Education Based Simulation Training for Ultrasound Guided Anesthesia: Improving Confidence Among Anesthesia Providers

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Background

- The placement of invasive catheters and monitors is a necessary, fundamental skill, within the Certified Registered Nurse Anesthetists (CRNAs) scope of practice
- Point-of-care ultrasound (POCUS) is a portable, noninvasive, ultrasonography tool that improves safety and efficacy of interventions provided in anesthesia care (AANA, 2020)
- Currently, there is no standard ultrasound curriculum for anesthesia providers in the United States
- 36% of anesthesia providers receive general POCUS training (Canon et al., 2018)
- American Board of Anesthesiologists encourages POCUS training for all anesthesia programs
- Research shows participants involved in education-based simulation training are more willing to incorporate the skills learned into practice
- American Society of Anesthesiologists states >90% of anesthesia providers incorporated skills learned in simulation into practice

PICO

For Certified Registered Nurse Anesthetists, does the use of education-based simulation training for ultrasound-guided anesthesia compared to no simulation training improve the knowledge, confidence, and incorporation of ultrasound use within the clinical practice setting?

Objectives

1. CRNAs self-perceived confidence and knowledge levels in using ultrasound will increase after attending the educational-based ultrasound simulation, as indicated with the information provider by the pre-intervention and post-intervention surveys

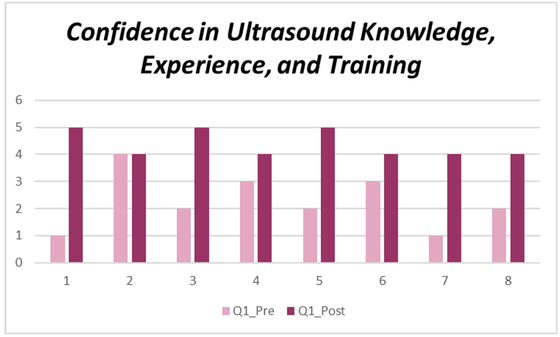
1. Incorporation of ultrasound use within clinical practice settings will increase for CRNAs who attended the education-based ultrasound simulation, as evidenced by the data collected from the post-intervention survey

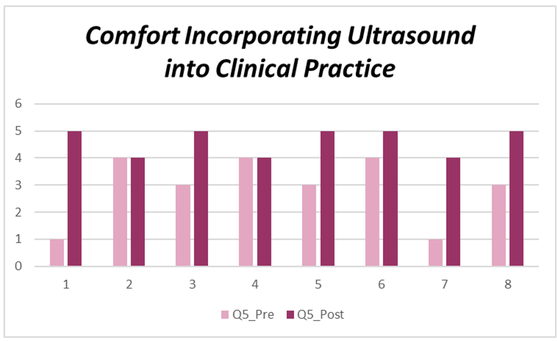
Methodology

- Literature search utilized Google Scholar, PubMED, and CINAHL databases with articles between 2017 and 2022
- Keywords included “ultrasound simulation”, “POCUS”, “education-based simulation”, “anesthesia”, “CRNA”
- The search yielded 750 articles of which 5 articles that with the strongest evidence to answer the research question were chosen
- Of the 5 articles included there was 1 Systematic Review, 1 Randomized Controlled Trial, and 3 Prospective Cohort Studies
- The Iowa Model for Sustainability Framework was used for implementation of the project

Translation

- An education-based ultrasound simulation was developed and implemented at Cedar Crest College, School of Nursing Simulation Center in Allentown, Pennsylvania
- Recruitment of CRNAs was conducted by placement of an educational ultrasound flyer within anesthesia break rooms at local hospitals
- A total of eight CRNAs attended the simulation day
- The ultrasound simulation included a didactic PowerPoint presentation followed by three stations: arterial line insertion, peripheral intravenous catheter placement, and ultrasound technique basics using a Blue Phantom Simulator





- All participants completed a pre-intervention and a post-intervention survey using Microsoft forms to assess their knowledge, confidence, and incorporation of ultrasound use in the clinical practice setting
- Data was analyzed using by the 2019 Dr. Joshua Lambert’s *t*-test calculator.
- Data analysis concluded a significant increase in CRNAs knowledge, confidence, and incorporation of ultrasound use in the clinical practice setting.

Recommendations for Practice

- CRNAs must continue to learn new skills in order to adapt to changes in healthcare and improve patient outcomes
- Utilize education-based ultrasound simulation to enhance the knowledge, confidence, and incorporation of ultrasound into clinical practice
- There needs to be continued education-based ultrasound simulation for CRNAs within clinical practice to maintain skills
- Further investigation needs to be completed to identify other barriers that exist to ultrasound use in clinical practice
- Future ideas should include conducting ultrasound simulations for ultrasound-guided peripheral nerve blocks and ultrasound-guided central line placement

Conclusion

- POCUS can be used in fast paced anesthesia environments to improve patient outcomes
- Educational simulation allows CRNAs to learn or improve their POCUS skills in a controlled, safe environment, which ultimately increases their skills and confidence with POCUS use
- The main purpose of this project was to improve the knowledge, confidence, and incorporation of ultrasounds in clinical practice settings
- There was an increase in post-intervention scores compared to the pre-intervention survey scores indicating that CRNAs had an increase knowledge, confidence, and incorporation of ultrasound use
- Despite smaller participant sample size, there is clinical significance, and this educational simulation will improve patient outcomes in clinical settings
- Limitations include a small sample size, recruitment from one local hospital, and only utilizing CRNAs in the participation

References

American Association of Nurse Anesthetists. (2020). *Point-of-care ultrasound in anesthesia care.* https://www.aana.com/docs/default-source/practice-aana-com-web-documents-(all)/professional-practice-manual/pocus-in-anesthesia-care-practice-considerations.pdf?sfvrsn=a3259e3e_4

Cannon, J., Sizemore, C., Zhou, T., McKelvey, G. M., Li, M., Chidiac, E. J., Guo, X., Reynolds, A., & Wang, H. (2018). Perioperative point-of-care ultrasound training: A survey of anesthesia academic programs in United States and China. *Journal of Anesthesia and Perioperative Medicine, 5*, 61-69. https://doi:10.24015/JAPM.2018.0030

Cullen, L., Hanrahan, K., Edmonds, S. W., Reisinger, H. S., & Wagner, M. (2022). Iowa implementation for sustainability framework. *Implementation Sciences, 17*(1), https://doi.org/10.1186/s13012-021-01157-5

Kim, T. E., & Tsui, B. (2019). Simulation-based ultrasound-guided regional anesthesia curriculum for anesthesiology residents. *Korean Journal of Anesthesiology, 72*(1), 13–23. https://doi.org/10.4097/kja.d.18.00317

Le, C. K., Lewis, J., Steinmetz, P., Dyachenko, A., & Oleskevich, S. (2019). The use of ultrasound simulators to strengthen scanning skills in medical students: A randomized controlled trial. *Journal of Ultrasound in Medicine, 38*(5), 1249–1257. https://doi.org/10.1002/jum.14805
Tolsgaard, M. G. (2018). A multiple-perspective approach for the assessment and learning of ultrasound skills. *Perspectives on Medical Education, 7*(3), 211–213. https://doi.org/10.1007/s40037-018-0419-8

Naji, A., Chappidi, M., Ahmed, A., Monga, A., & Sanders, J. (2021). Perioperative point-of-care ultrasound use by anesthesiologists. *Cureus*, *13*(5), e15217. https://doi.org/10.7759/cureus.15217