IMPROVING ANESTHESIA NON-TECHNICAL SKILLS IN NURSE ANESTHETISTS THROUGH AN ONLINE WORKSHOP

by

Melanie D. Schutt

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School of Nursing
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DNP Project Approval Form

This is to certify that ____________________________________________________________________________ 
(Name of Student)

successfully defended their project entitled:

Improving Anesthesia Non-Technical Skills in Nurse Anesthetist through an Online Workshop

__________________________________________________________________________________________

on ____________________________ , 2019 .
(Date)

DNP Project Advisor
(Required) Cheryl Spulecki, DNAP, CRNA

__________________________________________________________________________________________
(Typed Name)

__________________________________________________________________________________________
(Signature)

Committee Member 1*

__________________________________________________________________________________________
(Typed Name)

__________________________________________________________________________________________
(Signature)

Committee Member 2*

__________________________________________________________________________________________
(Typed Name)

__________________________________________________________________________________________
(Signature)

Committee Member 3*

__________________________________________________________________________________________
(Typed Name)

__________________________________________________________________________________________
(Signature)

*If applicable
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Abstract

Seventy percent of critical errors in anesthesia result from poor provider anesthesia non-technical skills (ANTS) indicating a critical need to examine alternative methods promoting ANTS. This Doctor of Nursing Practice (DNP) project examined the impact of an online educational ANTS workshop created for New York Certified Registered Nurse Anesthetists (CRNAs) who precept student registered nurse anesthetists (SRNAs). Lewin’s Theory of Planned Change was the theoretical framework. CRNAs were recruited using convenience snowball sampling through professional Facebook pages and the University at Buffalo LISTSERV. An online pre-workshop survey (n = 38), followed by an online self-guided workshop, focused on current ANTS information including the current definition, clinical implications, the perioperative role, and the importance of CRNAs training SRNAs about ANTS. A post-educational survey was administered immediately following the workshop (n = 29) and again one month later (n = 22). Data were analyzed using a one-way ANOVA rank test and chi square test of independence. Following the educational workshop, there was a statistically significant decrease in CRNAs’ perceived effectiveness in training SRNAs’ ANTS (p = 0.003). CRNAs perception of the importance of ANTS in non-crisis situations was statistically significant, increasing over time (p = 0.003 & p = 0.001). Forty percent of CRNAs reported personalities as a perioperative ANTS barrier. Knowledge was not perceived as a factor contributing to ANTS deficits. ANTS barriers reported by the CRNAs pointed toward the culture in the perioperative period. Introducing a no blame environment may increase the use of ANTS and improve patient outcomes.

Keywords: Certified registered nurse anesthetists (CRNAs), student registered nurse anesthetist (SRNA), anesthesia non-technical skills (ANTS), education
Medical errors are currently the third leading cause of death in the United States (U.S.) (Makary & Daniel, 2016). This problem has grown over time with previous research ranking medical errors as the eighth leading cause of death (Awad et al., 2005). In anesthesia, more than 70% of critical errors that directly contribute to brain damage and death stem from underdeveloped non-technical skills, more specifically from the lack of situation awareness (Schulz et al., 2015). With recent improvements in anesthesia technology, students are exposed to fewer emergency situations in the operating room during clinical training. Anesthesia non-technical skills (ANTS), such as teamwork and situation awareness, are a key aspect of crisis management in anesthesia. The importance of ANTS cannot be understated, as “they enhance workers' technical skills, and typically include situation awareness, decision-making, team work, leadership, and the management of stress and fatigue” (Flin, Patey, Glavin & Maran, 2010, p. 38). While anesthesia technical skills are taught through clinical rotations, non-technical skills are often left unaddressed. As a result, student anesthesia providers may have insufficient crisis management experience prior to beginning independent practice.

To address the gap in ANTS, universities and hospitals have incorporated simulation into their programs to expose student anesthesia providers to crisis scenarios. Despite the wide use of simulation, many anesthesia related medical errors continue to result from poor non-technical skills. The high rate of errors resulting from a failure in ANTS suggests that non-technical skills remain poorly developed during training (Schulz et al., 2015). It is crucial to understand why providers may not be implementing these skills in practice, and whether educating CRNAs on the importance of ANTS will result in improved ANTS.
Background and Significance

In the U.S., there are three categories of anesthesia providers: Physician Anesthesiologists (MDAs), Certified Registered Nurse Anesthetists/Anesthesiologists (CRNAs), and Anesthesiologist Assistants (AAs). MDAs and CRNAs are independent anesthesia providers, while AAs must work under the medical direction of an MDA (Sun, Dexter & Miller, 2016; AAAA, 2019). In the U.S., there are roughly 50,000 MDAs (Statista, 2019), 44,000 CRNAs (including student nurse anesthetists) (AANA, 2019a) and 2,000 AAs (Erickson, 2017). CRNAs have been providing anesthesia to patients in the U.S. since 1877 (AANA, 2019b), with MDAs beginning to practice in 1956 (AANA, 2019b). The first U.S. based AA educational program began in 1969 (AAAA, 2019). Regarding CRNA training, there currently are 121 accredited CRNA programs in the U.S. and Puerto Rico (AANA, 2019a).

