

Enhancing SRNA Proficiency in Ultrasound-Guided Peripheral Nerve Blocks: A Skills-Based Competency Approach

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Abstract

- **Purpose:** Development of a skills-based competency simulation module to enhance Student Registered Nurse Anesthetist (SRNA) competency in performing interscalene, supraclavicular, infraclavicular, and axillary nerve blocks guided by ultrasound.
- **Design:** Implementation of this quality improvement project began with the University of Wisconsin-Oshkosh (UWO) Certified Registered Nurse Anesthetist (CRNA) students receiving a pretest. Following completion of the pretest, they received an educational tool containing information on the skills needed to perform interscalene, supraclavicular, infraclavicular, and axillary nerve blocks. They then underwent simulation where they performed the skills and steps necessary to perform these peripheral nerve blocks. After the simulation, the students completed a posttest and a student satisfaction and self-confidence in learning survey.
- **Methodology:** Data was obtained from pre- and post-assessment scoring from the cohort of 2025. The scoring difference between these two assessments was compared using the mean score and a paired samples t-test to determine statistical significance. A rubric from the British Journal of Anaesthesia (Shafqat et al, 2018) was used to assess competency in performing ultrasound-guided nerve blocks during the simulation portion of this project. The mean scores for both cohorts were calculated.
- **Conclusion:** Findings indicated a statistically significant increase in participant knowledge for the 2025 cohort based on improvement in scores between the pretest and posttest assessments. The 2025 and 2026 cohorts scored greater than 99% during the simulation, using the assessment-checklist data-collection form from the British Journal of Anaesthesia (Shafqat et al, 2018) as the scoring guide.

Introduction

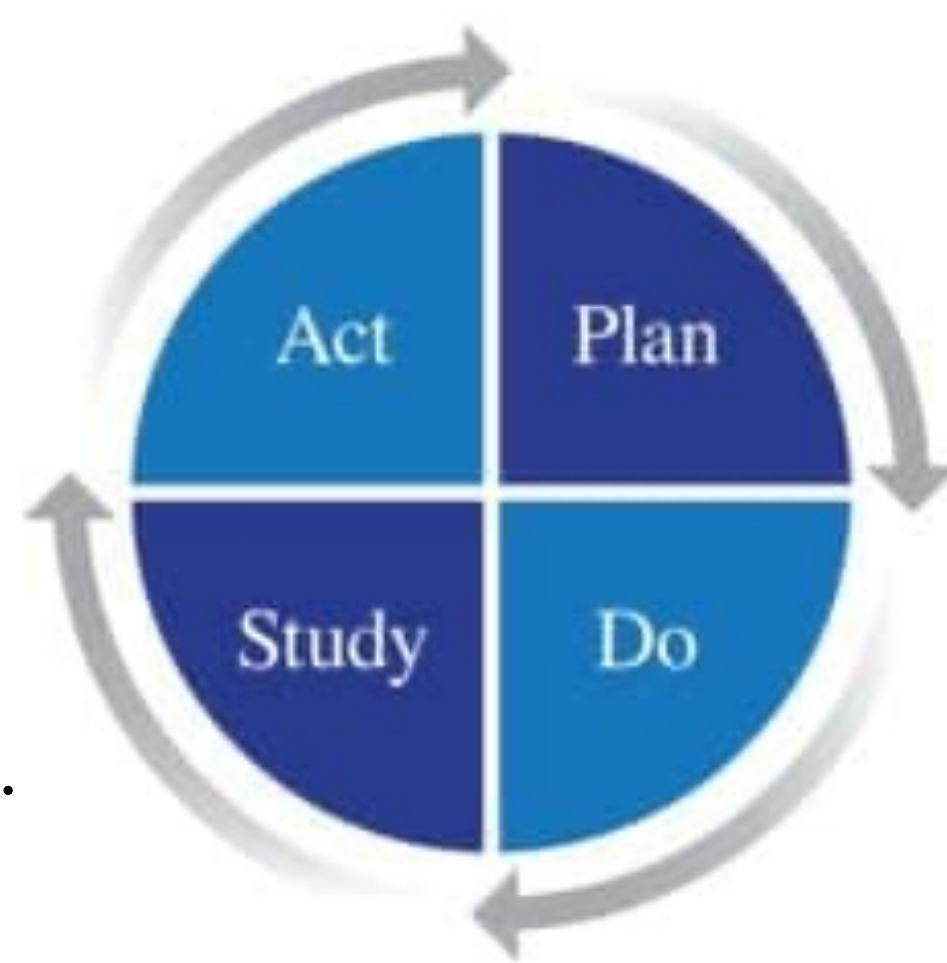
- This Doctor of Nursing Practice (DNP) project aims to develop a simulation-based module for ultrasound-guided peripheral nerve blocks in the UWO CRNA program to enhance SRNA competency.
- **Increased Use of Peripheral Nerve Blocks:** Peripheral nerve blocks are increasingly utilized in orthopedic procedures, with their use rising from 9.5% to 18.9% between 2006 and 2019 (Hospital for Special Surgery, 2023).
 - **Benefits of Peripheral Nerve Blocks:** They are associated with reduced rates of acute kidney injury, delirium, ICU admissions, opioid use, and hospital stays, while providing superior pain control (Hospital for Special Surgery, 2023).
 - **Educational Enhancement:** Implementing a simulation-based ultrasound-guided peripheral nerve block module in nurse anesthesia programs can potentially equip future CRNAs with the essential skills needed for providing effective pain management, especially in rural and underserved regions.

