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Objective Structured Clinical Examination (OSCE) for Transversus Abdominis Plane (TAP) Block Utilizing Ultrasound Technique

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OBJECTIVE STRUCTURED CLINICAL EXAMINATION (OSCE) FOR TRANSVERSUS ABDOMINIS PLANE (TAP) BLOCK UTILIZING ULTRASOUND TECHNIQUE

by

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Dr. Michong Rayborn, Committee Chair
Dr. Stephanie Parks

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ABSTRACT

The purpose of this doctoral project was to create a learning and evaluation tool on Transversus Abdominis Plane (TAP) blocks to be used by students in the Nurse Anesthesia program (NAP) at The University of Southern Mississippi (USM). Students can use this tool to help facilitate learning and skills in regional anesthesia techniques. An Objective Structured Clinical Examination (OSCE) for ultrasound-guided TAP blocks was created and evaluated by the USM NAP faculty and current second and third-year NAP students. Participants were provided with an OSCE template outlining the steps, educational resources, and equipment needed to perform a TAP block. The participants also received access to a video demonstrating how to perform the technique step-by-step. By having an OSCE available for the NAP students, the students will have a chance to practice performing a TAP block in a simulation setting before performing this procedure on a patient in the clinical setting.

The method used to evaluate this project was *Qualtrics*®, which is an online survey tool. Students and NAP faculty were asked seven questions that aided in assessing the effectiveness of this OSCE as an educational and self-evaluation tool. The survey results indicated that 100% of participants agreed that implementing this OSCE could benefit future student registered nurse anesthetists (SRNAs) that will have the opportunity to participate.

ACKNOWLEDGMENTS

We would like to extend our sincerest gratitude to Dr. Michong Rayborn, our committee chair, for motivating us throughout this process. Her patience, kindness, and leadership have aided us tremendously in the completion of this project. We would also like to thank our committee member, Dr. Stephanie Parks, for her words of wisdom and encouragement.

DEDICATION

First, I would like to give honor to God because without Him, none of this would be possible. I would like to dedicate this project to my family. Without your constant prayers, love, and support, I do not think I would have been able to complete this educational journey. I love each of you dearly, and I want you all to know that your support did not go unnoticed. I will spend the rest of my life trying to repay you for what you have done for me. Thank you all so much! *Anesha Handshaw*

Many people have shown me love and support throughout this whole process of getting into the NAP and helping me complete this DNP project. First and foremost are my parents, especially my mom! Narinder Dhaliwal, my mom, immigrated to the United States as a young girl and was only able to complete her high school degree. She has been my number one motivator in making sure I become an independent woman and get my education. My dad, Ranjit Dhaliwal, has supported me unconditionally by making sure that no one bothered me when studying and supporting me financially. Second, I would like to thank Simi, Balraj, and Bambi for giving me emotional support. Most importantly, with Waheguru's (my God) support and blessing I have made it to this point in my life. My prayers are that Waheguru continues to bless me and my family with health and togetherness! – *Gursharn Dhaliwal*

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LIST OF ABBREVIATIONS

AACN	American Association of Colleges of Nursing
ASA	American Society of Anesthesiologists
CRNA	Certified Registered Nurse Anesthetist
DNP	Doctoral of Nursing Practice
EBP	Evidence Based Practice
NAP	Nurse Anesthesia Program
OSCE	Objective Structured Clinical Examination
SRNA	Student Registered Nurse Anesthetist
TAP	Transversus Abdominis Plane
USM	The University of Southern Mississippi

CHAPTER I – INTRODUCTION AND BACKGROUND

Objective Structured Clinical Examinations (OSCEs) were first developed in the 1960s and have proven to be a safe and effective tool for learning and teaching clinical skills (Fouad et al., 2019). Ataro et al. (2020) found that exposing students to repetitive OSCE simulation with feedback improved the confidence and efficiency of students in their clinical skills. A learning and self-assessment tool like an OSCE would effectively demonstrate the proper technique and disperse information about Transversus Abdominis Plane (TAP) blocks to anesthesia providers.

In 2001, the TAP block was introduced as a landmark-guided regional anesthetic technique by anesthesiologist Dr. Ahmad N. Rafi (Tsai et al., 2017). Studies have shown that "TAP blocks reduce postoperative pain and opioid requirements, resulting in fewer side effects such as nausea and vomiting, respiratory depression, and sedation" (Urigel & Molter, 2014, p. 73). Anesthesia providers should be efficient when performing the TAP block technique because, with this procedure, risks are associated if done incorrectly. Risks related to TAP blocks include needle displacement in the peritoneum with the possibility of bowel perforation, visceral damage, local anesthetic systemic toxicity, allergic reaction, and femoral palsy (Butterworth et al., 2018; Tsai et al., 2017). An OSCE would help student registered nurse anesthetists (SRNAs) recognize and avoid these risks.

Problem Statement

Patients that receive anesthesia are at an increased risk of having respiratory depression following the administration of sedation. They also have an elevated risk of experiencing postoperative pain, increasing opioid requirements, nausea, and vomiting

with any surgical procedure (Urigel & Molter, 2014). Performing a TAP block minimizes the risks associated with general anesthesia, provides multimodal pain therapy and improves postoperative patient outcomes. At The University of Southern Mississippi (USM), there is currently no OSCE available for anesthesia students on TAP blocks. By developing an OSCE on TAP blocks for our Doctoral of Nursing Practice (DNP) project, nurse anesthesia students will have a video demonstration of the TAP block procedure. Student Registered Nurse Anesthetists (SRNAs) will also have information that includes steps and visual cognitive aids for performing this regional anesthetic technique.

Purpose and Context

To become a Certified Registered Nurse Anesthetist (CRNA), SRNAs must learn and master the skills necessary for success in the clinical setting. Studies have shown that OSCEs positively affect individuals in the medical profession and are practical resources for assessing clinical competence (Lee et al., 2021). This DNP project aims to create an OSCE that demonstrates the proper technique for performing a TAP block that SRNAs can use as a learning and evaluation tool for clinical practice.

According to Hirsch et al. (2019), one of the recommendations for reducing adverse events related to regional anesthesia is to “ensure the appropriate equipment and supplies are available to perform the anesthetic, to include a variety of needle lengths to suit the patient's size” (p. 371). Since possible adverse events can occur, having an OSCE available should help SRNAs learn what equipment they need, and the steps required to efficiently perform the TAP block regional technique. Learning to perform a TAP block and other regional anesthesia procedures is essential for an SRNA's future career as a CRNA.

Available Knowledge

Postoperative Pain Relief

Postoperative pain is expected for most patients after surgical procedures. One way to treat postoperative pain is through pharmacological methods. Over the years, opioids have become popular in chronic pain and postoperative pain relief. However, opioids carry many side effects, such as nausea, respiratory depression, sedation, ileus, and, most importantly, the risk of abuse (Griffis et al., 2021). Between 1999 and 2017, there were 399,230 deaths in the United States because of opioid overdose (Scholl et al., 2019). Because of these risk factors, individuals have different options available for pain relief after surgery. These options include non-opioid anesthetics such as volatile agents, analgesics, and regional anesthesia (Griffis et al., 2021).

The TAP block, a method of regional anesthesia, has been shown to have opioid-sparing effects and provide multimodal pain relief when used for open or laparoscopic abdominal surgeries. A TAP block can be used for procedures such as bowel resection, cesarean section, hysterectomy, cholecystectomy, appendectomy, hernia repair, prostatectomy, and nephrectomy (Shiel, 2020). Many studies have proven the successful effects of a TAP block on postoperative pain relief.

