



[Standardized patient program], (n.d.). <https://sites.psu.edu/hersheysimulation/standardized-patient-program/>

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

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# Overview of Topics

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Introduce PICOT question

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# Problem Statement



Surgical positioning → compromise between anatomical exposure for surgery vs. what anesthetized patient can tolerate structurally and physiologically.



Perioperative peripheral nerve injuries (PPNIs) due to incorrect positioning → on the rise (Hewson, Bedford, & Hardman, 2018)



Prevention is the best treatment of PPNIs.



Simulation-based education (SBE) → a bridge between theoretical knowledge and practical management of patients



SBE → advance patient safety and improve quality of anesthesia care

# PICOT Question

"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?"



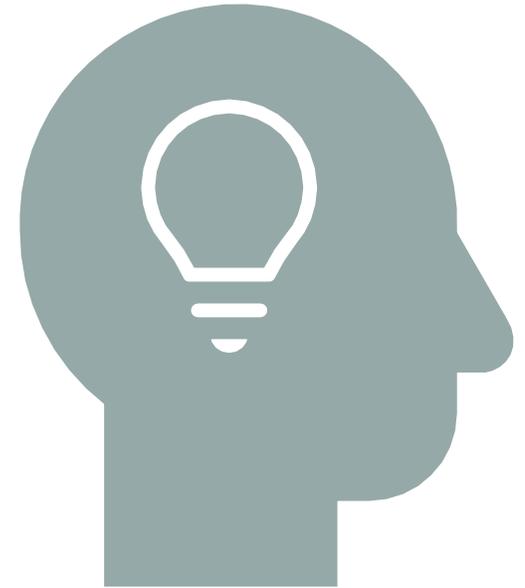
"In first-year nurse anesthesia students, how does participation in the correct positioning of standardized patients and prevention of perioperative peripheral nerve injuries simulation influence knowledge and confidence?"

# Background

- Anesthesia → legally responsible for perioperative position-related nerve injuries.
- 4 most used intraoperative surgical positions → dorsal decubitus, lithotomy, lateral decubitus, and prone.
- Anesthesia-related PPNIs → the 2nd most common cause of anesthesia-related litigations (Cheney, Domino, Caplan, & Posner, 1999; Fritzen, Kremer, & Biddle, 2003; Lalkhen & Bhatia, 2012; Metzner, Posner, Lam, & Domino, 2011).
- Most injured peripheral nerves due to improper surgical positioning → ulnar (28%), brachial plexus (20%), lumbosacral nerve roots (16%), and spinal cord injuries (13%) (Cassorla & Lee, 2015; Metzner et al., 2011; Thompson, 2018).
- Simulation has been identified as an effective learning strategy in health care that
  - ✓ 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).
  - ✓ allows acquisition of clinical skills through deliberate practice and improves learners' competence and confidence (Al-Ely, 2010; Boulet & Murray, 2010; Cant & Cooper, 2010).
  - ✓ reduces risks to patients and learners, increases patient safety (Higham & Baxendale, 2017; Khan, Pattison, & Sherwood, 2010). improves quality in healthcare (Hegland, Aarlie, Stromme, & Jamvech, 2017). and reduces health care costs in the long run (Al-Ely, 2010; Council on Accreditation of Nurse Anesthesia Educational Programs [COA], 2015).

# Practice Gap

- 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 University of Saint Francis Doctor of Nursing Practice -Nurse Anesthesia Program (USF DNP-NAP) does not include a correct positioning of surgical patients' simulation in the first-year nurse anesthesia curriculum.



# Scope of the Project

- **Evidence-based (EB) educational intervention**
- **Objectives of this DNP project:**
  - to improve first-year GSRNAs' knowledge and confidence on correct surgical positioning of anesthetized patients and prevention of PPNIs
  - to assess how participation in simulation-based activities influenced first-year GSRNAs' perceptions of knowledge and confidence.
- **Original plan:**
  - the DNP project manager's participation in a lecture and PowerPoint Presentation
  - Simulation
- **Modified plan:**
  - Simulation only

# Goals and Expected Outcomes

**The overall goal of this DNP project** → 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 expected outcomes for this DNP project:**

