRNA) must: 1) identify sonoanatomic landmarks and demonstrate sonographic image acquisition, 2) identify inclusion and exclusion criteria for PECS-II and Intrapec blocks, and 3) establish confidence to practice these techniques. The DNP project will teach ultrasonography techniques through a video Objective Structured Clinical Examination (OSCE) which will include lecture and demonstration, a decision-tree flowsheet outlining inclusion and exclusion criteria, and a survey to gauge provider confidence to achieve these goals.

Summary

The University of Southern Mississippi does not have a Best Practice Guideline (BPG) educational module to teach regional anesthesia techniques for breast augmentation surgery. This DNP project aims to provide SRNA's and CRNA's with the

necessary information and training to execute PECS-II and Intrapec blocks safely and effectively for their breast surgeries. Together, these blocks will provide dermatome analgesia and muscle relaxation, which has been shown to reduce intraoperative and postoperative opioid consumption, improve recovery, reduce pain, enable safer anesthesia methods, and improve overall patient outcomes and satisfaction (Aarab et al., 2021; Blanco et al., 2012; Kline et al., 2020). This improvement will be made by instructing the SRNA's and CRNAs on the blocks' technique, inclusion and exclusion criteria, and demonstration with ultrasound to establish confidence in these blocks for their current or future practice.

CHAPTER II – METHODOLOGY

The overarching purpose of this DNP project is to develop a regional anesthesia Best Practice Guideline for breast reconstructive surgery to provide increased analgesia, facilitate recovery, and decrease the number of opioids required intraoperatively and postoperatively. Current literature and clinical practice show that the PECS-II and Intrapec blocks will effectively achieve this goal by employing ultrasound-guided techniques for targeted local anesthetic administration (Blanco et al., 2012; Hadzic, 2022; Kline, 2018).

Context

This DNP project will be taught at The University of Southern Mississippi via an OSCE, which will include a video lecture and demonstration. The University of Southern Mississippi's Nurse Anesthesia Program seeks out innovative ways to teach SRNA's and provide resources for CRNAs to use in practice. These regional anesthesia techniques provide improved analgesia and decrease opioid consumption intraoperatively and postoperatively, subsequently improving patient outcomes. Implementation of the PECS-II and Intrapec Block OSCE will be used to instruct SRNA's and CRNA's alike on these Best Practice Guidelines.

Design

The authors completed a review of the literature to distinguish the most effective regional blocks that provide coverage and pain management utilized in breast reconstructive surgeries. A separate review of the literature was completed to establish the effects of opioid consumption intraoperatively and postoperatively with the PECS-II and Intrapec Blocks. Peer-reviewed scholarly databases and sources were the focus of our

literature search. The search was conducted primarily on databases such as PubMed, Cochrane Library, CINAHL, Google Scholar, and ProQuest. Keywords utilized in the search included regional blocks for breast reconstruction, the effectiveness of PECS Block and reduction in opioid consumption, safety and efficacy of PECS-II and Intrapec Block, the opioid epidemic, regional anesthesia versus general anesthesia, and cost-effectiveness of regional anesthesia versus general anesthesia. Inclusion criteria consisted of studies within the last 10 years and written in English. Additional search inclusion criteria incorporated studies within the past two years to ensure the most up-to-date and effective treatment method.

Completion of this DNP project began with the approval from the Institutional Review Board (IRB) at the University of Southern Mississippi. Upon approval from the IRB, a lesson plan along with a live demonstration incorporating the most recent and applicable literature was performed in front of the DNP chair and committee. Once approved, the same lesson plan and demonstration were taught via OSCE. Tests and evaluations were administered before and following the demonstration and quantitative data was obtained, recorded, analyzed, charted, and destroyed pertaining to the IRB regulations. The qualitative data obtained was obtained, recorded, analyzed, charted, and destroyed according to IRB regulations. Once all documentation and results were compiled, they were presented to the USM DNP committee for final approval. With final approval, an executive summary was formulated and submitted back to the DNP committee.

Intervention

The following is an outline of the step-by-step process that will be followed while implementing the intervention:

1. IRB Approval was obtained.

2. Obtained data and clinical setting from experts and stakeholders:

    a. The University of Southern Mississippi SRNA's

    b. Nina McLain, Ph.D., CRNA, FAANA

3. Prepared lesson plan and outline of implementation with supporting literature.

4. Submitted plan and outline for approval from the DNP committee.

5. Submission of the approved plan, review of literature, and evaluation to the expert panel.

6. Obtained and recorded evaluation data from the panel of experts in table format.

7. Altered lesson plan based on feedback.

8. Submitted to the DNP project committee for approval.

9. Presented executive summary with implementation techniques and results to the DNP project committee.

    a. Taught Intrapec and PECS-II blocks for OSCE.

    b. Evaluated teaching and reciprocation of teaching.

10. Disseminated research at DNP Scholarship Day on Friday, September 29, 2023.

Measures and Intervention

DNP project interventions included an evaluation and test before receiving the instructional and demonstrative teachings. Following the instructional and demonstrative teachings, the participants performed another evaluation and follow-up test. The evaluations were emailed to participants for pre and post-instruction. Participants were asked to evaluate their prior instruction or practice regarding regional anesthesia, prior experience with Intrapec or PECS-II blocks, how confident they feel about the effectiveness of Intrapec and PECS-II blocks, and where they stand on a scale of 1-10 related to confidence in performing an Intrapec and PECS-II blocks. The evaluation following the teaching was displayed with the same questions and contained an area for comments regarding instructional format and positives or negatives regarding teachings. The tests were administered before and following teaching and will test participants' knowledge of anatomy, physiology, and ultrasound techniques. Utilizing a scorable test will obtain concrete data related to the quality and effectiveness of the OSCE.

Summary

Once approval from the Institutional Review Board (IRB) at The University of Southern Mississippi was received, completion of this DNP project began. Utilizing literature reviews and evidence-based practice, the development of a decision-tree flow sheet outlining inclusion and exclusion criteria for receiving blocks was established. A thorough lesson plan and demonstration on ultrasound-guided PECS-II and Intrapec Block insertion was developed and recorded. Development of a survey, that was given before and after an OSCE to determine understanding and confidence of Best Practice

Guidelines. Upon acceptance and agreement, the PECS-II and Intrapec Block OSCE were established as the Best Practice Guidelines for breast augmentation surgery.