Utilizing a multimodal approach to postoperative pain management through a TAP block rather than opioids may improve patient outcomes. A study on the impact of TAP blocks in reducing opioid use after a hysterectomy concluded, “As part of multimodal pain management, TAP block has moderate opioid-sparing effects up to 48 hours after hysterectomy. Likewise, patients who underwent TAP blocks had fewer opioid-related side effects” (Tubog et al., 2018, p. 54).

Side Effects of General Anesthesia

General anesthesia can benefit patients undergoing surgical procedures, and general anesthesia is preferable to other anesthetic techniques in certain situations. General anesthesia is expected to provide analgesia, unconsciousness, amnesia, and immobility after surgical stimulation (Luo et al., 2020). While there are benefits, there are also many side effects during and after general anesthesia. Common side effects include nausea and vomiting, postoperative delirium, sore throat secondary to airway instrumentation, muscle aches, itching, and low body temperature (American Society of Anesthesiologists [ASA], 2021).

Most side effects can be prevented, but chances are increased with general anesthesia. A patient under general anesthesia may also experience postoperative interruptions in sleep. Luo et al. (2020) state, "Studies on mice and adult humans have shown that exposure to volatile general anesthetics, including sevoflurane, isoflurane, and halothane, might cause short-term sleep disturbances and fragmentation" (p. 2). These sleep disturbances caused by general anesthesia could place the patient at increased risk for other complications such as anxiety, fatigue, delirium, depression, and stroke (Luo et al., 2020). Although highly effective, the side effects of general anesthesia could outweigh the benefits when anesthesia providers can use other anesthetic techniques to provide safe and effective anesthesia to patients if acceptable for the procedure type.

SRNA

All SRNAs must gain experience in critical care to be accepted into a nurse anesthesia program; however, learning to practice anesthesia is new for nurse anesthesia students. SRNAs take on tremendous stress balancing academics, clinical, and personal

agendas during their graduate schooling. SRNAs have limited time to learn given material as there are many things to know and assignments to complete during school. SRNAs may benefit from having a study tool available to learn new material they are unfamiliar with and reduce their stress.

OSCEs are proven effective to reduce students' stress from evaluating clinical skills compared to other assessment tools (Ataro et al., 2020). A visual aid with written directions and sources where more information could be found regarding the task would tremendously reduce stress. Also, it would be beneficial for the student to watch a video at their convenience from any location and as many times as necessary to learn the clinical skill. Overall, an OSCE would benefit SRNAs by reducing their academic and clinical stress, increasing their familiarity with anesthesia-related skills, and providing convenience for the SRNA to learn at their own pace.

OSCEs Definition

OSCEs were developed about 50 years ago to standardize examination, eliminate instructor partiality, and avoid variables in examining student performances (Ataro et al., 2020). Miller's pyramid is the basis for evaluating the level of clinical skills of students. OSCEs are on the “show how” level after a basic understanding of the skill (Mohsen et al., 2021). Students are moving up the pyramid as they progress to OSCEs. An OSCE is a successful tool for evaluating clinical competency for various skills using multiple learning stations being observed against a standard of care (Ataro et al., 2020)

Fouad et al. (2019) found that an OSCE provides feedback to students and staff for validation and progress using formative and summative evaluation. Both students and teachers are satisfied with an OSCE being an effective learning tool because they feel it

best assesses their clinical skills with validity and believes it is reliable (Ataro et al., 2020). OSCEs must have a single basis of comparison for all students during evaluations. Having a basis for comparison reduces biases created by human judgment when evaluating student skills (Fouad et al., 2019).

For an OSCE to be beneficial, it must be well-structured with proper directions, well-organized, take place in a learning environment, and be based on current, reliable evidence (Fouad et al., 2019). A well-structured OSCE depends on a clear explanation of the clinical points and skills (Fouad et al., 2019). For the OSCE to be well-organized and create a favorable learning environment, it is vital to have enough stations set up to practice clinical skills. Lastly, reliable and current evidence is necessary to teach the safest method of carrying out the skill correctly.

Student preparation is necessary for the OSCE to be an effective tool in their learning. The OSCE will become an ineffective tool without having proper time for each OSCE station, and not having enough stations for students will cause stress. Additionally, inadequate student preparation can make an OSCE nonproductive (Ataro et al., 2020). Lack of adequately trained staff to evaluate students and inconsistent assessment tools are also downfalls that have created issues for successful OSCEs (Ataro et al., 2020). Inadequate training can be resolved by ensuring staff have proper time to train and set up the OSCEs, so they can be an effective tool for students and not have these downfalls.

The first step in creating an OSCE would be to collect evidence and the latest data about the specific clinical skill in mind. The second step would be to create a simulation or scenario often used in clinical settings for students to follow (Mohsen et al., 2021). The next step would be to create a template that includes supplies needed for the OSCE

and resources to learn about the skill. After creating a template, the next step would be to make a video demonstrating the steps in completing the clinical skill with additional information about risks and special precautions that need to be taken with each step. Lastly, the OSCE will be evaluated for validity and reliability using surveys to assess the tool. After the evaluation and corrections are made, the OSCE will be published to allow SRNAs to practice their skills.

TAP Block

Various abdominal surgeries such as robotic hernia repairs, hysterectomies, colectomies, cholecystectomies, and gynecological procedures may require TAP blocks to aid in postoperative pain relief (Tsai et al., 2017). To perform a TAP block, healthcare providers inject a local anesthetic into the abdominal plane between the internal oblique muscle and transversus abdominis muscle targeting T6 to L1 spinal roots (Tsai et al., 2017). In the past, TAP blocks were done using landmark techniques; however, it is now safer to use an ultrasound-guided approach (Tsai et al., 2017).

Anatomy of TAP Block

To provide a safe and effective block and prevent complications, it is vital to understand the anatomy related to the TAP block. First, the anatomy of the nerves that innervate the anterolateral abdominal wall will be discussed. When completing a TAP block, the target nerves are T6 to L1, commonly referred to as the thoracolumbar nerves. These nerves are supplied by the anterior primary ramus, which originates from the intervertebral foramen (Tsai et al., 2017). The thoracolumbar nerves further branch out and become the intercostal (T6-T11), subcostal (T12), and ilioinguinal/iliohypogastric

(L1) nerves which supply the target area for TAP blocks, the anterolateral abdominal wall (Tsai et al., 2017).

As mentioned earlier, our target for a TAP block is injecting local anesthetic between the internal oblique and transversus abdominis muscles. Between these muscle, layers are where the anterior primary rami spinal nerves, T7-T12, run and then merge into the rectus abdominis and become the anterior cutaneous branches innervating the anterior abdomen (Tsai et al., 2017). Spinal nerves T7-T11 divide again into anterior and posterior branches; the anterior branch supplies the abdominal wall, and the posterior branch supplies the skin over the latissimus dorsi. Spinal nerve T12 does not divide and supplies a part of the gluteal region. Lastly, the spinal nerve L1 divides into iliohypogastric and ilioinguinal nerves and innervates another gluteal region, the hypogastric region, and parts of the upper medial thigh and genital area (Tsai et al., 2017).

There are four muscles in the anterolateral abdominal wall area. First is the rectus abdominis, which runs midline of the abdomen (Tsai et al., 2017). The three muscles lateral to the rectus abdominis and lie vertically on each other are the transversus abdominis, internal oblique, and external oblique (Tsai et al., 2017). The spinal nerves and muscle groups are essential to know to administer a safe and effective block and prevent complications.