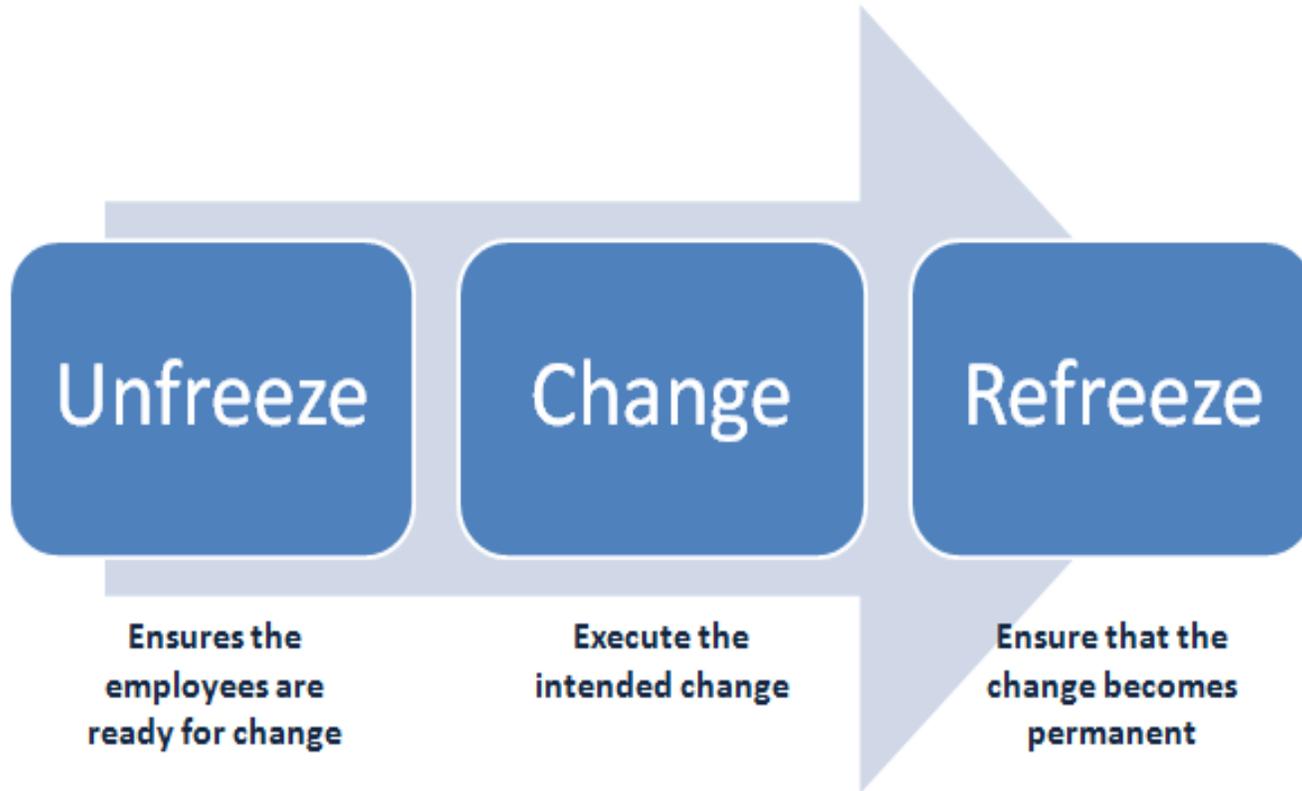
SBE should have been approved by the USF DNP-NAP faculty and the Institutional Review Board by December 2019 and implemented in March 2020

The mean knowledge scores between the pre- and post-knowledge surveys would have increased

50% of GSRNAs would have scored above 2 (somewhat agree) on the learning subscale questions on the SET-M evaluation questionnaire after the simulation

50% of GSRNAs would have scored above 2 (somewhat agree) on the confidence subscale questions on the SET-M evaluation questionnaire after the simulation.

