Effectiveness of Simulation-based Instruction of Correct Positioning of Standardized Surgical Patients and Prevention of Peripheral Nerve Injuries

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Abstract

Background: Optimal perioperative positioning for surgical procedures requires a compromise between the anatomical exposure required for surgery and what the anesthetized patient can tolerate structurally and physiologically. Anesthesia-related perioperative peripheral nerve injuries are the second most common cause of anesthesia-related litigations and a significant cause of physical disability. Incorporation of simulation-based education (SBE) on correct positioning of surgical patients and prevention of perioperative peripheral nerve injuries (PPNIs) early in the nurse anesthesia curriculum can help decrease position-related nerve injuries and improve patient outcomes. *Purpose*: The goal of this project was to increase first-year nurse anesthesia students' knowledge and confidence on the correct positioning of anesthetized patients and the prevention of PPNIs via SBE. *Results*: Descriptive statistics were used to analyze the mean scores of pre- and post-intervention knowledge surveys and SET-M scores. The mean for the pre- and post-knowledge surveys increased by 1.6000 ($SD = \pm 1.51658$). 100% of the first-year GSRNAs scored at or above 2 (somewhat agree) on the learning and confidence subscale questions on the SET-M evaluation questionnaire. Qualitative comments reflected positive responses toward the simulation experience. *Conclusions*: The statistical data reveal that the inclusion of SBE on correct positioning and PPNI was a great benefit to increasing knowledge and confidence in the first-year nurse anesthesia students. The research evidence presented within this project further supports SBE as an excellent medium to create highly-relevant contexts where nurse anesthesia students are active participants in the learning process, and repetitive hands-on experience increases their confidence.

Keywords: *anesthesia, student registered nurse anesthetist, simulation, standardized patient, peripheral nerve injury, patient positioning.*

Executive summary

Problem Statement

Positioning for a surgical procedure requires a compromise between the optimal anatomical exposure for surgery and what the anesthetized patient can tolerate structurally and physiologically. Each patient presents a unique case; hence, optimal positioning should be aimed to ensure patient safety and efficiency, as well as to provide access to the surgical field. Today, perioperative peripheral nerve injury related to incorrect positioning is on the rise in anesthesia practice (Hewson, Bedforth, & Hardman, 2018). The majority of PPNIs related to incorrect perioperative positioning of an anesthetized patient can be avoided if Certified Registered Nurse Anesthetists (CRNAs) and Graduate Student Registered Nurse Anesthetists (GSRNAs) are knowledgeable on how to prevent PPNIs by correctly positioning anesthetized surgical patients, and remain vigilant in maintaining proper patient positioning throughout the surgery. Simulation-based education (SBE) can successfully bridge the theory-practice gap of the application of theoretical knowledge to the practical management of patients.

Background

Anesthesia providers are legally responsible for perioperative position-related nerve injuries. The most commonly injured peripheral nerves due to improper surgical positioning of an anesthetized patient include ulnar (28%), brachial plexus (20%), lumbosacral nerve roots (16%), and spinal cord injuries (13%) (Cassorla & Lee, 2015; Metzner et al., 2011; Thompson, 2018). PPNI is a significant cause of physical disability that may pose various challenges to patients, ranging from mild discomfort to life-long impairment with neurological deficits. Current evidence-based practice emphasizes the importance of timely prevention of PPNIs.

SBE is a remarkable supplement for academic teaching and clinical experience. After conducting a gap analysis and needs assessment, the Doctor of Nursing Practice (DNP) project manager discovered that the University of Saint Francis Doctor of Nursing Practice - Nurse Anesthesia Program (USF DNP-NAP) did not include a correct positioning of surgical patients' simulation in the first-year nurse anesthesia curriculum. SBE allows for the acquisition of clinical skills through deliberate practice and improves learners' competence and confidence (Cant & Cooper, 2010; Al-Elq, 2010; Boulet & Murray, 2010). By actively participating in the correct positioning of anesthetized surgical patient simulation, first-year GSRNAs could supplement academic learning with experiential, simulation-based training that permits repetitive practice and increases knowledge and confidence on how to prevent PPNIs. Thus, careful consideration of perioperative surgical positioning by the anesthesia provider and the perioperative team could help to reduce the frequency and severity of peripheral nerve injuries.

Scope of Project

This DNP scholarly project was an evidence-based (EB) educational intervention aimed to implement SBE into the USF DNP-NAP and to improve first-year nurse anesthesia students' knowledge and confidence on correct patient positioning and prevention of PPNIs. The original scope of this scholarly project was planned to include the DNP project manager's participation in a lecture and PowerPoint presentation, as well as a simulation for the first-year GSRNAs on correct surgical positioning of anesthetized patients and prevention of PPNIs. The alternative implementation plan was made and included only the correct positioning and prevention of PPNI simulation due to Coronavirus (COVID-19) pandemic.

Aims

The expected outcomes for this DNP project were the following: (a) the simulation-based educational intervention should have been approved by the USF DNP-NAP faculty and the Institutional Review Board by December 2019 and implemented in March 2020, (b) the mean knowledge scores between the pre- and post-knowledge surveys would have increased, (c) 50% of the first-year nurse anesthesia students would have scored above 2 (somewhat agree) on the learning subscale questions (question 1-5 in Scenario section) on the SET-M evaluation questionnaire after the simulation, and (d) 50% of students would have scored above 2 (somewhat agree) on the confidence subscale questions (question 6-11 in Scenario section) on the SET-M evaluation questionnaire after the simulation.

Analysis

Descriptive statistics were used to analyze the demographic information of participants, the mean of pre- and post-intervention knowledge, and the interpretation of the SET-M tool scores. The statistical analyses were carried out using the Statistical Package for the Social Science (SPSS)® version 23.0 (IBM, Armonk, New York, NY, USA). Means and standard deviations were calculated for all analyzed variables. The categorical variables were expressed as percentages. Pre-post sample means were analyzed for summary values. The qualitative data were gathered through DNP project manager journaling and participant comments in the comment box of the SET-M tool.

Key Findings

The correct positioning and the prevention of PPNIs simulation was approved by the USF DNP-NAP faculty and the Institutional Review Board in October 2019 and implemented in March 2020. A total of five first-year GSRNAs ($n = 5$) participated in the SBE. The mean for the pre-knowledge survey for all participants (*n* = *5*) was 5.8000 (*SD* = ± 1.09545). The mean for the post-knowledge survey for participants (*n* = *5*) was 7.4000 (*SD* = ± .89443). Therefore, the expected outcome for this DNP project was successfully achieved because the mean for the pre- and post-knowledge surveys increased by 1.6000 (*SD* = ± 1.51658). The project met the anticipated outcomes because 100% of the first-year GSRNAs scored at or above 2 (somewhat agree) on the learning subscale questions (question 1-5 in scenario section) and at or above 2 (somewhat agree) on the confidence subscale questions (question 6-11 in Scenario section) on the SET-M evaluation questionnaire after the correct positioning of surgical patients and prevention of PPNIs simulation.

Limitations and Recommendations

The findings of this DNP project should be interpreted in light of several limitations. This DNP project had limitations related to attendance. An additional limitation within this DNP project is that the pre- and post-knowledge surveys were not randomly collected from the participants before and after the simulation. Lastly, the DNP project manager was not able to participate in the lecture and PowerPoint presentation as initially planned due to the suspension of face-to-face classes related to the coronavirus outbreak. Future recommendations include implementing this DNP project into the other nurse anesthesia programs, assigning each participant a unique survey ID for more substantial data analysis, and adhering to the original DNP project plan and assessing knowledge and confidence of participants at three different points throughout the project implementation.

Conclusion

In conclusion, the goal of this DNP project was to complement academic learning with experiential, simulation-based training that reduces patient safety concerns due to repetitive practice and increases knowledge and confidence on the correct positioning and the prevention of

PPNIs. SBE is a unique way to facilitate learning and increase nurse anesthesia students' knowledge and confidence on correct surgical positioning and prevention of positioning-related PPNIs. The results of this DNP project indicated that participation in the SBE positively influenced and improved participant's knowledge and perceptions of knowledge and confidence about surgical positioning and PPNIs. Hence, the incorporation of SBE strategies for first-year GSRNAs can help to advance patient safety and the overall quality of anesthesia care provided. This DNP project has a direct implication on health policy by transforming the education of the nurse anesthesia providers to meet diverse patients' needs, function as positioning leaders and experts, and advance nursing sciences that benefit patients.

Chapter 1: Introduction

Background

Anesthesia is necessary and beneficial to facilitate many recommended surgical, medical, and diagnostic procedures. Optimal perioperative positioning for a surgical procedure requires a compromise between the anatomical exposure for surgery and what the anesthetized patient can tolerate structurally and physiologically. The four most commonly used intraoperative surgical positions include dorsal decubitus, lithotomy, lateral decubitus, and prone. According to the American Association of Nurse Anesthesia Foundation closed malpractice claims database (Fritzlen, Kremer, & Biddle, 2003) and the American Society of Anesthesiologists (ASA) closed-claim analyses (Cheney, Domino, Caplan, & Posner, 1999; Lalkhen & Bhatia, 2012; Metzner, Posner, Lam, & Domino, 2011), anesthesia-related perioperative peripheral nerve injuries (PPNIs) are the second most common cause of anesthesia-related litigations. Perioperative nerve injury is a significant cause of physical disability that may pose various challenges to patients, ranging from mild discomfort to life-long impairment with neurological deficits. Today, perioperative peripheral nerve injury related to incorrect positioning is on the rise in anesthesia practice (Hewson, Bedforth, & Hardman, 2018). The majority of PPNIs related to incorrect perioperative positioning of an anesthetized patient can be avoided if Certified Registered Nurse Anesthetists (CRNAs) and Graduate Student Registered Nurse Anesthetists (GSRNAs) are knowledgeable on how to prevent PPNIs by correctly positioning anesthetized surgical patients, and remain vigilant in maintaining proper patient positioning throughout the surgery.

Throughout the healthcare community, there has been an increased use of simulation for training and education. Simulation has been identified as an effective learning strategy in health care that demonstrates a definite impact on patient outcomes and organizational resilience

(Higham, & Baxendale, 2017). Simulation is "an educational strategy in which a particular set of conditions are created or replicated to resemble authentic situations that are possible in real life" (Gaba, 2004). Simulation-based experiences include "a broad array of structured activities that represent actual or potential situations in education, practice, and research" (Pilcher, Goodall, Jensen, Huwe, Jewell, Reynolds, & Karson, 2012). Simulation-based experiences allow participants to "develop or enhance knowledge, skills, and or attitudes and provide an opportunity to analyze and respond to realistic situations in a simulated environment" (Pilcher et al., 2012). Incorporation of simulation-based education (SBE) strategies for GSRNAs serves to advance patient safety and the overall quality of anesthesia care provided. The SBE is ideal for providing nurse anesthesia students access to practical, "hands-on" applications of theoretical knowledge. By actively participating in the correct positioning of anesthetized surgical patient simulation, first-year GSRNAs could supplement academic learning with experiential, simulation-based training that permits repetitive practice and increases knowledge and confidence on how to prevent PPNIs. Thus, careful consideration of perioperative surgical positioning by the anesthesia provider and the perioperative team could help to reduce the frequency and severity of peripheral nerve injuries.

Problem Statement

Anesthesia providers are legally responsible for perioperative position-related nerve injuries. The goals of correct patient positioning are to provide access to the surgical site, intravenous lines, and monitoring equipment; maintain patient dignity, avoid pressure on the chest to ensure adequate ventilation; maintain circulation; protect the patient's eyes, fingers, toes, and genitals; and to protect muscles, nerves, and bony prominences (American Society of Anesthesiologists [ASA], 2018; Association of Perioperative Registered Nurses [AORN], 2001;

Association of Perioperative Registered Nurses [AORN], 2019; Cassorla & Lee, 2015; O'Connor & Radcliffe, 2018; Spruce, Van Wicklin, 2014; Thompson, 2018; Warner & Johnson, 2017). The most commonly injured peripheral nerves due to improper surgical positioning of an anesthetized patient include ulnar (28%), brachial plexus (20%), lumbosacral nerve roots (16%), and spinal cord injuries (13%) (Cassorla & Lee, 2015; Metzner et al., 2011; Thompson, 2018). In 2018, the ASA published a practice advisory for the prevention of PPNIs that focuses on correct perioperative positioning of the adult patient, the use of protective padding, and avoidance of contact with hard surfaces or supports that may apply direct pressure on susceptible peripheral nerves.

With advances in science and technology, the use of simulation as an educational tool is becoming increasingly prevalent in nursing education (Shin, Park, & Kim, 2015; Yuan, Williams, Fang, & Ye, 2012). Along with classroom lectures and clinical experiences, the ultimate goal of nursing education is to promote the application of theoretical knowledge to clinical practice (Shin, Park, & Kim, 2015). Several review studies report that SBE improves students' knowledge (Adamson, 2015; Berndt, 2014; Cant and Cooper, 2010; Cant and Cooper, 2014; Fisher and King, 2013; McGaghie, Issenberg, Barsuk, & Wayne, 2014; Norman, 2012; Skrable and Fitzsimons, 2014; Stroup, 2014; Weaver, 2011; Yuan et al., 2012). Also, simulation is an educational strategy that provides students with a realistic clinical situation and allows them to practice and learn in a safe environment (Al-Elq, 2010; Arthur, Levett-Jones, & Kable, 2012; Lorello, Cook, Johnson & Brydges, 2014; Shin, Park, & Kim, 2015; National League for Nursing, 2015; Kim, Park, & Shin, 2016; Higham & Baxendale, 2017; Hegland, Airlie, Stromme, & Jamtvedt, 2017). Simulation-based education also allows for the acquisition of clinical skills through deliberate practice and improves learners' competence and confidence

(Cant & Cooper, 2010; Al-Elq, 2010; Boulet & Murray, 2010). Simulation-based education reduces risks to patients and learners, increases patient safety (Khan, Pattison, & Sherwood, 2010; Higham & Baxendale, 2017), improves quality in healthcare (Hegland, Aarlie, Stromme, & Jamtvedt, 2017), and reduces health care costs in the long run (Al-Elq, 2010; Council on Accreditation of Nurse Anesthesia Educational Programs [COA], 2015). The continuing advances in simulation technology and an in-depth understanding of educational principles and practical applications of SBE to outcome-based programs helps to bridge the gap between the classroom and clinical environment (Khan, Pattison, & Sherwood, 2010). Simulation-based educational activities can successfully bridge this theory-practice gap of the application of theoretical knowledge to the practical management of patients. Thus, simulation-based education is a remarkable supplement for academic teaching and clinical experience.

The PICOT question for this scholarly project was "In first-year nurse anesthesia students (P), how does participation in the correct positioning of standardized patients and prevention of perioperative peripheral nerve injuries simulation (I) influence knowledge and confidence (O) compared with lecture and PowerPoint-based instruction only (C)?"

Practice Gap and Needs Assessment

According to the standards and guidelines of nurse anesthesia educational programs (2016), "simulated clinical experiences are learning experiences involving the imitation or representation of clinical activities that are designed for competency attainment, competency assessment, or competency maintenance." Simulation-based education can be used as a primary approach or supplemental activity to the lecture. After conducting a gap analysis and needs assessment, the DNP project manager discovered that the University of Saint Francis Doctor of Nursing Practice - Nurse Anesthesia Program (USF DNP-NAP) did not include a correct positioning of surgical patients' simulation in the first-year nurse anesthesia curriculum. NURS 511, Basic Principles of Anesthesia Care, introduces the proper positioning of surgical patients and discusses the potential peripheral nerve injuries via lecture and PowerPoint-based instruction only. Therefore, the need for a well-designed simulation-based education was established, and the existing gap between the USF DNP-NAP curriculum and evidence-based (EB) education for GSRNAs was identified. By participating in the simulation-based experience of correct positioning of surgical patients, first-year nurse anesthesia students could enhance academic learning with experiential, simulation-based training that reduces patient safety concerns and permits repetitive safe practice (Lorello, Cook, Johnson, & Brydges, 2014). Moreover, the innovative and interactive SBE on correct positioning of surgical patients and prevention of PPNIs could promote enhanced readiness for clinical practice. This DNP project was aimed at implementing simulation-based instruction on correct positioning of surgical patients into the USF DNP-NAP NURS 511 curriculum to improve first-year GSRNAs students' knowledge and confidence on correct surgical positioning of anesthetized patients and prevention of perioperative peripheral nerve injuries.

Scope of Project

Simulation has been documented in nurse anesthesia educational approaches for more than 25 years. This Doctor of Nursing Practice scholarly project was an evidence-based (EB) educational intervention aimed to implement SBE into the USF DNP-NAP and to improve first-year nurse anesthesia students' knowledge and confidence on correct patient positioning and prevention of PPNIs. Evidence-based practice is defined as "the integration of best research evidence with clinical expertise (including internal evidence) and patient values to facilitate clinical decision making" (Sackett et al., 2000). The original scope of this scholarly project was planned to include the DNP project manager's participation in a lecture and PowerPoint presentation, as well as a simulation for the first-year GSRNAs on correct surgical positioning of anesthetized patients and prevention of PPNIs. Before the PowerPoint presentation, participants were to complete a demographic questionnaire and pre-knowledge survey anonymously (Appendix A and Appendix B). Subsequently, the DNP project manager planned to present the PowerPoint content and lecture the first-year GSRNAs on correct patient positioning and prevention of PPNIs. After the PowerPoint presentation, the DNP project manager was to guide the participants to complete the post-knowledge survey to assess the first-year GSRNAs' knowledge increase/decrease/no change on correct surgical positioning of anesthetized patients and prevention of PPNIs. On the following day, the DNP project manager was to administer the simulation-based educational intervention on correct surgical positioning of anesthetized patients and prevention of PPNIs in the USF operating room (OR) simulation lab using a standardized patient (SP). Pre-briefing was planned to set the stage for each group of first-year GSRNAs. Following pre-briefing, the first-year GSRNAs were to engage in four different scenarios to correctly position the SP into dorsal decubitus, lithotomy, lateral decubitus, and prone positions. Following the simulation, a debriefing session was planned. Lastly, the participants were to complete the post-knowledge survey and evaluated the simulation effectiveness via the Modified Simulation Effectiveness Tool (SET-M) (Appendix C). The post-knowledge survey was identical to the pre- PowerPoint presentation and pre-simulation knowledge survey. After the pre- and post-knowledge survey and SET-M, data would have been precisely analyzed and presented by the DNP project manager to the stakeholders, and the proposed practice change was evaluated. The simulation activity was not planned to be graded by the DNP project manager or course instructor.

Stakeholders

The USF DNP-NAP faculty strictly adhered to the administrative norms of the Council on Accreditation of NAPs and American Association of Colleges of Nursing, DNP accreditation standards, policies, procedures, and guidelines. Both DNP and NAP nursing departments actively support SBE and provide high-quality academic education for doctorally prepared nurse anesthesia providers. Also, the USF DNP-NAP faculty strongly support and encourage EB interventions that benefit GSRNAs' education. The implementation of the DNP project on correct positioning of anesthetized surgical patients and prevention of PPNIs simulation for the first-year GSRNAs along with lecture and PowerPoint instructions were supported by Dr. Lisa Osborne, NAP Program Director, and Greg Louck, Assistant Professor. Both USF DNP-NAP stakeholders, as well as the USF Dean of the School of Health Sciences, Angela R. Harrel, identified that simulation has many advantages and results in highly trained nurse anesthesia graduates who are less likely to make life-threatening or costly medical errors. Professor Greg Louck's official letter of support to the USF Institutional Review Board is attached in Appendix D. The DNP project team comprised of the project advisor, Dr. Susan Lown; the practice mentor, Professor Gregory Louck; the academic advisor, Dr. Lisa Osborne; the Director of the School of Health Sciences Simulation Lab, Professor Dawn Parker; and the project manager, Natalya Kollektsionova, BSN, RN, CCRN, GSRNA.

Setting

The University of Saint Francis is a private, Catholic university located in Fort Wayne, Indiana. Most of the DNP-NAP classes and simulations occurred on the USF Fort Wayne Campus in Doermer Health Science Building. The simulation-based educational intervention on correct surgical positioning of anesthetized patients and prevention of PPNIs was planned to occur at the USF operating room (OR) simulation lab.

Target Population

A convenience sample of all first-year GSRNAs enrolled in the USF DNP-NAP program, taking the NURS 511 course during the spring of 2020, and expected to graduate in 2022, were invited to be participants of this DNP project. Attendance at all academic lectures and simulation sessions were mandatory in the NAP-DNP program. Originally, it was planned that all participants would attend the lecture and actively participate in the simulation on correct patient positioning and prevention of PPNIs. Also, all participants would have been asked to complete a demographic questionnaire, pre- and post-knowledge surveys, and SET-M questionnaire voluntarily.

Cost and Description of Resources

The initial cost associated with this DNP project was expected to be less than four hundred U. S. dollars. All of the DNP project expenses were donated by the USF Nurse Anesthesia Program and USF clinical partners. The DNP project manager utilized the existing USF OR simulation lab space, classroom, and training equipment located on the main campus in the Doermer Health Sciences building. The USF available resources for the correct positioning of anesthetized surgical patients and prevention of PPNIs simulation included the OR table, monitors, arm boards, leg holders, blankets, pillows, arm restraints, and chest rolls. Other desirable equipment, such as a prone headrest and foam positioning aids for arms and legs, were sponsored and provided by USF clinical partners. The participation in the correct patient positioning and perioperative nerve injury prevention simulation was free for first-year GSRNAs. Neither the first-year GSRNAs or the SP would not have received financial compensation, and all participants would have engaged in the simulation pro-bono. The cost of printed simulation scenarios and evaluation forms was funded by the DNP project manager.

General Timeline

It was estimated that the project would take 13 months from the needs assessment and gap analysis (June 2019) to completion of analysis and interpretation (July 2020). The need assessment, gap analysis, organizational assessment, and synthesis of the literature was completed during the summer of 2019. The permission to utilize the SET-M tool was obtained from the author in August 2019 (Appendix E). The DNP proposal to the USF IRB application was submitted in September 2019 and approved in October 2019. The DNP project manager completed “SIM. 101” online modules based upon the International Nursing Association for Clinical Simulation and Learning (INACSL) Standards of Best Practice: Simulation[SM] offered by the USF School of Health Sciences (SOHS) in October 2019. The completion of the SBE design occurred in January of 2020 and was reviewed by the DNP practice mentor to ensure that the SBE accomplished its intended purpose and provided the opportunity for participants to achieve the stated objectives. The original DNP project plan included the lecture and PowerPoint presentation by the DNP project manager scheduled on the morning of March 17, 2020. The simulation was planned for the morning of March 18, 2020. Analysis and interpretation of the results were scheduled to be completed by the end of April 2020. The final submission of the DNP manuscript occurred in late May of 2020, and the DNP project results were disseminated in July 2020.

Goals, Objectives, and Expected Outcomes

The overall goal of this DNP scholarly project was to increase the first-year GSRNAs’ knowledge and confidence on how to correctly position the anesthetized patient for surgical procedure and prevent the occurrence of PPNIs. The objectives of this DNP project were: 1) to improve first-year GSRNAs' knowledge and confidence on correct surgical positioning of anesthetized patients and prevention of PPNIs, and 2) to assess how participation in simulation-based activities influenced first-year GSRNAs' perceptions of knowledge and confidence.

