

Development and Implementation of a Nurse Anesthesia Education Application Enhance Student Registered Nurse Anesthetist Clinical Training

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Abstract

Background: Clinical training is the foundation for nurse anesthesia education. Certified Registered Nurse Anesthetist (CRNA) clinical instructors are charged with an essential role in the quality of clinical education of Student Registered Nurse Anesthetists (SRNA) throughout SRNA training. Problem: Limited opportunity exists for educational guidance and preceptor resources for CRNA clinical instructors are often not provided. This directly limits clinical educator effectiveness and instruction quality. **Approach:** This project developed an online clinical education tool to improve clinical instructor effectiveness. CRNAs utilized the tool over 12 weeks, addressing the complexities of constructive feedback, objective evaluation, and clinical subspecialty knowledge. **Conclusion:** This project demonstrated that providing educational resources to clinical instructors increases their confidence and perceived performance in the clinical area. Improved clinical teaching can lead to better-prepared nurse anesthesia graduates, improve job satisfaction and experience for the instructor and trainee, and increase patient safety.

Introduction

As of August 2022, the American Association of Nurse Anesthesiology (AANA) reported 130 accredited nurse anesthesia programs in the United States and Puerto Rico, with more than 2300 clinical sites ¹. Clinical training is the foundation on which nurse anesthesia education is built. The clinical component of nursing education, a practice-based profession, prepares students with skills and patient scenarios under the supervision of licensed professionals. The role of the clinical instructor is imperative to teach students to prioritize clinical tasks while fostering flexibility and problem-solving skills they need to be competent in the operative setting ². Certified Registered Nurse Anesthetist (CRNA) clinical instructors are charged with an essential role in the quality of education of Student Registered Nurse Anesthetists (SRNA) and contribute most clinical instruction throughout SRNA training. The CRNA provides safe, high-quality anesthesia care while concurrently instructing and translating such care to the SRNA. Trainees learn to deliver patient care and develop paramount patient safety skills through preceptorship from the CRNA clinical instructor ³.

Typically, CRNAs serve as educators without formal training and often without systemic support from nursing faculty and hospital administration ⁴. Most clinical instructors are not University faculty and are not financially compensated as educators ⁴. The AANA reports

graduates of nurse anesthesia programs log an average of 9,369 clinical experience hours¹. Despite thousands of hours of clinical instruction, opportunities for guidance are limited, and preceptor resources are scarce for CRNA clinical instructors. This directly limits the effectiveness of CRNA clinical educators and the quality of instruction⁵. Providing clinical instructors with clear expectations for their role, well-defined clinical learning objectives, and guidance for clinical teaching may improve their confidence in their skills and ability to maintain patient safety while providing a high-quality learning experience for the student.

Methods

This project took place at a large, urban, level-one trauma academic medical center that performs an average of 18,000 procedures annually and approximately 32,000 anesthetics. Approximately 100 CRNAs are employed at this site, all of whom educate SRNAs. The project center serves as the primary clinical site for a nurse anesthesia program comprising 90 students across three cohorts. There are 33 operating rooms and 10-13 off-site procedural areas daily where anesthetics are performed by CRNAs assigned to work with students. This project was deemed non-human-subject research and therefore exempt from the University's institutional review board review due to its educational nature.

First, an online tool was developed. The nurse anesthesia program uses Canvas for course delivery; therefore, this platform was selected to host the clinical teaching tool. After the module was created, clinical instructors were granted access to its content through a site-generated email. The first section presents the CRNA clinical instructor role expectations, developed by nurse anesthesia program faculty in collaboration with primary clinical-site nurse anesthesia clinical leadership. These include supervision guidelines of SRNAs at the clinical site, care plan requirements, and communication expectations throughout the perioperative continuum (preoperative to postoperative care). Daily clinical evaluation requirements are also included. The Family Education Rights and Privacy Act (FERPA) of 1974 is included to guide confidentiality regulations that must guide clinical education and teaching. Additional clinical instructor resources include AANA's previous publications on Education of the Clinical Preceptor, AANA Standards of Care for nurse anesthesia practice, AANA Code of Ethics, and the AANA Informed Consent for Anesthesia Care. AANA Wellness documents on infection control are also linked. Lastly, project managers uploaded class photographs of each cohort to assist clinical instructors in identifying students.

A clinical instructor "toolbox" is included, which addresses adult learning theory and generational differences in teaching and learning. An explanation of each clinical semester course and its objectives is provided here, along with descriptions of the learner levels listed on daily clinical evaluations (novice, advanced beginner, competent, proficient). A few articles are provided to guide readers, offering objective feedback and constructive criticism. Articles on teaching "difficult personalities" and critical thinking skills are also listed in the toolbox. Nurse anesthesia program-specific documents were provided, such as a clinical unsafe practice form and a link to the current nurse anesthesia program handbook.