CHAPTER III – RESULTS

Participants in this DNP project got the opportunity to give feedback on the value of this OSCE and confidence in performing the PECS-II and Intrapec Blocks. Participants were given a pretest and posttest. Each required a consent affirmation to continue through the survey. Both tests had the same test questions to gather quantitative data and survey questions to gather qualitative data. Correct answers are denoted by being painted orange.
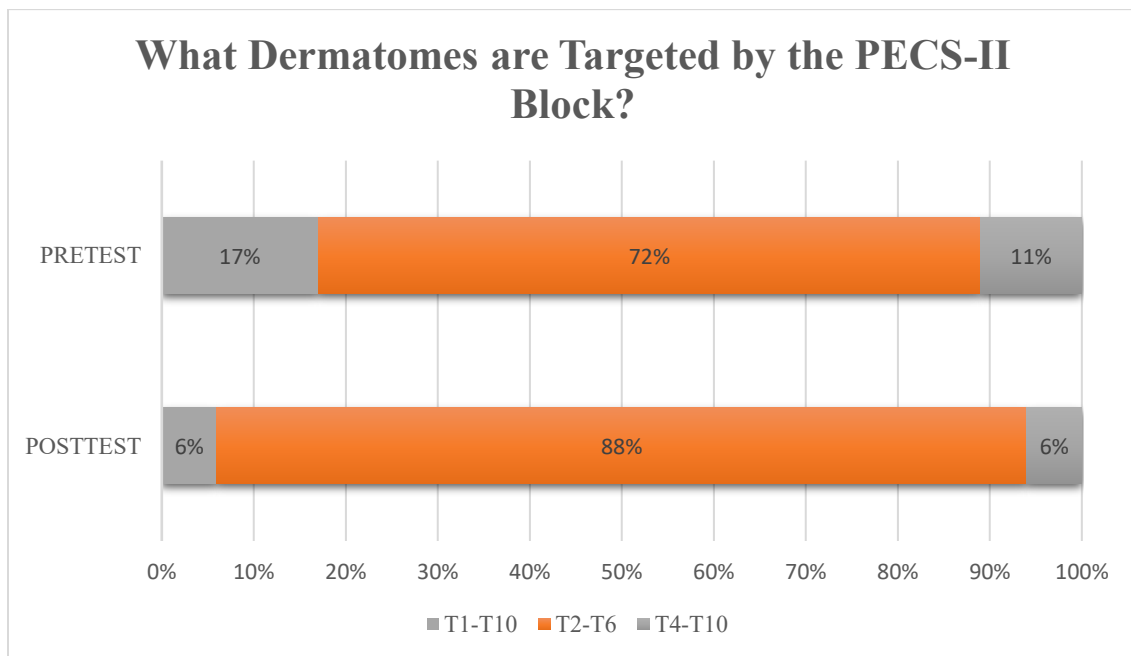
Figure 3. What Dermatomes are Targeted by the PECS-II Block.
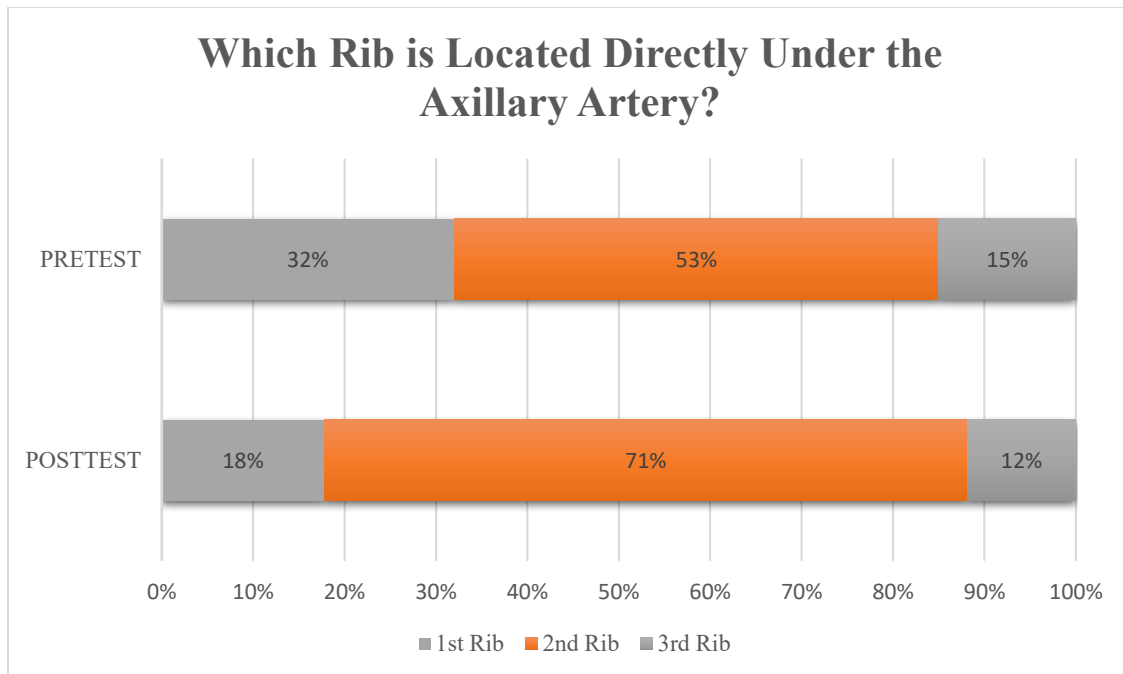
Figure 4. Which Rib is Located Directly Under the Axillary Artery?
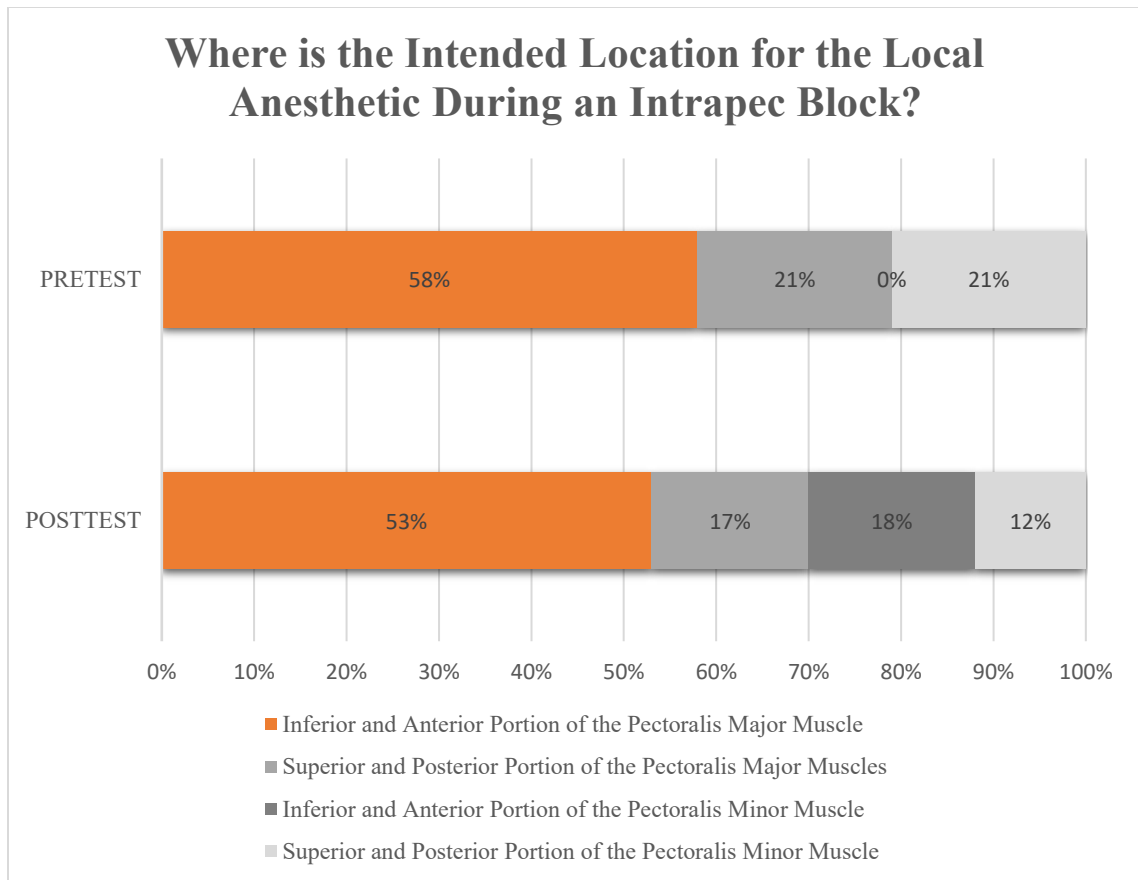
Figure 5. Where is the Intended Location of the Local Anesthetic During an Intrapec block?