Risks and Complications Associated with TAP Blocks

One risk associated with performing a TAP block is visceral damage resulting in organ perforation and bleeding (Tsai et al., 2017). Organ damage could be caused by the trauma of inserting the needle and advancing it without a good ultrasound view, which

increases the patient's risk for infection, hypotension, and the need for blood products. Another risk of TAP blocks is caused by using high concentrations of local anesthetics, leading to local anesthetic systemic toxicity, which is a life-threatening complication (Tsai et al., 2017). Moreover, a patient can have an allergic reaction that can lead to anaphylactic shock in which the airway can become compromised. Lastly, if local anesthetic is deposited in the incorrect area, this could lead to femoral palsy (Tsai et al., 2017). Femoral palsy is a transient decrease in the sensorium and strength of the anteromedial thigh. It can last up to 36 hours, so this complication results in an extended hospital stay (Manatakis et al., 2013).

Benefits of TAP Blocks

A TAP block can be used as an adjunct in multimodal analgesia without opioids. Reducing opioid usage decreases the risks of nausea, vomiting, respiratory depression, sedation, and aspiration. Furthermore, a study on TAP blocks in patients receiving bariatric surgery concluded that TAP blocks provide discharge readiness, early ambulation, and early return of bowel activity (Mittal et al., 2018). Early ambulation decreases the risk of deep venous thrombosis and pulmonary embolism that can develop from surgery and immobility. TAP blocks provide not only acute pain relief but also long-lasting pain relief. However, these long-lasting pain relief benefits are limited to lower abdominal wall surgeries and surgical procedures under the umbilicus (Butterworth et al., 2018).

A TAP block offers increased patient safety, early mobility, and reduced hospital stay. In addition to the benefits that are provided to the patient, TAP blocks are not time-

consuming. A postoperative care plan that requires fewer opioids and decreases the risk of respiratory depression could be beneficial to patients as well.

Rationale

As mentioned earlier, the United States opioid overdose epidemic continues to be a problem and creates many complications. Opioid use and complications like nausea, vomiting, respiratory depression, sedation, and aspiration can be reduced if a successful TAP block is performed, and it improves patient safety. An OSCE can help train SRNAs to execute safe and effective TAP blocks for multimodal pain relief.

Specific Aims

Performing a TAP block could aid patients in experiencing the benefits of multimodal pain therapy and have better outcomes postoperatively. Developing an OSCE that illustrates a safe and effective method for performing the TAP block technique would benefit SRNAs as a study tool to improve their clinical skills. The specific aim of this project is to educate SRNAs on TAP blocks using evidence-based practice and research. Also, the objective of this project is to provide a video demonstration of how to perform the TAP block using ultrasound safely. After completing the OSCE, the SRNAs will have a study tool they can access at their convenience to help them succeed in performing a safe and effective TAP block.

DNP Essentials

The requirements for the DNP project for the USM College of Nursing and Health Professions include meeting the American Association for Colleges of Nursing (AACN) DNP Essentials. There are eight essentials, and this doctoral project focuses on Essentials I, II, III, IV, and VIII. According to the AACN (2006), Essential I, scientific

underpinnings for practice, is met by integrating nursing science into the highest level of nursing practice and developing and evaluating practice approaches. Since the OSCE uses the latest evidence-based practice to demonstrate a TAP block, it meets Essential I. Developing the OSCE to help students learn and evaluate their learning on TAP blocks meets Essential II, organizational and systems leadership for quality improvement and systems thinking (AACN, 2006). Essential III, clinical leadership and analytical methods for evidence-based practice, is met by this project because the OSCE is implementing the best evidence for practice after sifting through the existing literature, and the OSCE is a method to disseminate findings to improve healthcare outcomes for patients receiving a TAP block from SRNAs (AACN, 2006). DNP Essential IV, information systems/ technology and patient care technology for the improvement and transformation of health care, is met because this OSCE is designed and used to allow SRNAs to evaluate their skills and the outcomes they have on patient care (AACN, 2006). Lastly, Essential VIII, advanced nursing practice, is met by this OSCE because it is an educational tool that will encourage students to use their clinical judgment, critically think, and raise their awareness of accountability of delivering care based on evidence-based practice (EBP) to improve patient outcomes after receiving a TAP block (AACN, 2006). A list of all eight Essentials is found in Appendix A, along with a description of the ones this project has met.

Summary

Regional anesthesia has proven to be an acceptable alternate option for treating postoperative pain in patients following a surgical procedure. The use of opioids has become less favorable over the years because of their side effects and potential for abuse.

Patients can also have side effects from general anesthesia, such as nausea and vomiting, sedation, and respiratory depression, that some patients may not tolerate well (ASA, 2021). Utilizing a TAP block reduces side effects caused by general anesthesia and opioids.

Currently, the USM Nurse Anesthesia program has no OSCE on TAP blocks for SRNAs. Since regional anesthesia has become more common, nurse anesthesia students need to learn to perform these techniques efficiently. A TAP block is just one among many other blocks that can be done in nurse anesthesia practice. SRNAs learning how to complete a TAP block through a resource like an OSCE would reduce their stress in learning the skill and benefit their future patients with pain relief. This Doctoral of Nursing Practice (DNP) project focused on creating and providing an OSCE as a learning tool for SRNAs to perform a TAP block successfully. The methodology section of Chapter II will explain the development of this OSCE and its steps.

CHAPTER II – METHODOLOGY

Context

The requirements for the DNP project for the USM College of Nursing and Health Professions included meeting the AACN DNP Essentials. This project satisfied essentials I, II, III, IV, and VIII. The focus of this project was to develop an OSCE for TAP blocks using an ultrasound technique. SRNAs will use the OSCE as a learning tool to build their regional anesthesia skills. By integrating a TAP block OSCE at USM, nurse anesthesia students can practice the technique before being introduced to it in clinical practice.

Intervention and Study of the Intervention

The intervention for this DNP project was to create an OSCE for a TAP block outlining and demonstrating the technique to enhance students' knowledge in the USM nurse anesthesia program (NAP). The DNP project aimed to create an OSCE, assess its effectiveness, and provide feedback. The first step in developing this OSCE involved extensive research and synthesis of information from various sources on the importance and benefits of accurately performing the TAP block technique. The next step was to gain approval from the committee chair for a project proposal to the USM Institutional Review Board (IRB). After the committee approved the project, the IRB approval process began (Protocol # 22-633).

After the IRB approval (Appendix E), emails were sent to the 2022 (senior students) and 2023 (junior students) cohorts of the USM NAP and USM Nurse Anesthesia faculty requesting consent to participate in a survey. The cohorts of 2022 and 2023 were selected because they can utilize this OSCE at their current stage in the NAP

after having the regional anesthesia course. The survey was created using the online survey tool, *Qualtrics*® and contained pertinent information related to the OSCE. The SRNAs and USM nurse anesthesia faculty that participated were stakeholders because they are currently learning and practicing regional anesthesia techniques and can adequately determine the effectiveness of the OSCE.

Measures

This OSCE will be an educational tool for SRNAs to safely and effectively perform the TAP block technique using the latest evidence-based practices to improve patient outcomes. The expected result of this project is to provide the USM NAP with a successful educational tool for SRNAs to use in their clinical practice and education. This OSCE will allow patients receiving TAP blocks from SRNAs to receive multimodal pain therapy benefits and better postoperative outcomes.

The OSCE was created based on the literature review and feedback from surveys. In addition to the literature, using feedback from the survey results will strengthen and improve the OSCE to be a successful educational tool for SRNAs. This OSCE can be used by current SRNAs in their clinical practice, but also be used in many years to come by future SRNAs.