The expected outcomes for this DNP project were the following: (a) the simulation-based educational intervention should have been approved by the USF DNP-NAP faculty and the Institutional Review Board by December 2019 and implemented in March 2020, (b) the mean knowledge scores between the pre- and post-knowledge surveys would have increased, (c) 50% of the first-year nurse anesthesia students would have scored above 2 (somewhat agree) on the learning subscale questions (question 1-5 in Scenario section) on the SET-M evaluation questionnaire after the simulation, and (d) 50% of students would have scored above 2 (somewhat agree) on the confidence subscale questions (question 6-11 in Scenario section) on the SET-M evaluation questionnaire after the simulation.

Risk Analysis

The USF, Fort Wayne Institutional Review Board (IRB) approval was obtained before the initiation of this DNP project. There was no anticipated discomfort for participants contributing to this study, so the risk to participants and SP was insignificant. The probability and magnitude of harm or distress anticipated in this DNP project were minimal for all participants and the SP and not higher than those ordinarily encountered in daily life or during the performance of routine physical or psychological examinations or tests. Informed consent forms were signed by all first-year GSRNAs and SP before participating in the EB educational intervention.

Students and SP records (including anonymous surveys and informed consents) were kept confidential and were not to be released without consent, except if required by law. The data was retained in a locked cabinet in the NAP office for one (1) year after the implementation of the EB educational intervention. Access to these data was limited to the DNP project manager. No identifying information was collected. One (1) year post-implementation, all paper records were shredded and recycled. All files stored on a computer were erased using commercial software applications designed to remove all data from the storage device. If the results of this study were written in a scientific journal or presented at a scientific meeting, students and SP's names would not be used, and only grouped data would be given. Please review Appendix F for a study participant informed consent and privacy authorization form; Appendix G for a student informed consent form; and Appendix H for a release form for SP participation in educational activities.

Chapter 2: Synthesis of Supporting Evidence and Project Framework

Theoretical Framework

The Kurt Lewin Change Theory (1951) was chosen to guide this educational, simulation-based intervention on the correct positioning of surgical patients and the prevention of perioperative peripheral nerve injuries. The application of Lewin's Change Theory (1951) provided a structured approach for this DNP project. Lewin's (1951) theory led to a better understanding of how change affects the organization, identified barriers for successful implementation, and was a useful tool for identifying opposing forces that act on human behavior during change, therefore overcoming resistance and leading to acceptance of new technologies by faculty and students (Bozak, 2003).

Lewin’s (1951) theory consists of three steps: unfreezing, changing, and refreezing. The unfreezing stage of Lewin’s theory involves getting ready for change. This step includes recognizing a problem, identifying the need for change, and mobilizing others to see the need for change (Shirley, 2013). During this stage, the DNP project manager assessed the current educational strategies used by the USF DNP-NAP and identified the need for change in the first-year nurse anesthesia students’ NURS 511, Basic Principles of Anesthesia Care curriculum. After conducting a gap analysis and numerous discussions with the USF-NAP faculty, a solution was selected for the first-year nurse anesthesia students to receive information via lecture, PowerPoint presentation, and simulation-based instruction on correct positioning of surgical patients and peripheral nerve injuries associated with improper surgical positioning. The changing stage of Lewin’s theory involves changing or moving. In the changing stage of the project, a detailed plan was created, and active engagement of the USF NAP and DNP faculty was facilitated by the DNP project manager. During the changing stage, it was planned that the first-year nurse anesthesia students would receive information on correct positioning of surgical patients and peripheral nerve injuries associated with improper surgical positioning via lecture, PowerPoint presentation, and simulation-based instruction. In the refreezing stage, the DNP project would be adopted by the USF-NAP and adapted as a new norm. Once the DNP project was completed and fully operational, a summary of problems encountered, successes realized, and challenges faced throughout the project would be communicated to the stakeholders.

Theory of Adult Learning

The humanistic approach to adult learning theory fits nurse anesthesia learners closely. According to the humanistic perspective, learning involves more than just cognitive processes and overt behavior; it is a function of motivation and involves choices and responsibilities

(Hartland, 2017). In nurse anesthesia education, clinical teaching can be examined in terms of a teaching continuum between the pure pedagogical model and the pure andragogical model (Phillips, 2018). According to Knowles (1980, 1984, 1990) and Knowles, Holton, & Swanson (2015), pedagogy is defined as the “art and science of helping children to learn” (p. 40). Under the pedagogical model, the teacher or clinical instructor assumes responsibility for all decisions concerning what will be learned, when it will be learned, and how it will be learned (Hartland, 2017). On the other hand, andragogy is “the art and science of teaching adults” (Bastable & Myers, 2017). The Knowles’ concepts of andragogy are grounded in humanistic assumptions. Knowles (1980, 1984, 1990, 2015) discovered through his work with adults that instructors needed to care about the actual interests of learners instead of focusing on what instructors believed were learners’ interests. Andragogy focuses more on the process and less on the content being taught; hence, andragogy is a learner-focused approach to adult learning.

Based on Knowles’ observations, (1980, 1984) the five assumptions of andragogy state that adults are self-directed learners, adult learners bring a wealth of experience to the educational setting, adults enter educational settings ready to learn, adults are problem-centered in their learning, and adults are best motivated by internal factors. Nurse anesthesia students are enrolled in nurse anesthesia programs for one reason: to become a nurse anesthetist. The journey to become a CRNA is long, rigorous, stressful, and demanding. Therefore, most nurse anesthesia students are willing, ready, and eager to learn before they are accepted to a CRNA school. The adult learner moves from dependency to increasing self-directedness as he or she matures and can direct his or her learning (Teaching excellence in adult literacy, 2011). As adult learners, nurse anesthesia students are better motivated when they are actively involved in the learning process (Hartland, 2017). Adult learners learn best when they have clear obtainable goals. Prior to learning, nurse anesthesia students need to know what they are going to learn and why they need to know it. Subject matter should be presented in a logical sequence to facilitate adults' learning. Also, as adult learners, CRNA students prefer immediate application of learning. Learned material appears to be retained longer in adult learners if it is applied soon after it has been taught (Hartland, 2017). In nurse anesthesia education, simulation and clinical practicum provides the student an opportunity to apply learned material into practice. Learning is facilitated and reinforced when the learner is made aware of his or her progress. Adult learners want to be treated like adults by professors and clinical instructors via constructive, specific, and obtainable feedback. Furthermore, adult learners reach learning plateaus that inhibit learning progression. Frequent changes in the nature of the learning task will ensure continuous progress. Adult learners possess a large amount of prior knowledge and experience. Thus, learning new material is facilitated when it is related to what is already known. The more that adult educators are familiar with adult learning theories, the more effective and responsive their educational practice can be to meeting the needs of adult learners.

Review of Literature

A comprehensive literature review was conducted using the following databases: Cumulative Index to Nursing and Allied Health Literature (CINAHL), PubMed, OVID MEDLINE, Ebsco Databases, and Google Scholar. Search terms included anesthesia, general anesthesia, student registered nurse anesthetist, nurse anesthesia, simulation, high fidelity simulation, standardized patient, intraoperative complications, peripheral nerve injury, patient positioning, adult learning theory, pedagogy, and andragogy. Inclusion criteria consisted of articles that addressed patient positioning and perioperative peripheral nerve injuries, simulation-based interventions in nursing and medical education, and English written articles from peerreviewed scholarly journals. Exclusion criteria consisted of non-English articles and articles not related to healthcare. The review of literature was organized under four headings: 1) Overview of the most common positions for surgery, 2) Position related peripheral nerve injuries, 3) Current perioperative evidence-based practice, and 4) Simulation-based education.

Most Common Positions for Surgery. Positioning for a surgical procedure requires a compromise between the optimal anatomical exposure for surgery and what the anesthetized patient can tolerate structurally and physiologically. Each patient presents a unique case; hence, optimal positioning should be aimed to ensure patient safety and efficiency, as well as to provide access to the surgical field. The goals of correct patient positioning are to provide access to the surgical site, intravenous lines, and monitoring equipment; maintain patient dignity; avoid pressure on the chest to ensure adequate ventilation; maintain circulation; protect the patient's eyes, fingers, toes, and genitals; and to protect muscles, nerves, and bony prominence (Association of Perioperative Registered Nurses [AORN], 2001; Association of Perioperative Registered Nurses [AORN], 2019; American Society of Anesthesiologists [ASA], 2018; Cassorla & Lee, 2015; O'Connor & Radcliffe, 2018; Spruce, Van Wicklin, 2014; Thompson, 2018; Warner & Johnson, 2017). Anesthesia providers are legally responsible for ensuring accurate and thorough medical record-keeping of perioperative patient positioning and take actions to reduce the chance of adverse patient effect or complications related to positioning (ASA, 2018). The goal of the patient's positioning during the anesthesia care is for the patient to be in a natural position that one would well tolerate when awake and unsedated. If extreme positions cannot be avoided, their duration should be limited as much as possible (Cassorla & Lee, 2015). There are four most common positioning of surgical patients: dorsal decubitus, lithotomy, lateral decubitus, and prone.

The dorsal decubitus is also known as the traditional supine position. It is the most frequently used position for surgical procedures on the abdomen, head, neck, upper and lower extremities, and chest. The patient lies on his or her back with a small gel-type pillow or soft padding beneath the head to prevent direct pressure on the occiput from a firm operating table (AORN, 2019; Cassorla & Lee, 2015; O'Connor & Radcliffe, 2018; Thompson, 2018; Warner & Johnson, 2017; Woodfin, Johnson, Parker, Mikach, Johnson, & McMullan, 2018). The arms are either padded and restrained alongside the trunk or abducted on well-padded arm boards.

The lithotomy position is a variation of supine position and mostly utilized for gynecologic, rectal, and urologic procedures. In the lithotomy position, each lower extremity is flexed at the hip and knee, and both limbs are simultaneously, slowly elevated and separated, so the perineum becomes accessible for the surgical procedure (AAOR, 2001; Warner & Johnson, 2017). The hips are flexed 80-100 degrees from the trunk, and the legs are abducted 30 to 45 degrees from the midline with the knees flexed until the lower legs are parallel to the torso (Cassorla & Lee, 2015). Four basic variations of lithotomy positions exist (low, standard, high, and exaggerated) based on the progressively increasing degree of leg elevation.

Lateral position is used for orthopedic procedures and surgeries involving the thorax and kidneys when the supine position cannot provide adequate anatomical exposure (Cassorla & Lee, 2015; Woodfin et al., 2018). In the standard lateral decubitus position, the patient is rolled onto the nonoperative side on a flat table surface with the shoulders, hips, head, and legs always maintained in the same plane.

The prone or ventral decubitus position is used for access to the dorsal aspects of the patient's body such as the posterior fossa of the skull, the posterior spine, the buttocks and perirectal area, and the lower extremities. The patient is turned prone onto the surgical table after the anesthesia care provider anesthetized the patient on a stretcher or a hospital bed and coordinated the perioperative team members to log-roll the patient while keeping the neck aligned with the spine during the move (Cassorla & Lee, 2015; Woodfin et al., 2018). The arms can be tucked parallel to the sides with a draw sheet or secured with arm guards (AORN, 2019; Thompson, 2018).

Position Related Peripheral Nerve Injuries. All four surgical positions during the intraoperative period possess the risk of potential positioning-related complications that can be detrimental to a patient's short- or long-term outcomes. The mechanisms of perioperative peripheral nerve injuries include but are not limited to stretch, compression, hypoperfusion, direct trauma, exposure to neurotoxic material, or a combination of these factors (Hewson, Bedforth & Hardman, 2018). The multifactorial etiology of PPNIs includes the combination of local and systemic insults. Direct compression and stretching of neural and soft tissue are the two most common local mechanical insults that may result in ischemia and tissue damage (Chui, Murkin, Posner, & Domino, 2018; Warner & Johnson, 2017). The American Association of Nurse Anesthetists Foundation (AANA-F) and the American Society of Anesthesiologists Closed Claims Project (ASA-CCP) have conducted studies of closed malpractice claims from professional liability insurance companies and provided a substantial amount of data about position-related complications. According to the ASA-CCP, nerve injuries (22%) is the second major cause of liability (Metzner, Posner, Lam, & Domino, 2011). The most commonly affected nerves due to improper surgical positioning were ulnar (28%), brachial plexus (20%), lumbosacral nerve roots (16%), and spinal cord (13%) (Cassorla & Lee, 2015; Lalkhen & Bhatia, 2012; Metzner et al., 2011; Thompson, 2018). Understanding the cause of PPNIs is vital for proper risk evaluation and injury prevention.

The ulnar nerve lies in a superficial position at the elbow. The perioperative ulnar neuropathy affects motor and sensory nerve function and, if permanent, results in the inability to abduct or oppose the fifth finger, weakness in hand flexion, diminished sensation, pain, tingling, or burning in the fourth and fifth fingers, and eventual atrophy of the intrinsic muscle of the hands creating a clawlike hand (Bouyer-Ferullo, 2013; Cassorla & Lee, 2015). Usually, anesthesia-related perioperative ulnar neuropathy associated with external nerve compression or stretch is caused by incorrect surgical positioning. Excessive elbow flexion can cause ulnar nerve damage due to: (1) compression by the aponeurosis of the flexor carpi ulnaris muscle and cubital tunnel retinaculum, (2) poorly formed fibrotendinous roof of the cubital tunnel and anterior subluxation, or (3) dislocation of ulnar nerve over the medial epicondyle of the humerus (Warner & Johnson, 2017). Moreover, the external compression on the postcondylar groove of the humerus can cause ulnar nerve injury (Cassorla & Lee, 2015; Warner & Johnson, 2017). The risk for ulnar neuropathy exists in all surgical positions; therefore, the nurse anesthesia provider must ensure preventive measures in all anesthetized surgical patients.

The second most frequent site of upper extremity neuropathy, after the ulnar nerve, is the brachial plexus (BP). The brachial plexus supplies innervation to the upper limb and consists of a branching network of nerves derived from the anterior rami of the lower four cervical (C4-C8) and the first thoracic (T1) spinal nerves (Hadzic, 2012; Uribe, Kolla, Omar, Dakwar, Abel, Mangar, & Camporesi, 2010). The five roots of BP give rise to three trunks (superior, middle, and inferior), and each trunk divides into an anterior and posterior division. Behind the clavicle, at the apex of axilla, the divisions combine to produce three cords (lateral, median, and posterior to the location of the axillary artery) and, from this point on, individual nerves of the upper extremity are formed (Hadzic, 2012). The BP is susceptible to stretching due to its long superficial course from the neck to the arm via the axilla with two points of fixation – the cervical vertebrae and the axillary fascia (Cassorla & Lee, 2015). Moreover, the BP nerves are at risk for compression between the clavicle and the first rib. After BP injury, the patient experiences sensory deficit in the distribution of the ulnar nerve due to excessive abduction or lateral rotation of the arms, asymmetric sternum retraction, or direct trauma or compression (AORN, 2001; AORN, 2019; Cassorla & Lee, 2015; Thompson, 2018; Warner & Johnson, 2017). Also, shoulder braces in patients in the Trendelenburg position contribute to the BP neuropathy (Cassorla & Lee, 2015; Warner & Johnson, 2017). Individual factors and co-existing conditions can predispose the patient to BP injury during general anesthesia, such as hypovolemia, hypotension, alcoholism, diabetes mellitus, and hypothermia (Uribe et al., 2010). The risk for brachial plexus neuropathy exists in all surgical positions.

The lumbar plexus is formed within the psoas muscle and composed of five to six peripheral nerves that have their origins in the spinal roots of L1 to L4, with a contribution from T12 (Enneking, Wedel, & Horlocker, 2009; Hadzic, 2012). The sacral plexus gives a rise of the posterior cutaneous nerve of the thigh and the sciatic nerve (Enneking, Wedel, & Horlocker, 2009). The sciatic nerve divides into the tibial and common peroneal nerve at the posterior aspect of the thigh to the popliteal fossa (Enneking, Wedel, & Horlocker, 2009; Horlocker, Kopp, & Wedel, 2015). Injuries to the sciatic and common peroneal nerves occur most often in the lithotomy position (Cassorla & Lee, 2015; Warner & Johnson, 2017). The sciatic nerve can be stretched with external rotation of the leg, hyperflexion of the hips, an extension of the knees or via prolonged direct compression (Cassorla & Lee, 2015). The common peroneal nerve is most damaged from the compression between the head of the fibula and an external structure, such as the frame of a leg support (Cassorla & Lee, 2015). Other common causes of common peroneal nerve (CPN) injury are external compression, stretch, contusion, traction, and compression (Emamhadi, Bakhshayesh, & Andalib, 2016). Activities such as crossing legs, prolonged kneeling, and wearing a leg cast can also compress the CPN. The CPN neuropathy manifest as a foot drop and inability to extend the toes in a dorsal direction or evert the foot (Cassorla & Lee, 2015; Emamhadi, Bakhshayesh, & Andalib, 2016; Thompson, 2018; Warner & Johnson, 2017).

Current Evidence-Based Practice. Perioperative nerve injury is a significant cause of physical disability that may present various challenges to patients, ranging from mild discomfort to life-long impairment with neurological deficits. Because sensation is blocked by general anesthesia, early warning symptoms of pain with normal spontaneous repositioning are absent (Lee & Cassorla, 2011). Prevention of peripheral neuropathies is part of the larger process of perioperative care (American Society of Anesthesiologists [ASA], 2018). The AANA-F and ASA-CCP studies highlighted the importance of following standards of care.

The prevention of PPNIs should start with preoperative history and physical assessment to identify patients at risk for positioning injuries (AORN, 2001; ASA, 2018; Bouyer-Ferullo, 2012; Byron, 2017; Chui, Murkin, Posner, & Domino, 2018; Lee & Cassorla, 2011; Sørensen, Kusk, & Grønkjaer, 2015). Body habitus, preexisting neurological symptoms, diabetes, peripheral vascular disease, alcohol dependence, arthritis, sex (males are more likely to develop ulnar neuropathy), and prolonged hospitalization are risk factors for PPNIs and should be assessed to ascertain whether patients can comfortably tolerate the anticipated operative position (AORN, 2001; ASA, 2018; Bouyer-Ferullo, 2012; Byron, 2017; Chui, Murkin, Posner, & Domino, 2018; Fritzlen, Kremer, & Biddle, 2003; Lee & Cassorla, 2011; Sørensen, Kusk, & Grønkjaer, 2015). If preoperative assessment reveals that the patient is at high risk for development of PPNIs, the anesthesia provider should discuss the perioperative positioning strategies to minimize risks with the surgeon and OR team. During the surgery, the anesthesia provider must monitor the patient's position after positioning and repositioning activities to ensure that no devices or equipment cause a direct compression to the patient's extremities (AORN, 2017; ASA, 2018; Bhananker & Domino, 2013; Cassorla & Lee, 2015; Thompson, 2018; Warner & Johnson, 2017). Thus, preoperative assessment and perioperative vigilance are essential in the prevention of PPNIs.

Arm abduction in supine, prone, and lithotomy positions should be limited to 90° or less (AORN, 2019; ASA, 2018; Cassorla & Lee, 2015; O'Connor & Radcliffe, 2018; Spruce & Van Wicklin, 2015; Thompson, 2018; Warner & Johnson, 2017). Some patients in the prone position may tolerate arm abduction greater than 90° (ASA, 2018; Cassorla & Lee, 2015). The positioning of upper extremities on an armboard in the supine position must avoid direct pressure on the postcondylar groove of the humerus (ulnar groove) by supination or a neutral forearm position (AORN, 2019; ASA, 2018; Cassorla & Lee, 2015; O'Connor & Radcliffe, 2018; Thompson, 2018; Warner & Johnson, 2017). If patient's arms are tucked at the side in a supine or lateral position, a neutral forearm position is recommended (ASA, 2018; Bhananker & Domino, 2013; Cassorla & Lee, 2015; Thompson, 2018; Warner & Johnson, 2017). Elbow flexion must be avoided to reduce the risk of ulnar neuropathy, but the current literature does not specify the degree of acceptable flexion (ASA, 2018; Bhananker & Domino, 2013; Cassorla & Lee, 2015; Thompson, 2018; Warner & Johnson, 2017). Elbow extension in an anesthetized patient beyond the range that is comfortable during the preoperative assessment should be minimized to avoid stretching of the median nerve and prevent median neuropathy (AORN, 2019; ASA, 2018; Bhananker & Domino, 2013; Cassorla & Lee, 2015; Thompson, 2018;

Warner & Johnson, 2017). The prolonged pressure from a hard surface on the radial nerve in the spinal groove should be avoided to prevent radial neuropathy (AORN, 2019; ASA, 2018; Bhananker & Domino, 2013; Cassorla & Lee, 2015; Thompson, 2018; Warner & Johnson, 2017). Periodic assessment of upper extremities during the surgery by anesthesia professionals ensure the maintenance of the desired position.

The current recommendations to reduce perioperative sciatic neuropathy include the avoidance of positions that stretch the hamstring muscle group beyond the range that is comfortable during the initial preoperative assessment and to limit the degree of hip flexion and knee extension due to the crossing of sciatic nerve both at the hip and the knee joints in the lithotomy position (AORN, 2019; ASA, 2018; Bhananker & Domino, 2013; Cassorla & Lee, 2015; Chui, Murkin, Posner, & Domino, 2018; Thompson, 2018; Warner & Johnson, 2017). The anesthesia provider must avoid, when possible, extension or flexion of the hip and extreme abduction and external rotation of thighs to reduce the risk of femoral neuropathy in the lithotomy position. (AORN, 2019; ASA, 2018; Bhananker & Domino, 2013; Cassorla & Lee, 2015; Thompson, 2018; Warner & Johnson, 2017). The prolonged, direct pressure on the peroneal nerve at the fibular head must be eliminated to prevent peroneal neuropathy (AORN, 2019; ASA, 2018; Bhananker & Domino, 2013; Cassorla & Lee, 2015; Thompson, 2018; Warner & Johnson, 2017). Preoperative assessment of lower extremities range of motion and limitations should dictate the perioperative positioning.

Prophylactic padding may be applied to bony prominences or other areas subjected to continuous or intermittent pressure, friction, and shear (AORN, 2019). Padded armboards in dorsal decubitus, lithotomy, lateral decubitus, or prone position helps to decrease the risk of upper extremity neuropathy (AORN, 2019; ASA, 2018; Bhananker & Domino, 2013; Cassorla &

Lee, 2015; Thompson, 2018; Warner & Johnson, 2017). In the lateral decubitus position, adequately placed chest rolls help to avoid compression to the brachial plexus and have been associated with a decrease in upper extremity neuropathies (AORN, 2019; ASA, 2018; Bhananker & Domino, 2013; Cassorla & Lee, 2015; Thompson, 2018; Uribe, Kolla, Omar, Dakwar, Abel, Mangar, & Camporesi, 2010; Warner & Johnson, 2017). Padding at the elbow in all surgical positions may decrease the risk of ulnar neuropathies (AORN, 2019; ASA, 2018; Bhananker & Domino, 2013; Cassorla & Lee, 2015; Prielipp, Morell, & Butterworth, 2002; Thompson, 2018; Warner & Johnson, 2017). Also, padding at the fibular head in the lithotomy position helps to minimize excessive pressure of a hard surface against the peroneal nerve (AORN, 2019; ASA, 2018; Bhananker & Domino, 2013; Bouyer-Ferullo, 2012; Cassorla & Lee, 2015; Thompson, 2018; Warner & Johnson, 2017). It is worth mentioning that if padding is too tight, it may increase the risk of neuropathy.