Figure 6. What is the Benefit of the Intrapec Block Compared to the PECS-I Block?
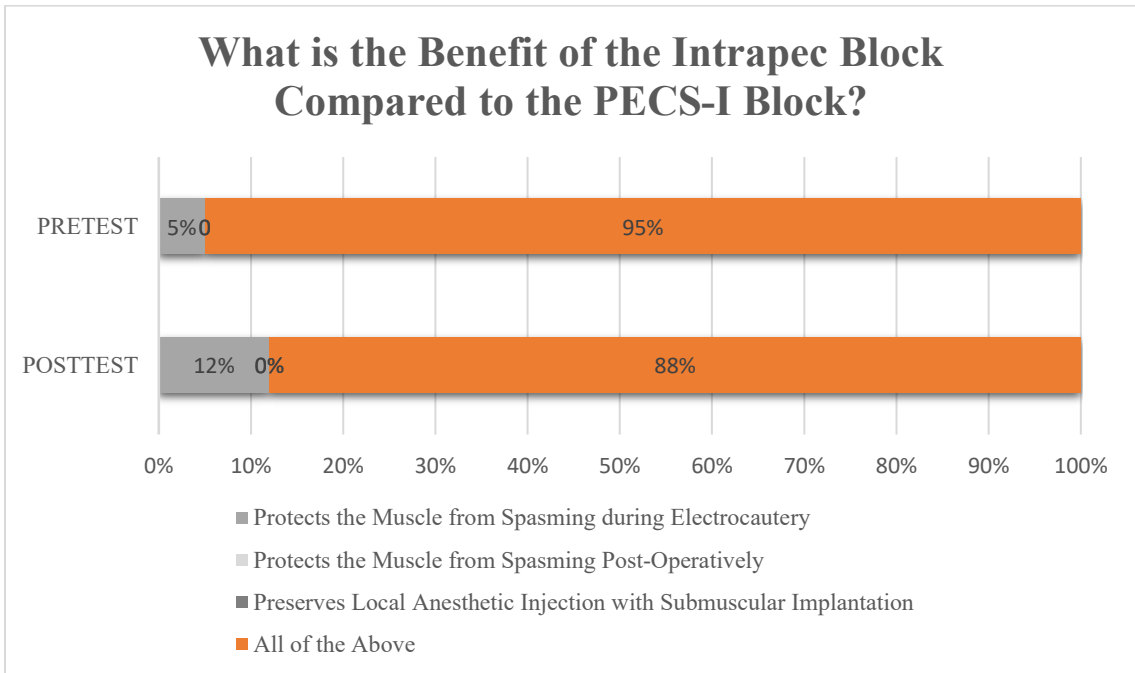
Figure 7. What is the Recommended Volume to be Deposited with the PECS-II Block?
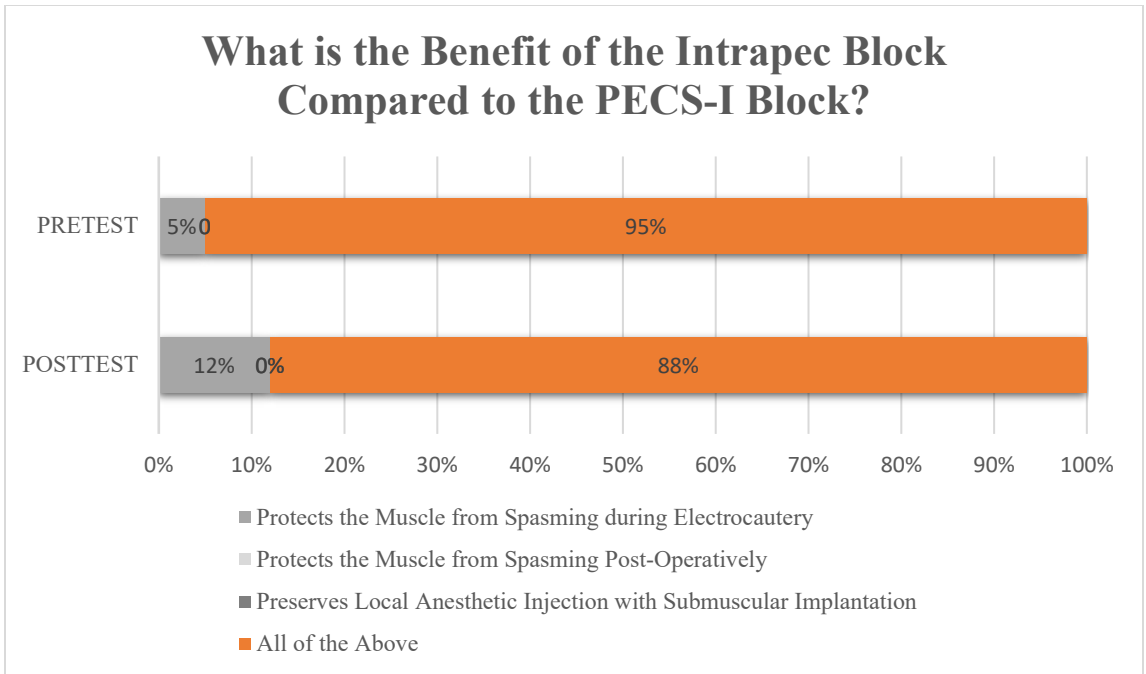
Figure 8. What is the Recommended Volume of Local Anesthetic to be Deposited with the Intrapec Block?
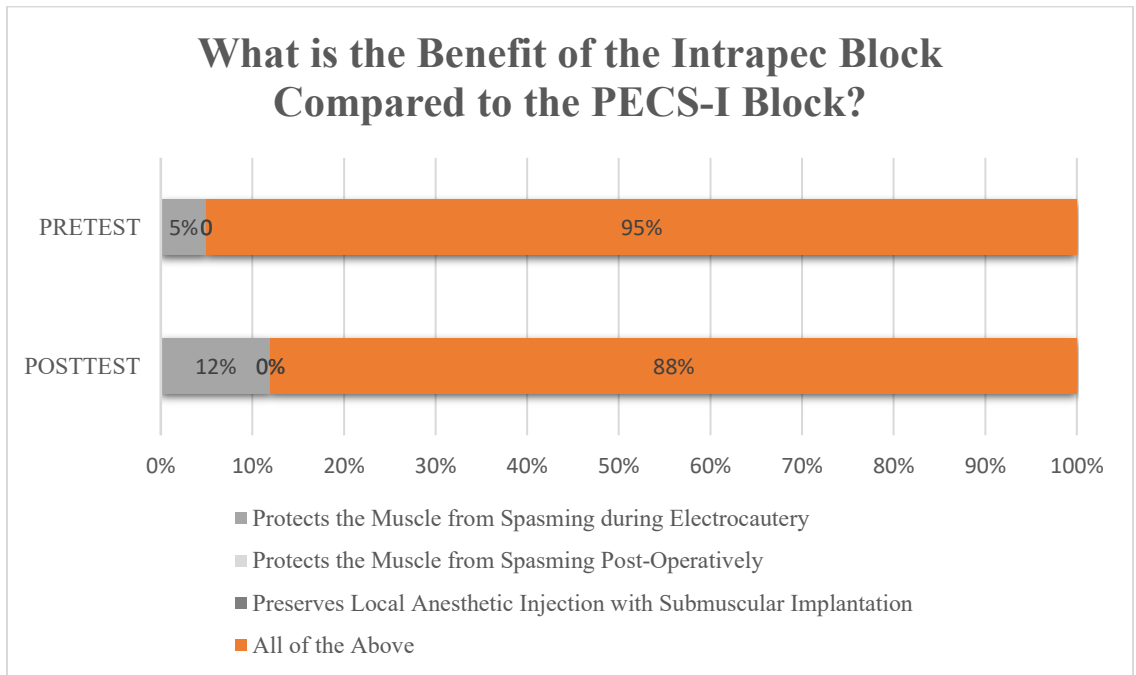
Figure 9. Overall Percentage Correct.