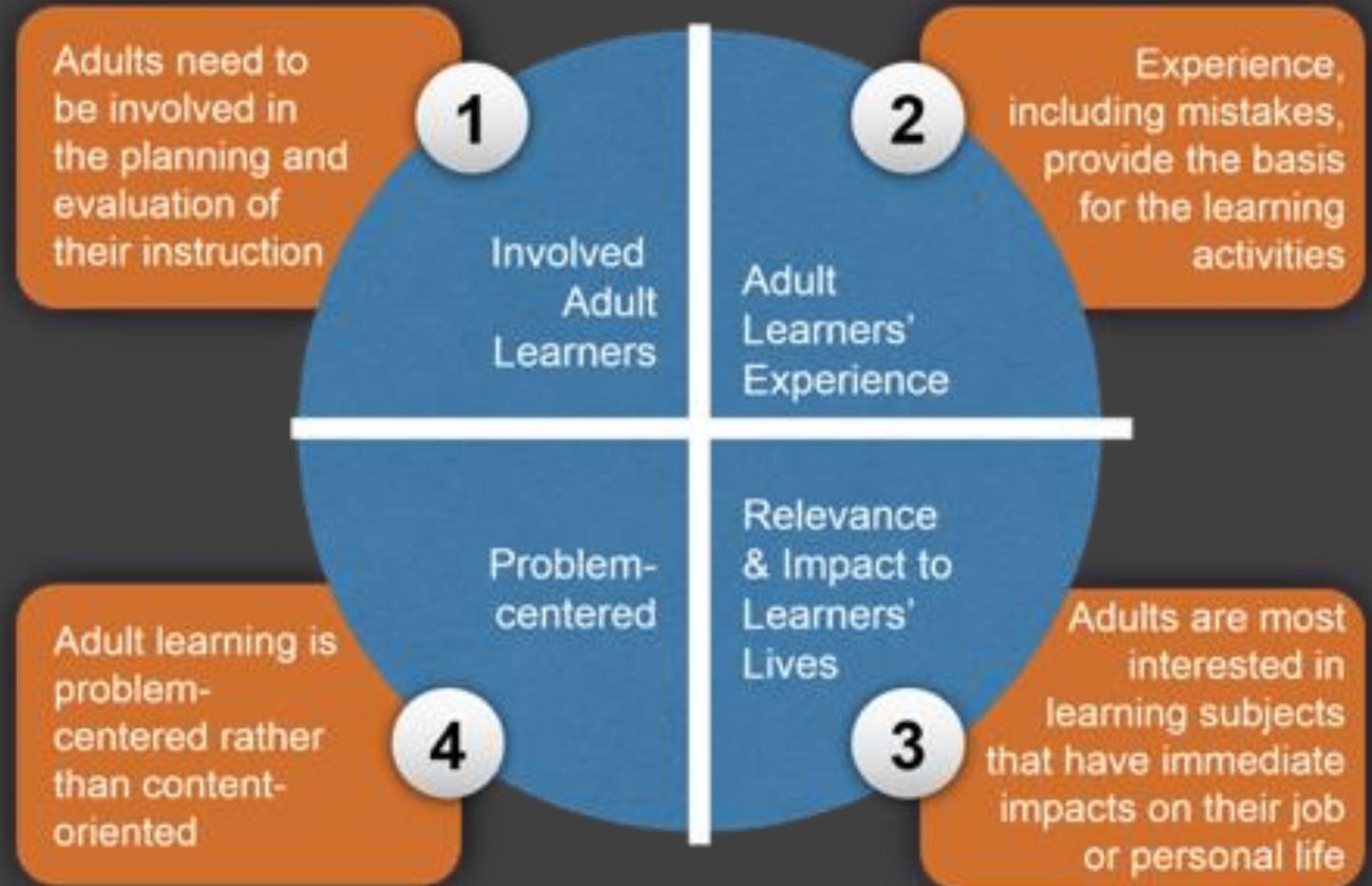
# The Lewin Change Theory (1951)