The anesthesia provider must ensure that the automated blood pressure cuff is appropriately functioning and accurately positioned (i.e., placed above the antecubital fossa) on the arms to avoid the risk of upper extremity neuropathies (AORN, 2019; ASA, 2018; Bhananker & Domino, 2013; Bouyer-Ferullo, 2012; Cassorla & Lee, 2015; Thompson, 2018; Warner & Johnson, 2017). Pneumatic tourniquet pressure of more than 400 mm Hg is known to contribute to PPNIs; therefore, only the minimal pressure should be used for occluding blood flow to the extremity for no greater than 2 hours (Fritzlen, Kremer, & Biddle, 2003). Anesthesia providers should be cognizant of straps and other ancillary positioning devices that may cause nerve compression and nerve injury if tightened excessively (AORN, 2017; Fritzlen, Kremer, & Biddle, 2003). Thus, safety restraints and monitoring devices must be applied in a manner that secures the patient safety and allows effective hemodynamic monitoring without nerve, tissue, or circulatory compression. If misused, stirrups can cause peroneal neuropathy via direct compression in the lithotomy position. Shoulder braces in supine, steep head-down (Trendelenburg) positions may increase the risk of brachial plexus injuries; therefore, the shoulder braces and beanbags should be avoided by utilizing a non-sliding mattress (AORN, 2019; ASA, 2018; Bhananker & Domino, 2013; Cassorla & Lee, 2015; Metzner, Posner, Lam, & Domino, 2011; Thompson, 2018; Warner & Johnson, 2017). If possible, neurophysiologic monitoring should be used intraoperatively to detect and identify potential PPNIs (ASA, 2018; AORN, 2017, Fritzlen, Kremer, & Biddle, 2003). As follows, nurse anesthesia providers must be aware of intraoperative positioning equipment and follow evidence-based guidelines in the application and maintenance of it.

A complete post-anesthesia evaluation and documentation by the anesthesia professional or other qualified anesthesia practitioner are required by Centers for Medicare & Medicaid Services (CMS) no later than 48 hours after surgery or a procedure requiring anesthesia services (Centers for Medicare & Medicaid Services [CMS], 2011). A simple postoperative assessment of extremity nerve function may lead to early recognition of peripheral neuropathies (ASA, 2018; Bhananker & Domino, 2013; Cassorla & Lee, 2015; Metzner, Posner, Lam, & Domino, 2011; Thompson, 2018; Warner & Johnson, 2017). Timely referral to neurology consultation may be beneficial if PPNIs are suspected.

Documentation of specific perioperative positioning actions may be useful for continuous improvement processes, help practitioners focus attention on relevant aspects of patient positioning, and provide information on positioning strategies that lead to an improvement in patient care (ASA, 2018). The American Association of Nurse Anesthetists (n.d.) recommends to document the position of patient and bed; pressure points, plexus protection, alignment of extremities, head, and neck; who positioned the patient and type of position used; placement and type of eye protection; dressing and securing of monitoring lines; position changes; and use of bed extensions and/or positioning belts.

Simulation-Based Education. The anesthesia provider should know the risks of improper positioning and resulting nerve injuries in order to make an early diagnosis properly. With advances in science and technology, the use of simulation as an educational tool is becoming increasingly prevalent in nursing education (Shin, Park, & Kim, 2015; Yuan, Williams, Fang, & Ye, 2012). Along with classroom lectures and clinical instructions, the ultimate goal of nursing education is to promote the application of theoretical knowledge to clinical practice (Shin, Park, & Kim, 2015). A number of the review studies reported that SBE improved students' knowledge (Adamson, 2015; Berndt, 2014; Cant and Cooper, 2010; Cant and Cooper, 2014; Fisher and King, 2013; McGaghie, Issenberg, Barsuk, & Wayne, 2014; Norman, 2012; Skrable and Fitzsimons, 2014; Stroup, 2014; Weaver, 2011; Yuan et al., 2012). Also, simulation is an educational strategy that provides students with a realistic clinical situation and allows them to practice and learn in a safe environment (Al-Elq, 2010; Arthur, Levett-Jones, & Kable, 2012; Hegland, Aarlie, Stromme, & Jamtvedt, 2017; Higham & Baxendale, 2017; Kim, Park, & Shin, 2016; Lorello, Cook, Johnson & Brydges, 2014; National League for Nursing, 2015; Shin, Park, & Kim, 2015). Additionally, SBE allows acquisition of clinical skills through deliberate practice and improves learners' competence and confidence (Al-Elq, 2010; Boulet & Murray, 2010; Cant & Cooper, 2010). Furthermore, SBE reduces risks to patients and learners, increases patient safety (Higham & Baxendale, 2017; Khan, Pattison, & Sherwood, 2010), improves quality in healthcare (Hegland, Aarlie, Stromme, & Jamtvedt, 2017), and reduces health care costs in the long run (Al-Elq, 2010; Council on Accreditation of Nurse Anesthesia

Educational Programs [COA], 2015). The continuing advances in simulation technology and an in-depth understanding of educational principles and practical applications of SBE to outcome-based programs will help bridge the gap between the classroom and clinical environment (Khan, Pattison, & Sherwood, 2010). Thus, simulation-based educational activities can successfully bridge this theory-practice gap of the application of theoretical knowledge to the practical management of patients.

The undeniable connections between the SBE and patient safety initiatives make it imperative that nurse anesthesia education programs have strong simulation-based curricular components (Villanueva, 2017). Standard E.11 of the Standards for Accreditation of Nurse Anesthesia Programs – Practice Doctorate (2015) requires that "simulated clinical experiences are incorporated into the curriculum." Simulation-based activities are most successful when they become part of the standard curriculum along with lectures, problem-based learning, clinical experience, and multimedia computer-based learning (Motola, Devine, Chung, Sullivan & Issenberg, 2013). The SBE is ideal for providing nurse anesthesia students access to practical, "hands-on" applications of their theoretical knowledge.

Simulators are often classified according to their resemblance to reality. Fidelity refers to "the degree of realism associated with a particular simulation activity" and "the ability of the simulation to reproduce the reactions, interactions, and responses of the real-world counterpart" (Lopreiato et al., 2016; Roberts, & Cooper, 2019). Low-fidelity simulators (LFS) do not need to be controlled or programmed externally for the learner to participate (Palaganas, Maxworthy, Epps, & Mancini, 2015), and include case studies, role-playing, or task trainers used to support students or professionals in learning a clinical situation or practice (Lopreiato, et al., 2016; National League for Nursing-Simulation Innovation and Resource Center [NLN-SIRC], n. d. ;

Roberts, & Cooper, 2019; Seropian, Brown, Gavilanes, & Driggers, 2004; Shin, Park, & Kim, 2015). High-fidelity simulators (HFS) are highly realistic devices that can mimic human body functions at a very high level (Lopreiato, et al., 2016; Roberts, & Cooper, 2019; Seropian, Brown, Gavilanes, & Driggers, 2004; Shin, Park, & Kim, 2015; Yuan, Williams, Fang, & Ye, 2011). SPs are volunteers or live actors with scripts who are trained to represent a patient's condition or to provide informative feedback (Jeffries et al., 2018; Mai, Szyld, & Cooper, 2013).

Current literature is controversial whether increased fidelity leads to a general improvement in students' performance and growth of knowledge as compared to low-fidelity simulation. Ilgen, Sherbino, and Cook (2013), Lee and Oh (2015) studies found that higher-fidelity simulation has more benefits than lower-fidelity simulation and positively impacts a high level of cognitive and clinical skills acquisition. Tuzer, Dinc, and Elcin (2016) found that the use of SPs was more effective than the use of HFS in increasing the knowledge scores of students on thorax-lungs and cardiac examinations. De Giovanni, Roberts, and Norman (2009); Lee, Grantham, and Boyd (2008); Massoth et al. (2019); Matsumoto, Hamstra, Radomski, and Cusimano (2002); and Munshi, Lababidi, and Alyousef (2015) found no significant difference in students' performance when subjects were trained on a low- or high-fidelity simulator. Sarmah, Voss, Ho, Veneziano, and Somani (2017) established that a combination of low- and high-fidelity simulators provide a realistic and cost-effective modality in SBE. Currently, no recommendations can be made regarding the use of a specific type of simulator in SBE. Thus, the level of fidelity should correspond to the type of task and the stage of nurse anesthesia student training in the program.

A simulator is best utilized if used in alignment with educational goals that underpin its use within a program. Nurse anesthesia educators need to consider many factors and purposively design clinical scenarios that are based on INACSL Standards of Best Practice (2016) used for simulation. Simulation is not intended to replace the need for learning in the clinical environment; thus, it is essential to integrate simulation training with the clinical practice during nurse anesthesia curriculum development.

Summary of Supportive Evidence

The literature review established that goals of correct positioning for a surgical procedure requires a compromise between the optimal anatomical exposure for surgery and what the anesthetized patient can tolerate structurally and physiologically; establishes an access to the essential intraoperative equipment while protecting the patient's eyes, fingers, toes, genitals, muscles, nerves, and bony prominence; and ensures adequate ventilation and maintains circulation. In all four of the most common surgical positions (dorsal decubitus, lithotomy, lateral decubitus, and prone), the risk of perioperative peripheral nerve injuries exists if the anesthetized surgical patient is positioned incorrectly (AORN, 2001; AORN, 2019; ASA, 2018; Cassorla & Lee, 2015; O'Connor & Radcliffe, 2018; Spruce, Van Wicklin, 2014; Thompson, 2018; Warner & Johnson, 2017). The most commonly affected nerves due to improper positioning are ulnar, brachial plexus, lumbosacral nerve roots, and spinal cords (Cassorla & Lee, 2015; Lalkhen & Bhatia, 2012; Metzner et al., 2011; Thompson, 2018). Current evidence-based practice emphasizes the importance of timely prevention of PPNIs. Recent AANA (n. d.), AORN (2001, 2019), and ASA (2018) recommendations on PPNIs prevention include: preoperative history and physical assessment; meticulous intraoperative monitoring of positioning and surgical equipment; use of prophylactic padding; avoidance of excessive extremity flexion, extension, adduction, abduction, and stretching; and a completion of post-anesthesia evaluation and documentation.

The use of simulation-based education promotes the application of theoretical knowledge to clinical practice and improves students' knowledge, competence, and confidence (Adamson, 2015; Al-Elq, 2010; Berndt, 2014; Boulet & Murray, 2010; Cant & Cooper, 2010; Cant & Cooper, 2014; Fisher & King, 2013; McGaghie, Issenberg, Barsuk, & Wayne, 2014; Norman, 2012; Skrable & Fitzsimons, 2014; Stroup, 2014; Weaver, 2011; Yuan et al., 2012). The continuing advances in simulation technology, in-depth understanding of educational principles, and practical applications of SBE to outcome-based programs will help bridge the gap between the classroom and clinical environment (Khan, Pattison, & Sherwood, 2010; Motola, Devine, Chung, Sullivan & Issenberg, 2013; Villanueva, 2017). By participating in the simulation-based instructions of correct positioning of surgical patients, first-year nurse anesthesia students can supplement academic learning with experiential, simulation-based training that reduces patient safety concerns and permits repetitive practice.

Chapter 3: Project Design and Methodology

Methodological Model

The DNP project manager utilized the Model for Evidence-Based Practice Change (MEBPC) to facilitate the integration of educational EBP for change improvement. The original version of the MEBPC was developed by Rosswurm and Larrabee (1999) and called "A model for change to evidence-based practice." This model was derived from theoretical and research literature related to EBP, research utilization, and change theory. Rosswurm and Larrabee's (1999) model begins with the assessment of the need for the change and ends with the integration of an EB protocol. Later, Larrabee revised steps and schema after teaching and leading nurses in the application of the original model since 1999 at West Virginia University Hospitals (Larrabee, 2009). The revised model re-distributed the actions in Step 2 and Step 3 and also integrated principles of QI, use of teamwork tools, and EB translation strategies to promote adoption of new practice (Dang et al., 2015). Today, the MEBPC consists of six steps.

Step 1: Assess the need for change in practice. The first step of MEBPC consists of assessment of the need for change in practice or opportunity for improvement; creation of an EBP of stakeholders to effectively address the practice problem; collection of internal data about current practice and comparison of external data for benchmarking with internal data; definition of the practice problem statement by linking problem with possible interventions and desired outcomes or by developing a PICOT question (Dang et al., 2015). After reviewing the USF DNP-NAP curriculum, the DNP project manager found that the NURS 511 course, Basic Principles of Anesthesia Care, introduces the proper positioning of surgical patients and discusses the potential peripheral nerve injuries via lecture and PowerPoint-based instructions only. The need for SBE intervention was presented to Dr. Lisa Osborne, NAP Program Director, and Greg Louck, Assistant Professor. Both stakeholders agreed that the first-year GSRNAs need to supplement academic learning with experiential, simulation-based training that permits the repetitive practice of technical skills and increases knowledge and confidence in the prevention of PPNIs. Lastly, the PICOT question was developed by the DNP project manager to locate the best evidence available.

Step 2: Locate the best evidence. The search for evidence should be planned as a rigorous systematic review, including identifying the types and sources of evidence, planning the search for evidence, formulating the research question to guide the search, deciding on the search strategy, selecting the inclusion and exclusion criteria, and planning the synthesis (Dang et al., 2015). During this step, the manager of the scholarly project refined the PICOT question to facilitate the search for an answer and performed a comprehensive literature review.

Step 3: Critically analyze the evidence. Critical appraisal of the evidence is conducted by judging the strength of the evidence; synthesizing the evidence; and assessing the feasibility, benefits, and risks of implementing the new practice (Gang et al., 2015). Once all the evidence is critically analyzed and synthesized, the EBP team members decide if the body of evidence is adequate and support a practice change, and if so, the discussion whether or not benefits and risks of the new practice are acceptable and feasible to the workplace (Gang et al., 2015). After conducting a comprehensive literature search, the DNP project manager completed a comprehensive systematic search worksheet. Furthermore, the appraisal of evidence was performed, and the first draft of a review of the literature was completed. After the DNP project manager received substantial feedback from several DNP faculty members, the literature review was further refined, analyzed, and synthesized. The presently available literature strongly supports the benefits of SBE in the nurse anesthesia curriculum. Thus, the DNP project was approved to be acceptable and feasible to the USF DNP-NAP.

Step 4: Design practice change. Key actions of designing practice change include the proposed practice change definition; identification of needed resources; design of the evaluation of the pilot, and design of the implementation plan (Gang et al., 2015). The description of new practice may have different forms such as protocol, policy, procedure, or guidelines supported by the extensive body of evidence. The needed resources must be identified and include personnel, materials, equipment, and forms. In Step 4, the DNP project manager planned the implementation process and defined desirable outcomes. The action plan was created and discussed with the USF DNP-NAP faculty; the deadline for project implementation was established (March 2020). The educational intervention was approved by the USF DNP-NAP faculty and the USF IRB. The DNP project budget was arranged and discussed with the DNP-

NAP Program Director. The simulation-based scenarios were developed by the DNP project manager utilizing the USF School of Health Science simulation lab scenario design template (Appendix I). The DNP project manager was responsible for the design of simulation-based scenarios; administration, collection, and analysis of demographic surveys, informed consents, pre- and post-knowledge surveys, and SET-M evaluations; and for the organization and administration of the pre-briefing session, simulation, and the debriefing session.

Step 5: Implement and evaluate change in practice. During Step 5, the implementation of the pilot study, process, outcomes, and cost evaluation, as well as the development of conclusion and recommendation takes place (Gain et al., 2015). This DNP project meant to augment the theoretical nurse anesthesia knowledge of the proper positioning of the surgical patient and PPNIs prevention via simulation, not to replace it. After the demographics, knowledge surveys, and SET-M data had been precisely analyzed, it was recorded in the DNP project manuscript and presented by the DNP project manager. Lastly, the practice change was evaluated by the stakeholders.

Step 6: Integrate and maintain change in practice. The final step of the MEBPC involves sharing recommendations about the new practice with stakeholders, incorporating the new practice into the standards of care, monitoring the process and outcome indicators, and celebrating and disseminating results of the project (Gang et al., 2015). The DNP project manager defended the scholarly project and disseminated results to the stakeholders and USF DNP-NAP faculty.

The MEBPC model effectively guided the design and implementation of approaches intended to strengthen EB decision making and helped the DNP project manager implement an EB change into practice (Appendix J).

Ethical Considerations

This DNP project was an evidence-based educational intervention with the overall goal to increase the first-year GSRNAs' knowledge and confidence on how to correctly position the anesthetized patient for surgical procedure and prevent the occurrence of PPNIs. There were no real ethical considerations associated with this DNP project. No risks or discomforts for participants contributing to this study were identified. Informed consent forms were signed by all first-year GSRNAs and SP before the participation in the EB educational intervention. All students and SP records were kept confidential in a locked cabinet in the NAP office and were destroyed one (1) year post-intervention.

A letter of support from the USF DNP-NAP faculty, Gregory Louck, was obtained in September 2019 (Appendix D). An Institutional Review Board (IRB) approval was completed in September 2019 and obtained in October 2019 prior to the project initiation (Appendix K). The DNP project manager completed the Collaborative Institutional Training Initiative (CITI) program (Appendix L) in July 2019. Health Insurance Portability and Accountability Act (HIPAA) policies were not breeched since no actual patient data was reviewed.

Project Schedule and Work Breakdown

The proposed DNP project schedule included the PowerPoint and lecture presentations followed by simulation-based education with pre-briefing and de-briefing sessions. According to the initial plan, the DNP project manager was supposed to present a positioning and nerve injury PowerPoint to the first-year GSRNAs, designed by professor Louck on March 17, 2020. On the following day, March 18, 2020, the DNP project manager would have had administered the simulation-based educational intervention on correct surgical positioning of anesthetized patients and prevention of PPNIs in the USF operating room (OR) simulation lab using SP. SP is a term referring to “all human role players in any simulation context who are trained to portray a patient in realistic and repeatable ways; interact with learners in experiential education and assessment contexts; and provide feedback on learner performance from the perspective of the person they portray” (Lewis et al., 2017). SPs can present a variety of conditions in a standardized manner.

Simulation-based education would have begun with a pre-briefing to set the stage for each group of first-year GSRNAs. Pre-briefing is “an information or orientation session immediately prior to the start of a SBE in which instructions or preparatory information is given to the participants and to establish a psychologically safe environment for participants” (International Nursing Association for Clinical Simulation and Learning [INACSL] Standards Committee, 2016). Goals of pre-briefing is to explain the purpose, timing, expectations, learning outcomes of the SBE, as well as to establish an environment of integrity, trust, and respect (INACSL Standards Committee, 2016).

Simulation is defined as “an educational strategy in which a particular set of conditions are created or replicated to resemble authentic situations that are possible in real life” (INACSL, 2016). After pre-briefing, two groups of first-year GSRNAs would have been given four different scenarios to correctly position the SP into dorsal decubitus, lithotomy, lateral decubitus, and prone positions. The DNP project manager would have utilized a facilitative approach for each scenario to achieve intervention fidelity.

Following the simulation-based education, a debriefing session was planned to occur. Debriefing is “a reflective process immediately following the SBE that is led by a trained facilitator using an evidence-based debriefing model to encourage participants’ reflective thinking, provide feedback regarding the participants’ performance, encourage participants to explore emotions and questions, reflect, and provide feedback to one another” (INACSL

Standards Committee, 2016). During the debriefing session, first-year GSRNAs would have been given the opportunity for emotional release and asked open-ended questions to summarize outcome achievement. The goal of the post-simulation debriefing session was to "enrich learning and contribute to the consistency of the simulation-based education for participants and facilitators" (INACSL Standards Committee, 2016). The DNP project manager planned to facilitate the group's understanding of errors in knowledge, skills, attitudes, as well as restate the American Society of Anesthesiologists (2018) practice advisory for the prevention of perioperative peripheral neuropathies.

Step by Step Plan and Procedures

The goal of this DNP project was to compliment academic learning with experiential, simulation-based training that reduces patient safety concerns due to repetitive practice and increases knowledge and confidence on the prevention of PPNIs. The initial DNP scholarly project consisted of several stages: preparation, lecture and PowerPoint presentation, and simulation-based education on the correct positioning of SPs and the PPNIs prevention.

Preparation. The DNP project manager planned to present a lecture and PowerPoint developed by Gregory Louck, Assistant Professor. The DNP project manager developed simulation scenarios according to INACSL standards by utilizing the USF School of Health Science simulation lab scenario template (Appendix I). A comprehensive list of equipment for the simulation was collected by the end of January 2020. The SP was recruited on a volunteer basis and trained by the DNP project manager to take on the characteristics of a real patient in February of 2020. The SP was required to sign a study participant informed consent and privacy authorization form (Appendix F) and a release form for SP participation in educational activities (Appendix H).

Lecture Day. Before the lecture and PowerPoint presentation, a comprehensive description of the DNP scholarly project was supposed to be provided to participants, including the project purpose; what to expect as a participant; potential benefits and risks; and the DNP project manager's contact information if participants had questions or concerns. Next, all first-year GSRNAs would have been asked to sign a study participant informed consent and privacy authorization form (Appendix F), as well as a student informed consent form (Appendix G). The project participants would have been instructed to complete the demographic questionnaire and pre-knowledge survey anonymously prior to the lecture (Appendix A and Appendix B). All forms would have been collected and retained by the DNP project manager. Next, both, Gregory Louck and the DNP project manager, would have presented the NURS 511 lecture and PowerPoint on correct patient positioning and prevention of PPNIs. The participants would have been allowed to ask questions during and after the presentation. After the lecture and PowerPoint presentation, the first-year GSRNAs would have completed the post-knowledge survey anonymously and returned it to the DNP project manager. The time allocated for the lecture and PowerPoint presentation, as well as the completion of consents and surveys, was supposed to be 3 hours. Demographic questionnaire forms, pre- and post-knowledge surveys would have been administered over a 30 minute period.

Simulation Day. The simulation was projected to occur on the next day after a lecture and PowerPoint presentation. Before the simulation, the pre-briefing session would have taken place. The DNP project manager would have identified expectations for participants and established ground rules. In addition, during the pre-briefing session, the DNP project manager would have oriented first-year GSRNAs to the space, equipment, method of evaluation, roles, the time allotted, simulation objectives, patient situation, and limitations (INACSL, 2016). During the pre-briefing session, the DNP project manager would have had established and maintained throughout the SBE a safe psychological environment. Following the pre-briefing session, two groups of first-year GSRNAs would have been given four different simulation scenarios and asked to position the SP correctly. During the simulation, the first-year GSRNAs would have practiced principles of safe positioning, padding, and patient movement on and off the OR table.

After the simulation, the debriefing session was planned to occur. The goal of the debriefing phase was to enhance learning and heighten participants' self-awareness and self-efficacy (INACSL, 2016). The GAS (gather, analyze, summarize) Job Aid of the Structured and Supported Debriefing Model was planned to be utilized as a debriefing model (Appendix M). The author's permission to use the GAS Job Aid of the Structured and Supported Debriefing Model was obtained in January 2020 (Appendix N). After debriefing, the participants would have been asked to complete the post-knowledge survey identical to pre- and post-lecture knowledge surveys. The goal of knowledge surveys was to identify the increase/decrease/no change in the mean knowledge scores between the pre- and post-knowledge surveys completed by first-year GSRNAs. Lastly, first-year GSRNAs would have evaluated simulation effectiveness on learning and confidence via the SET-M tool (Appendix C). The time allocated for simulation-based education was planned to be 4 hours for both groups of first-year GSRNAs.