The participants were provided six multiple-choice questions to evaluate knowledge regarding the two regional anesthesia techniques and ultrasonographic landmarks. What is shown is the percentage of correct answers. The posttest yielded a slight reduction of points regarding the Intrapec Technique. The correct answer choice for "where is the intended location for the local anesthetic during an Intrapec Block" was "inferior and anterior portion of the pectoralis major muscle". The most selected incorrect answer was "inferior and anterior portion of the pectoralis minor muscle". This answer suggests a possibility of accidental incorrec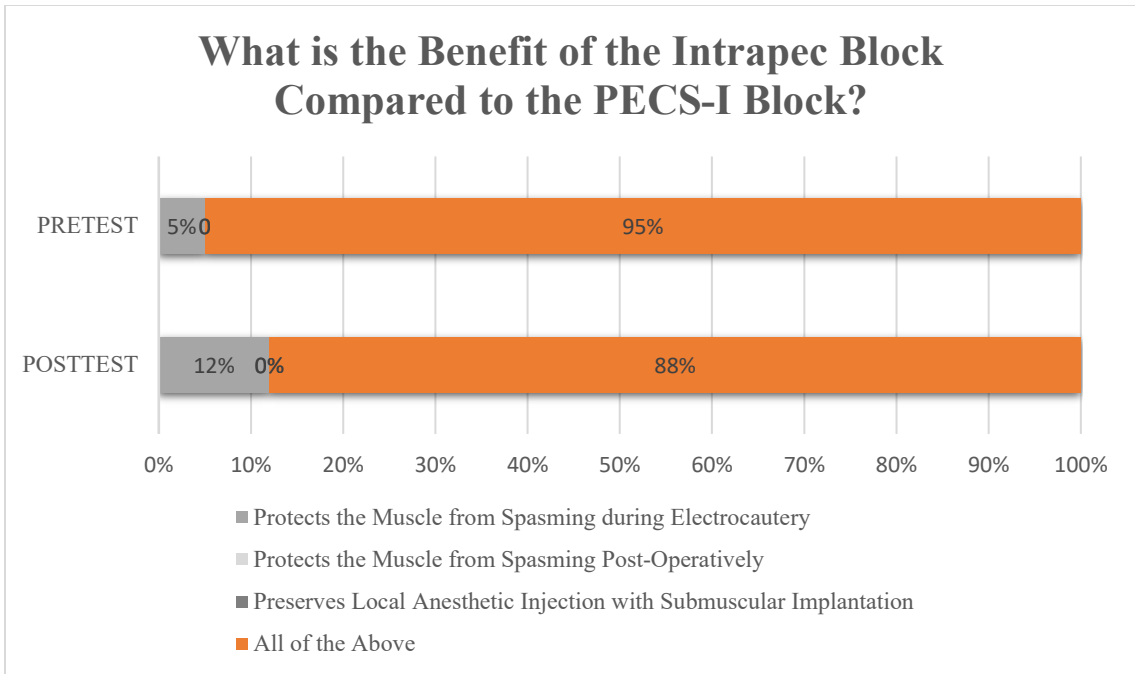t selection by missing a single-word change. The correct answer choice for "What is the benefit of the Intrapec Block compared to the PECS-I Block?" was "all of the above". Only one participant changed their answer from "all of the above" in the pretest to "protects the muscle from spasming during electrocautery" in the posttest. More subsequent studies are needed to evaluate these differences.
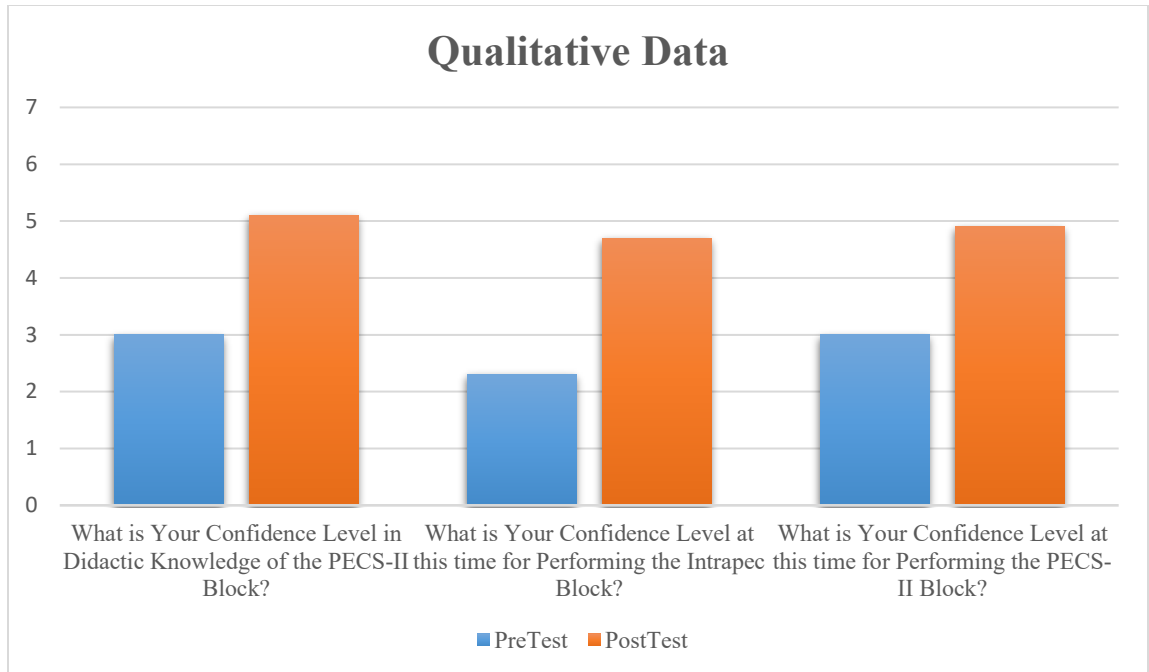
Figure 10. Qualitative Data.