THEORETICAL  
UNDERPINNINGS

# THEORETICAL UNDERPINNINGS

## The Adult Learning Theory: Andragogy by Knowles (1980)



# Model for Evidence-Based Practice Change by Larrabee (2009)

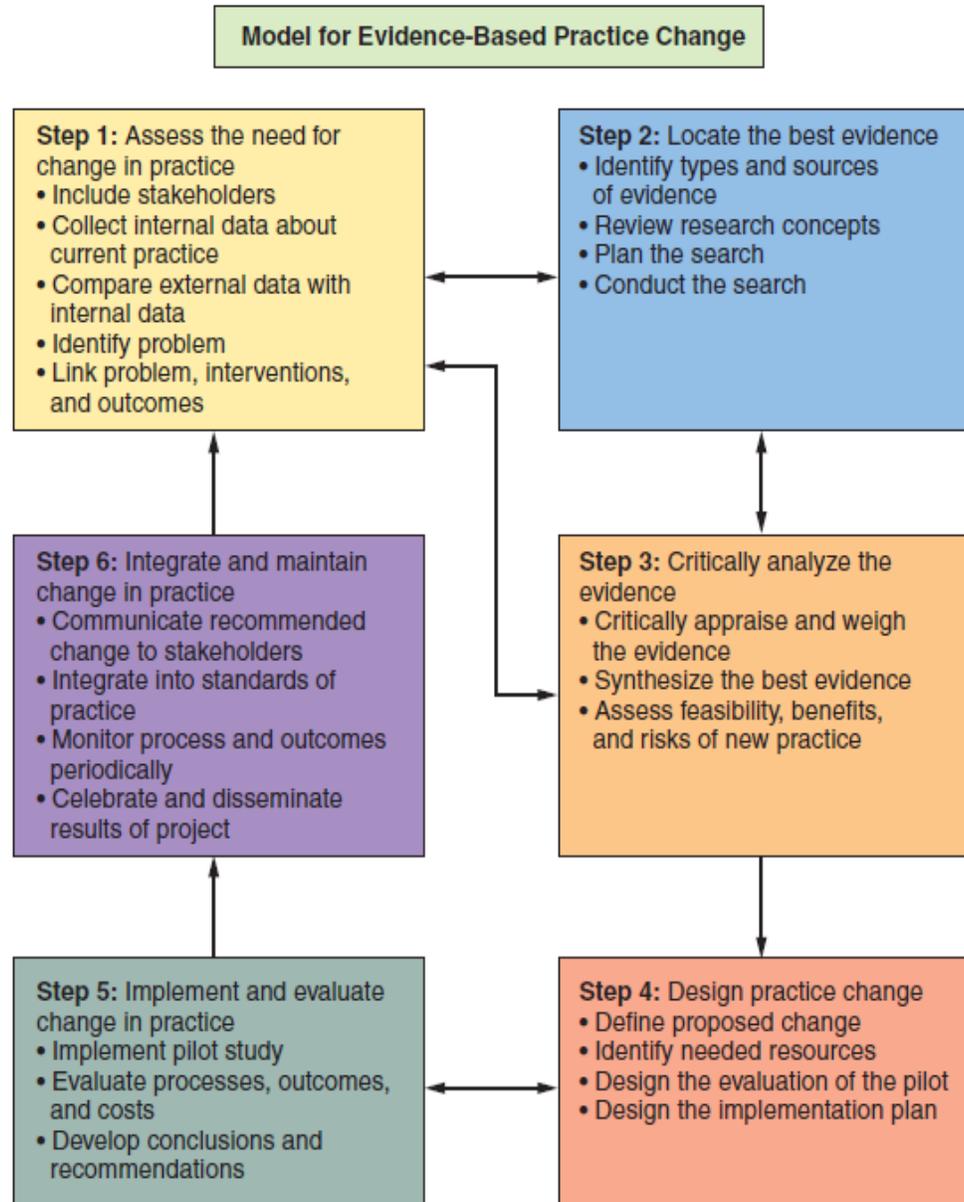


Figure 1. A model of evidence-based practice change. Adapted from "Nurse to nurse: Evidence-based practice," by J. H. Larrabee, 2009. Copyright 2009 by the McGraw-Hill.

THEORETICAL  
UNDERPINNINGS

# Data Collection Methods

## Quantitative

- Pre-/post-knowledge surveys
- Demographic questionnaire
- The Modified Simulation Effectiveness Tool (SET-M)

## Qualitative

- First-year GSRNA comments

## 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

# INSTRUMENTS AND TOOLS

## Indirect method → the SET-M learning and confidence subscales

### Simulation Effectiveness Tool - Modified (SET-M)

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

<b>PREBRIEFING:</b>	<b>Strongly Agree</b>	<b>Somewhat Agree</b>	<b>Do Not Agree</b>
Prebriefing increased my confidence	3	2	1
Prebriefing was beneficial to my learning.	3	2	1
<b>SCENARIO:</b>			
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
<b>DEBRIEFING:</b>			
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?			