Learning Objectives. The lecture and simulation learning objectives provided a blueprint for the design of a PowerPoint presentation and SBE. The lecture and SBE has been developed by the DNP project manager and reviewed by the DNP practice and project mentors. The DNP project manager developed broad and specific objectives to address identified needs and optimize the achievement of expected outcomes (INACSL, 2016). Also, the DNP project manager has utilized the SMART (specific, measurable, achievable, realistic, and time-bound) acronym for objective development. Lecture and simulation learning objectives are included in Appendix O.

Method of Instruction. The DNP project manager planned to utilize multiple methods of instruction during this scholarly intervention. First, the instructor-led lecture method was planned to be used during the lecture and PowerPoint presentation. The DNP project manager was supposed to present current information; summarize material; and focus on key concepts, principles, and ideas concerning correct surgical positioning and PPNIs prevention (McKeachie and Svinicki, 2014). Next, the simulation was projected to be implemented as an additional educational strategy. Interactive discussion during the debriefing session would have promoted reflective learning and identified strategies to improve future performance. By utilizing multiple methods of instructions, the DNP project manager would have best organized and delivered instructions to the diverse population of the first-year GSRNA students.

Method of Assessment. Assessment methods are “the strategies, technique, tools, and instruments for collecting information to determine the extent to which students demonstrate desired learning outcomes” (Winston-Salem State University [WSSU], n.d.). The DNP project manager planned to utilize a combination of direct and indirect methods of assessment. Direct methods of assessment ask students to “demonstrate their learning” while indirect methods ask students to “reflect on their learning” (WSSU, n.d.). The direct method of assessment in this scholarly project included participants' completion of a knowledge survey to assess knowledge objectively and quantitatively. Following the clinical simulation, the first-year GSRNAs would have been asked to complete the SET-M for the evaluation of the participants’ perception of the effectiveness of learning and confidence in the simulation environment. By utilizing the SET-M learning and confidence subscales, the DNP project manager planned to indirectly assess first-year GSRNAs' knowledge and confidence subjectively and quantitatively.

Measures, Tools, Instruments

A convenient sample of first-year GSRNAs was recruited from the USF DNP-NAP. The demographic survey (Appendix A) was developed by the DNP project manager and included information on DNP project participants' age, gender, total years of registered nursing (RN) experience, years of intensive care unit (ICU) experience, years of OR experience (if any), and primary ICU specialty (surgical, transplant, trauma, medical, neurological, neonatal, pediatric, cardiovascular, other). Originally, demographic information planned to be obtained before the lecture and PowerPoint presentation on March 17, 2020.

An assessment of participants' prior knowledge about correct surgical positioning and prevention of PPNIs was planned to be obtained using a pre-knowledge survey before the lecture and PowerPoint presentation. A post-knowledge survey using the same questions as in the pre-knowledge survey, was intended to be utilized to determine the change in knowledge after the lecture and PowerPoint presentation, as well as after the simulation. Due to the use of primary data, the data collection mechanism required the creation of new tools or modification of existing data collection systems and data collection instruments (Sylvia & Terhaar, 2018). The pre- and post-knowledge survey (Appendix B) was created by the DNP project manager and contained eight questions related to the correct surgical patient positioning and prevention of PPNIs.

After the simulation, the DNP project manager planned to assess the evaluation of simulation effectiveness on the first year GSRNAs' learning and confidence via the SET-M. The SET-M (Appendix C) was updated by K., Leighton, P., Ravert, V., Mudra, & C. Macintosh in 2015 to be consistent with the INACSL Standards of Best Practice. Exploratory factor analysis was completed using unweighted least squares. Four subscales were identified with acceptable internal consistency: Pre-briefing (α = .833), Learning (α = .852), Confidence (α = .913), and Debriefing (α = .908) (Leighton, Ravert, Mudra, & Macintosh, 2015). Thus, the SET-M is a valid and reliable method of evaluating students' perceptions of the effectiveness of learning in the simulation setting.

Evaluation Plan

The DNP project manager planned to analyze responses using a descriptive statistic design after demographic forms, SET-M data, pre- and post-lecture, as well as post-simulation knowledge surveys were collected. Descriptive statistics helped to describe, show, or summarize data. By using descriptive statistics, the DNP project manager interpreted project outcomes by using statements such as: "Many responders (N=X, YY %) strongly agreed that the simulation increased confidence in providing interventions that foster patient safety."

Data Sources. The data for this DNP project was obtained directly from the participants. Primary data was collected from knowledge surveys, a demographic questionnaire, and SET-M responses administered by the DNP project manager. The participants' responses provided the DNP project manager with specific information in order to assess first-year GSRNAs' knowledge and confidence quantitatively.

Data Collection Methods. The collection of data for this DNP project was obtained using the quantitative methods. The data collection mechanisms and instruments of this DNP project were pre-/post-knowledge surveys and a demographic questionnaire (survey) created by the DNP project manager. The simulation effectiveness on first-year GSRNAs' learning and confidence were assessed via the Modified Simulation Effectiveness Tool [SET-M] (2015) created by K. Leighton, P. Ravert, V. Mudra, & C. Macintosh and modified by the DNP project manager. The data for this DNP project were collected via multiple sources at different data points during the intervention period, and each test/tool/questionnaire were printed on different colored paper.

Data Analysis Plan. After the DNP project manager collected all the data, a data cleaning approach and a single-sourced data warehouse to normalize the data were planned to be utilized. The DNP project manager planned to manually transfer all data from paper to the SPSS and analyze it. The mean of the total sum of pre- and post-knowledge surveys would have been analyzed using an independent sample t-test. The demographic questionnaire and SET-M tool were planned to be presented in the form of frequency and percent. After all data was precisely analyzed, it was planned to be presented by the DNP project manager to the stakeholders.

Dissemination Plan

The primary goal of disseminating evidence is to facilitate the transfer and adoption of research findings into clinical or academic practice. The public presentation of this DNP project occurred as a proposal before the implementation of the project in November 2019. The public presentation of this DNP project was planned to be completed during the summer of 2020. The proposal consisted of a verbal defense of the project by the DNP project manager in front of the project team and DNP project stakeholders. A verbal defense of the DNP project included a presentation of the introduction, PICOT question, background of the problem, literature review, project plan with budget, target population, methodology, tools for evaluation, and expected implementation process.

The final step of this DNP project included sharing recommendations about the new practice with stakeholders, incorporating the new practice into the standards of care, monitoring the process and outcome indicators, and celebrating and disseminating results of the project

(Dang et al., 2015). After the project completion, a formal public presentation to the DNP project team, stakeholders, USF faculty, and invited DNP-NAP cohorts by the DNP project manager was planned. During the final presentation, the DNP project manager would have disseminated the project results, interpreted results, and summarized recommendations and implications for future practice (Moran, Burson, & Conrad, 2020, p. 379). At the end of both presentations, a 30-minute question and answer session was planned. Additionally, the DNP project manager considered to prepare a manuscript for submission to the INACSL online simulation journal.

Implementation Process Analysis

Environmental Factors. Two weeks before the DNP project implementation, there were no environmental factors identified that could negatively affect the DNP project attendance or implementation. Social, economic, and political factors were mostly favorable to the DNP project implementation. The correct positioning and prevention of PPNI simulation implementation followed the proposed timeline.

On March 11, 2020, the USF leadership announced that all face-to-face classes and experiential learning activities were suspended due to a risk of COVID-19 contraction and spread (E. Kriss, personal communication, March 11, 2020). Coronavirus (COVID-19) is “an infectious disease caused by a newly discovered coronavirus that spreads primarily through droplets of saliva or discharge from the nose when an infected person coughs or sneezes” (World Health Organization [WHO], 2020). According to the Center for Disease Control and Prevention [CDC] recommendations (2020), all schools were required to urge people to practice social distancing and cancel all large gatherings (e.g., group social events with ten or more people) during the COVID-19 pandemic. The DNP-NAP faculty strongly advocated and lobbied for special permission to continue with the plan to implement the correct positioning of SP and prevention of PPNI simulation on March 18, 2020. Fortunately, the USF dean of the School of Health Sciences allowed for the DNP project implementation with an exception that it must be communicated exceedingly clear to the first-year GSRNAs that attendance to the simulation was entirely optional. The NAP program director, in the email to all first-year GSRNAs, specified that participation in the DNP project implementation was “optional but highly encouraged” (L. Osborne, personal communication, March 14, 2020).

The occurrence of a pandemic was not predicted nor expected by anyone at USF and led to the need to make substantial changes to the DNP project implementation. The DNP project manager made a decision not to present Professor Louck’s lecture on positioning and nerve injury on March 17, 2020 due to short notice (2 days before the planned lecture and PowerPoint presentation) and a lack of knowledge and access to the Canvas and VoiceThread software. The DNP project mentor supported the DNP manager's decision due to the circumstances and agreed that learning new software (Canvas, VoiceThreads) over a two-day period was not a reasonable expectation. The decision was communicated to the DNP project team members, and Professor Louck agreed to record and publish the “Positioning and Nerve Injury” PowerPoint presentation, making it available via the Canvas platform to the project participants before March 18, 2020.

The DNP project manager then sent an email to all first-year GSRNAs and personally invited them to attend the correct positioning and prevention of PPNI simulation to promote attendance. By the end of March 17, 2020, five potential participants were identified, and the news was communicated to all DNP project team members. The decision was made by the DNP project manager to adhere to the planned schedule and have two groups for two simulation sessions despite an uneven number of participants per group. Equipment disinfection and handwashing instructions were obtained and strictly followed by the DNP project manager and the DNP project participants.

During the project development phase, there were no environmental factors identified as potential threats to the DNP project implementation. The sudden outbreak of COVID-19 in the U.S. resulted in the potential inability to implement the planned DNP project in the required timeframe. In order to be able to move forward with the project implementation, the DNP project manager was required to strategically reprocess the situation and exercise superb negotiating skills with professional colleagues in order to mobilize people around a highly focused agenda. During this period of re-planning, the DNP project manager strived to maintain high project standards without compromising institutional or individual safety. The DNP project manager adjusted to new circumstances quickly and remained flexible throughout the DNP project implementation phase.

Organizational Culture and Social Factors. The organizational culture in which the DNP project was implemented was based in Catholic and Franciscan norms and values. Initially, the DNP project manager had significant support from the DNP-NAP faculty who identified benefits for the first-year GSRNAs that would result from the correct positioning and prevention of PPNI simulation. On January 13, 2020, the USF President's Cabinet announced that the decision to "sunset the BSN-DNP Nurse Anesthesia Program in the light of the ongoing financial resources required to support the program" had been made (A. Harrell, personal communication, January 13, 2020). Unfortunately, the current first-year GSRNAs were the last students admitted to the DNP-NAP. The organizational culture and staff morale was unfavorable for the DNP project implementation during January and February of 2020. After grievance and acceptance of the DNP-NAP closure, the DNP project manager and the DNP project team reflected on the experience and planned the DNP project implementation in March of 2020.

During the period of readjusting to the fact that no additional student cohorts would be entering into the USF DNP-NAP program, all DNP-NAP faculty continued to actively plan for and promote the correct positioning and prevention of PPNI simulation to the first-year GSRNA curriculum. After USF suspended all face-to-face classes and experiential learning activities due to COVID-19, the DNP-NAP faculty facilitated obtaining special permission to run the planned simulation on March 18, 2020, and continued to promote optional GSRNAs' participation in the simulation due to potential benefits that simulation would yield. Under the circumstances, the DNP-NAP faculty strongly encouraged all students to attend the correct positioning and prevention of PPNI simulation while making it clear that participation was entirely voluntary, and that strict hand and equipment hygiene precautions would be implemented. The target population expressed positive attitudes toward the DNP project and readiness to learn from the DNP project manager. Hence, despite all the obstacles and unforeseen circumstances, the organizational culture and social environment were favorable to the DNP project implementation.

Economic Factors. The original plan of the DNP project included the recruitment of professional actors to act as SP during the simulation. In January 2020, the DNP program director informed the DNP project manager that no monetary funds were available through the nurse anesthesia or graduate nursing department to finance SP. This risk was expected, and an alternative plan was formed during the early phase of the DNP project development.

The DNP project manager sought assistance from the DNP faculty to recruit undergraduate nursing student volunteers for SP roles, and three nursing students expressed their interest in volunteering. The DNP project manager instructed all three volunteers on their SP roles and established clear role expectations two months before the DNP project implementation. The DNP project manager communicated with the volunteers on a weekly basis via text messages. Four days before the DNP project implementation, the NAP program director informed the DNP project manager that the USF undergraduate nursing students could no longer be used as SP volunteers due to the risk of spreading and contracting the COVID-19 virus. The DNP project manager notified and thanked all three volunteers for their willingness and desire to help with the DNP project implementation via text messages.

Three days before the DNP project implementation, the DNP project manager recruited and trained a volunteer who was willing to work pro bono. The SP volunteer agreed to perform all four surgical positions and was available on the morning of March 18, 2020. Thus, even though economic factors were anticipated and addressed, the addition of environmental factors to the existing issues made economic factors harder to achieve. In as timely a manner as the circumstances allowed, the DNP project manager identified potential risks and supportive resources that helped successfully implement the correct positioning and prevention of PPNI simulation utilizing an SP volunteer.

Chapter 4: Results and Outcomes Analysis

Data Collection Techniques and Measures

The implementation of this DNP project took place on March 18, 2020. Upon arrival at the USF OR simulation lab, two groups of first-year GSRNAs were asked to sign and date individual consent forms to participate in the simulation. All GSRNAs confirmed they had received and listened to the "Positioning and Nerve Injury" lecture recorded by Professor Louck prior to attending the simulation. Demographic information and an assessment of the first-year

GSRNAs' pre-knowledge survey was obtained before the pre-briefing session. All participants received the simulation learning objectives and four positioning scenarios. The DNP project manager provided a printed version of Professor Louck's "Positioning and Nerve Injury" PowerPoint and anatomical pictures of upper and lower extremity peripheral nerve locations in the pre-/debriefing room for reference.

During pre-briefing, the DNP project manager explained the purpose, expectations, and learning outcomes of the SBE and established favorable conditions to the learning environment. Once the participants confirmed their understanding of the goals and objectives of SBE, the simulation began. Both groups successfully positioned the SP into the four most common surgical positions (dorsal decubitus, lithotomy, lateral decubitus, and prone) within forty minutes of the start of the simulation. After completing the four positioning scenarios, the participants discussed their thoughts, experiences, and impressions of the intervention. The GAS (Gather, Analyze, Summarize) job aid of the Structured and Supported Debriefing Model was utilized to guide the debriefing. At the conclusion of the intervention, the participants completed the post-knowledge survey and evaluated the simulation effectiveness on learning and confidence via the SET-M tool.

Descriptive statistics were used to analyze the demographic information of participants, the mean of pre- and post-intervention knowledge, and the interpretation of the SET-M tool scores. The statistical analyses were carried out using the Statistical Package for the Social Science (SPSS)® version 23.0 (IBM, Armonk, New York, NY, USA). Means and standard deviations were calculated for all analyzed variables. The categorical variables were expressed as percentages. Pre-post sample means were analyzed for summary values. The qualitative data were gathered through DNP project manager journaling and participant comments in the comment box of the SET-M tool.

Data Analysis Inferences

Demographics. A total of five first-year GSRNAs (*n = 5*) participated in the SBE. Baseline demographics revealed that three of the participants were male (60%), and two were female (40%). The participants' ages ranged from 26 to 44 years and the mean (*M*) for age was 36 years with a standard deviation (*SD*) of ± 8.497. 60% of participants (*n=3*) reported being a Registered Nurse (RNs) for a total of four (4) years, 20% (*n=1*) reported 10 years, and 20% (*n=1*) reported 14 years. The mean for the total number of years of RN experience was 7.2, the median and mode were 4.00 for all participants (*n = 5*) with *SD* = ± 4.60. All participants had worked in intensive care units (ICU) with 60% of participants (*n = 3*) working in the ICU for four (4) years, 20% (*n = 1*) for three (3) years, and 20% (*n = 1*) for six (6) years. The years of ICU experience mean was 4.20, median and mode were 4.0 with *SD* = ± 1.095. Out of all DNP project participants, 20% (*n = 1*) reported working in the OR for 6 years, while 80% (*n* =4) had no experience working as a Registered Nurse in the OR. The participants' primary ICU specialty included trauma, neurological, medical, surgical, pediatric, and cardiovascular.

Pre- and Post-intervention Knowledge Survey Results. All participants (*n = 5*) completed pre- and post-intervention knowledge surveys. Changes for pre- and post-knowledge scores cannot be determined on an individual level because the participants were not assigned identification numbers in order to preserve anonymity. However, an overall analysis of the pre- and post-knowledge survey scores did indicate improvement on all eight questions (Appendix P). Percentage scores for each of the pre- and post-intervention knowledge questions are presented below.

Knowledge Survey Question # 1. What upper extremity nerve injury causes inability to abduct or oppose the 5th finger, and decreased sensation over both surfaces of the medial one and one-half of the ring and pinky fingers? In the pre-knowledge survey, 60% (*n = 3*) of the participants answered correctly (ulnar nerve), while 40% (*n = 2*) of the participants answered incorrectly. In the post-knowledge survey, 100% (*n = 5*) answered the question correctly. There was a 40% increase in objective and quantitative knowledge of first-year GSRNAs.

Knowledge Survey Question # 2. If the arm is abducted to greater than "X" degrees in supine position, risk of brachial plexus nerve injury is increased. In the pre-knowledge survey, 80% (*n = 4*) of the participants responded correctly (90 degrees), while 20% (*n = 1*) of the participants responded incorrectly. In the post-knowledge survey, 100% (*n = 5*) answered the question correctly. There was a 20% increase in objective and quantitative knowledge of first-year GSRNAs.

Knowledge Survey Question # 3. When positioning the patient supine, the head should be maintained in a neutral position. In the pre-knowledge survey, 80% (*n = 4*) of the participants answered correctly (true), while 20% (*n = 1*) of the participants answered incorrectly. In the post-knowledge survey, 80% (*n = 4*) answered the question correctly. There was no increase in objective and quantitative knowledge.

Knowledge Survey Question # 4. Once the patient is in the lateral position, what should be done to the knee and hip of the dependent leg to stabilize the patient? In the pre-knowledge survey, 80% (*n = 4*) of the participants responded correctly (flexion), while 20% (*n = 1*) of the participants responded incorrectly. In the post-knowledge survey, 100% (n = 5) answered the question correctly. There was a 20% increase in objective and quantitative knowledge of first-year GSRNAs.

Knowledge Survey Question # 5. Padding should not be placed under the shoulders in the prone position to prevent stretching of the brachial plexus. In the pre-knowledge survey, 40% (*n = 2*) of the participants answered correctly (false), while 60% (*n = 2*) of the participants answered incorrectly. In the post-knowledge survey, 80% (*n = 4*) answered the question correctly. There was a 40% increase in objective and quantitative knowledge of first-year GSRNAs.

Knowledge Survey Question # 6. What device helps to relieve pressure exerted on the brachial plexus of the dependent arm in the lateral decubitus position? In the pre-knowledge survey, 100% (*n = 5*) of the participants answered correctly (axillary roll). In the post-knowledge survey, 100% (*n = 5*) responded to the question correctly. There was no increase in objective and quantitative knowledge.

Knowledge Survey Question # 7. In order to avoid torsion of the lumbar spine during the initiation of the lithotomy position, what action must be taken? In the pre-knowledge survey, 80% (*n = 4*) of the participants responded correctly (both legs should be raised together, simultaneously flexing the hips and knees), while 20% (*n = 1*) of the participants responded incorrectly. In the post-knowledge survey, 80% (*n = 4*) answered the question correctly. There was no increase in objective and quantitative knowledge.

Knowledge Survey Question # 8. In order to reduce external pressure on the spinal groove of the humerus and the ulnar nerve in a supine position, the appropriate hand and forearm position are. In the pre-knowledge survey, 60% (*n = 3*) of the participants answered correctly (supinated or a neutral position with palm toward the body.), while 40% (*n = 2*) of the participants answered incorrectly. In the post-knowledge survey, 100% (*n* = 5) answered the question correctly. There was a 40% increase in objective and quantitative knowledge of first-year GSRNAs.

Total scores for pre- and post-knowledge surveys were calculated for each participant. One (1) point was awarded for each correct answer, and zero (0) points was awarded for each incorrect answer. The total maximum points for both pre- and post-knowledge surveys was 8 points. The overall scores for pre-knowledge and post-knowledge surveys for each participant are listed in Table 1. The pre- and post-knowledge mean for total scores is listed in Table 2.

Table 1

Pre- and Post-knowledge Survey with Individual and Total Scores for each First-year GSRNA

Pre-Knowledge Survey	**Q1**	**Q2**	**Q3**	**Q4**	**Q5**	**Q6**	**Q7**	**Q8**	**Total**
Test 1	0	1	1	1	0	1	1	1	6
Test 2	0	1	1	1	1	1	1	0	6
Test 3	1	1	0	1	0	1	1	1	6
Test 4	1	1	1	0	0	1	0	0	4
Test 5	1	0	1	1	1	1	1	1	7
Post-Knowledge Survey	**Q1**	**Q2**	**Q3**	**Q4**	**Q5**	**Q6**	**Q7**	**Q8**	**Total**
Test 1	1	1	1	1	1	1	1	1	8
Test 2	1	1	1	1	0	1	1	1	7
Test 3	1	1	0	1	1	1	0	1	6
Test 4	1	1	1	1	1	1	1	1	8
Test 5	1	1	1	1	1	1	1	1	8

Table 2

Pre- and Post-knowledge Mean for Total Scores

	N	**Mean**	**Std. Deviation**	**Std. Error Mean**
PreTestScr	5	5.8000	1.09545	.48990
PostTestScr	5	7.4000	.89443	.40000

A summary of total pre- and post-knowledge survey scores was used to compare two means from the same participants taken at two separate times. The mean for the pre-knowledge survey for all participants (*n* = 5) was 5.8000 (*SD* = ± 1.09545). The mean for the post-knowledge survey for participants (*n = 5*) was 7.4000 (*SD* = ± .89443). Therefore, the expected outcome for this DNP project was successfully achieved because the mean for the pre- and post-knowledge surveys increased by 1.6000 (*SD* = ± 1.51658). The graphic presentation of pre- and post-knowledge first-year GSRNAs answers are presented in Appendix P.

SET-M Results. All participants (*n = 5*) evaluated the simulation effectiveness using the Modified Simulation Effectiveness Tool (SET-M). Percentage scores for each of the SET-M statements are presented below.

SET-M Learning Subscale, Question # 1. I am better prepared to respond to changes in my patient's condition. 80% (*n* = 4) of the participants responded to the statement by indicating strongly agree (3), and 20% (*n* = 1) responded to the statement by indicating somewhat agree (2). 100% of the first-year GSRNAs scored at or above 2 (somewhat agree) on the learning subscale question # 1 in the scenario section on the SET-M evaluation questionnaire post-intervention.

SET-M Learning Subscale, Question # 2. I developed a better understanding of the pathophysiology. 60% (*n* = 3) of participants responded to the statement by indicating strongly agree (3) and 40% (*n* = 2) responded to the statement by indicating somewhat agree (2). 100% of the first-year GSRNAs scored at or above 2 (somewhat agree) on the learning subscale question # 2 in the scenario section on the SET-M evaluation questionnaire post-intervention.