An additional module was included to house anesthesia department protocols to guide anesthesia practice. Many of these protocols were created by anesthesiologists and nurse anesthetists and accepted as institutional standards to guide high-acuity cases. Departmental Grand Rounds presentations in these areas were also uploaded to provide quick references for instructors to provide student feedback and guide clinical education.

The remaining modules include detailed learning objectives for clinical sub-specialties, literature about anesthesia considerations for each, and questions and answers developed to help guide clinical teaching. These subspecialties included neurosurgery, orthopedics, burns, trauma, general and robotic surgery, transplant, vascular, ear nose and throat, as well as emergency airway manipulation, and non-OR anesthesia (ie, endoscopy, electrophysiology lab, MRI, interventional radiology). Obstetrics was not included because a separate tool was created for this rotation. Specialty objectives and question/answer documents were created using the NBCRNA (National Board of Certification and Recertification for Nurse Anesthetists) National Certification Examination Content Outline with consideration of the Council on Accreditation clinical case totals and experiences. Articles deemed excellent by CRNA clinical instructor experts were included to help guide clinical discussion in the subspecialty area.

A pilot group of 28 Certified Registered Nurse Anesthetists (CRNA) participated in the project. Participation was voluntary and required no consent, and all completed a one-hour course on accessing and utilizing the application. Participants could access this application via a standard web browser or by downloading the Canvas app on their smartphone. Participant application utilization over one semester was monitored in active time on the Canvas application.

The evaluation was conducted using pre- and post-course questionnaires, administered and collected anonymously to ensure confidentiality. The pre-course questionnaire was administered before the in-person instruction on the application's use. The post-course questionnaire was administered to project participants at the end of the academic semester, twelve weeks later. The questions for both pre/post-surveys were 12 identical questions (Table 2) adapted and modified from a quality improvement project by Scott-Herring and Singh addressing preceptor satisfaction, confidence, and comfort in their role⁷. The project members reviewed and approved the adaptation of the questions before implementation. Demographic data was collected during the post-course questionnaire (Table 1).

Questionnaire items were scored on a 5-point Likert scale addressing training or formal education about the clinical instructor (CI) role, confidence, comfort and knowledge of expectations when functioning in the CI role, comfort level instructing students with difficult personalities and resolving conflict, ability to provide positive and constructive feedback to students, and perception of support in CI role.

Table 1. Participant Demographics

DEMOGRAPHIC DATA	CRNAs n=23 (%)
Gender, No (%)	
Female	16 (70)
Male	7 (30)
Age, No (%)	
< 30	4 (17)
31-40	13 (57)
41-50	5 (22)
51-60	1 (4)
Education, No (%)	
Master's degree	15 (65)
Doctorate degree	8 (35)

Previous CI Education, No (%)	
Yes	5 (22)
No	18 (78)
Years as CRNA, No (%)	
<2	5 (21)
2-5	3 (13)
6-10	10 (43)
11-15	2 (9)
16-20	1 (4)
Years as CRNA at project site, No (%)	
<2	6 (26)
2-5	6 (26)
6-10	6 (26)
11-15	3 (14)
16-21	1 (4)
>21	1 (4)
SRNA at NAP (Nurse Anesthesia Program), No (%)	
Yes	21 (91)
No	2 (9)
Years as RN, No (%)	
< 5	2 (9)
6-10	5 (21)
11-15	9 (39)
16-20	3 (13)
20-25	2 (9)
>26	2 (9)
Total Times Tool Accessed	
1-5	12
6-10	6
11-15	5

After completing the pre-/post-course questionnaires, the results were entered into an Excel database after consultation with a biostatistician for proper data analysis. A paired t-test was utilized to compare pre/post-course survey results, and descriptive statistics were used to compare item means.

Results

Twenty-eight CRNA clinical instructors attended an in-person education course on using the online resource application and completed the pre-course questionnaire. At the end of the 12-week course implementation period, 23 CRNA clinical instructors successfully used the

application and completed the post-course questionnaire. Pre- and post-course Likert-scale responses indicated that all participants improved their instructor confidence, role satisfaction, knowledge of role expectations, knowledge of adult learning theory, and their ability to provide constructive feedback. All participants demonstrated growth in their perceived role as clinical instructors. Participants' mean total scores for pre-course and post-course results were compared for illustration (Table 2).

The post-course questionnaire included an additional question addressing the estimated number of times the participants accessed the online resource application (Table 1). CRNA participants who successfully completed the course showed a significant ($P < 0.05$) improvement in their confidence ($P = 0.00000137$) and understanding of their role ($P = 0.000000395$) as clinical instructors (Table 2).