Participants were asked to rate three different categories from 0 (least confident) to 7 (very confident). What is shown is the average of responses gathered from the participants. This response points to a clear increase in confidence across the board. Evaluating didactic knowledge of the Intrapec Block was intentionally left out due to the novel nature of the block.
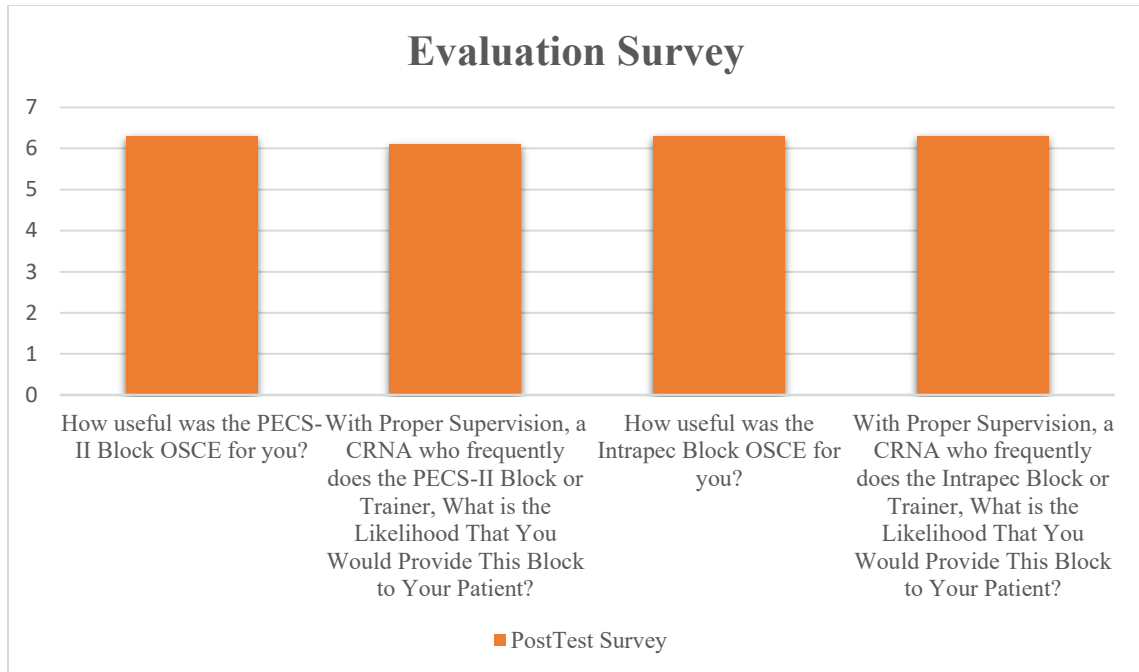
Evaluation Survey

Figure 11. Evaluation Survey.

Participants were allowed to rank the usefulness of each OSCE on a 0 (not useful at all) to 7 (extremely useful) scale. Both the PECS-II and Intrapec OSCE's were rated above a 6 on usefulness. Participants were also allowed to rank the likelihood of use on a 0 (will not provide) to 7 (definitely will provide) scale. Both the PECS-II and Intrapec Blocks were rated above a 6 on the likelihood of use.

Please offer any additional feedback you would like to share:

SNRA	
SRNA	Great Information
SRNA	These videos were easy to follow and were a good tool to be able to brush up on block anatomy
SRNA	Nice job!

Figure 12. Comments from Participants.

Summary

These OSCE's were developed to educate SRNA's on how to provide PECS-II and Intrapec Blocks. Educational material was provided along with accompanying instructional videos to illustrate how to complete these blocks. Quantitative and qualitative data was obtained, and an overall evaluation survey provided participants the opportunity to evaluate the OSCE as a whole. While there was a slight reduction in quantitative scoring regarding the Intrapec Block, the qualitative and survey data suggest that the instructional material was effective and useful.

CHAPTER IV – DISCUSSION

As the field of anesthesia evolves, so does anesthesia education. With advances in medical and information delivery technology, we can educate providers more efficiently and with higher-quality instruments. This OSCE promoted a new BPG in the field of breast augmentation surgery but can be applied to subpectoral procedures of any kind. This DNP project aimed at using Evidence-based Based Practice (EBP) to teach NAP students at USM new techniques to employ in their careers. The completed DNP project was submitted for the NAP faculty to review so that it can be evaluated as a teaching tool for the program.

Limitations

The study was limited by a small sample size. The OSCE and survey were sent to USM's NAP. This excluded practicing CRNAs, Anesthesiologists, and Anesthesia Assistants. The sample and data significance could be improved by increasing the number of participants.

Considerations

More research could be done to identify the slight reduction of correct points regarding the Intrapec Block. The researchers understand that this is a novel technique and may require more teaching material than was provided. When asked about Intrapec benefits, the educational material could have highlighted the additional benefits more to make it clear that it is not just for electrocautery spasm prevention. When asked about where the local anesthetic should be injected, we could structure the answer choices more carefully to show a clear distinction between them. This would strengthen the DNP

project and promote usage with patients to improve surgical outcomes. This OSCE must remain on the cutting edge of research to help propel anesthesia forward.

Summary

This DNP project's OSCE utilized current EBP and created a tool that will help the USM NAP faculty teach SRNAs. The PECS-II and Intrapec Blocks were seen as beneficial and likely to be implemented in practice. This OSCE will provide USM NAP graduates the knowledge and capability to help surgeons, fellow anesthesia providers, and patients establish improved outcomes and recovery.