Data Collection and Analysis

Data were first gathered through literature research for evidence-based practices, and then feedback was collected by surveys from SRNAs and the expert panel. The literature research was compiled using numerous peer-reviewed articles and texts. Next, emails (Appendix B) were sent for voluntary participation in the feedback process. Participants included the USM cohort of 2022, and the USM cohort of 2023, and the

expert panel included five Nurse Anesthesia professors. The participants were given an OSCE template that guides their learning and details how to follow the OSCE (Appendix D). After reviewing feedback and statistics, they are then summarized in Chapter III. The feedback received from the participants will be used to improve the OSCE to present the best evidence-based practices for performing the TAP block ultrasound technique.

Ethical Considerations

Patient safety is always an ethical concern in health care. Creating an OSCE and making it available to SRNAs will increase patient safety and have positive outcomes of performing a TAP block utilizing ultrasound. OSCEs are an effective educational tool and can help improve patient outcomes when receiving TAP blocks by SRNAs (Ataro et al., 2019). Another ethical concern specific to TAP blocks is using ultrasound and not only landmarks to increase a successful and safe block. According to Tsai et al. (2017), using the ultrasound technique is safer for the patient and has better outcomes for a successful block. Lastly, the identity of the participants from the survey feedback will be kept anonymous.

Summary

The purpose of this DNP project was to provide SRNAs with an educational tool to help them learn the TAP block technique using ultrasound. Since OSCEs have been proven to be an effective educational tool for students, an OSCE was developed using literature research and feedback from current SRNAs and USM NAP faculty. Ethical considerations were kept in mind during this process, feedback was voluntary, and participant identities were kept anonymous. DNP essentials I, II, III, IV, and VIII were met by the completion of this project. This methodology meets the standards of the USM

Graduate School of Leadership and Advanced Nursing Practice and the AACN DNP Essentials required for accreditation.

CHAPTER III – RESULTS

Participants received an educational module demonstrating how to perform a TAP block using an ultrasound (Appendix D) and completed a post-educational survey (Appendix C). The requested participants for this data collection process included five NAP faculty at USM and the second-year and third-year cohorts of SRNAs at USM. The purpose of the survey was to collect data to determine if the educational module would benefit SRNAs. The seven-questioned survey and results are represented in Figures 1-6 and Table 1. One of the seven questions was left for open-ended comments and suggestions to improve the OSCE further.

The survey was sent to participants via email, and the data from the post-educational modules were collected anonymously using *Qualtrics*®, an online survey server. Results were collected for four weeks after sending the invitation emails and resulted in 30 participants: five CRNAs, 14 second-year SRNAs, and 11 third-year SRNAs. The following charts include the results.