# INSTRUMENTS AND TOOLS

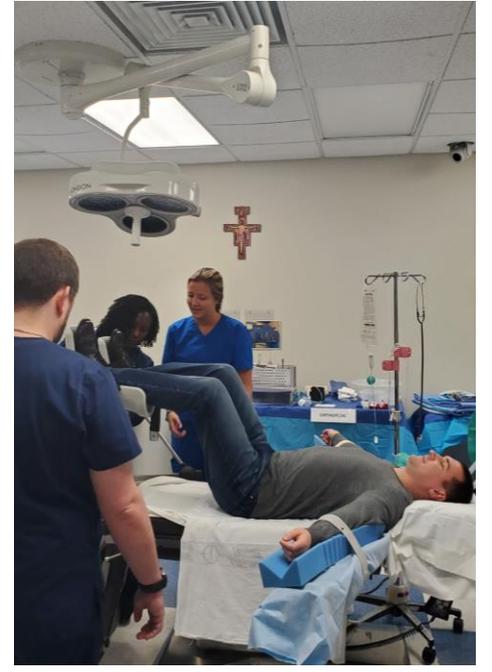
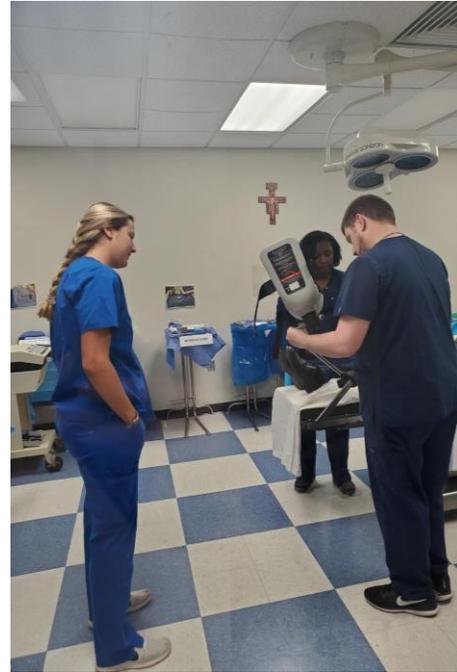
## Direct method → participants' completion of a knowledge survey

### Appendix B: Pre- and Post-knowledge Survey

Date \_\_\_\_\_

1. What upper extremity nerve injury causes inability to abduct or oppose the 5<sup>th</sup> 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

# INSTRUMENTS AND TOOLS



# IMPLEMENTATION

# Analysis

- Descriptive statistics via SPSS<sup>®</sup> 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 → journaling and participant comments in the comment box of the SET-M tool.

# Results and Findings

- The correct positioning and the prevention of PPNIs simulation was approved by the USF DNP-NAP faculty and the IRB in October 2019 and implemented in March 2020.
- A total of five first-year GSRNAs ( $n = 5$ ) participated in the SBE.
- The expected outcome for this DNP project was successfully achieved → the mean for the pre- and post-knowledge surveys increased by 1.6000 ( $SD = \pm 1.51658$ ).
  - ❑ The mean for the pre-knowledge survey for all participants ( $n = 5$ ) was 5.8000 ( $SD = \pm 1.09545$ ).
  - ❑ The mean for the post-knowledge survey for participants ( $n = 5$ ) was 7.4000 ( $SD = \pm .89443$ ).
- 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.

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## Attendance

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The pre- and post-knowledge surveys were not randomly collected from the participants before and after the simulation

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The DNP project manager was not able to participate in the lecture and PowerPoint presentation