Conclusion

In conclusion, this DNP project took recent EBP and cutting-edge research to take existing regional anesthesia techniques and improve upon them. The existing PECS-II block technique remained while the PECS-I Block was modified to an Intrapec Block due to positive emerging research. Both of these, in conjunction, suggest vastly improved post-operative outcomes with opioid-sparing strategies in mind.

The purpose of the DNP project was to create an educational module that could teach USM NAP students how to use these techniques. Data was gathered and suggested successful teaching of the techniques so that the students can employ them in their post-graduate careers. This will enable USM Graduates to have the capability to reduce opioid consumption for one of the fastest-growing surgical procedures in a nation struggling with an opioid epidemic

APPENDIX A – DNP Essentials

DNP Essentials	Clinical Implications
Essential I: Scientific Underpinning for Practice	Identified a need for an OSCE-based learning experience for PECS-II and Intrapec blocks for clinical competency.
Essential II: Organizational and Systems Leadership for Quality	Collaboration with USM's NAP faculty and students as well as IRB approval for this OSCE.
Essential III: Clinical Scholarship and Analytical Methods for Evidence-Based Practice	A thorough review of the current literature was conducted to determine the best practice for competency in the areas covered by this OSCE.
Essential IV: Information Systems/Technology and Patient Care Technology for the Improvement and Transformation of Health Care	Implementing PECS-II and Intrpec blocks via the utilization of ultrasound-guided techniques is covered in this doctoral project.
Essential V: Health Care Policy for Advocacy in Health Care	This doctoral project shows that this OSCE is a valuable educational tool that should be implemented in the NAP curriculum.
Essential VI: Interprofessional Collaboration for Improving Patient and Population Health Outcomes	Collaboration occurred between the authors of this doctoral project, NAP faculty, and NAP students.
Essential VII: Clinical Prevention and Population Health for Improving the Nation's Health	The goal of this doctoral project is to improve the clinical competency of future anesthesia providers, which will lead to improved patient outcomes and satisfaction.
Essential VIII: Advanced Nursing Practice	This essential is satisfied by the scientific literature review conducted as well as the techniques and knowledge taught/gained by this OSCE.

APPENDIX B – Invitation Letter

Dear Participants,

Our names are Kaleb Smith and Roland Colburn, and we are DNP students in the Nurse Anesthesia Program at USM. We want to request your participation in our research project regarding PECS-II and Intrapec Blocks for Breast Augmentation Surgery.

A standard online informed consent is provided for review prior to participation. If consent is declined, you will not be able to participate. Participation in this study will take approximately 10 minutes and consists of completing an anonymous online pretest questionnaire, reviewing the project content on PECS-II and Intrapec Blocks, and completing the anonymous online post-test questionnaire.

The questionnaires are voluntary, and all information will be kept anonymous and confidential. Neither survey asks for identifying information. There are no repercussions for non-participation, and if at any time you choose to withdraw, you may simply exit the browser. The links to participate and give feedback to improve our instructional seminar are provided below.

Pretest Link:

https://usmuw.co1.qualtrics.com/jfe/form/SV_eX89XykEN5Q4VM2

Post-test Link:

https://usmuw.co1.qualtrics.com/jfe/form/SV_0BbEexvsi2XkPFY

This DNP project has been approved by the University of Southern Mississippi Institutional Review Board 23-0299.

If you have any questions, please contact us. Our information is provided below. Thank you for your time and feedback on our study!

Thank you,

Kaleb Smith

Kaleb.A.Smith@usm.edu

601-600-XXXX

Roland Colburn

Roland.Colburn@usm.edu

205-275-XXXX

APPENDIX C – OSCE Template

Anesthesia Best Practice Guideline for Intrapecs Block Utilizing Ultrasound Guidance

for Student Nurse Anesthetists

LEARNER OUTCOMES:

1. Proper use of ultrasound and block supplies.

2. Be able to locate and identify correct anatomical landmarks.

3. Successfully administer local anesthetic to the specified area for a block.

DOMAINS: Clinical Skill, Knowledge Development, Formative Evaluation,

Performance Assessment.

PURPOSE**:** Student practice and Performance assessment.

LEARNER OBJECTIVES:

1. Demonstrate proper technique with ultrasound and block supplies.

2. Identify correct sonoanatomic landmarks for Intrapecs block.

3. Effectively administer local anesthetic to the correct location.

INDIVIDUAL OR GROUP: Individual best practice guideline; One 2nd year SRNA in

simulation lab at a time while being evaluated by Dr. Rayburn on completeness.

REQUIRED READING and ASSOCIATED LECTURES:

1. Barash: Chapter 36

2. Morgan-and-Mikhail: Chapter 46

3. Nagelhout: Chapter 50

4. Lecture Powerpoint:

REQUIRED VIDEO:

REQUIRED PARTICIPANTS: Volunteer Junior Student Nurse Anesthetist (2nd Year) and NAP Instructor (Dr. Rayburn) for Formative Evaluation and Performance Assessment.

VENUE: NAP Simulation Lab

STUDENT LEVEL OF OSCE: Semester 3-6

TIME ALLOWED: 20 minutes

SEQUENTIAL PRACTICE & TESTING: The lab station will be completed by performing an Intrapecs block. This will be a peer-led evaluation to ensure there is no intimidation thus creating a learning environment in which the junior student feels at ease to ask questions.

RECOMMENDED PRACTICE PRIOR TO EXAMINATION: 3X is recommended for this station, 20 minutes each time (60 minutes total).

CONTEXT: (Background/story)

EQUIPMENT& SUPPLIES:

- Gloves (Sterile and nonsterile)

- Chloraprep for skin disinfection.

- Ultrasound Machine

- Ultrasound Transducer Sleeve

- Ultrasound gel

- One 20-ml syringe for local anesthetic (Intrapecs Block)

- One 8cm, 22-gauge, 30-degree bevel, insulated echogenic needle (Intrapecs Block)

- Local Anesthetic of Choice (provider and patient dependent)

SITE SELECTION:

Intrapecs Block- Begin the procedure by placing the ultrasound probe infraclavicular and in the transverse plane. The goal is to concentrate the local anesthetic in the inferior and anterior portion of the pectoralis major muscle. The block needle is then placed, in-plane, down to the desired intramuscular point to deposit 10-15ml of local anesthetic.

TASK STATEMENT:

Your task is to select the correct supplies and equipment, demonstrate proper technique and use of an ultrasound machine, and identify and administer a local anesthetic to correct anatomical landmarks.