SET-M Learning Subscale, Question # 3. I am more confident of my nursing assessment skills. 100% (*n* = 5) of the first-year GSRNAs responded to the statement by indicating strongly agree (3). 100% of participants scored at or above 2 (somewhat agree) on the learning subscale question # 3 in the scenario section on the SET-M evaluation questionnaire post-intervention.

SET-M Learning Subscale, Question # 4. I felt empowered to make clinical decisions. 100% (*n* = 5) of the participants responded to the statement by indicating strongly agree (3). 100% of participants have scored at or above 2 (somewhat agree) on the learning subscale question # 4 in the scenario section on the SET-M evaluation questionnaire post-intervention.

SET-M Learning Subscale, Question # 5. I had the opportunity to practice my clinical decision-making skills. 100% (*n* = 5) of the participants responded to the statement by indicating strongly agree (3). 100% of participants scored at or above 2 (somewhat agree) on the learning subscale question # 5 in the scenario section on the SET-M evaluation questionnaire post-intervention.

SET-M Confidence Subscale, Question # 6. I am more confident in my ability to prioritize care and interventions. 80% (*n* = 4) of the participants responded to the statement by indicating strongly agree (3) and 20% (*n* =1) responded to the statement by indicating somewhat agree (2). 100% of the participants scored at or above 2 (somewhat agree) on the confidence subscale question # 6 in the scenario section on the SET-M evaluation questionnaire post-intervention.

SET-M Confidence Subscale, Question # 7. I am more confident in communicating with my patient. 80% (*n* = 4) of the participants responded to the statement by indicating strongly agree (3) while 20% (*n* = 1) of participants did not respond to the statement. 80% of the participants scored at or above 2 (somewhat agree) on the confidence subscale question # 7 in the scenario section on the SET-M evaluation questionnaire post-intervention.

SET-M Confidence Subscale, Question # 8. I am more confident in my ability to teach patients about their illness and interventions. 60% (*n* = 3) of the participants responded to the statement by indicating strongly agree (3) and 40% (*n* = 2) responded to the statement by indicating somewhat agree (2). 100% of the participants scored at or above 2 (somewhat agree) on the confidence subscale question # 8 in the scenario section on the SET-M evaluation questionnaire post-intervention.

SET-M Confidence Subscale, Question # 9. I am more confident in my ability to report information to health care team. 60% (*n* = 3) of the participants responded to the statement by indicating strongly agree (3) and 40% (*n* = 2) responded to the statement by indicating somewhat agree (2). 100% of the participants scored at or above 2 (somewhat agree) on the confidence subscale question # 9 in the scenario section on the SET-M evaluation questionnaire post-intervention.

SET-M Confidence Subscale, Question # 10. I am more confident providing interventions that foster patient safety. 80% (*n* = 4) of the participants responded to the statement by indicating strongly agree (3) and 20% (*n* = 1) responded to the statement by indicating somewhat agree (2). 100% of the participants scored at or above 2 (somewhat agree) on the confidence subscale question # 10 in the scenario section on the SET-M evaluation questionnaire post-intervention.

SET-M Confidence Subscale, Question # 11. I am more confident in using evidence-based practice to provide nursing care. 80% (*n* = 4) of the participants responded to the statement by indicating strongly agree (3) and 20% (*n* = 1) responded to the statement by indicating somewhat agree (2). 100% of the participants scored at or above 2 (somewhat agree) on the confidence subscale question # 11 in the scenario section on the SET-M evaluation questionnaire post-intervention.

The project met the anticipated outcomes because 100% of the first-year GSRNAs scored at or above 2 (somewhat agree) on the learning subscale questions (question 1-5 in scenario section) and at or above 2 (somewhat agree) on the confidence subscale questions (question 6-11 in Scenario section) on the SET-M evaluation questionnaire after the correct positioning of surgical patients and prevention of PPNIs simulation. The graphic presentation of SET-M results can be found in Appendix Q.

Qualitative Data Results. Recurrent themes in comments provided by the first-year GSRNAs during the debriefing session revealed that all participants highly valued the realism of the simulation and the utilization of SP vs. patient simulators. Also, participants emphasized the importance of teamwork and clear communication during the correct positioning of the anesthetized patient for surgical procedures. All participants indicated that the lithotomy position was the most challenging of the four positions included in the simulation. In the SET-M tool comment section, participants indicated they received “an invaluable experience coming from the simulation,” “awesome experience! Definitely helpful,” “very good learning opportunity. This will help as I progress forward as a SRNA,” “it was a good learning experience and I am glad I attended,” “wonderful experience. Thank you for creating the simulation to give better understanding to proper positioning.” The participants stated that the simulation was well-organized, objectives were clear and easy to understand, and simulation scenarios resembled real-life situations.

Based upon the project’s statistical and qualitative data, it is appropriate to state that SBE improved first-year GSRNAs’ knowledge and perceptions of knowledge and confidence on correct surgical positioning of anesthetized patients and prevention of PPNIs. The mean knowledge scores between the pre- and post-knowledge surveys increased by 1.6000 (*SD* =

1.51658). 100% of the first-year GSRNAs scored at or above 2 (somewhat agree) on the learning subscale questions (question 1-5 in scenario section) and on the confidence subscale questions (question 6-11 in scenario section) on the SET-M evaluation questionnaire after the correct surgical positioning of anesthetized patient and prevention of PPNIs, and all participants expressed satisfaction with the simulation verbally and in a written form. Thus, the goals and expected outcomes of this DNP project have been fully achieved.

Unanticipated Consequences

Due to the COVID-19 pandemic and suspension of face-to-face classes and experiential learning activities, the number of first-year GSRNAs attendees was significantly less than expected by the DNP project manager. The total number of the first-year GSRNAs who took the NURS 511 course during the spring of 2020 was thirteen. Only five first-year GSRNAs attended and actively participated in the simulation on correct patient positioning and prevention of PPNIs. The DNP project manager utilized G*Power 3.1.9.7 software (Faul, Erdfelder, Lang, & Buchner, 2007; Faul, Erdfelder, Buchner, & Lang, 2009) to determine the total sample size for power (1-ß err probability) of 0.8. The total sample size for the actual power of 0.8 should be 27 participants to calculate the difference between two dependent means with α err probability of 0.05. Due to the small sample size, the likelihood of a Type II error skewing the results was increased, which decreased the power of the study.

Another limitation was that participants' identification was not collected due to confidentiality and anonymity concerns; therefore, descriptive statistics were used instead of inferential statistics, such as a paired t-test. The utilization of descriptive statistics was a limitation because the results cannot be generalized, and the differences are not supported by statistical significance. Should this study be replicated, the DNP project manager recommends assigning each participant a unique survey identification (ID) number to maintain confidentiality, as well as to collect and compare individuals' results and measure the change before and after an intervention.

Chapter 5: Leadership and Management of the Project

Organizational Culture

Organizational culture is "the company's social and spiritual field, shaped by material and non-material, visible and disguised, conscious and unconscious processes and phenomena that together determine the consonance of philosophy, ideology, values, problem-solving approaches and behavioral patterns of the company's personnel" (Vasyakin, Ivleva, Pozharskaya, & Shcherbakova, 2016). Organizational culture is capable of driving an organization towards progress. The culture of the University of Saint Francis had a direct effect on the faculty and students' success and how they responded to a change.

USF is rooted and guided by Catholic and Franciscan values that emphasize respect for each individual, service to humanity, a trusting community, a deeper awareness of peace and justice issues, and respect and care for creation (Kriss, n.d.). The university has a hierarchical organizational structure where power and responsibility are allocated to individuals according to their standing or position within the hierarchy. In a hierarchical organizational structure, the focus is on structure, standard procedures, and control (Bragg, 2018; Druckman, Singer, & Van Cott, 1977). All decisions originating at the bottom of the USF organizational pyramid must pass up through the chain of command that connects all departments within the organization.

A hierarchical organizational structure includes many advantages such as clear lines of authority and reporting, distinct roles and responsibilities of management and employees, a straightforward career path, and extensive development of employees' specialization (Bragg, 2018; Meehan, 2019). On the other hand, disadvantages of a hierarchical organizational culture include a complicated chain of command, increased bureaucracy that can slow down decision-making processes, inconsistency and delays in communication among management at different levels which can impede work, a disconnect of employees from top-level management, and rivalry between departments that may inflame as each department decides what benefits its interests rather than the organization's as a whole (Meehan, 2019). An organization's culture involves a set of ideas, values, and behaviors within any given organization over time and plays a vital role in the DNP project implementation and success.

Due to a hierarchical organizational structure of USF, the approval of the DNP project implementation and any changes related to the DNP project went through an extensive chain of command, which created numerous potential communication breakdowns between departments. For example, after the USF leadership announced suspension of face-to-face classes and experiential learning activities the week before planned DNP project implementation due to a risk of COVID-19 contraction, the DNP project manager immediately contacted the DNP project team members for further directions and possible changes to the DNP project. In the face of this adversity, the NAP director reached out to the USF Dean of the School of Health Sciences and lobbied for special permission from the USF leadership for the DNP project implementation in the light of the COVID-19 pandemic occurrence. The dean granted permission for the DNP project implementation.

Leadership Style

Leadership is the ability to guide others, whether they are colleagues, peers, clients, or patients, toward desired outcomes (Marshall & Broome, 2017). The DNP project manager chose transformational leadership style to develop, lead, and implement the DNP project.

Transformational leadership is “a leadership style in which leaders encourage, inspire, and motivate followers to innovate and create change that will help grow and shape the future success of the organization” (White, 2018). J. MacGregor Burns (1978) proposed the original concept and foundational theory for transformational leadership. Later, B. M. Bass (1985) expanded upon Burn’s original theory and added four essential elements that underlie transformational leadership. Four main ideas of transformational leadership theory include the creation of a vision, growth mindset, authenticity, and creativity (Marshall & Broome, 2017).

The DNP project manager applied the Franciscan value system, as well as emotional intelligence, during the DNP project implementation. As a transformational leader, the DNP project manager communicated continuously with the DNP project team and first-year GSRNAs, as well as consistently expressed flexibility, enthusiasm, and open mindfulness toward the DNP project implementation. The DNP project manager inspired and motivated first-year GSRNAs to ask questions, communicate with each other, and share responsibilities for standardized patient well-being during a correct surgical positioning of anesthetized patients and PPNI simulation. The DNP project implementation was an advanced immersion experience that allowed the DNP project manager to build a skill set and competencies to function in clinical leadership roles to the highest level of practice expertise.

Interprofessional Collaboration

Interprofessional collaboration is vital to the implementation of discoveries and best practices in the creation of cost-effective, evidence-based patient- and family-centered health care. Moreover, interprofessional collaboration leads to the empowerment of all team members, closes communication gaps, and promotes a team mentality. The DNP project manager had demonstrated transformational leadership commitment, cultivated effective team communication, and applied interprofessional collaboration during the DNP project planning and implementation.

During the project planning and implementation, the DNP project manager learned essential communication and leadership skills on how to lead intra- and interprofessional teams, model professional behavior, guide team members to the highest level of function to improve proposed outcomes and implement the evidence-based doctoral project. Interprofessional competence is the cornerstone of authentic, collaborative practice that is founded on shared values, mutual respect, effective leadership, and ongoing and dedicated efforts to create and maintain excellent relationships (Laskowski-Jones, 2018). The DNP project manager collaborated with the DNP project advisor, the nurse anesthesia practice mentor, the nurse anesthesia academic advisor, and the Director of the School of Health Sciences Simulation Lab to design and implement the DNP project. Also, the DNP project manager frequently communicated with the first-year GSRNAs and USF clinical partners throughout all phases of the DNP project. Continuous and straightforward interprofessional collaboration with all team members of the DNP project ensured the success of the DNP project implementation.

Conflict Management

Conflict is an “interactive process manifested in incompatibility, disagreement, or dissonance within or between social entities such as individual, group, or organization” (Rahim, 2010). Sources of a potential conflict during the project implementation included conflict over administrative procedures, conflict over workforce resources, conflict over schedules, conflict over cost, and personality conflict (Hiltz, 1994). Thomas and Kilmann (1974) described five different modules for responding to conflict situations: avoidance, competition, accommodation, compromise, and collaboration. During the planning and implementation of the DNP project phases, the DNP project manager actively utilized all five conflict management strategies depending on the situation.

The DNP project manager utilized numerous strategies to reduce conflict during the project implementation. The DNP manager was meticulously prepared for every meeting with stakeholders which significantly reduced the opportunity for conflict to develop. The DNP project manager frequently updated all members of the DNP project team on the action plan timeline. Also, the DNP project manager communicated with stakeholders, practice advisors, and volunteers in a clear, concise, and consistent manner. The DNP project manager developed a project plan and set a realistic schedule that assisted in the project implementation. Moreover, the DNP project manager was open and flexible to changing strategies and tactics to maximize the DNP project results.

The DNP project manager executed numerous strategies to avoid conflict during all phases of the project. Despite these efforts, the announcement that all face-to-face classes and experiential learning activities were suspended due to the risk of COVID-19 one week before the DNP project implementation directly threatened the DNP project implementation and the need for conflict management interventions was imperative. The DNP project manager employed compromising, collaborating, and negotiating conflict-handling techniques. The DNP project manager created an open communication channel via email with the project team. This facilitated open dialogue, the determination of possible solutions, and a clear communication path for the DNP project manager to keep everyone updated and informed on the DNP project implementation progress. Fortunately, the DNP project implementation was approved by the USF Dean of the School of Health Sciences, and the DNP project implementation conflict was resolved.

Negotiation is a crucial skill for successful relationships. The purpose of negotiation is to resolve differences and reach an agreement that is based on a thorough discussion (Dreher & Glasgow, 2017). The DNP manager's role in negotiation required a high level of system thinking and an ability to apply expertise in system theory and functioning. Throughout the DNP project planning and implementation phases, the DNP project manager developed skills and strategies necessary to effectively optimize relationships within and between USF leaders to achieve a successful project implementation outcome.

CHAPTER 6: Discussion

Impact of the DNP Project

The goal of this DNP project was to supplement academic learning with experiential, simulation-based training that permits repetitive practice, and increases participants' knowledge and confidence on the correct positioning of the standardized patient and prevention of PPNIs in the perioperative setting. The initially planned PICOT question was, "In first-year nurse anesthesia students, how does participation in the correct positioning of standardized patients and prevention of perioperative peripheral nerve injuries simulation influence knowledge and confidence compared with lecture and PowerPoint-based instruction only?" Throughout the implementation, the DNP project manager revised the PICOT question to reflect the required changes to the DNP project. The final version of the PICOT question for this scholarly project was, "In first-year nurse anesthesia students, how does participation in the correct positioning of standardized patients and prevention of perioperative peripheral nerve injuries simulation influence knowledge and confidence?"

The results of this DNP project indicate that participation in the SBE positively influenced and improved participants' knowledge and perceptions of knowledge and confidence about surgical positioning and PPNIs. The quantitative data from the pre- and post-simulation knowledge survey and SET-M tool, as well as qualitative data from students' comments, support the premise that simulation experience can help to improve students' knowledge on correct surgical positioning of anesthetized patients and prevention of PPNIs. Hence, the incorporation of SBE strategies for first-year GSRNAs can help to advance patient safety and the overall quality of anesthesia care provided. Well-informed future CRNAs will be better equipped to identify and mitigate risks associated with improper surgical positioning of anesthetized patients, to decrease frequency and severity of PPNIs, to increase confidence in the clinical setting, and to practice anesthesia safely. Moreover, CRNAs can educate future nurse anesthesia providers about the importance of simulation in nurse anesthesia education.

Limitations and Recommendations

The findings of this DNP project should be interpreted in light of several limitations. This DNP project had limitations related to attendance. All first-year GSRNAs were invited to the simulation (n = *13*), but only a small number of participants actually attended (n = *5*). A possible reason for the small sample size was the coronavirus pandemic and limited knowledge about the contraction and spread of the disease during the DNP project implementation period. An additional contributing factor was the departure of many of the first-year GSRNAs from Fort Wayne following the suspension of face-to-face classes and experiential learning activities. Considering the small sample size, the outcomes may not be an accurate representation of the entire first-year GSRNA population. Further analysis is needed to determine if this project should be implemented into the other nurse anesthesia programs.

An additional limitation within this DNP project is that the pre- and post-knowledge surveys were not randomly collected from the participants before and after the simulation. This precluded the comparison of individual participant's responses. Given the small sample size, it would have been more effective to evaluate the increase or decrease of knowledge scores from each participant rather than generalizing the totals as a group. A future recommendation would be to assign each participant a unique survey ID for more substantial data analysis.

Lastly, the DNP project manager was not able to participate in the lecture and PowerPoint presentation as initially planned due to the suspension of face-to-face classes related to the coronavirus outbreak. Hence, the comparison of pre-lecture, post-lecture, and post-simulation knowledge survey scores was not attained. By administering pre- and post-knowledge surveys at three different points of time, the DNP project manager planned to track the increase/decrease/no change in knowledge and confidence of the correct positioning of standardized patient and prevention of PPNIs. The McNemar and Cochran's Q tests could be performed to determine the statistical significance of simulation influence on knowledge and confidence compared with lecture and PowerPoint-based instruction only. Therefore, a future recommendation would be to adhere to the original DNP project plan and assess the knowledge and confidence of participants at three different points throughout the project implementation.

Application to Other Settings

Advancing patient safety and quality of care are fundamental driving forces for incorporating SBE into CRNA curricula. Curriculum designs for simulation integration that are longitudinal and integral to other curricular components enhance the effectiveness of SBE (Villanueva, 2017). Through the outcome analysis of the project findings, the correct positioning of standardized patient and prevention of PPNIs simulation should be considered for possible implementation into other nurse anesthesia programs. A potential barrier that should be considered by other nurse anesthesia programs is that the development and integration of new learning modules and simulations required for the students to meet the course objectives can be time-consuming. Also, the cost to hire standardized patients must be included during the nurse anesthesia program budgeting to ensure high fidelity of the simulation. Lastly, nurse anesthesia faculty preparation and proficiency in SBE are critical to the success of a simulation. Overall, the correct positioning of the standardized patient and the prevention of PPNIs simulation for first-year GSRNAs can provide learners the opportunity to increase their knowledge and confidence of the anesthesia techniques and skills before actually attempting it on a live anesthetized patient. Therefore, risks to patients and learners could be decreased, and patient safety could be improved.

Strategies for Maintaining and Sustaining of Change

Potential strategies for maintaining and sustaining the educational evidence-based intervention include continuous assessment of organizational culture, development of a sustainability plan, identification of strengths and major barriers to the intervention, continuous monitoring of results, active dissemination of results and outcomes to the stakeholders, and critical analysis and integration of the new research findings (Dang et al., 2015). On January 13, 2020, the USF President's Cabinet announced that the decision was made to "sunset the BSN-DNP Nurse Anesthesia Program in the light of the ongoing financial resources required to support the program" (A. Harrell, personal communication, January 13, 2020). Unfortunately, the first-year GSRNAs project participants were the last cohort of students admitted to the USF DNP-NAP. Therefore, no strategies for maintaining and sustaining educational evidence-based intervention were selected for this DNP project.

Lessons Learned

The goal of this DNP project was to provide the evidence associated with the improvement of patient outcomes during surgical positioning and prevention of PPNIs that can be used to deliver safe, individualized anesthesia care, as well as to educate stakeholders and participants about the importance of integrating SBE into the nurse anesthesia education. Factors that contributed to the success of this DNP project included meticulous planning; continuous assessment and evaluation of the DNP project goals during the planning; implementation and evaluation phases; utilization of standardized processes and evidence-based models; substantial stakeholders support; timely troubleshooting and conflict management; as well as ongoing communication within the DNP project team. The DNP project goals were met on schedule and within the budget. There was a high level of satisfaction regarding the outcome reported by participants, the DNP project manager, the DNP project team, and stakeholders. This DNP project reflected the culmination of the attainment by the DNP project manager of the eight DNP Essentials of Doctoral Education for Advanced Nursing Practice, outlined by the American Association of Colleges of Nursing (2006). Thus, the DNP project should be considered successful.

DNP Project and DNP Essentials

During and after development and implementation of this DNP project, the DNP project manager fulfilled all of the American Association of Colleges of Nursing (AACN)'s Doctor of Nursing practice essentials. Also, the DNP project manager satisfied the USF DNP graduate student learning outcomes, including synthesis of current and emerging science and theories from nursing and other disciplines in the application and evaluation of advanced nursing practice to benefit individuals across the lifespan and health care systems. Moreover, the DNP project manager served in an advanced leadership role to transform nursing practice in complex systems considering cultural, political, organizational, and economic implications. By implementing the DNP project on correct positioning and prevention of PPNI simulation, the DNP project manager learned how to improve patient and population health outcomes by cultivating interprofessional networks that support mentorship, knowledge development, shared decision-making, and professional growth. The DNP project manager mastered the utilization of information and technology to manage knowledge, mitigate error, resolve conflicts, collaborate with interdisciplinary teams, and improve patient and population health outcomes. And lastly, the DNP project manager promoted the translation of research in nursing practice through continuous scholarship and dissemination of research evidence that improves health outcomes in a variety of populations, clinical settings, and systems (University of Saint Francis, 2020). After attaining all of the DNP-NAP competencies, the DNP project manager was prepared for the highest level of leadership in practice and scientific inquiry.

Chapter 7: Conclusion

Potential Project Impact on Health Outcomes Beyond Implementation Site

Anesthesia-related PPNIs are the second most common cause of anesthesia-related litigations after death (Cheney, Domino, Caplan, & Posner, 1999; Fritzlen, Kremer, & Biddle, 2003; Lalkhen & Bhatia, 2012; Metzner, Posner, Lam, & Domino, 2011). Improper positioning of the arms, hands, shoulders, legs, or feet of the anesthetized patient during the surgical procedure may lead to severe nerve injury or paralysis. A significant reduction in the perioperative nerve injury can be achieved by integrating the correct surgical positioning of standardized patient and prevention of PPNIs simulation into the nurse anesthesia curriculum. Simulation is a safe way for student registered nurse anesthetists to achieve skill competency without jeopardizing patient safety. Moreover, simulation can provide graduate nurse anesthesia students with opportunities they might not get depending on the clinical experience. By becoming positioning experts early in the educational process, SRNAs all over the country can prevent nerve injuries, reduce the number of disabilities caused by improper perioperative surgical positioning, and positively impact nurse anesthesia patient-related outcomes.

Health Policy Implications of Project

In today's world, health care is rapidly developing and changing. As future advanced practice nurses, SRNAs and actively practicing CRNAs in clinical and academic settings must move forward along with these changes. SBE is a unique way to facilitate learning and increase nurse anesthesia students' knowledge and confidence on correct surgical positioning and prevention of positioning-related PPNIs. The review of literature provides an extensive body of evidence that supports SBE in nurse anesthesia education as a means to improve learners' knowledge and confidence in the clinical settings. Both SRNAs and CRNAs must be active in the development of health policies to better control their practice, protect patient safety, and increase the quality of care. In some instances, individuals who acquire DNP-NAP degrees will seek roles as educators and will use their practice expertise on the correct positioning and the prevention of PPNIs to educate the next generation of nurse anesthesia providers. This DNP project has a direct implication on health policy by transforming the education of the nurse anesthesia providers to meet diverse patients' needs, function as positioning leaders and experts, and advance nursing sciences that benefit patients.