# Limitations

# Recommendations

Implement

- Implement this DNP project into the other nurse anesthesia programs

Assign

- Assign each participant a unique survey ID for more substantial data analysis

Adhere

- Adhere to the original DNP project plan

Assess

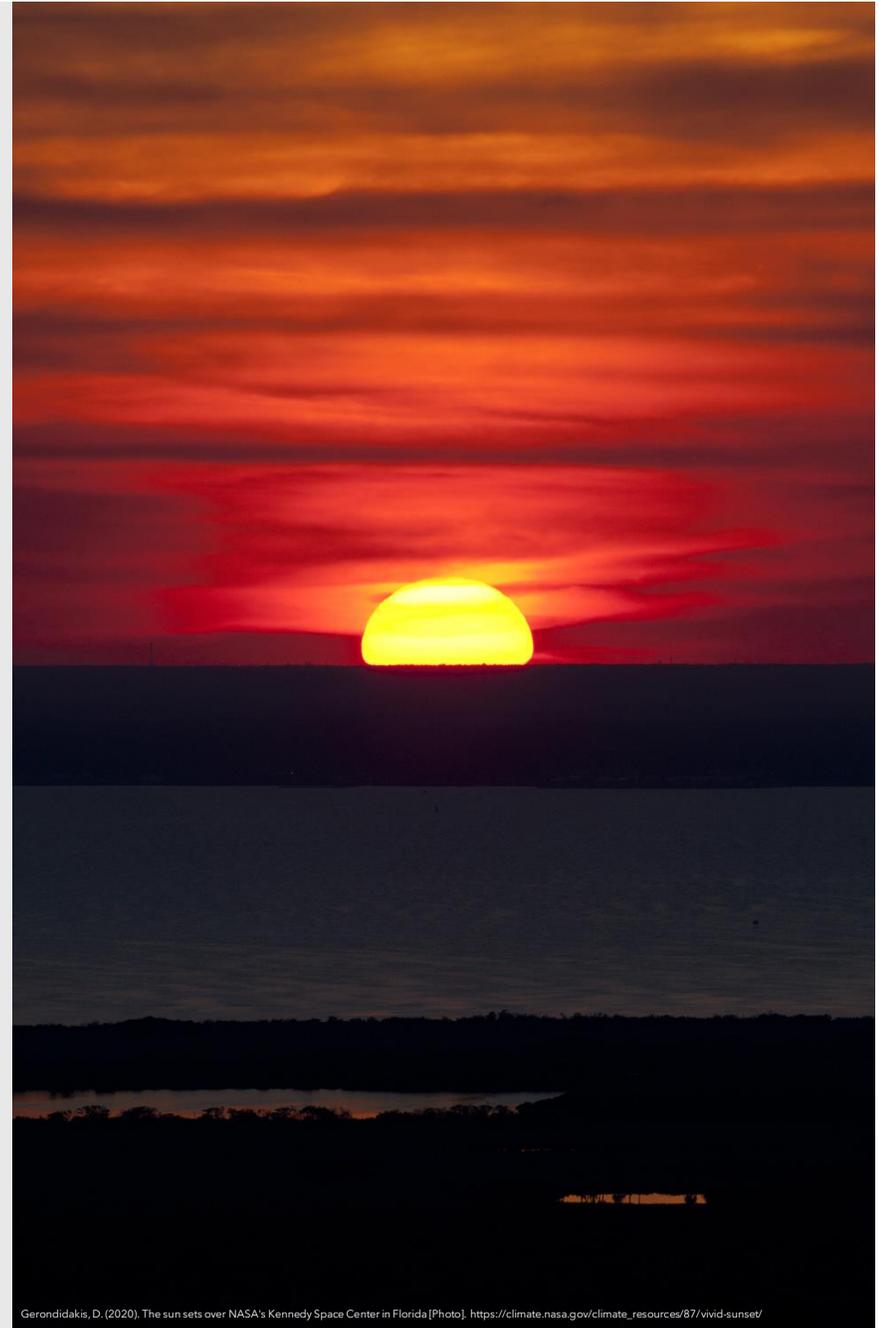
- Assess knowledge and confidence of participants at three different points throughout the project implementation.

# Implications

- 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.
- 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.
- 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.

# Sustainability

- Sunset of the BSN-DNP Nurse Anesthesia Program
- The first-year GSRNAs project participants were the last cohort of students admitted to the USF DNP-NAP.
- No strategies for maintaining and sustaining educational evidence-based intervention were selected for this DNP project.





# Dissemination

- The public presentation of this DNP project consisted of a verbal defense of the project by the DNP project manager in front of the project team and DNP project stakeholders during the summer of 2020.
- Possible preparation of a manuscript for submission to the INACSL online simulation journal

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