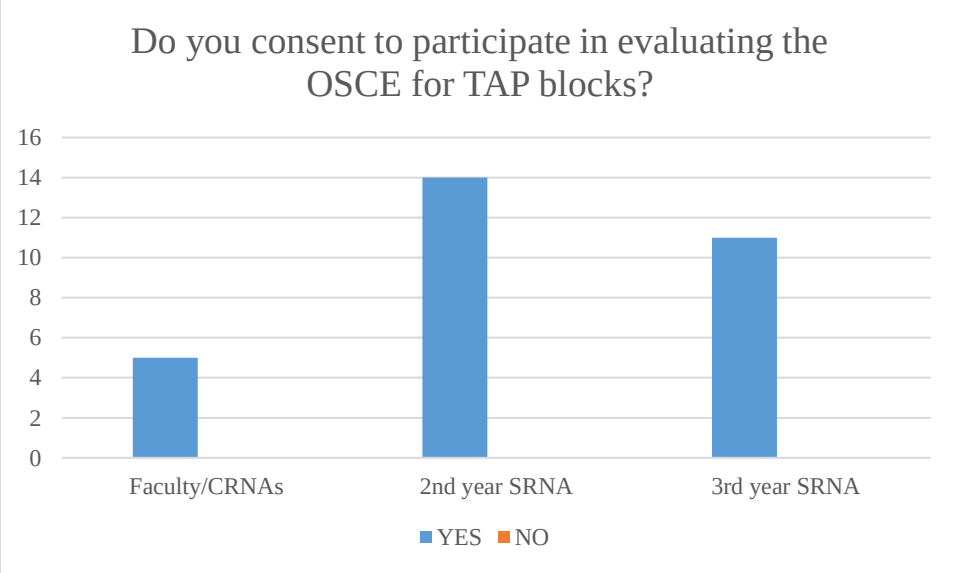

Figure 1. Post-Educational Survey Question 1: Responses from CRNAs and SRNAs

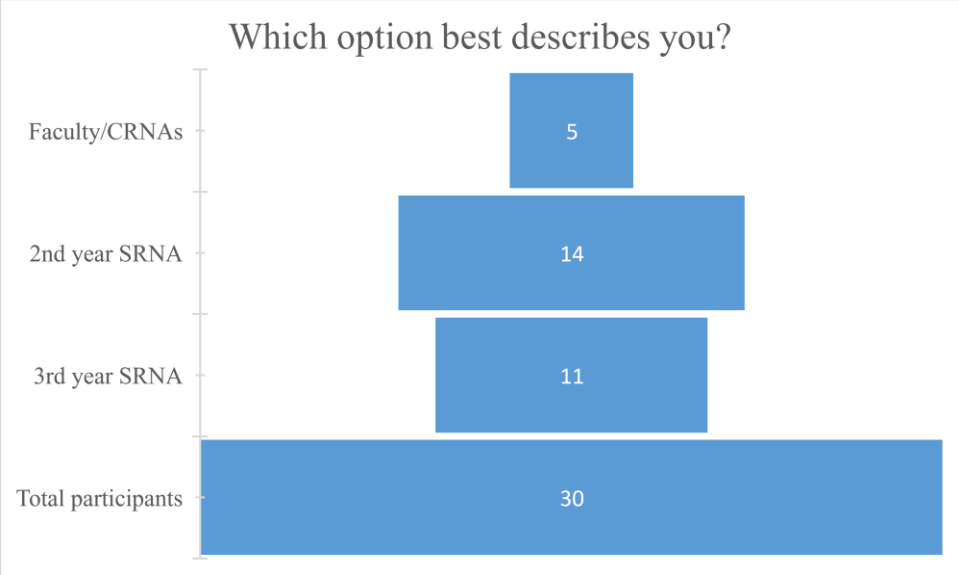

Figure 2. Post-Educational Survey Question 2: Responses from CRNAs and SRNAs

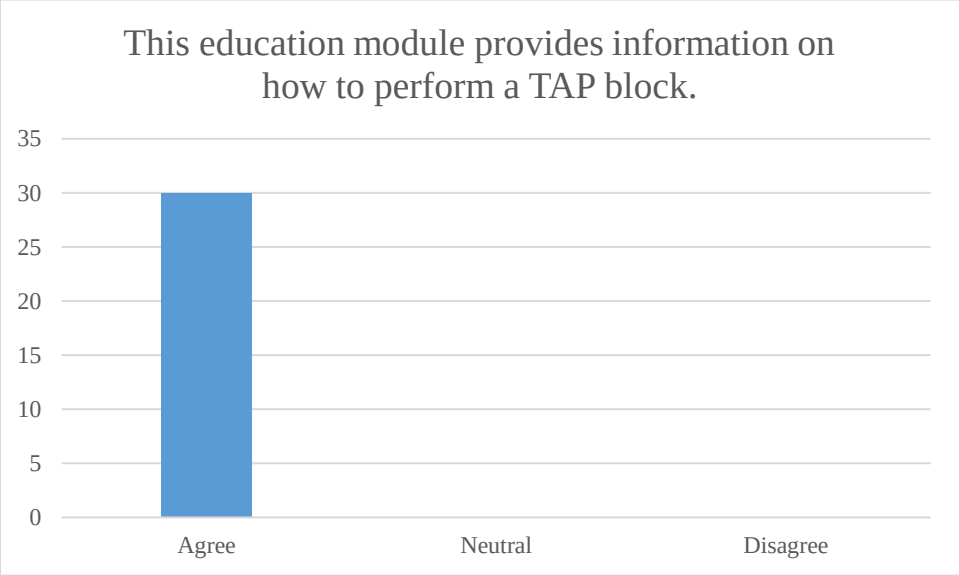

Figure 3. Post-Educational Survey Question 3: Responses from CRNAs and SRNAs

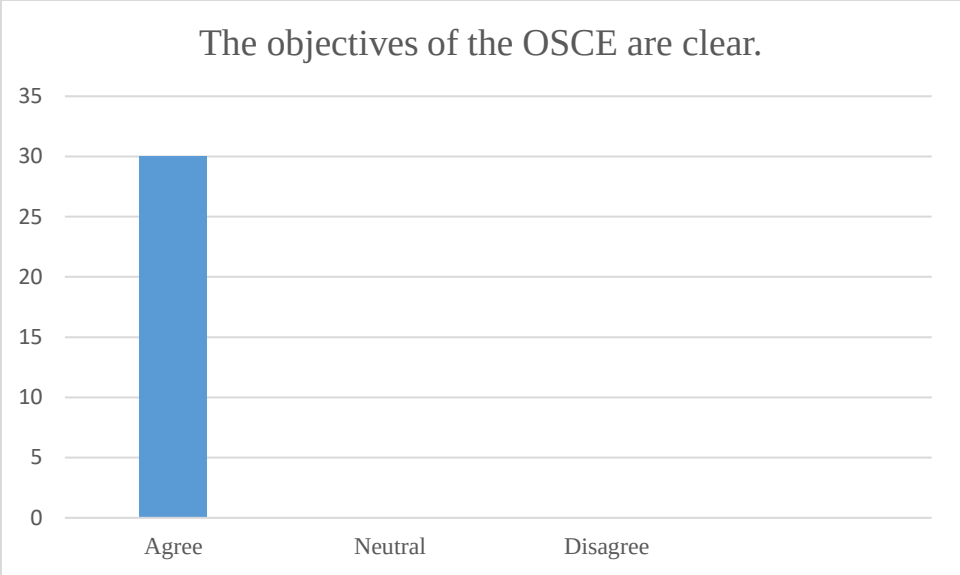

Figure 4. Post-Educational Survey Question 4: Responses from CRNAs and SRNAs

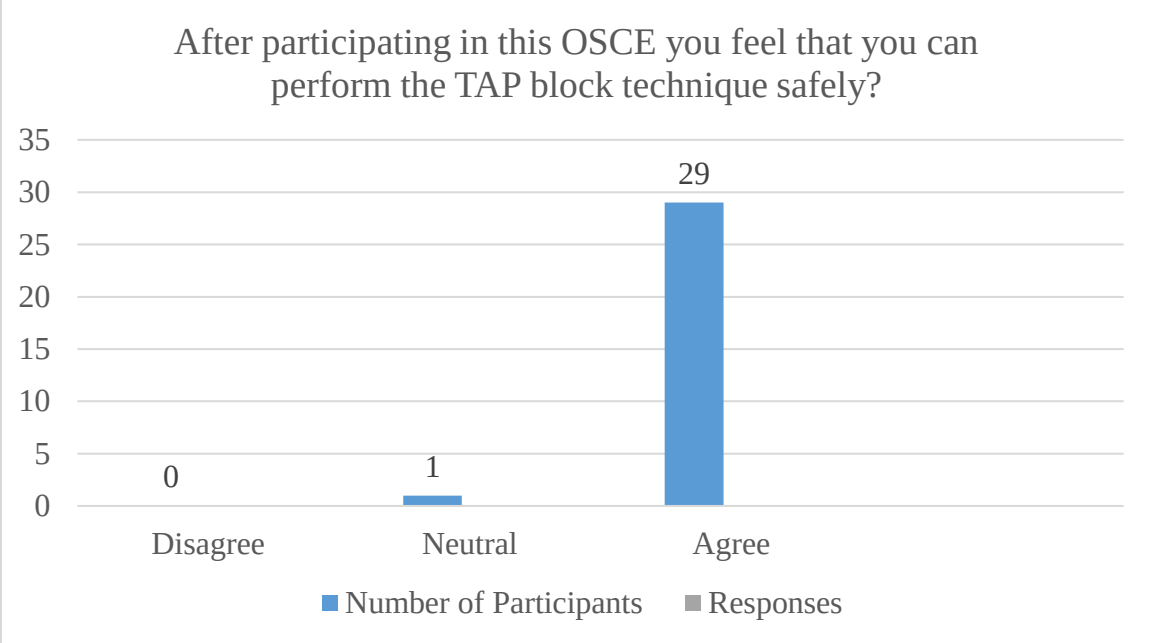

Figure 5. Post-Educational Survey Question 5: Responses from CRNAs and SRNAs

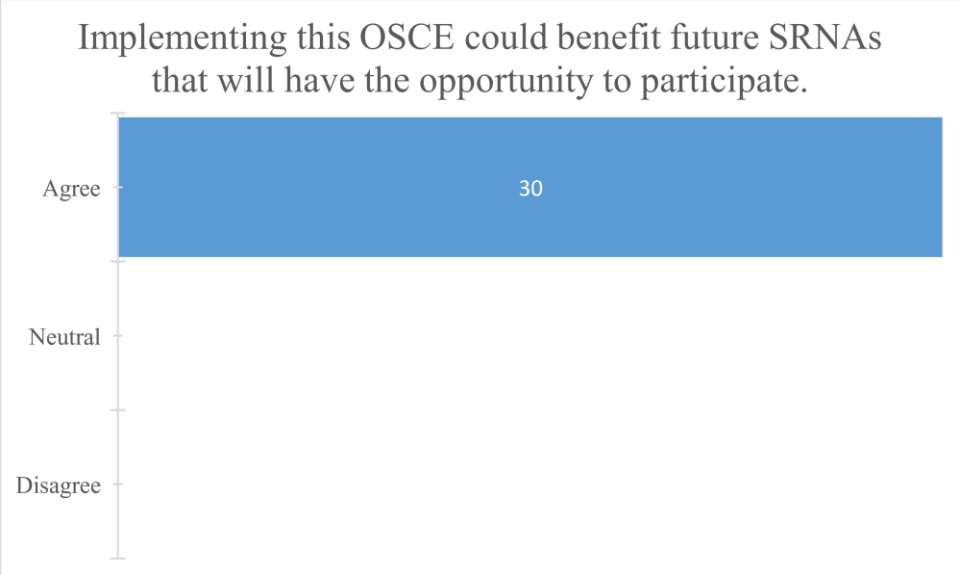

Figure 6. Post-Educational Survey Question 6: Responses from CRNAs and SRNAs

Table 1

Response to Question 7 from CRNAs and SRNAs

Please provide additional feedback and recommendations to make this OSCE for TAP blocks easier to understand for future SRNAs in the comments section below.	
Participant 1	"Video is great, and the timing is perfect. May add landmarks will be great. "
Participant 2	"I would have answered agree to perform the block but I would need to practice it several times. However, the information was very well presented and clear. Great job! "

Table 1 (continued).

Participant 3	“Easy to understand TAP block OSCE. Well done. ”
Participant 4	“Excellent job! ”
Participant 5	“I learn well through your video. Thank you! ”
Participant 6	“Great job presenting clear and precise directions. In the debriefing section, I would suggest replacing the word 'remember' with an action word. Also, check punctuation on the steps and use when appropriate.”