PROCESS

1. Identify patient, verify procedure, and obtain consent.

2. Gather all supplies needed for the block.

3. Perform timeout before the procedure.

4. Identify the correct site to begin ultrasound imaging.

5. Correct utilization of ultrasound machine and landmark identification.

6. Correctly clean the site where the needle is to be inserted.

7. Apply ultrasound gel to the transducer.

8. Don sterile gloves.

9. Insert ultrasound transducer in sterile probe cover.

10. Apply sterile ultrasound gel to the needle insertion site.

11. Locate the previously identified blocking area with ultrasound.

12. Have an assistant prime blocking needle.

13. Insert the echogenic needle in the plane within view of the ultrasound.

14. Identify the needle in the correct location.

15. Have the assistant perform a negative aspiration to ensure the needle is outside any vessels.

16. Deliver local anesthetic in 5ml increments and re-aspirate between each increment.

17. Observe the spread of fascia on ultrasound imaging.

18. Remove the needle from the patient and clean the area.

IMAGES:

DEBRIEFING FORM:

1. Which fascial plane is targeted by the INTRAPEC Block?

    A. A fascial plane is not targeted. (Kline et al., 2020; Kline, 2018)

2. True or False: The benefit of INTRAPEC, as opposed to PECS 1, is that it protects against muscle spasms during electrocautery, and spasm post-operatively, and protects against local anesthetic loss during pocket creation.

    A. True. (Kline et al., 2020; Kline, 2018)

3. Where do you place the ultrasound probe at the beginning of an Intrapecs block?

    A. Infraclavicular. (Kline et al., 2020; Kline, 2018)

QUESTION & DEMONSTRATION STATION: TASKS

TASKS	PASS	FAIL	COMMENTS
1. Prepares and selects appropriate equipment and supplies			
2. Demonstrates proper use of ultrasound machinery			
3. Locates proper site for needle insertion and provides antiseptic application			
4. Identifies layers and structures appropriately on the image provided			
5. Demonstrates correct insertion angle of needle for "in-plane" view			
6. Confirms needle tip throughout the procedure			
7. Performs negative aspiration before each injection of LA			
8. Identifies adequate spread of LA in the fascial plane			
9. Assess the patient for signs and symptoms of LAST			
10. Cleans machinery and stores in the correct position			

The Best Practice Guideline by the student demonstrates foundational knowledge and correct use of the ultrasound machine in performing an adequate nerve block: (Circle one) PASS FAIL

-Does the student need to repeat this Best Practice Guideline at a later date to satisfy learning requirements? (Circle one) YES   NO   Date to return for evaluation: _____

EXAMINER: _____ DATE: _____

OSCE Template

Anesthesia Best Practice Guideline for PECS-II Block Utilizing Ultrasound Guidance for

Student Nurse Anesthetists

LEARNER OUTCOMES:

4. Proper use of ultrasound and block supplies.

5. Be able to locate and identify correct anatomical landmarks.

6. Successfully administer local anesthetic to the specified area for a block.

DOMAINS: Clinical Skill, Knowledge Development, Formative Evaluation,

Performance Assessment.

PURPOSE: Student practice and Performance assessment.

LEARNER OBJECTIVES:

4. Demonstrate proper technique with ultrasound and block supplies.

5. Identify correct sonoanatomic landmarks for the PECS-II block.

6. Effectively administer local anesthetic to the correct location.

INDIVIDUAL OR GROUP: Individual best practice guideline; One 2nd year SRNA in

simulation lab at a time while being evaluated by Dr. Rayburn on completeness.

REQUIRED READING and ASSOCIATED LECTURES:

5. Barash: Chapter 36

6. Morgan-and-Mikhail: Chapter 46

7. Nagelhout: Chapter 50

8. Lecture PowerPoint: Upper and Lower Extremity Blocks

REQUIRED VIDEO:

REQUIRED PARTICIPANTS: Volunteer Junior Student Nurse Anesthetist (2nd Year) and NAP Instructor (Dr. Rayburn) for Formative Evaluation and Performance Assessment.

VENUE: NAP Simulation Lab

STUDENT LEVEL OF OSCE: Semester 3-6

TIME ALLOWED: 20 minutes

SEQUENTIAL PRACTICE & TESTING: The lab station will be completed by performing a Pecs-II block. This will be a peer-led evaluation to ensure there is no intimidation thus creating a learning environment in which the junior student feels at ease to ask questions.

RECOMMENDED PRACTICE PRIOR TO EXAMINATION: 3X is recommended for this station, 20 minutes each time (60 minutes total).

CONTEXT: (Background/story)

EQUIPMENT& SUPPLIES:

- Gloves (Sterile and nonsterile)

- Chloraprep for skin disinfection.

- Ultrasound Machine

- Ultrasound Transducer Sleeve

- Ultrasound gel

- One 20-ml syringe for local anesthetic (PECS-II Block)

- One 8cm, 22-gauge, 30-degree bevel, insulated echogenic needle (PECS-II Block)

- Local Anesthetic of Choice (provider and patient dependent)

SITE SELECTION:

PECS-II Block- The PECS-II Block aims to numb the T2-T6 dermatome plane from the nipple line to the mid-axilla. Local anesthetic is to be deposited in the fascial plane between the pectoralis minor and serratus anterior at the level of the fourth rib, using hydro dissection to facilitate adequate coverage of the medication. Begin the procedure by placing the ultrasound probe in a sagittal orientation in the deltopectoral groove. At this point, the probe is tilted with the probe head aiming towards the thorax. Once the axillary artery and vein are identified, the rib shadow positioned underneath is confirmed to be the second rib. The probe is then migrated caudally and laterally, counting rib shadows until the third and fourth ribs are in view. The block needle is then placed, in-plane, down to the desired fascial layer to deposit 15-20ml of local anesthetic.

TASK STATEMENT:

Your task is to select the correct supplies and equipment, demonstrate proper technique and use of an ultrasound machine, and identify and administer a local anesthetic to correct anatomical landmarks.

PROCESS

19. Identify patient, verify procedure, and obtain consent.

20. Gather all supplies needed for the block.

21. Perform timeout before the procedure.

22. Identify the correct site to begin ultrasound imaging.

23. Correct utilization of ultrasound machine and landmark identification.

24. Correctly clean the site where the needle is to be inserted.

25. Apply ultrasound gel to the transducer.

26. Don sterile gloves.

27. Insert ultrasound transducer in sterile probe cover.

28. Apply sterile ultrasound gel to the needle insertion site.

29. Locate the previously identified blocking area with ultrasound.

30. Have an assistant prime blocking needle.

31. Insert the echogenic needle in the plane within view of the ultrasound.

32. Identify the needle in the correct location.

33. Have the assistant perform a negative aspiration to ensure the needle is outside any vessels.

34. Deliver local anesthetic in 5ml increments and re-aspirate between each increment.

35. Observe the spread of fascia on ultrasound imaging.

36. Remove the needle from the patient and clean the area.

IMAGES:

DEBRIEFING FORM:

1. Which Rib is located directly under the Axillary Artery?

    A. 2nd Rib (Blanco et al., 2012; Hadzic, 2022)

2. Which Nerve is targeted by the PECS 2 Block?

    A. Long Thoracic Nerve (Blanco et al., 2012; Hadzic, 2022)

3. Which fascial plane is targeted by the PECS 2 Block?

A. Between Pectoralis Minor and Serratus Anterior (Aarab et al., 2021).

QUESTION & DEMONSTRATION STATION: TASKS

TASKS	PASS	FAIL	COMMENTS
1. Prepares and selects appropriate equipment and supplies			
2. Demonstrates proper use of ultrasound machinery			
3. Locates proper site for needle insertion and provides antiseptic application			
4. Identifies layers and structures appropriately on the image provided			
5. Demonstrates correct insertion angle of needle for "in-plane" view			
6. Confirms needle tip throughout the procedure			
7. Performs negative aspiration before each injection of LA			
8. Identifies adequate spread of LA in the fascial plane			
9. Assess the patient for signs and symptoms of LAST			
10. Cleans machinery and stores in the correct position			

The Best Practice Guideline by the student demonstrates foundational knowledge and correct use of the ultrasound machine in performing an adequate nerve block: (Circle one) PASS FAIL

-Does the student need to repeat this Best Practice Guideline at a later date to satisfy learning requirements? (Circle one) YES   NO   Date to return for evaluation: _____

EXAMINER: _____ DATE: _____

ORI | Office *of*
Research Integrity

INSTITUTIONAL REVIEW BOARD
STANDARD (ONLINE) INFORMED CONSENT

STANDARD (ONLINE) INFORMED CONSENT PROCEDURES
• ***Use of this template is <u>optional</u>.*** However, by federal regulations (45 **CFR** 46.116), all consent documentation must address each of the required elements listed below (purpose, procedures, duration, benefits, risks, alternative procedures, confidentiality, whom to contact in case of injury, and a statement that participation is voluntary). Last Edited May 18th, 2022

Today's date: 04/03/2023		
PROJECT INFORMATION		
Project Title: An Objective Structured Clinical Evaluation (OSCE) for PEC-II and Intrapec Blocks		
Protocol Number: 23-0299		
Principal Investigator: Kaleb Smith Co-Investigator: Roland Colburn	Phone: 601-600-1905 Phone: 205-275-8841	Email: Kaleb.A.Smith@usm.edu Roland.Colburn@usm.edu
College: Nursing and Health Professions	School and Program: School of Leadership and Advanced Nursing Practice	
RESEARCH DESCRIPTION		
1. **Purpose**: The purpose of the project is to educate anesthesia providers on the Intrapec and PECS II regional anesthesia blocks and determine the validity of the objective structured clinical examination that was developed. 2. **Description of Study:** Participation in this study is voluntary and anonymous. The qualitative research project utilizes a pretest post-test design to evaluate the baseline knowledge level of anesthesia providers.		

Once the pretest is completed, the OSCE project templates will be viewed. The voluntary, anonymous post-test will then be completed. Knowledge, learning, and participant confidence will be assessed by comparisons between the pretest and post-test results.

3. **Benefits:**
No benefits or incentives will be awarded to participants. Advantages to the authors of the project will be DNP project completion, which fullfills the USM's NAP requirements for graduation.

4. **Risks:**
There will be no risks involved with completing this survey. The study takes approximately 10 minutes to complete.

5. **Confidentiality:**
Surveys will be submitted anonymously and require no identifying information. All electronic files containing data taken from surveys will be stored on a password-protected computer and deleted upon completion of the DNP project. Any printed data will be thoroughly shredded and disposed of on-site in the secure shred box of the College of Nursing and Health Professions work room.

6. **Alternative Procedures:**
This study is anonymous, and participation is voluntary. All recipients have the right to refuse participation in the survey. No negative repurcussions will occur to those that decline participation.

7. **Participant's Assurance:**
This project and this consent form have been reviewed by the Institutional Review Board, which ensures that research projects involving human subjects follow federal regulations. Any questions or concerns about rights as a research participant should be directed to the Chair of the Institutional Review Board, The University of Southern Mississippi, 118 College Drive #5125, Hattiesburg, MS 39406-0001, 601-266-5997.

Any questions about this research project should be directed to the Principal Investigator using the contact information provided above.

CONSENT TO PARTICIPATE IN RESEARCH

I understand that participation in this project is completely voluntary, and I may withdraw at any time without penalty, prejudice, or loss of benefits. Unless described above, all personal information will be kept strictly confidential, including my name and other identifying information. All procedures to be followed and their purposes were explained to me. Information was given about all benefits, risks, inconveniences, or discomforts that might be expected. Any new information that develops during the project will be provided to me if that information may affect my willingness to continue participation in the project.

(Include the following information only if applicable. Otherwise delete this entire paragraph before submitting for IRB approval:) The University of Southern Mississippi has no mechanism to provide compensation for participants who may incur injuries as a result of participation in research projects. However, efforts will be made to make available the facilities and professional skills at the University. Participants may incur charges as a result of treatment related to research injuries. Information regarding treatment or the absence of treatment has been given above.

CONSENT TO PARTICIPATE IN RESEARCH
By clicking the box below, I give my consent to participate in this research project. *If you do not wish to participate in this study, please close your browser now.*
    Yes, I consent to participate.

APPENDIX E – IRB Approval Letter

Office of Research Integrity

THE UNIVERSITY OF SOUTHERN MISSISSIPPI

The project below has been reviewed by The University of Southern Mississippi Institutional Review Board in accordance with Federal Drug Administration regulations (21 CFR 26, 111), Department of Health and Human Services regulations (45 CFR Part 46), and University Policy to ensure:

The risks to subjects are minimized and reasonable in relation to the anticipated benefits.
The selection of subjects is equitable.
Informed consent is adequate and appropriately documented.
Where appropriate, the research plan makes adequate provisions for monitoring the data collected to ensure the safety of the subjects. Where appropriate, there are adequate provisions to protect the privacy of subjects and to maintain the confidentiality of all data. Appropriate additional safeguards have been included to protect vulnerable subjects.

Any unanticipated, serious, or continuing problems encountered involving risks to subjects must be reported immediately. Problems should be reported to ORI using the Incident form available in InfoEd.
The period of approval is twelve months. If a project will exceed twelve months, a request should be submitted to ORI using the Renewal form available in InfoEd prior to the expiration date.

PROTOCOL NUMBER: PROJECT TITLE: SCHOOL/PROGRAM RESEARCHERS:

IRB COMMITTEE ACTION: CATEGORY:
PERIOD OF APPROVAL:

23-0299

PECS-II AND INTRAPEC: A REGIONAL APPROACH TO BREAST AUGMENTATION SURGERY

Leadership & Advanced Nursing

PI: Kaleb Smith
Investigators: Smith, Kaleb~Colburn, Roland~Mclain, Nina Elisabeth~

Approved
Expedited Category 15-May-2023 to 14-May-2024

Donald Sacco Jr.

Donald Sacco, Ph.D.
Institutional Review Board Chairperson

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