Proposed Future Direction for Practice

In conclusion, the goal of this DNP project was to complement academic learning with experiential, simulation-based training that reduces patient safety concerns due to repetitive practice and increases knowledge and confidence on the correct positioning and the prevention of PPNIs. The research evidence presented within this project further supports SBE as an excellent medium to create highly-relevant contexts where nurse anesthesia students are active participants in the learning process, and repetitive, hands-on experience increases their confidence. The USF first-year GSRNAs were selected as participants for this DNP project. The statistical data revealed that the implementation of this DNP project was a great benefit to increasing knowledge and confidence in this population. The advantage of simulation is a critical topic for both research and practice. It is the DNP project manager's hope that this DNP project will guide future research on the correct positioning and the prevention of PPNIs among the nurse anesthesia students and become a permanent intervention in other nurse anesthesia programs. This project can potentially result in a wider spread of the correct knowledge of the positioning and the prevention of PPNIs, as well as improvement of patients' satisfaction and outcomes.

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Appendix A: Demographic Questionnaire

Demographic Questionnaire

Please fill in the blank or check the appropriate boxes for each of the following questions.

1. What is your age?______________ years

2. What is your gender? ☐ Female ☐ Male ☐ Other

3. How long have you been a Registered Nurse (RN)?_______ years

4. How many years of Intensive Care Unit (ICU) experience do you have? _______ Years

5. How many years of OR experience do you have? _______ years

6. What is your primary ICU specialty?

    - ☐ Medical
    - ☐ Surgical
    - ☐ Cardiovascular
    - ☐ Transplant
    - ☐ Trauma
    - ☐ Neurological
    - ☐ Pediatric
    - ☐ Neonatal
    - ☐ Other, please specify

Appendix B: Pre- and Post-knowledge Survey

Date ___________________________

1. What upper extremity nerve injury causes inability to abduct or oppose the 5th finger, and decreased sensation over both surfaces of the medial one and one-half of the ring and pinky fingers?
   1) **Ulnar nerve**
   2) Radial nerve
   3) Medial nerve
   4) Axillary nerve
2. If the arm is abducted to greater than _________ degrees in supine position, risk of brachial plexus nerve injury is increased.
   1) **90**
   2) 60
   3) 30
   4) 45
3. When positioning the patient supine, the head should be maintained in a neutral position.
   1) False
   2) **True**
4. Once the patient is in the lateral position, what should be done to the knee and hip of the dependent leg to stabilize the patient?
   1) Extension
   2) **Flexion**
   3) Adduction
   4) Abduction
5. Padding should not be placed under the shoulders in the prone position to prevent stretching of the brachial plexus.
   1) True
   2) **False**
6. What device helps to relieve pressure exerted on the brachial plexus of the dependent arm in the lateral decubitus position?
   1) **Axillary roll**
   2) Shoulder brace
   3) Pillow
   4) Gel donut
7. In order to avoid torsion of the lumbar spine during the initiation of the lithotomy position, what action must be taken?
   1) Each leg should be raised independently, simultaneously flexing the hip and knee
   2) **Both legs should be raised together, simultaneously flexing the hips and knees**
   3) Each leg should be raised independently, simultaneously extending the hip and knee
   4) Both legs should be raised together, simultaneously extending the hips and knees

8. In order to reduce external pressure on the spinal groove of the humerus and the ulnar nerve in a supine position, the appropriate hand and forearm position are:
    1) Pronated or a neutral position with palm away the body
    2) Supinated or a neutral position with palm toward the body
    3) Pronated or a neutral position with palm toward the body
    4) Supinated or a neutral position with palm away the body

Appendix C: SET-M Tool

Simulation Effectiveness Tool - Modified (SET-M)

After completing a simulated clinical experience, please respond to the following statements by circling your response.

PREBRIEFING:	**Strongly Agree**	**Somewhat Agree**	**Do Not Agree**
Prebriefing increased my confidence	3	2	1
Prebriefing was beneficial to my learning.	3	2	1
SCENARIO:			
I am better prepared to respond to changes in my patient's condition.	3	2	1
I developed a better understanding of the pathophysiology.	3	2	1
I am more confident of my nursing assessment skills.	3	2	1
I felt empowered to make clinical decisions.	3	2	1
I developed a better understanding of medications. (Leave blank if no medications in scenario)	3	2	1
I had the opportunity to practice my clinical decision making skills.	3	2	1
I am more confident in my ability to prioritize care and interventions	3	2	1
I am more confident in communicating with my patient.	3	2	1
I am more confident in my ability to teach patients about their illness and interventions.	3	2	1
I am more confident in my ability to report information to health care team.	3	2	1
I am more confident in providing interventions that foster patient safety.	3	2	1
I am more confident in using evidence-based practice to provide nursing care.	3	2	1
DEBRIEFING:			
Debriefing contributed to my learning.	3	2	1
Debriefing allowed me to verbalize my feelings before focusing on the scenario	3	2	1
Debriefing was valuable in helping me improve my clinical judgment.	3	2	1
Debriefing provided opportunities to self-reflect on my performance during simulation.	3	2	1
Debriefing was a constructive evaluation of the simulation.	3	2	1
What else would you like to say about today's simulated clinical experience?			

Leighton, K., Ravert, P., Mudra, V., & Macintosh, C. (2015). Update the Simulation Effectiveness Tool: Item modifications and reevaluation of psychometric properties. *Nursing Education Perspectives, 36*(5), 317-323. Doi: 10.5480/1 5-1671.

Appendix D: Letter of Support

UNIVERSITY of SAINT FRANCIS™

September 11, 2019

To: University of Saint Francis Institutional Review Board

I support Natalya Kollektsionova in her proposed doctoral project which will utilize simulation to instruct first-year nurse anesthesia students for correct positioning of surgical patients. My role is as the subject matter expert for this project.

Correct positioning of surgical patients helps to prevent nerve injuries and is the responsibility of the nurse anesthesia provider. The anticipated benefit to the first-year nurse anesthesia students, and nurse anesthesia program, is an increased knowledge of surgical positioning and patient safety. There is a potential to incorporate the simulation techniques from Natalya's project into the ongoing yearly positioning lecture and workshop. I do not anticipate any negative impact nor conflicts of interest for the nurse anesthesia program or School of Health Sciences.

If I can be of further assistance, please feel free to contact me.

Greg Louck, MS, CRNA

Regards,

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Fort Wayne, Indiana 46808

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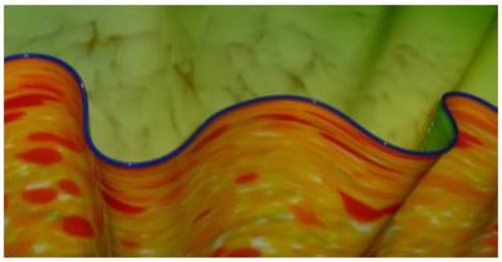
Appendix E: SET-M Permission



Evaluating Healthcare Simulation

August 31, 2019

Dear Natalya,

The authors of the Simulation Effectiveness Tool - Modified (SET-M) are pleased to grant permission for you to use this instrument in your DNP project. I look forward to learning about the outcomes of your work.

Please don’t hesitate to reach out with any questions.

Warm regards,

Kim

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Appendix F: Study Participant Informed Consent and Privacy Authorization Form

Study Participant Informed Consent and Privacy Authorization Form

Title: The Correct Surgical Patient Positioning and Prevention of Position-related Peripheral Nerve Injuries Simulation

Principal Investigator: Natalya Kollektsionova

DNP Scholarly Project Advisor: Dr. Susan Lown

Introduction. During surgery, patients are often required to assume positions which would be unbearable without anesthesia and can lead to position-related peripheral nerve injuries (PPNIs). Legally, anesthesia providers are responsible for correct surgical patient positioning. The SBE on correct positioning of surgical patient and prevention of PPNIs early in the nurse anesthesia curriculum can decrease position-related nerve injuries and improve patient outcomes. Also, the SBE is an effective educational methodology where Graduate Student Registered Nurse Anesthetists (GSRNAs) can actively participate in the proper positioning of the standardized surgical patient and learn how to prevent PPNIs. The first-year nurse anesthesia students will have a chance to practice technical skills such as positioning of the surgical patient in the simulation lab, and they also will solidify theoretical knowledge gained during the lecture. Therefore, the first-year nurse anesthesia students' confidence will increase due to increased knowledge and ability to apply theoretical knowledge in the clinical setting. The project manager of "The Correct Surgical Patient Positioning and Prevention of Position-related Peripheral Nerve Injuries Simulation" Doctor of Nursing Practice (DNP) scholarly project is Natalya Kollektsionova, BSN, RN, CCRN, GSRNA. The DNP scholarly project advisor is Dr. Susan Lown, DNP, RN, CME.

Definitions. Standardized patients are trained to portray patient cases; assess/document student performance; provide individualized feedback on clinical, interpersonal skills and professionalism; and represent patient satisfaction. During a specific event, a standardized patient may receive specific training for completion of a checklist, including physical examination techniques (done-not done or correct technique-incorrect technique). Feedback will consist of informing the student of documented communication checklist by electronic means (IPad, iMacs, or desktop computers or any combination of these three).

Purpose of the Project. "The Correct Surgical Patient Positioning and Prevention of Position-related Peripheral Nerve Injuries Simulation" Doctor of Nursing Practice (DNP) scholarly project aims to implement an evidence-based (EB) educational intervention into the University of Saint Francis DNP-Nurse Anesthesia Program (USF DNP-NAP) and to improve first-year GSRNAs' knowledge and confidence on correct patient positioning and prevention of PPNIs. The SBE on correct positioning of surgical patient and prevention of PPNIs early in the nurse anesthesia curriculum can decrease position-related nerve injuries, improve patient outcomes, and decrease healthcare costs associated with PPNIs.

Procedure. The educational intervention will consist of the DNP project manager's lecture and PowerPoint presentation on surgical positioning and prevention of PPNIs associated with improper surgical positioning for the first-year GSRNAs. Prior to and after a lecture and PowerPoint presentation, the DNP project manager will administer pre- and post-knowledge surveys. The simulation-based scenarios will be developed by utilizing the USF School of Health Science simulation lab scenario design template. Prior to simulation, the pre-briefing session will take place explaining the purpose, timing, expectations, and learning outcomes of the SBE. Two groups of Graduate Student Registered Nurse Anesthetists **(**GSRNAs) will be given four different scenarios where they will have to correctly position the standardized patient into dorsal decubitus, lithotomy, lateral decubitus, and prone positions. During a debriefing session, GSRNAs will be allowed the emotional release, asked open-ended questions, and asked to summarize outcome achievement. The DNP project manager will correct errors in knowledge, skills, attitudes, as well as restate the Standard of Care. After the simulation, the DNP project manager will administer a post-knowledge survey again. The evaluation forms will be collected after debriefing secessions and the evaluation of simulation effectiveness on the first-year GSRNAs learning and confidence will be assessed via the Modified Simulation Effectiveness Tool [SET-M] (2015) by K. Leighton, P. Ravert, V. Mudra, & C. Macintosh.

Risks and benefits. No foreseeable risks or discomforts for GSRNAs or a standardized patient may incur as a result of participation. There is no anticipated discomfort for those contributing to this study, so the risk to participants is minimal. The probability and magnitude of harm or discomfort anticipated in this DNP project are minimal to all participants and not greater than those ordinarily encountered in daily life or during the performance of routine physical or psychological examinations or tests. The first-year nurse anesthesia students' confidence will increase due to increased knowledge and ability to apply theoretical knowledge in the clinical setting. Students and standardized patients will not receive any compensation or will not pay to participate in this educational activity.

Confidentiality. Students and standardized patient's records (including anonymous surveys and informed consents participants will fill out) will be kept confidential and will not be released without consent except as required by law. The data will be retained in a locked cabinet in the NAP office. Access to these data will be limited to the DNP project manager. If the results of this study are written in a scientific journal or presented at a scientific meeting, students and standardized patient's name will not be used, and only grouped data will be presented. No identifying information will be collected. The data was stored for one (1) year after the implementation of the EB educational intervention. All data paper records were shredded and recycled. All records stored on a computer will be erased using commercial software applications designed to remove all data from the storage device.

Withdrawal. Students and standardized patient's decision to take part in this DNP scholarly project is entirely voluntary. Students and the standardized patient may refuse to take part in or may withdraw from the study at any time and for any reason without penalty. The student's participation or decision not to participate will have no impact on their grade or educational program. Although it rarely happens, events that are canceled by the project manager with three or less hours of notice to standardized patients will result in one hour of pay to standardized patients. Cancellation by the project manager or standardized patient within 24 hours will result in no pay to the standardized patient for the event.

Contact information. Signing this form indicates that you voluntarily agree to participate in a DNP project entitled: "The Correct Surgical Patient Positioning and Prevention of Position-related Peripheral Nerve Injuries Simulation" to be carried out by Natalya Kollektsionova under the supervision of Dr. Susan Lown. Principal Investigator, Natalya Kollektsionova, can be contacted at 864-601-4060, natalyaivanko@yahoo.com**,** 2701 Spring Street, Fort Wayne, Indiana, 46808. The DNP scholarly project advisor, Dr. Susan Lown, can be contacted at 260-399-7700 ext. 8543, slown@sf.edu**,** 2701 Spring Street, Fort Wayne, Indiana, 46808. Also, the University of Saint Francis IRB Chairperson can be reached at 260-399-7700, IRB@sf.edu**,** 2701 Spring Street, Fort Wayne, Indiana 46808.

I have received an explanation of this study and agree to participate. I understand that my participation in this study is strictly voluntary. I received a copy of this form.

X ______________________

Print name

X ______________________

Student Signarute

X ______________________

Date

Appendix G: Student Informed Consent Form

Form 5. 11. 2
Accepted 10-14
Rev 8-2019
Page 1 of 2

Student Informed Consent Form

As a student enrolled in the University of Saint Francis, I understand that participation will include academic, laboratory and clinical work performed in the classroom, laboratory, hospitals and other clinical facilities with direct care or exposure to clients with a variety of illnesses. These experiences may include the handling of and/or contact with human bodily fluids and tissues with possible exposure to disease-carrying microorganisms.

Also, I understand that I may be asked to participate in practice of skills in the following capacities:

- As a patient/subject for a class demonstration
- As a patient/subject for the practice of the skills by my classmate/laboratory partner
- As a caregiver practicing skills and administering treatment to a classmate/lab partner/ standardized patient

I understand that each skill that is assigned for practice by students will be preceded by readings or lecture presentation on the effects, indications, contraindications and precautions for each activity. Each skill that is practiced by the student is preceded by faculty instructions or demonstration of the skill. I also understand that the initial practice of skills will be scheduled in a supervised setting and that I may decline participation as a patient/subject with approval of the instructor.

In consideration of my being permitted to participate in these learning activities at the University of Saint Francis, I hereby release the University of Saint Francis, its representatives, agents, administrators, employees and volunteers from, and waive, any and all suits, actions, claims, judgments, liability for any injury, whether personal or property, that I now have, ever had, or may have due to my participation in the activities that are attributable to the fault of myself and to the extent permitted by law, the University of Saint Francis, its representatives, agents, administrators, employees and volunteers.

I understand that by signing the Release and Waiver of Liability, I give up substantial rights, and I here in represent that I have signed it freely and voluntarily, and that it constitutes a release and waiver of all claims of liability to the greatest extent permitted by law.

I agree to indemnify and hold harmless the University of Saint Francis, its representatives, agents, administrators, employees and volunteers, from and against any and all loss, costs, damages or expenses, including but limited to, attorney fees incurred by the University of Saint Francis arising out of any act by me or my child during my or their participation in the activity.

X ______________________ X ______________________

Print name Student Signarute

X ______________________

Date

Appendix H: Release Form for Standardized Patient Participation in Educational Activities

Form 5. 11. 3
Accepted 10-14
Rev 8-2019
Page 1 of 3

Release Form for Standardized Patient Participation in Educational Activities

As an individual who is currently enrolled in the University of Saint Francis academic program, I agree to uphold all aspects of confidentiality related to actual or simulated clinical settings. I understand that I am never to review or discuss confidential information for personal purposes with others. Examples of confidential information include student and instructor identity, actions and discussions.

I consent to participate in demonstrations, practice or studies for educational purposes. I understand that each skill or activity that is performed will be preceded by an explanation of the activity's effect, indications, contra-indications and precautions. I understand that the activity will be supervised by an appropriate faculty. I understand that at any point during the simulation activities, if I am uncomfortable or experiencing physical discomfort, I must notify the instructor immediately.

By signing a Confidentiality and Informed Consent for Standardized Patient Participation in Educational Activities, you agree to the following release terms:

I, the undersigned, a standardized patient, standardized participant, teaching associate, or exam model, for the University of Saint Francis (USF), operated by the Board of Trustees of the University of Saint Francis, hereby voluntarily agree to give my express consent to:

- Authorize the professional staff and such assistants, photographers, and technicians to take still photographs and motion pictures and produce educational (closed circuit) television programs, including video tapes, as well as other visual and/or auditory/digital recordings.

- Permit such photographs, motion pictures, video tapes and/or auditory/digital recordings to be published and republished in professional journals and medical books to be used for any other purpose which the staff member may deem fit in the interest of medical education or research and to be used as professional meetings of any kind.
- Further authorize the modification or retouching of such photographs and the publication of information relating to my case, either separately or I connection with the publication of the photographs taken of me.

In addition to the above, I also agree to the following:

- Although I have given permission to the publication of all details and photographs concerning my case, it is understood that I will not be identified by name.
- I understand that all information regarding the standardized patient case for which I have been trained is the confidential property of USF, and I agree that I will not disclose to any third party any information about the standardized patient case or information about the students who I have seen during the examination.
- I understand that all rights of every kind and nature (including copyrights) in and to all photographs, motion pictures, video tapes and/or auditory digital recordings made in connection with this standardized patient case by USF shall be and remain vested on USF for purposes in perpetuity.
- I will not receive financial incentive for participating in this educational activity.

In consideration of my being permitted to participate in these learning activities at the University of Saint Francis, I hereby release the University of Saint Francis, its representatives, agents, administrators, employees and volunteers from, and waive, any and all suits, actions, claims, judgments, liability for any injury, whether personal or property, that I now have, ever had, or may have due to my participation in the activities that are attributable to the fault of myself and to the extent permitted by law, the University of Saint Francis, its representatives, agents, administrators, employees and volunteers.

I understand that by signing the Release and Waiver of Liability, I give up substantial rights, and I here in represent that I have signed it freely and voluntarily, and that it constitutes a release and waiver of all claims of liability to the greatest extent permitted by law.

I agree to indemnify and hold harmless the University of Saint Francis, its representatives, agents, administrators, employees and volunteers, from and against any and all loss, costs, damages or expenses, including but limited to, attorney fees incurred by the University of Saint Francis arising out of any act by me or my child during my or their participation in the activity.

X ______________________ X ______________________

Print name Signature

X ______________________

Date

Appendix I: SOHS Simulation Lab Scenario Design Template

SOHS SIMULATION LAB SCENARIO DESIGN TEMPLATE

Scenario Name: Correct Positioning of Standardized Surgical Patients and Prevention of Peripheral Nerve Injuries
Simulator: Standardized patient
Scene/Room: OR simulation lab
Course #: NURS 511

Synopsis: This simulated clinical experience is designed to increase the first-year GSRNAs' knowledge and confidence on how to correctly position the anesthetized patient for surgical procedure and prevent the occurrence of PPNIs.

History: NURS 511, Basic Principles of Anesthesia Care, introduces the proper positioning of surgical patients and discusses the potential peripheral nerve injuries via lecture and PowerPoint-based instruction only. The need for a well-designed simulation-based education was established, and the existing gap between the USF DNP-NAP curriculum and evidence-based (EB) education for GSRNAs was identified. By participating in the simulation-based experience of correct positioning of surgical patients, first-year nurse anesthesia students can enhance academic learning with experiential, simulation-based training that reduces patient safety concerns and permits repetitive safe practice (Lorello, Cook, Johnson, & Brydges, 2014). Moreover, the innovative and interactive SBE on correct positioning of surgical patients and prevention of PPNIs can promote enhanced readiness for clinical practice.

SMART Learning Outcomes:

1. Students will apply entry knowledge of lecture objectives to the positioning of the standardized patient.
2. Students will demonstrate appropriate positioning techniques by utilizing a standardized patient.
3. Students will articulate risks for complications associated with incorrect perioperative surgical positioning and plan for appropriate interventions.
4. Students will formulate appropriate and timely interventions to prevent perioperative peripheral nerve injuries.
5. Students will demonstrate effective communication with team members and standardized patient.

SOHS SIMULATION LAB SCENARIO DESIGN TEMPLATE

Pre-simulation Assignments

Reading/Review materials – complete assigned reading and attend Nurs 511 lecture
Pre-test- Questions - complete pre-test administered before the simulation

Post-simulation Assignments

Post-test – complete post-test after debriefing
SET-M evaluation tool – complete SET-M questionnaire after debriefing

Supplies/Set – Up:

OR table
Prone foam pillow
Head support pillow/ regular pillow
Sheet
Blankets
Surgical towels
Cradle, arm positioning foam device
Straps/tape
Candy cane/ Lithotomy boot stirrups (YellowFin™)
Axillary roll/ 1 L NS bag
Arm supporter
Chest/Stomach/hip/shin positioning pads
EMR: not required
Monitor Settings: 3-lead EKG, blood pressure cuff, pulse oximeter, anesthesia machine

Timing

Orientation/pre-briefing: 10-20 minutes
SIM: 30-40 minutes (7-10 minutes for each position; total – 4 surgical positions)
Debriefing: 40-50 minutes
Evaluations: SET-M evaluation form & post-knowledge survey completion is 10-20 minutes

Previous Simulation-Based Experiences

Previous simulation-based experience is not required for participants. The DNP project manager will administer and coordinate the simulation.

Roles

Standardized patient – volunteer
The simulation lab facilitators – the DNP project manager
CRNA group - two groups of first-year GSRNAs

SOHS SIMULATION LAB SCENARIO DESIGN TEMPLATE

Pre-briefing/Orientation Notes: The DNP project manager will identify expectations for participants and the facilitators and establish ground rules. In addition, during the pre-briefing session, the DNP project manager will orient first-year GSRNAs to the space, equipment, method of evaluation, roles, the time allotted, simulation objectives, patient situation, and limitation. During pre-briefing session, the DNP project manager will establish and maintain throughout the SBE a safe psychological environment and trust. It is all about learning. The simulation activity will not be graded by the DNP project manager or course instructor, and participants will not receive "pass/fail" evaluations. Mistakes are ok if learning occurs. No video or audio recording. Collaboration is encouraged.

Environment: OR simulation lab

EMR: not needed

Simulator: trained standardized patient

Role Expectations: First-year GSRNAs will receive a scenario and arrive at the room to relieve the CRNA on-duty. The patient will be already intubated or sedated. After a quick CRNA on-duty hand-off to reinforce given scenario, a group of first-year GSRNAs will position a patient into the correct position. After the patient is positioned into the assigned position, first-year GSRNAs will leave the room and receive a new scenario, while the OR suite will be re-arranged and prepared for the next scenario. This sequence of events will be repeated for each of four surgical positions.