All participants agreed to participate in the survey. All participants agreed that the objectives were clear for this OSCE, and the information provided was on how to perform a TAP block. The number of participants that agreed they could perform the TAP block technique safely was 29 of 30 participants. One participant neither agreed nor disagreed that they could perform the TAP block technique safely.

The purpose of this OSCE was to provide an educational tool on how to perform a TAP block using ultrasound technology so that future SRNAs can use it when learning how to perform regional anesthesia procedures. There was 100% agreement that implementing this OSCE would benefit SRNAs that can participate. All comments and

feedback were positive; however, one recommended practicing several times before being able to perform the TAP block technique using an ultrasound

Summary

The results of the post-educational survey show future SRNAs learning the TAP block technique using ultrasound will benefit from this OSCE. The feedback from CRNAs and SRNAs who participated recommended that practicing a TAP block several times may be needed before performing the TAP block technique using ultrasound. Another comment recommended minor punctuation and grammar suggestions, but all other comments were positive and did not recommend any changes. Overall, the results reveal this OSCE is a beneficial educational tool for SRNAs.

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CHAPTER IV – CONCLUSION

Summary

This DNP project aimed to provide a video demonstration of the TAP block technique using ultrasound with detailed steps and visual cognitive aids to be used by SRNAs as a study and evaluation tool. Another goal was to provide this educational tool to USM to use in their teaching. The educational template explained the risks and benefits, equipment needed for the procedure, and anatomy related to TAP blocks. Post-educational survey results indicate an overall increased knowledge about the TAP block using ultrasound technique and confidence in performing the procedure after reading the educational template (Appendix D) and watching the OSCE video.

Interpretations

The invitation email (Appendix B) with the OSCE template (Appendix D) was sent to the five NAP faculty members who are practicing CRNAs, second-year SRNA students, and third-year SRNA students. After four weeks, there were 30 responses: 5 faculty CRNAs, 14 second-year students, and 11 third-year students. All participants agreed that the objectives of the OSCE were clear, and the majority (29 participants) felt that after participating in the study, they could perform the TAP block technique safely. Again, our purpose was to create an educational tool for SRNAs to use as part of their learning. Results from the surveys show that 100% of the participants agreed that implementing the OSCE could benefit future SRNAs that will have the opportunity to participate.

Limitations

The limitations of this study were time constriction and a limited survey pool size. To complete the DNP project on time, the survey was sent to participants at USM only. Another limitation was only having 5 CRNAs participate. CRNAs could provide the best expertise and feedback as they have been through school and currently perform TAP blocks. In the future, having a bigger pool of participants, more time, and more CRNAs providing input could improve the OSCE.

Conclusions

Providing safe and effective care for our patients is the priority for SRNAs and CRNAs. The goal of creating an OSCE on TAP blocks using the ultrasound technique was to help students learn the skill and provide an evaluation tool for their learning. The indirect goal was to improve patient safety when SRNAs and CRNAs practice regional anesthesia techniques. Post-educational survey results were overwhelmingly positive and strengthened this goal. For future research, having a larger pool of participants, having more CRNAs to participate, and having more time for the research and response period will further improve this study. This OSCE will be published on the USM database, Aquilla, and the iSouthern Miss app, and will be available for access by SRNAs. With the OSCE, SRNAs will have available knowledge and an evaluation tool to monitor their success in performing the TAP block technique using ultrasound. Overall, this OSCE has resulted in positive results, and improvements could be made to future studies to strengthen this study further.

APPENDIX A – DNP Essentials

DNP Essentials		The essentials that are most met by this project and how they were met.
I.	Scientific Underpinnings for Practice	This OSCE is using the latest evidence in literature to demonstrate a TAP block.
II.	Organizational and Systems Leadership for Quality Improvement and Systems Thinking	Developing and using the OSCE to help students learn and evaluate their learning on TAP blocks meets this essential.
III.	Clinical Scholarship and Analytical Methods for Evidence-Based Practice	This essential is met because the OSCE implements the best evidence for practice after conducting literature search and disseminates findings to SRNAs once this project is completed.
IV.	Information Systems/Technology and Patient Care Technology for the Improvement and Transformation of Health Care	This essential is met by having designed an OSCE that is used to allow SRNAs to evaluate their skills and outcomes they can have on patient care.
V.	Health Care Policy for Advocacy in Health Care	Not a focused essential for this project.
VI.	Interprofessional Collaboration for Improving Patient and Population Health Outcomes	Not a focused essential for this project.
VII.	Clinical Prevention and Population Health for Improving the Nation's Health	Not a focused essential for this project.
VIII.	Advanced Nursing Practice	This OSCE is helps students use their clinical judgement, critically think, and make them aware of their accountability of delivering care using EBP to improve patient outcomes after receiving a TAP block.

APPENDIX B – Recruitment Email

Objective Structured Clinical Evaluation (OSCE) for Transversus Abdominis Plane (TAP) Block Utilizing Ultrasound Technique- Anesha Handshaw and Gursharn Dhaliwal

Dear SRNA or faculty member

We would like to request volunteers, for your time to review the objective structured clinical exam (OSCE) template attached and the video demonstration on how to perform a TAP block using the ultrasound technique for the completion of our DNP project. The purpose of our DNP project is to present an educational and evaluation tool, such as an OSCE on how to perform a TAP block using ultrasound for SRNAs to help reduce their stress about learning new anesthetic techniques and improve patient outcomes receiving TAP blocks. After reviewing the OSCE template and video, please follow the link to a quick seven-question survey to provide feedback to help us improve our project.

Participation should take no more than 15-20 minutes. Questions will be asked on, *Qualtrics*®, USM's online survey platform and answers are kept anonymous and confidential. Participation is completely voluntary. An informed consent is included in the survey. Please complete agreeing to informed consent. If at any time you choose not to participate, then you may exit your browser without any repercussions for nonparticipation. This project and the informed consent have been approved by The University of Southern Mississippi and the Institutional Review Board (IRB), Protocol number 22-633.

For any questions or concerns, please contact Anesha Handshaw at 601-xxx-xxxx or anesha.handshaw@usm.edu and Sharn Dhaliwal at 601-xxx-xxxx or gursharn.dhaliwal@usm.edu. Thank you for your participation and time!

APPENDIX C – OSCE Survey

	Please Circle One		
1. Do you consent to participate in evaluating the OSCE for TAP blocks?	YES		NO
2. Which option best describes you?	Faculty/ CRNA	2nd Year SRNA	3rd Year SRNA
3. This educational module provides information on how to perform a TAP block.	Agree	Neutral	Disagree
4. The objectives of the OSCE are clear.	Agree	Neutral	Disagree
5. After participating in this OSCE you feel that you can perform the TAP block technique safely.	Agree	Neutral	Disagree
6. Implementing this OSCE could benefit future SRNAs that will have the opportunity to participate.	Agree	Neutral	Disagree
7. Please provide any additional feedback and recommendations to make this OSCE for TAP blocks easier to understand for future SRNAs in the comments section below.			

APPENDIX D – OSCE Template

ANESTHESIA OBJECTIVE STRUCTURED CLINICAL EXAMINATION

Transversus Abdominis Plane (TAP) Block Utilizing Ultrasound Technique

LEARNER OUTCOMES:

1. Identifies landmarks and proper anatomy for completing a TAP block.
2. Be able to assess the need for a TAP block.
3. Be able to identify the consequences of an improper technique of using a TAP block.
4. Perform the TAP block technique using ultrasound successfully and safely.