PICOT Question

(P) For UWO CRNA students in the 2025 and 2026 cohorts **(I)** does a new module and simulation of peripheral nerve blocks improve competency and confidence regarding ultrasound-guided regional anesthesia **(C)** compared to the current curriculum without a simulation training assessment on peripheral nerve blocks **(O)** in terms of students’ competence in performing peripheral nerve blocks, measured through pre- and post-simulation assessment and simulation scoring **(T)** during the summer of 2024?

Theoretical Framework

- Plan-Do-Study-Act (PDSA) Cycle developed by Dr. Deming**
- Plan: Identify a goal or purpose (The Deming Institute, 2023).
 - Do: Implementation of a plan (The Deming Institute, 2023).
 - Study: Assess validity of the plan and monitor signs of progress or areas for improvement (The Deming Institute, 2023).
 - Act: Integrate the learning and outcomes of the entire process. Methods and theories may be changed or revisited to improve learning and development (The Deming Institute, 2023).



Source: (The Deming Institute, 2023)

Review of Literature

- **Current Education for Nurse Anesthesia Students:** Studies have found that incorporating simulation-based training methods into CRNA programs have been beneficial for students’ education. One study by Emmanuel demonstrated that nurse anesthesia students undergoing simulation led to an improvement in the accuracy of identifying interscalene brachial plexus nerve bundles (Emmanuel, 2023).
- **Simulation-Based Training:** A study done by O’Driscoll et al. discussed the importance of proper education regarding regional anesthesia practices. Anesthesia providers that undergo simulation and gain more experience with these blocks during simulation have increased knowledge and confidence scores after completing training (O’Driscoll et al., 2018).
- **Clinical Impact of Nerve Blocks:** Studies done by Fillingham et al. (2022) and Zhou et al. (2018) have shown that incorporating peripheral nerve blocks into practice leads to a reduction in postoperative pain and decreased opioid consumption.

Methodology

Design

- This is a quality improvement project.
- Voluntary consent forms were distributed and completed by participants.
- Pre- and posttest assessments were created and used to assess students’ knowledge of performing peripheral nerve blocks.
- A PowerPoint educational tool was created and distributed to the students.
- Students performed the steps and techniques in a simulation setting required to perform the upper extremity block of the evaluator’s choosing (interscalene, supraclavicular, infraclavicular, or axillary).
- A phantom gel tool and ultrasound machine were used to assess the students’ needle advancement techniques and maintenance of needle visualization on the ultrasound machine.
- Following simulation, the students were debriefed and completed a survey form.

Setting

- This project took place at the University of Wisconsin-Oshkosh Graduate Simulation Lab.

Population

- SRNAs from the 2025 and 2026 cohorts enrolled in the doctoral nurse anesthesia program at the University of Wisconsin-Oshkosh. Twelve participants from each cohort took part in this quality improvement project.

Measures

- Data was collected from pre- and post-assessments from the 2025 cohort.
- An assessment-checklist data-collection form from the British Journal of Anaesthesia (Shafqat et al, 2018) was used to score simulation performance.
- Likert scoring was used in the student satisfaction and self-confidence in learning survey, and the scores were measured.

Results and Implications

Simulation scoring using the assessment-checklist data-collection form from the British Journal of Anaesthesia (Shafqat et al, 2018)

Statistical Analysis	N	Mean
2025 Cohort	12	99.4%
2026 Cohort	12	99.8%

Pretest scores before educational tool was distributed and simulation was performed compared to posttest scores after completing the simulation. (Note: Pre- and posttest assessments were given to 2025 cohort only. These assessments were created after the simulation was implemented with the 2026 cohort. The study design was strengthened.)

Statistical Analysis (2025 Cohort)	N	Mean
Pretest score	12	73.3%
Posttest score	12	85.8%

Two-Sided p Value = 0.036. A p Value < 0.05 indicates a statistically significant difference between the pre- and posttest mean scores completed by the 2025 cohort.

- Likert scoring of 1 to 5 (1 = strongly disagree to 5 = strongly agree) from the student satisfaction and self-confidence in learning survey.
 - 2025 cohort: 4.95/5
 - 2026 cohort: 4.75/5
- A rubric from the British Journal of Anaesthesia (Shafqat et al, 2018) was used to assess competency in performing ultrasound-guided nerve blocks. The average score for performing peripheral nerve blocks for UWO CRNA students was greater than 99%.
- Results showed an improvement in scores from 73.3% on the pretest to 85.8% on the posttest for the 2025 cohort.
- With these results, this simulation-based module along with the educational tool was found to improve UWO SRNAs’ competency in performing ultrasound-guided nerve blocks.
- Success and implementation of this module into CRNA program curriculum has the potential to empower CRNA students in the UWO CRNA program, decrease the use of opioids for pain management, and spark further research regarding the impact of ultrasound-guided peripheral nerve blocks leading to improved care for patients.

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