Observing Professionals: After the patient is positioned into the surgical position, the DNP project manager will circle correctly simulated position features on four printed pictures with surgical positions and cross incorrect features.

Starting cue for sim: The DNP project will give a scenario to a group of seven or eight first-year GSRNAs.

Ending: A group of seven or eight first-year GSRNAs will state: "Done" or expiration of assigned 10 minutes.

Debriefing: Debriefing is a reflective process immediately following the SBE that is led by a trained facilitator using an evidence-based debriefing model to encourage participants' reflective thinking, provide feedback regarding the participants' performance, encourage participants to explore emotions and question, reflect, and provide feedback to one another. During the 40-50 minutes debriefing session, first-year GSRNAs will be given the opportunity for emotional release. They will be asked open-ended questions to summarize outcome achievement. The goal of post-simulation debriefing session is to enrich learning and contribute to the consistency of the simulation-based education for participants and facilitators. The DNP project manager will facilitate the group's understanding of errors in knowledge, skills, attitudes, as well as restate the American Society of Anesthesiologists (2018) practice advisory for the prevention of perioperative peripheral neuropathies.

Evaluations: The first-year GSRNAs will complete the post-knowledge survey and evaluate the simulation effectiveness via the SET-M. The post-knowledge survey will be identical to the post- PowerPoint presentation knowledge survey.

SOHS SIMULATION LAB SCENARIO DESIGN TEMPLATE

Stem for all positions: "You are assigned to relieve your CRNA colleague for lunch. The patient already has a secured airway and hemodynamically stable."

State	Events	Expected Behaviors	Facilitator Notes
Supine position	**Patient:** 45 years old male **Weight** = 78 kg **Height** = 1.68 m HR = 81 Rhythm = NSR B/P = 121/75 ETT # 7.5, 22 at the lip, placed automatically, bilateral clear lung sounds Vent settings = VCV, TV 550 ml, I:E 1:2.5, RR = 12 bpm, PEEP 4 SpO2 = 100% **PMH:** none **Diagnosis**: ruptured appendix **Procedure:** open appendectomy **Positioning:** supine with both arms on arm boards	• The patient lies on his or her back with a foam pillow or regular pillow beneath the head to prevent direct pressure on the occiput from a firm operating table • Head is midline and in a neutral position avoiding the hyperextension of the neck. • The arms are abducted on well-padded arm boards. • Padded (with Cradle™ [arm positioning foam device] or blankets and towels) arm boards should be leveled with the OR bed mattress, placed to secure limb position and to avoid direct pressure on the peripheral nerves. • Upper extremity abduction should be limited to less than 90 degrees to minimize the likelihood of brachial plexus injury • Arms should not be positioned above the head • Elbows padded • The hand and forearm are either supinated or kept in neutral position with the palm toward the body • Surgical towels with tape used to secure both hands if arm straps are not available • A pillow under the patient's knee or placing the table in a slight "lounge chair" position increases patient comfort • Patient's feet should not be hyperflexed or hyperextended. • The elevation of the patient's heels or utilization of a heel-suspension device redistributes pressure and helps to reduce extra pressure on the skin over the calcaneum.	START:

SOHS SIMULATION LAB SCENARIO DESIGN TEMPLATE			
Lithotomy position	**Patient:** 27 years old male **Weight** = 61 kg **Height** = 1.55 m HR = 64 Rhythm = NSR B/P = 110/61 LMA #4, placed automatically, bilateral clear lung sounds Spontaneous ventilation TV 420 ml, RR = 12 bpm SpO2 = 100% **PMH:** allergy to Sulfa drugs **Diagnosis**: painful urination **Procedure:** cystoscopy **Positioning:** lithotomy with arms out	• Patient is supine with both arms abducted and away from the hinge-point of the foot section. • The patient lies on his or her back with a foam pillow or regular pillow beneath the head to prevent direct pressure on the occiput from a firm operating table • Head is midline and in a neutral position avoiding the hyperextension of the neck. • The arms are abducted on well-padded arm boards. • Padded (with Cradle™ [arm positioning foam device] or blankets and towels) arm boards should be leveled with the OR bed mattress, placed to secure limb position and to avoid direct pressure on the peripheral nerves. • Upper extremity abduction should be limited to less than 90 degrees to minimize the likelihood of brachial plexus injury • Arms should not be positioned above the head • Elbows padded • The hand and forearm are either supinated or kept in neutral position with the palm toward the body • Surgical towels with tape used to secure both hands if arm straps are not available • Each lower extremity is flexed at the hip and knee, and both limbs are simultaneously, slowly elevated and separated, so the perineum becomes accessible for the surgical procedure • The hips are flexed 80-100 degrees from the trunk • Legs are abducted 30 to 45 degrees from the midline with the knees flexed until the lower legs are parallel to the torso. • Patient's hips positioned in a manner that prevents excessive flexion, rotation, or abduction • The lower extremities should be free of pressure via the appropriate padding of lateral or posterior knees and ankles • Stirrups or leg holders at an even height, supporting the patient's leg over the largest possible surface area of the leg, and not allowing the patient's leg to rest against the leg holder posts • Each leg holder device should be fitted to the individual patient. • Upon the discontinuation of lithotomy position and lowering the patient's legs to the bed, a minimum of one person per leg should remove the leg from the leg holder slowly and bringing both legs together simultaneously	

SOHS SIMULATION LAB SCENARIO DESIGN TEMPLATE			
Lateral decubitus	**Patient:** 70 years old male **Weight** = 85 kg **Height** = 1.75 m HR = 57 Rhythm = NSR B/P = 115/62 ETT # 7.5, 23 at the lip, bilateral clear lung sounds Vent settings = VCV, TV 600 ml, I:E 1:2.5, RR = 10 bpm, PEEP 5 SpO2 = 100% **PMH:** smoker **Diagnosis:** broken hip **Procedure:** right total hip arthroplasty **Positioning:** left lateral decubitus with both arms abducted	• Patient is rolled onto the nonoperative side (left) on a flat table surface with the shoulders, hips, head, and legs always maintained in the same plane. • A head positioner, a headrest, or pillows should be placed under the patient's head for proper support so that the cervical and thoracic spines are properly aligned in a neutral position • The patient head should not be allowed to hang, tilt, hyperflex, or hyperextend during the lateral decubitus position • The patient's dependent ear and eye (left) should be free of pressure • Once the patient is in the lateral position, the dependent leg (left) should be flexed at the knee and hip, the patient's upper leg (right) extended comfortably and supported with pillows placed between the lower extremities, the lateral aspect of the dependent leg (left) padded from knee to the heel • A safety restraint placed across the patient's hips and fixed to the underside of the tabletop • The provider must ensure that the hip straps or tapes lie between the iliac crest and the head of the femur and not over the head of the femur • If two level arm board is used, the dependent arm (left) is positioned in front of the patient on a padded arm board perpendicular to the torso and flexed less than 90 degrees at the elbow • The nondependent arm (right) positioned parallel to the dependent arm, leveled with the shoulder and flexed less than 90 degrees on a well-padded arm holding device • In the situation where only a single arm board is available, both extremities can be positioned with adequate padding between them (pillows) on one padded arm board. • An axillary roll is placed under the dependent (left) thorax and the bed, slightly caudad to the dependent (left) axilla, at the level of the seventh to the ninth rib • The anesthesia provider must frequently monitor the patient's bilateral radial pulses after placement of the axillary roll • The anterior and posterior support of the trunk is prevented by devices such as beanbags, pillows, sandbags, braces, adhesive straps and tape. • If adhesive straps or tape is used, they should be placed just caudal to the axilla	

SOHS SIMULATION LAB SCENARIO DESIGN TEMPLATE

Prone position	**Patient:** 36 years old male **Weight** = 50 kg **Height** = 1.70 m HR = 77 Rhythm = NSR B/P = 131/76 ETT # 7.0, 21 at the lip, placed automatically, bilateral clear lung sounds Vent settings = VCV, TV 355 ml, I:E 1:2.5, RR = 12 bpm, PEEP 4 SpO2 = 100% **PMH:** anemia **Diagnosis:** pilonidal cyst near cleft of the left buttock **Procedure:** pilonidal cyst removal **Positioning:** prone with both arms abducted	• The patient turned prone onto the surgical table after • the anesthesia care provider anesthetized the patient on a stretcher or a hospital bed and coordinated the perioperative team members to log-roll the patient while keeping the neck aligned with the spine during the move • The patient's head may be positioned facedown via a face positioner or turned to the side. • In facedown position, the patient's head should be in a neutral, midline position, without excessive flexion, extension, or lateral rotation • Patient's eyes, nose, chin, and ears must be free of direct pressure • Patient's arms should be carefully rotated and supported into extended position next to the patient's head on arm boards (called the prone superman position) • The arms should not be abducted greater than 90 degrees with the palms facing down • Extra padding should be added under the shoulder and elbows to ensure neutral alignment • The arm boards should be maintained at a level lower than the chest • The shoulders, breasts, abdomen, lower coastal margins, iliac crest, genitals, pelvis, knees, and ankles require additional padding and positioned to limit pressure on them. • Pelvic, abdominal, and chest support includes parallel rolls of tightly packed sheets, gels, padded and adjustable metal frames, and four-pillar frames help to free the abdomen from pressure and compression • Pillows can be placed under the patient's knees and legs to ensure that patient's toes are off the bed and free of pressure • The area under the patient's shins should be well-padded to relieve direct pressure for the OR bed.	END:

SOHS SIMULATION LAB SCENARIO DESIGN TEMPLATE

Debriefing Plan – 3 parts

Part 1, Opening

a. **Explain Purpose, Timing, Expectations of Debriefing**

Purpose: Debriefing is a reflective process that encourages participants' reflective thinking, provides feedback regarding the participants' performance, encourages participants to explore emotions and question, reflects, and provides feedback.

Expectations: During the debriefing session, first-year GSRNAs will be given the opportunity for emotional release. First-year GSRNAs will be asked open-ended questions to summarize outcome achievement and reveal their opinions on how successful they managed events.

Goal: The goal of post-simulation debriefing session is to enrich learning and contribute to the consistency of the simulation-based education for participants and facilitators. The DNP project manager will facilitate the group's understanding of errors in knowledge, skills, attitudes, as well as restate the American Society of Anesthesiologists (2018) practice advisory for the prevention of perioperative peripheral neuropathies. Moreover, the DNP project manager will recap the major learning points that were realized (or not) as a result of participation in simulation.

Timing: 40-50 minutes

b. **Establish Confidentiality of discussion and Safe Learning Environment**

This is a safe learning environment. Everything what is said during debriefing will be confidential and will not affect your NURS 511 grade. This simulated clinical experience is designed to increase the first-year GSRNAs' knowledge and confidence on how to correctly position the anesthetized patient for surgical procedure and prevent the occurrence of PPNIs.

c. **Repeat Learning Outcomes**

1. Students will apply entry knowledge of lecture objectives to the positioning of the standardized patient.
2. Students will demonstrate appropriate positioning techniques by utilizing a standardized patient.
3. Students will articulate risks for complications associated with incorrect perioperative surgical positioning and plan for appropriate interventions.
4. Students will formulate appropriate and timely interventions to prevent perioperative peripheral nerve injuries.
5. Students will demonstrate effective communication with team members and standardized patient.

SOHS SIMULATION LAB SCENARIO DESIGN TEMPLATE

Part 2. Middle – Open Ended Questions

The Gas Job Aid of the Structured and Supported Debriefing Model

Phase	Goal	Actions	Simple questions	Time
Gather	Listen to participants to understand what they think & how they feel about session	Request narrative from team leader Request clarifying or supplemental information from team	How do you feel? Can you tell us what happened?	25%
Analyze	Facilitate participants reflection on & analysis of their actions	Review of accurate record of events Report observations (correct & incorrect steps) Ask a series of questions to reveal participants' thinking processes Assist participants to reflect on their performance Direct/redirect participants to assure continuous focus on session objectives	I noticed … Tell me more about... How did you feel about…? What were you thinking when …? I understand, however, tell me about "X" aspect of the scenario… Conflict resolution: Lets refocus – "what's important is not who is right but what is right for the patient…"	50%
Summarize	Facilitate identification & review of lessons learned	Participants identify positive aspects of team or individual behaviors & behaviors that require change Summary of comments or statements	List two actions or events that you felt were effective or well done Describe two areas that you think you/team need to work on…	25%

(Adopted from Winter Institute for Simulation, Education, and Research)

SOHS SIMULATION LAB SCENARIO DESIGN TEMPLATE

Part 3. Closing

- How has your thinking/practice changed? What if you were faced with a similar situation in the future?
- Summarize outcome achievement
- Correct errors in knowledge, skill, attitude.
- Restate Standards of Care
- Final Questions

Appendix J: Model for Evidence-Based Practice Change

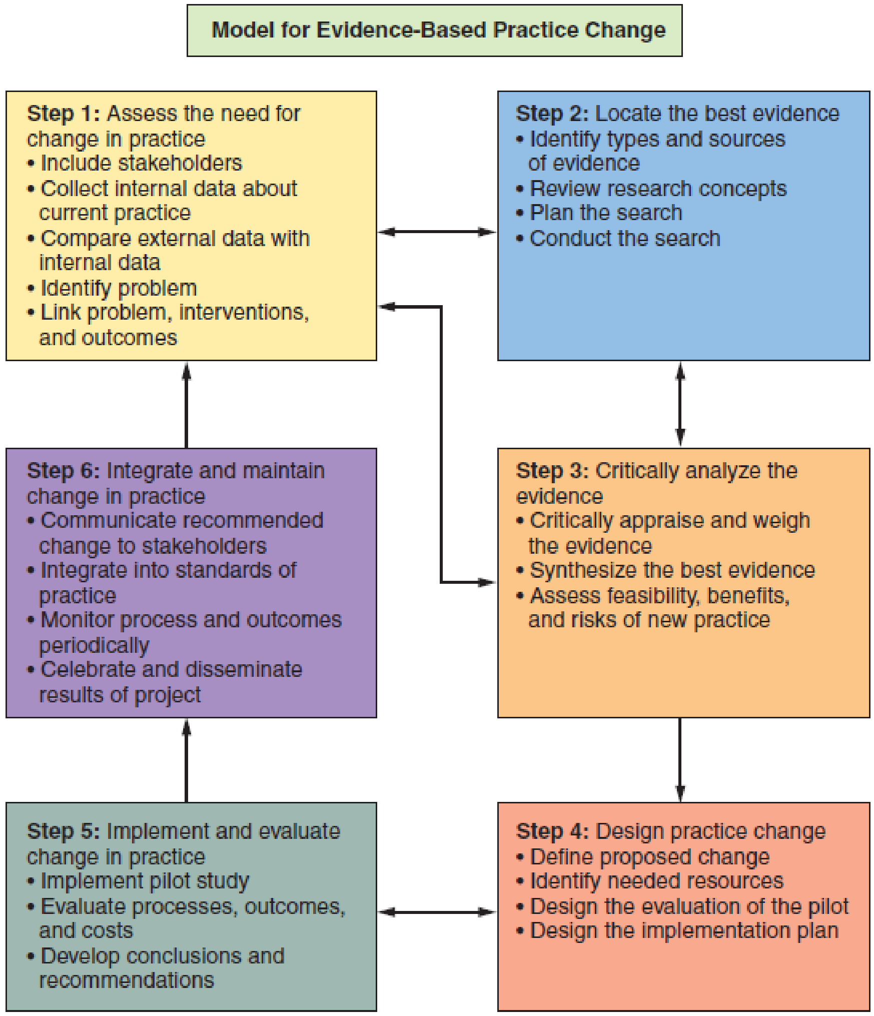


Figure 1. A model of evidence-based practice change. Adapted from "*Nurse to nurse: Evidence-based practice*," by J. H. Larrabee, 2009. Copyright 2009 by the McGraw-Hill.

Appendix K: Institutional Review Board (IRB) Approval.

University of Saint Francis
Institutional Review Board
Human Subjects Review Committee/ACUC/IBC
Institutional Review Board Approval Form

Protocol Number: 1569236-HSFC

Review by (underline one): HSRC ACUC IBC

Date Reviewed: 10/09/2019
Principal Investigator: Natalya A. Kollektsionova
Faculty Advisor: Dr. Susan Lown
Protocol Title: Effectiveness of simulation-based instruction of correct positioning of standardized surgical patients
Study Site(s): University of Saint Francis NAP Program

Items submitted for review:
☒Initial protocol
☐Abstract
☒Informed Consent Form (if applicable)
☒Approval letter from outside institution - University of Saint Francis NAP Program
☐Other – explain: Data collection instruments

Type of Review:
☒Full Review
☐Expedited Review
☐Exempt Review

Approval:
☒Approval granted on 10/09/2019
☐Approval granted on ____________ for a period of one year.
☐Conditional approval* granted on ____________ for a period of one year.
☐Not approved*
☐Other

*Comments:
NOTE: The IRB noted the project as an educational intervention not necessarily needing IRB approval.

The committee performing this review is duly constituted and operates in accordance and compliance with local and federal regulations and guidelines.

Stephanie Oetting	*Stephanie Oetting*	10/14/2019
Printed Name (Chair or designee)	Signature	Date

IRB Committee Approval Form sjo 10/15/2019

Appendix L: Collaborative Institutional Training Initiative (CITI) Certifications

CITI PROGRAM

Completion Date 28-Jul-2019
Expiration Date 27-Jul-2022
Record ID 32510270

This is to certify that:

Natalya Kollektsionova

Has completed the following CITI Program course:

Institutional/Signatory Official: Human Subject Research (Curriculum Group)
Institutional/Signatory Official: Human Subject Research (Course Learner Group)
1 - Basic Course (Stage)

Under requirements set by:

University of Saint Francis

CITI Collaborative Institutional Training Initiative

Verify at www.citiprogram.org/verify/?wdb4eba4b-af81-49e0-9cc9-bebf535d1c54-32510270

CITI PROGRAM

Completion Date 28-Jul-2019
Expiration Date 27-Jul-2022
Record ID 32534656

This is to certify that:

Natalya Kollektsionova

Has completed the following CITI Program course:

GCP – Social and Behavioral Research Best Practices for Clinical Research (Curriculum Group)
GCP – Social and Behavioral Research Best Practices for Clinical Research (Course Learner Group)
1 - Basic Course (Stage)

Under requirements set by:

University of Saint Francis

CITI Collaborative Institutional Training Initiative

Verify at www.citiprogram.org/verify/?wffd6696b-91e6-4db6-807e-10679c14dc4e-32534656

CITI PROGRAM

Completion Date 21-Jul-2019
Expiration Date 20-Jul-2023
Record ID 32510271

This is to certify that:

Natalya Kollektsionova

Has completed the following CITI Program course:

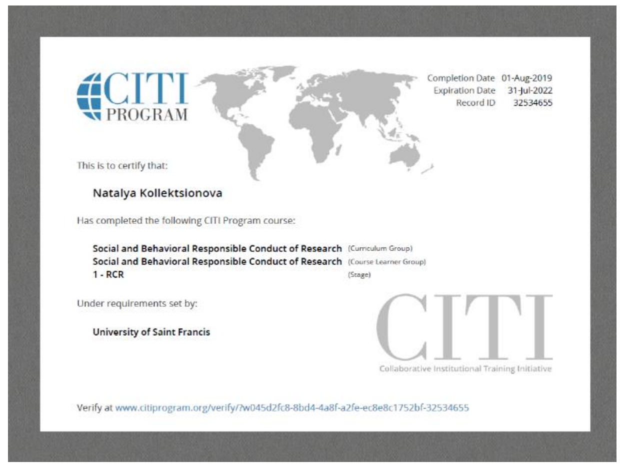
CITI Conflicts of Interest (Curriculum Group)
Conflicts of Interest (Course Learner Group)
1 - Basic Course (Stage)

Under requirements set by:

University of Saint Francis

CITI Collaborative Institutional Training Initiative

Verify at www.citiprogram.org/verify/?w81a6037c-c1e6-42d6-ab80-f38e3f0e7fed-32510271



CITI PROGRAM

Completion Date 01-Aug-2019
Expiration Date 31-Jul-2022
Record ID 32534655

This is to certify that:

Natalya Kollektsionova

Has completed the following CITI Program course:

Social and Behavioral Responsible Conduct of Research (Curriculum Group)
Social and Behavioral Responsible Conduct of Research (Course Learner Group)
1 - RCR (Stage)

Under requirements set by:

University of Saint Francis

CITI Collaborative Institutional Training Initiative

Verify at www.citiprogram.org/verify/?w045d2fc8-8bd4-4a8f-a2fe-ec8e8c1752bf-32534655

CITI PROGRAM

Completion Date 01-Aug-2019
Expiration Date N/A
Record ID 32534654

This is to certify that:

Natalya Kollektsionova

Has completed the following CITI Program course:

Information Privacy Security (IPS) (Curriculum Group)
Researchers (Course Learner Group)
1 - Basic Course (Stage)

Under requirements set by:

University of Saint Francis

CITI Collaborative Institutional Training Initiative

Verify at www.citiprogram.org/verify/?w7dd6dde2-627b-4706-af7f-cde42a894940-32534654

CITI PROGRAM

Completion Date 31-Jul-2019
Expiration Date 30-Jul-2022
Record ID 32534657

This is to certify that:

Natalya Kollektsionova

Has completed the following CITI Program course:

Public Health Research (Curriculum Group)
Public Health Research (Course Learner Group)
1 - Basic (Stage)

Under requirements set by:

University of Saint Francis

CITI Collaborative Institutional Training Initiative

Verify at www.citiprogram.org/verify/?wf48d7881-5b72-490f-8d88-f9d4d75433c2-32534657

CITI PROGRAM

Completion Date 31-Jul-2019
Expiration Date 30-Jul-2022
Record ID 32510269

This is to certify that:

Natalya Kollektsionova

Has completed the following CITI Program course:

Social & Behavioral Research - Basic/Refresher (Curriculum Group)
Social & Behavioral Research (Course Learner Group)
1 - Basic Course (Stage)

Under requirements set by:

University of Saint Francis

CITI Collaborative Institutional Training Initiative

Verify at www.citiprogram.org/verify/?w8812ee1f-ed15-4341-93da-40b1dd9fb8ca-32510269

Appendix M: The GAS Job Aid of the Structured and Supported Debriefing Model

Phase	Goal	Actions	Sample Questions	Time
Gather	Actively listen to participants to understand what they think and how they feel about the session	• Request narrative from participant(s) • Request clarifying or supplemental information from participant(s)	• How do you feel? • How do you think it went? • Can you tell me what happened?	25%
Analyze	Provide feedback on performance Facilitate participant(s) reflection *on* and analysis *of* their actions Investigate basis for performance gaps	• Review accurate record of events • Report observations (correct and incorrect steps) • Ask questions to reveal participants' thinking process • Stimulate reflection and provide redirection	• I noticed ... • Tell me more about... • What were you thinking when... • I understand, however, tell me about "X"	50%
Summarize	Facilitate identification and review of lessons learned	• Identify positive aspects of session • Discuss behaviors that require change • Summarize session	• List two actions that you felt were effective or went well • Describe two areas that you think you need to work on • How will you improve these areas for the future	25%

Appendix N: GAS Model Permission to Use

Written permission to utilize "The GAS Job Aid of the Structured and Supported Debriefing Model"

Kollektsionova, Natalya
Thank you very much, Dr. O'Donnell! I greatly appreciate your help, and I would love to have an access to a narrated PowerPoint and other job aids. ... Mon 1/27/2020 5:53 PM

Label: Default Email Retention (4 years) Expires: Fri 1/26/2024 3:41 PM

O'Donnell, John Marc <jod01@pitt.edu>
Mon 1/27/2020 3:41 PM
Kollektsionova, Natalya

WARNING: This email originated from outside of USF. Do **NOT** click links or attachments unless you recognize the sender and know the content is safe.