DOMAINS: Clinical Skill, Performance assessment, & Formative evaluation.

PURPOSE: Student learning and practice of clinical skill and formative evaluation.

LEARNER OBJECTIVES:

1. Identify the landmarks and anatomy using ultrasound to perform a TAP block.
2. Demonstrate the TAP block using the ultrasound technique.
3. Appropriately self-evaluate the technique for areas of improvement.

INDIVIDUAL OR GROUP OSCE: Group

REQUIRED READING and ASSOCIATED LECTURES:

Barash et al. (2017). *Clinical anesthesia* (8th ed.). Wolters Kluwer p. 982-987, 1593-1595.

Butterworth et al. (2018). Morgan and Mikhail's clinical anesthesiology (6th ed.). Lange. p. 1044-1045.

Nagelhout, J., & Elisha, S. (2018). Nurse anesthesia (6th ed.). Elsevier. p. 1057-1058.

Transversus abdominis plane block: An updated review of anatomy and techniques. https://doi.org/10.1155/2017/8284363

REQUIRED VIDEO:

Medmastery. (2018, September 20). *How to perform an ultrasound-guided transversus abdominis plane (TAP) block* [Video]. YouTube. https://www.youtube.com/watch?v=-WgRTIhEQcQ

Regional Anesthesiology and Acute Pain Medicine. (2021, October 6). *Ultrasound-guided transversus abdominis plane (TAP) block* [Video]. YouTube. https://www.youtube.com/watch?v=OqedcP9OPvc

REQUIRED PARTICIPANTS: SRNA volunteer Junior level student, SRNA volunteer Senior level student, NAP faculty member as an examiner

VENUE: Asbury Hall, NAP simulation LAB

STUDENT LEVEL OF OSCE: SRNA students, semesters 4-9.

TIME ALLOTED: 10 minutes.

SEQUENTIAL PRACTICE & TESTING: Multiple stations will be set, and students can practice their skills by watching the videos and using the resources mentioned in this template to guide their learning. The OSCE will be led by peers to reduce stress related to learning the new skill and to create a comfortable learning environment for students to practice and ask questions.

RECOMMENDED PRACTICE PRIOR TO EXAMINATION: 10 minutes times 6 attempts = 60 minutes total.

CONTEXT

CONTENT OUTLINE

You are assigned to Mrs. Superwoman, and she is scheduled for a robotic hysterectomy. Mrs. Superwoman is a 47-year-old female who is 5'4" and weighs 167 pounds with a BMI of 28.66. Mrs. Superwoman has no known allergies. The only medications she claims to take is Pepcid for her GERD, over the counter iron pill for her iron deficiency, and Tylenol as needed for her occasional knee pain. She has no other significant medical history, denies having had surgery before but reports no family history of problems with anesthesia, and follows up with a primary care physician for yearly labs and checkups. Mrs. Superwoman's vital signs read BP 147/78, HR 75, RR 18, O_2 saturation 98% on room air, and temperature 98 F. When asked about her blood pressure being elevated, she denies a history of hypertension and reports being anxious and nervous about the surgery. Imaging comes back with heart size within normal limits and bilateral lungs clear. Other labs are also within normal limits.

Upon assessment: full range of motion of the neck, negative TMJ, MP II, TMD greater than 3 cm. Bilateral breath sounds clear, bowel sounds are present and active. After conducting her history, analyzing labs, imaging, chart, and physical exam, the anesthesia provider plans to administer general anesthesia with a regional TAP block to help with post-operative pain. As the anesthesia provider for Mrs. Superwoman,

demonstrate your skills in performing a TAP block for this procedure by following the steps outlined in this OSCE.

EQUIPMENT& SUPPLIES:

- Ultrasound machine with a high-frequency (10-15MHz), linear probe
- Ultrasound probe cover
- Sterile gloves
- Skin disinfectant
- Sterile gel
- Mask
- A blunted 22-gauge, Echogenic 50-100 mm needle and injection tubing
- 18- to 21-gauge, 10-cm Tuohy needle with extension tubing (if doing catheter)
- 20-30ml local anesthetic (Adults: 2 mg/kg of bupivacaine or 3 mg/kg of ropivacaine; Children: one-tenth of those volumes)
- Additives for local anesthetic (Dexamethasone, Clonidine, Dexmedetomidine)

SITE SELECTION:

The transversus abdominis plane (TAP) block targets the ventral rami of spinal nerves T7-T10 that travel within the transversus abdominis plane. It can be performed as a bilateral or unilateral block. The bilateral approach can be used for laparoscopic procedures. For the TAP block, the patient is placed in the supine position. The SRNA should place the ultrasound transducer parallel to the costal margin and adjacent to the lateral border of the rectus abdominis muscle. Following placement of the ultrasound transducer, the SRNA should be able to identify the external, internal, and transversus abdominis muscles. Once the needle is inserted 2-3 cm medial to the transducer, the tip of the needle will be seen between the internal oblique muscle and the transversus abdominis muscle. (Block Buddy, 2022)

TASK STATEMENT:

Your task is to identify the appropriate landmarks, demonstrate appropriate skills with the ultrasound machine, and walk the preceptor through inserting the needle in the correct location for local anesthetic injection.

PROCESS

1. Identify and confirm the correct patient, verify procedure, and verify that consents are signed for regional anesthesia
2. Verify that patient's lab values and medical condition is not contraindicated for the procedure
3. Gather supplies and equipment
4. Wash hands

5. Place the patient in the supine position and ensure comfort
6. Perform timeout before beginning the procedure
7. Clean the site with skin disinfectant (chlorhexidine)
8. Don gloves and place an ultrasound cover on the transducer (Maintain sterility!)
9. Place the ultrasound probe transversely in the midline to identify the rectus abdominis muscles. Then move the probe laterally to identify the external oblique, the internal oblique, and the transversus abdominis muscles. Lastly, position the probe above the iliac crest in the anterior axillary line.
10. Insert the needle 2-3 cm medial to the transducer. Aim the needle toward the muscle plane between the internal oblique and transversus abdominis muscles.
11. Identify the needle tip.
12. Aspirate and then inject local anesthetic of 3-5 mL at a time up to a total volume of 20-30 mL per side. The local anesthetic will appear as an expansion of hypoechogenicity deep to the fascial plane of the internal oblique muscle and above the transversus abdominis muscle.
13. Monitor patient for signs and symptoms of local anesthetic systemic toxicity (LAST)
14. Evaluate the effectiveness of nerve block

IMAGES:

Figure A1. *Surface Anatomy Labeled for Landmark Insertions of TAP Block in An Adult Male in the Supine Position*

(Modi, 2019)