Table 2. Pre/Post-Test Results

Question	Growth in score (1-5)	P value
How satisfied are you with your preparation regarding the education of SRNAs?	1.35	0.000028
How confident are you with your ability to precept an SRNA?	0.91	0.0000014
How comfortable are you in actively coaching critical thinking with your SRNA?	1.04	0.000039
How comfortable are you in working with a SRNA who has a different personality or learning style than you?	1.13	0.0002
How comfortable are you in providing both positive and constructive feedback to a SRNA?	1.13	0.000003
I am knowledgeable about the CRNA preceptor's role and responsibilities?	1.09	0.0000004
I am proficient with Knowles' Theory of Adult Learning and its application to educating SRNAs.	2.52	0.0000000006
I am able to assess learner's needs and their learning style readily.	1.87	0.000000005
I am comfortable with conflict management and resolution when it comes to SRNA clinical education.	1.61	0.0000041
I am proficient in delivering constructive verbal AND written feedback for SRNAs' daily evaluation.	1.35	0.0000045
I am given the resources I need to be an effective preceptor to SRNAs.	1.91	0.0000002
I am proficient at the proper utilization of the SRNA clinical evaluation form at our facility and have access to the criteria utilized to evaluate SRNAs.	1.30	0.0000004
Overall Mean Total Score (Pre/ Post)	35.74/52.96	

Discussion

CRNA clinical instructors are tasked with providing safe anesthetic care while instructing, guiding, and evaluating the student registered nurse anesthetist (SRNA) in the clinical skills, science, and art of nurse anesthesia delivery in various settings⁶. A common theme throughout the literature is the lack of formal preceptorship or educational training for CRNA clinical instructors, limited access to supportive resources, and sparse systemic support. This project has given CRNA clinical instructors access to materials that better prepare the instructor to facilitate learning and clinical training. The pre-course and post-course surveys demonstrated an overall improvement in instructor understanding of role definition, preparation, confidence, and knowledge levels of adult learning theory and student evaluation processes, as demonstrated by the overall mean score improvement (Table 2).

This project supports a need in the literature regarding the lack of preparation and resources provided to CRNA clinical instructors. Findings are consistent with those of Elisha (2008), in which an eight-hour CRNA clinical instructor educational course was found to improve participants' knowledge and behaviors⁴. All items on this project's 12-question survey displayed a statistically significant improvement post-implementation. This is mostly likely because preceptors are given no formal training in clinical education at this site. This mirrors what is found in the literature. The question with the highest growth in score pertained to the knowledge of Knowles' Theory of Adult Learning and its application to the education of SRNA. This could result in improved learning for the adult learner. The ability to quickly assess learner needs and learning styles and overall satisfaction with preparation in the education of the SRNA also showed improvement. Overall, a statistically significant improvement was found ($p < 0.05$) regarding CRNA clinical instructor confidence and understanding of their role as clinical instructors. These findings demonstrate that a resource tool helps prepare CRNA clinical instructors and improve confidence levels as educators. This project could impact the quality of student training as clinical instructors have the resources needed to offer specialized clinical guidance, work through generation gaps in communication and personality differences, and objectively evaluate students.

Sample size is identified as a limitation, where a larger set of participants could result in a broader understanding of deficits in instructor preparedness and resources by providing a larger representation of CRNA clinical instructors. The project failed to have participants log the times they were assigned with a student in the clinical area in the twelve-week period. This may have interfered with application usage as some instructors may have been assigned a student more frequently depending on scheduling and case types. Monitoring the time log regarding application utilization prompted project administrators to implement an emailed weekly reminder at week four to engage participants for the remaining implementation length. Utilizing this weekly reminder at the beginning of the project implementation may have been beneficial in increasing application use. Finally, although the project began with 28 participants, five were excluded due to incomplete documentation of their numeric identifier on the post-course survey, resulting in 23 participants.

Conclusion

CRNA clinical instructors are imperative to the development and success of SRNA trainees. Effective clinical instructors, equipped with effective teaching strategies, constructive communication skills, clearly defined role expectations, and supportive resources, can instruct and mentor future nurse anesthesia providers. This project demonstrates that providing educational resources to clinical instructors increases their confidence and performance in the clinical arena.

Providing this application to a larger cohort of CRNA clinical instructors could validate the enhancement in the SRNA's educational experience. It may positively impact future nurse anesthesia clinical educators. The opportunity to demonstrate the effectiveness of the SRNA learning experience in its impact will further support the implementation of this project at additional nurse anesthesia program clinical sites. Improved clinical teaching can lead to better-prepared nurse anesthesia graduates, improve job satisfaction and experience for the instructor and trainee, and increase patient safety.

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