Hi Natalya- you have my permission to use with attribution.

1. O'Donnell, J.M., Rodgers, D.L., Lee, W, W., Edelson, D. P., Haag, J., Hamilton, M. F., Hoadley, T., McCullough, A., Meeks, R., (2009), Structured and Supported Debriefing [Computer Software]. American Heart Association, Dallas, TX.
2. Phrampus P.E. and O'Donnell J.M. 'Debriefing: Using a Structured and Supported Approach' in The Comprehensive Manual of Healthcare Simulation (Ed.) Levine A.L., Bryson E.O., DeMaria S., Schwartz A.D. Springer (2013).

Please let me know how it goes- if you need training materials I can give you access to a narrated PPT and some other job aids we use

JOD

...

Kollektsionova, Natalya
Good afternoon, Dr. O'Donnell! I hope this email finds you well! My name is Natalya Kollektsionova, and I am one of the senior CRNA students at the ... Sun 1/26/2020 7:25 PM

Appendix O: Learning Objectives

Lecture learning objectives.

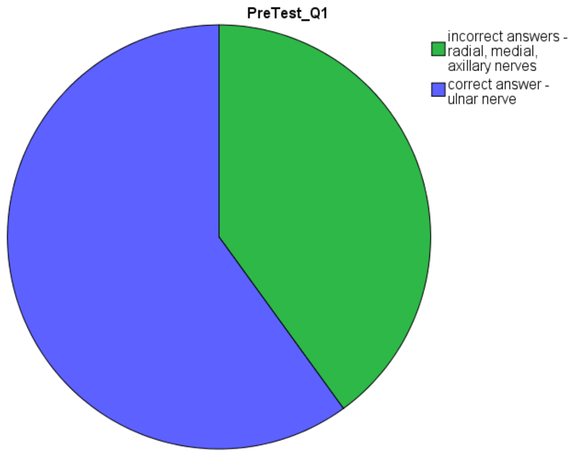
1. Describe the 5 most common intra-operative surgical positions.
2. Identify safety precautions taken with common intraoperative patient positions.
3. Describe the pathophysiology of nerve injury.
4. Describe the potential nerve injuries associated with patient positioning in the operating room.
5. Describe the symptoms associated with common intraoperative nerve injuries.

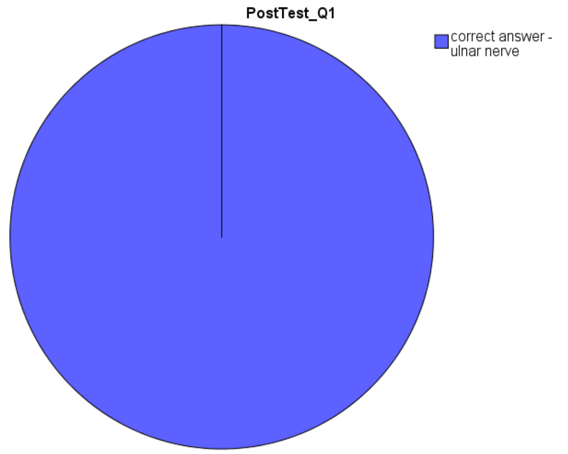
Simulation learning objectives.

1. Students will apply entry knowledge of lecture objectives to the positioning of the standardized patient.
2. Students will demonstrate appropriate positioning techniques by utilizing a standardized patient.
3. Students will articulate risks for complications associated with incorrect perioperative surgical positioning and plan for appropriate interventions.
4. Students will formulate appropriate and timely interventions to prevent perioperative peripheral nerve injuries. Students will demonstrate effective communication with team members and standardized patient.

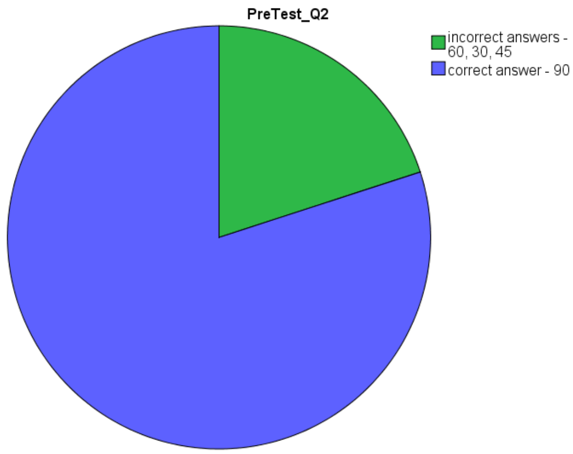
Appendix P: Pre- and Post-knowledge Outcomes

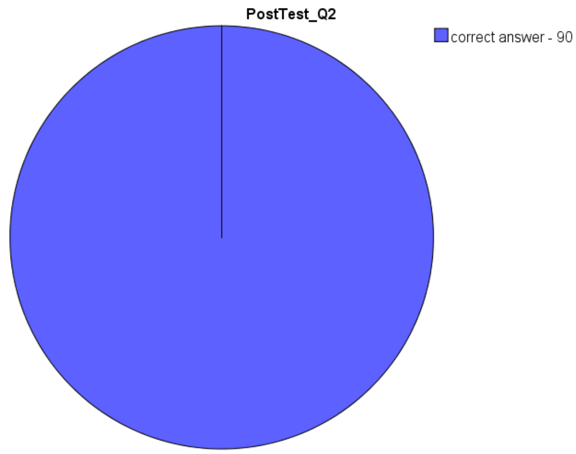
1. What upper extremity nerve injury causes inability to abduct or oppose the 5th finger, and decreased sensation over both surfaces of the medial one and one-half of the ring and pinky fingers?



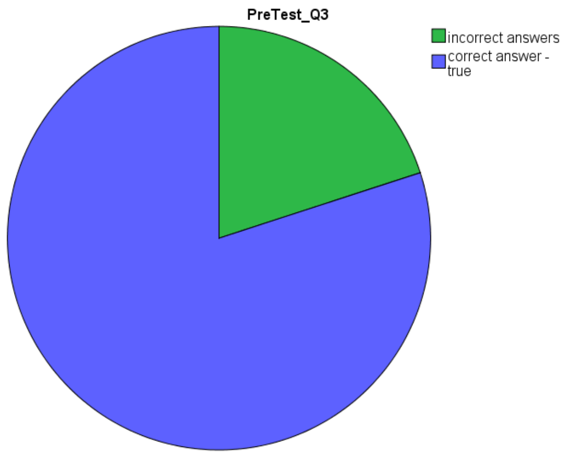


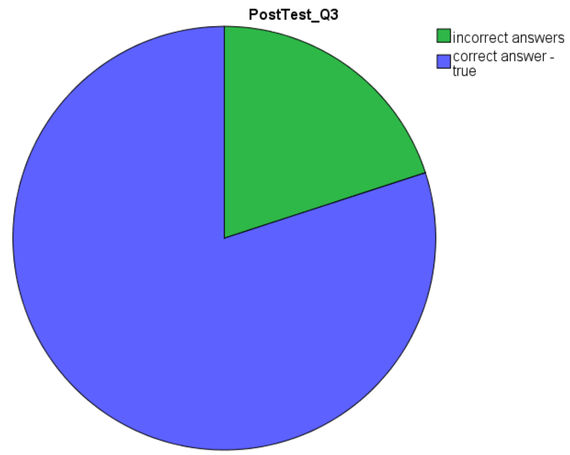
2. If the arm is abducted to greater than ________ degrees in supine position, risk of brachial plexus nerve injury is increased.



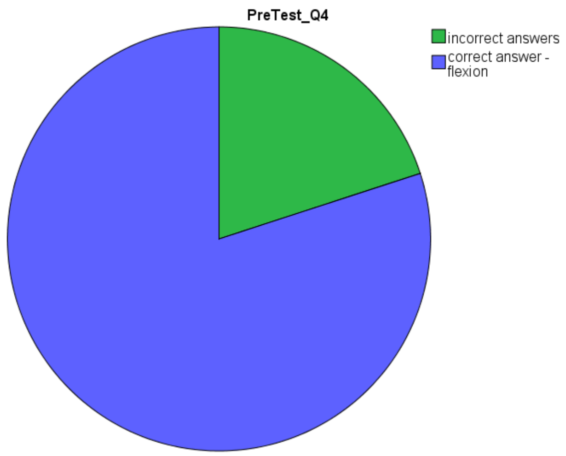


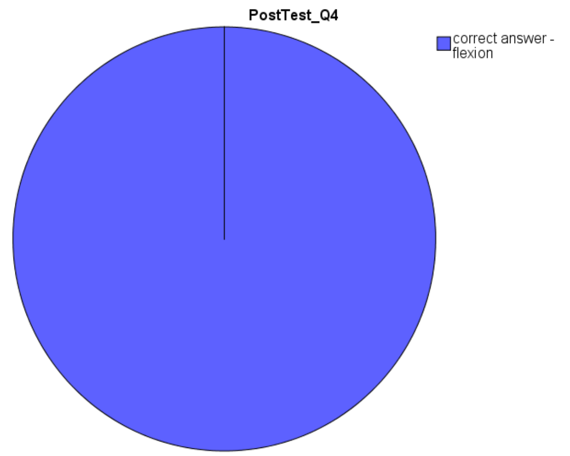
3. When positioning the patient supine, the head should be maintained in a neutral position



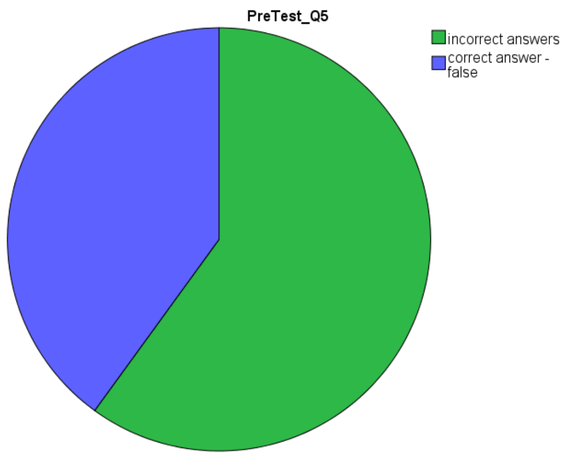


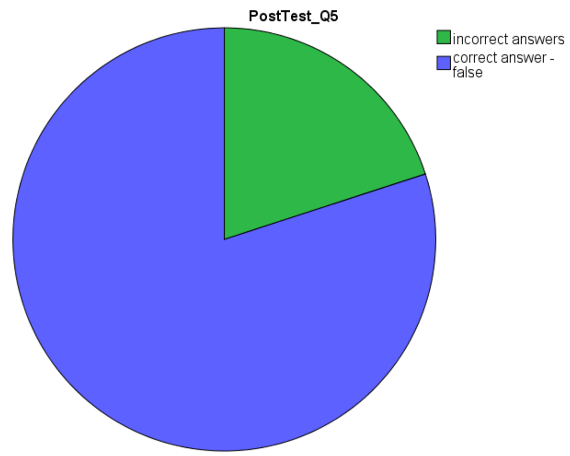
4. Once the patient is in the lateral position, what should be done to the knee and hip of the dependent leg to stabilize the patient?



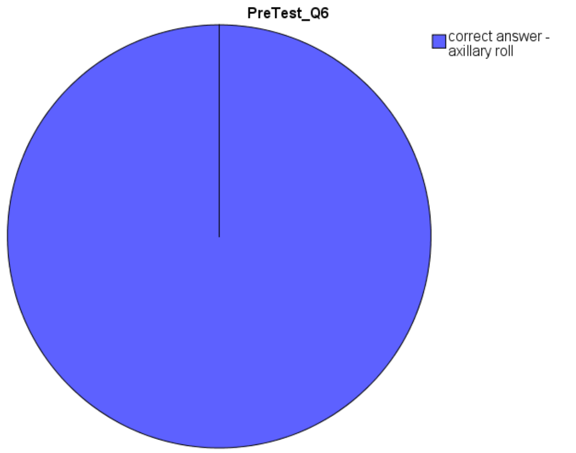


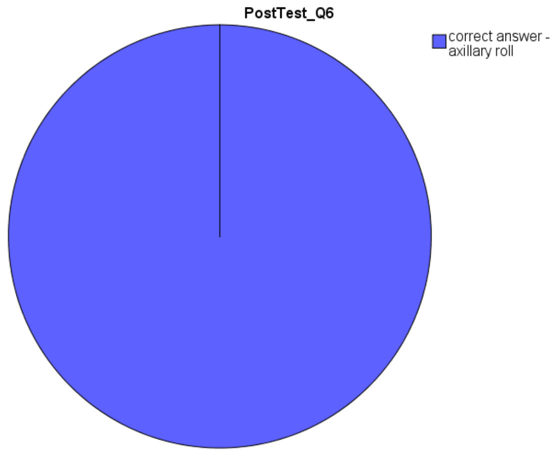
5. Padding should not be placed under the shoulders in the prone position to prevent stretching of the brachial plexus.



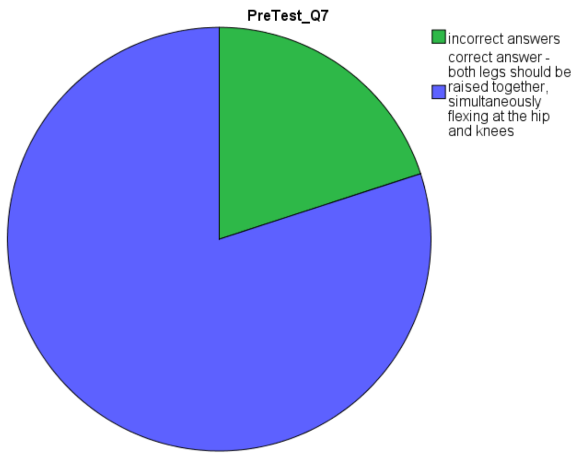


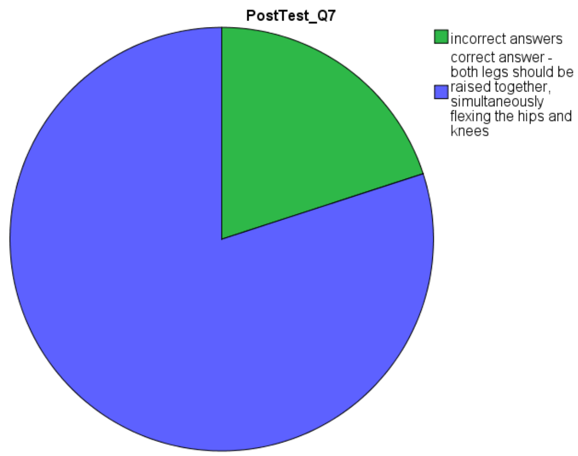
6. What device helps to relieve pressure exerted on the brachial plexus of the dependent arm in the lateral decubitus position?



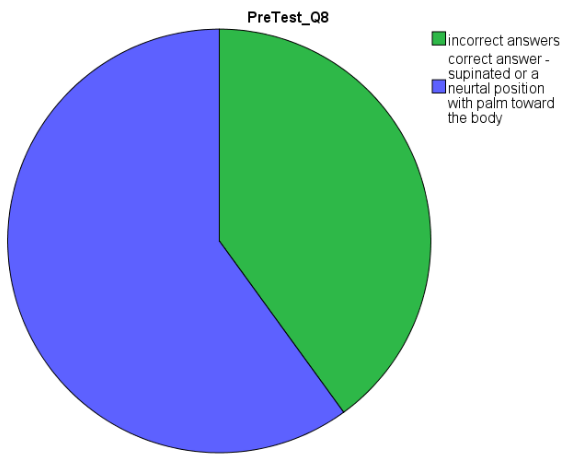


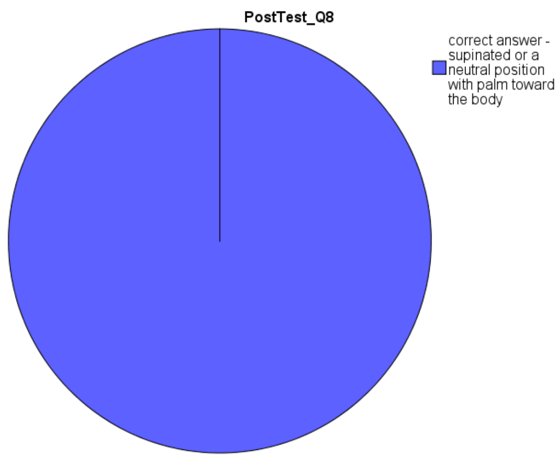
7. In order to avoid torsion of the lumbar spine during the initiation of the lithotomy position, what action must be taken?



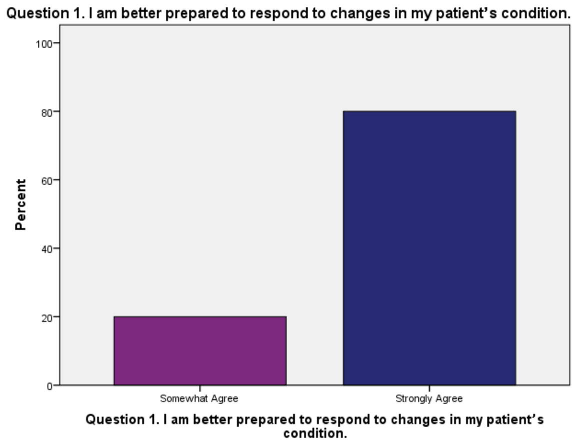


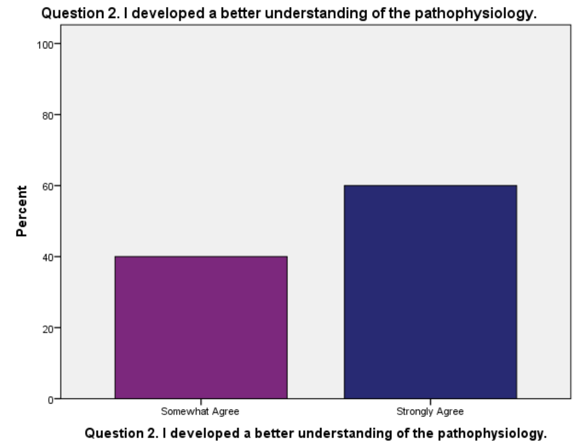
8. In order to reduce external pressure on the spinal groove of the humerus and the ulnar nerve in a supine position, the appropriate hand and forearm position are:

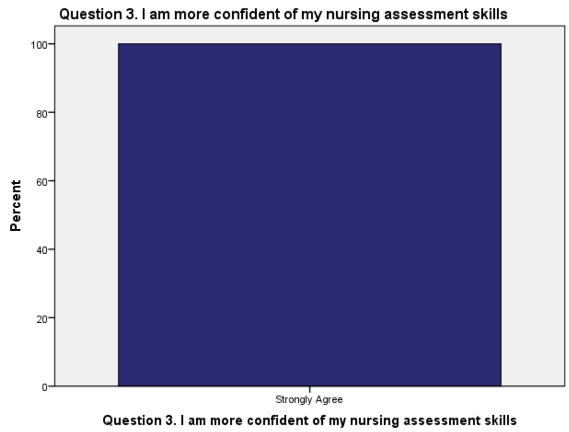


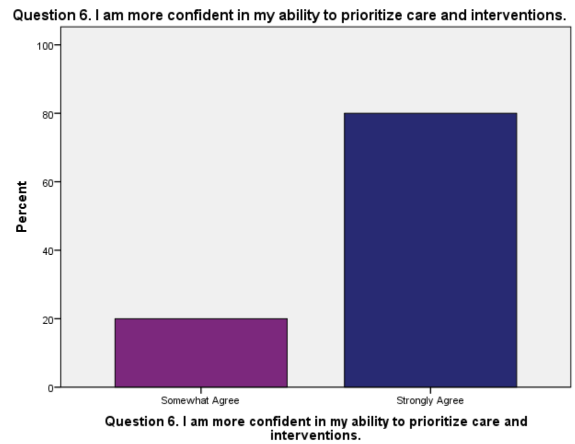


Appendix Q: SET-M Results

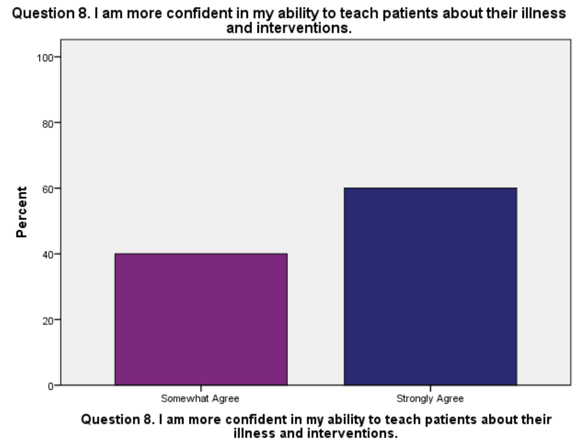




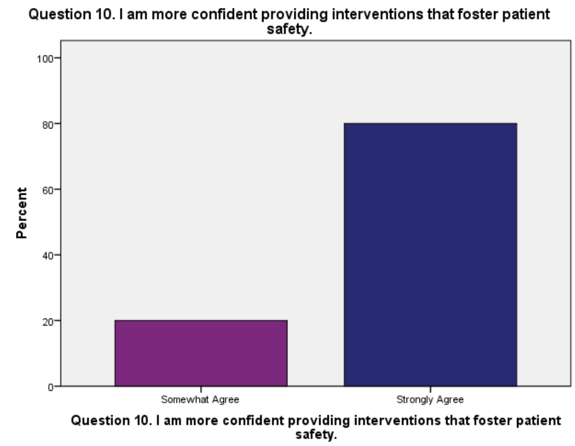





Question 7. I am more confident in communicating with my patient.
Percent
0
20
40
60
80
100
Strongly Agree
Question 7. I am more confident in communicating with my patient.


Question 8. I am more confident in my ability to teach patients about their illness and interventions.
Percent
0
20
40
60
80
100
Somewhat Agree
Strongly Agree
Question 8. I am more confident in my ability to teach patients about their illness and interventions.


Question 9. I am more confident in my ability to report information to health care team.
Percent
0
20
40
60
80
100
Somewhat Agree
Strongly Agree
Question 9. I am more confident in my ability to report information to health care team.


Question 10. I am more confident providing interventions that foster patient safety.
Percent
0
20
40
60
80
100
Somewhat Agree
Strongly Agree
Question 10. I am more confident providing interventions that foster patient safety.


Question 11. I am more confident in using evidence-based practice to provide nursing care.
Percent
0
20
40
60
80
100
Somewhat Agree
Strongly Agree
Question 11. I am more confident in using evidence-based practice to provide nursing care.

Contact information

The DNP project "The Correct Surgical Patient Positioning and Prevention of Position-related Peripheral Nerve Injuries Simulation" was carried out by Natalya Kollektsionova under the supervision of Dr. Susan Lown. Principal Investigator. Natalya Kollektsionova, can be contacted at natalyaivanko@yahoo.com. The University of Saint Francis IRB Chairperson can be reached at 260-399-7700, IRB@sf.edu, 2701 Spring Street, Fort Wayne, Indiana 46808. "