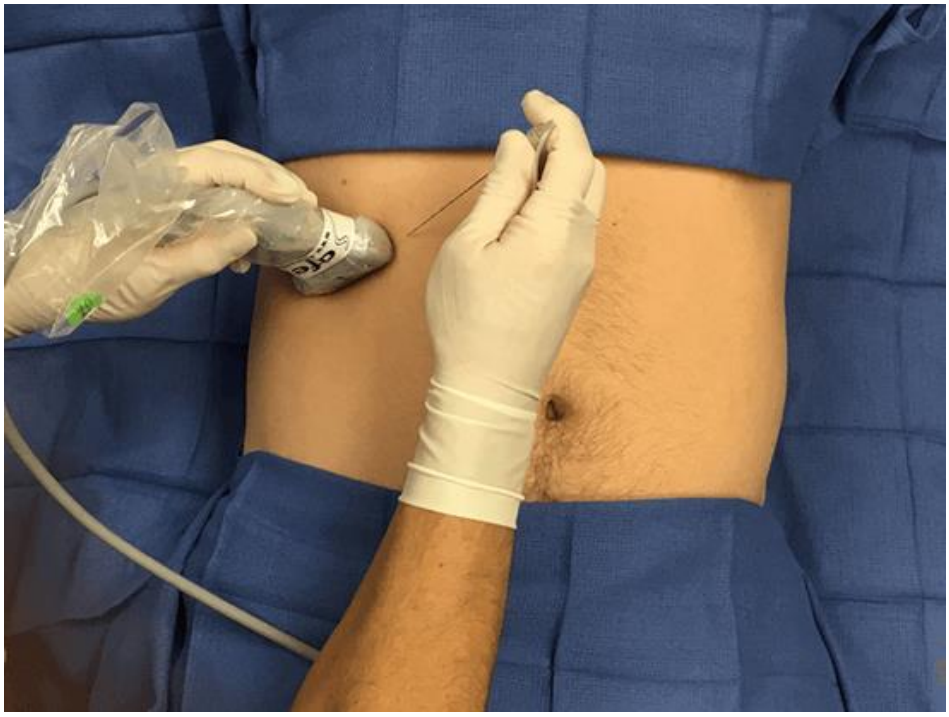

Figure A2. *Showing Needle Placement Relative to Transducer Site.*

(Block Buddy, 2022)

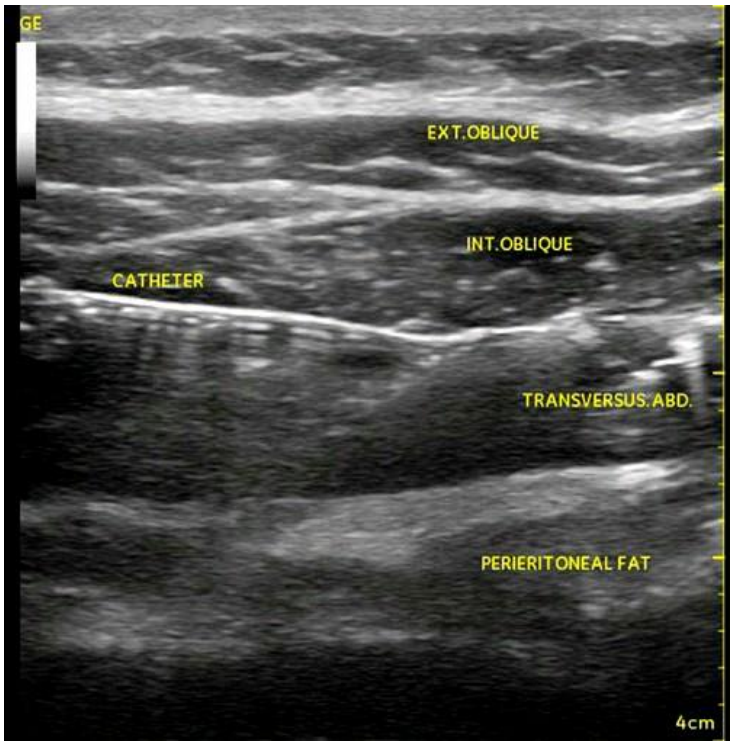

Figure A3. *Showing the Catheter Between the IOM Internal Oblique Muscle and TAM Transversus Abdominis Muscle.*

(Elsharkawy & Bendtsen, 2022)

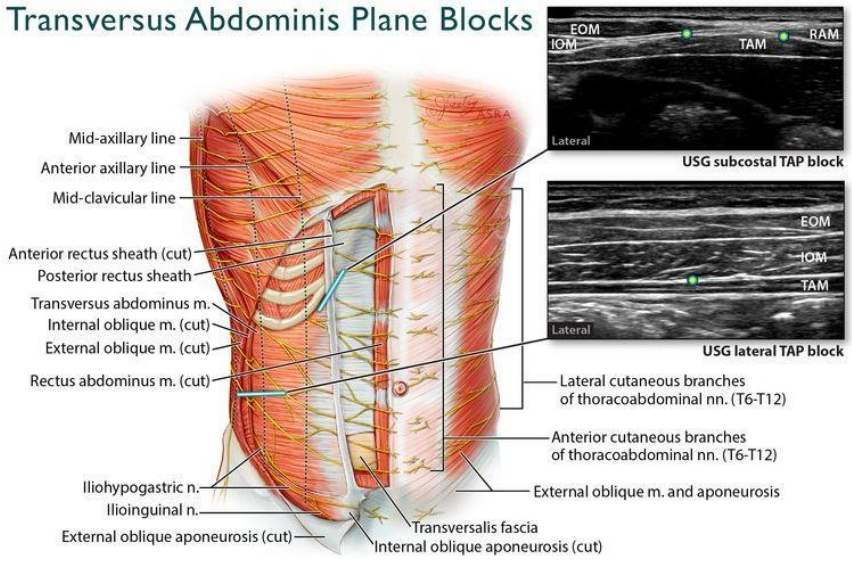

Figure A4. *Transversus Abdominis Plane Blocks*

(Modi, 2019)

DEBRIEFING FORM:

1. Were you able to correctly identify the external oblique muscle, internal oblique muscle, transversus abdominis muscle, and peritoneal fat on the ultrasound image?
2. Were you able to visualize your needle on the ultrasound image?
3. What is an essential step to prevent local anesthetic systemic toxicity? Did you remember to do this?
4. Is there anything that you would have done differently to improve your technique? If yes, please describe.

QUESTION & DEMONSTRATION STATION:

	TASKS	**PASS**	**FAIL**	**COMMENTS**
	1. Prepares and selects appropriate equipment			
*	2. Performs time-out and correctly identifies patient, surgery, and verifies informed consent is signed			
*	3. Places the patient in the supine position			
	4. Dons gloves and places an ultrasound cover on the transducer			
	5. Cleans the site with skin disinfectant (chlorhexidine)			
*	6. Identifies landmarks with ultrasound			
*	7. Inserts the needle 2-3 cm medial to the transducer			
*	8. Aspirates and then injects local anesthetic 3-5 mL at a time up to a total volume of 20-30 mL per side			
*	9. Identifies adequate spread of local anesthetic			
	10. Verbalizes monitoring patients for signs and symptoms of local anesthetic systemic toxicity (LAST) and evaluating the effectiveness of nerve block			

Steps with * Must be properly completed. All steps must be completed/passed to receive a passing grade.

The OSCE by the student demonstrates foundational knowledge and correct use of the ultrasound machine in obtaining IV access: (Circle one) **PASS FAIL**

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

EXAMINER: _____ DATE: _____

APPENDIX E – IRB Approval Letter

Office *of*
Research Integrity

THE UNIVERSITY OF SOUTHERN MISSISSIPPI

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NOTICE OF INSTITUTIONAL REVIEW BOARD ACTION

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 via the Incident submission on InfoEd IRB.
- The period of approval is twelve months. An application for renewal must be submitted for projects exceeding twelve months.

PROTOCOL NUMBER:	22-633
PROJECT TITLE:	Objective Structured Clinical Evaluation (OSCE) for Transversus Abdominis Plane (TAP) Block Utilizing Ultrasound Technique
SCHOOL/PROGRAM	Leadership & Advanced Nursing
RESEARCHERS:	PI: Gursharn Dhaliwal Investigators: Dhaliwal, Gursharn~Rayborn, Michong~Handshaw, Anesha~
IRB COMMITTEE ACTION:	Approved
CATEGORY:	Expedited Category
PERIOD OF APPROVAL:	01-Jul-2022 to 30-Jun-2023

Donald Sacco Jr.

Donald Sacco, Ph.D.
Institutional Review Board Chairperson

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