Although there are roughly the same number of MDAs and CRNAs, they tend to not be evenly distributed geographically. Ninety-one percent of the practicing MDAs are located in metropolitan areas (Fallacaro & Ruiz-Law, 2004). In rural settings, CRNAs are the primary anesthesia providers. Furthermore, CRNAs safely administer over 45 million anesthetics annually (AANA, 2019a).

For all anesthesia providers, the operating room is a high stress environment, where the most routine procedure can lead to a rapid deterioration of a patient. Despite the rigorous training programs for CRNAs and MDAs, critical errors in the operating room occur (Neuhaus et al., 2018). Critical errors include medication errors, machine malfunctions and inadequate patient sedation (Schulz et al., 2017). The lack of situation awareness contributes to more than 70% of critical errors that directly contribute to brain damage and death (Schultz et al., 2015). Situation awareness, a non-technical skill, may be underdeveloped in the training of anesthesia providers.
Wright and Fallacaro (2011) attribute this to the limited exposure to emergency situations in clinical rotations. This decreased exposure to emergencies creates a gap in anesthesia providers’ crisis management skills (Schulz et al., 2015). As a result, novice anesthesia providers may lack the non-technical skills, particularly situation awareness, which are needed to correctly intervene in anesthesia crises (Yule et al., 2015).

To address the lack of situation awareness, student anesthesia providers may receive training through high fidelity simulation integrated into their curriculum or provided by the hospital (Green, Tariq & Green, 2016). Much of the current literature points to simulation as an effective way to improve non-technical skills for anesthesia providers (Blanié, Gorse, Roulleau, Figueiredo & Benhamou, 2018; Nguyen, Elliott, Watson & Dominguez, 2015). However, despite training providers through clinical exposure and simulation, the prevalence of errors resulting from improper use of non-technical skills suggests there may be a disconnect between theory and practice (Schulz et al., 2015). One possible solution is a multifaceted approach to train anesthesia non-technical skills, including high fidelity simulation in combination with didactic education sessions (Hagemann et al., 2017).

**Purpose**

The purpose of this study was to educate CRNA preceptors on ANTS. This included increasing their knowledge of ANTS, their understanding of the importance of non-technical skills in the operating room, as well as their ability to train these skills with their students. Secondarily, this study assessed the barriers to implementing ANTS in the perioperative period.

**Aims and Objectives**

The aims of this study were to increase CRNA preceptor knowledge and usage of ANTS and provide to provide the CRNA preceptors with tools to educate their student registered nurse
anesthetist (SRNAs) about ANTS with a focus on applying ANTS in difficult high stress situations. Project objectives included the following:

Objective 1: Identify the current knowledge of anesthesia non-technical skills in CRNA preceptors practicing in NY. To meet this objective, this study collected data from practicing CRNAs, through a survey, that asks about their knowledge and usage of non-technical skills.

Objective 2: Identify the barriers CRNA preceptors face when attempting to use anesthesia non-technical skills in the perioperative period. To meet this objective, this study asked open ended questions in the survey.

Objective 3: Increase the use of anesthesia non-technical skills in CRNAs practicing and precepting SRNAs in NY. To meet this objective, this study implemented an online educational module focusing on the definition of anesthesia non-technical skills, the clinical relevance and how to implement these skills into practice.

**Theoretical Framework**

The purpose of this study was to educate NY CRNA preceptors on the importance of ANTS to improve their use in the perioperative period. The goal of the education was to positively impact NY CRNAs’ practice and their training of SRNAs. This study was based on Kurt Lewin’s Theory of Planned Change, which was developed in the 1940s by Lewin, a social scientist interested in social conflict resolution (Burnes, 2004). Lewin described four key elements for planned change: field theory, group dynamics, three-step model of change and action research. Field theory and group dynamics seek to describe a group’s behavior (Rotondo, 2017). These two portions of the Theory of Planned Change depict how “change occurs because of the introduction of a new force, or a change in the direction and/or strength of existing forces, which destabilize the status quo and create disequilibrium” (Rotondo, 2017, p. 120). The three-
step module consists of unfreezing, moving or transitioning and refreezing (Shirey, 2013). Action research recognizes that “change requires action” and is based upon “analyzing the situation correctly” (Burnes, 2004, p. 684).

The research relies on the framework contained in the three-step module. Unfreezing is the first step of the Lewin three-step model, with the focus of this stage preparing for the change. First, the problem must be identified (Shirey, 2013). In this project, the unfreezing stage began with identifying the prevalence of errors in anesthesia stemming from underdeveloped ANTS. Next, the literature was combed for factors contributing to underdeveloped ANTS, as well as possible solutions. In the online workshop, CRNAs of NY were exposed to this data, making them aware of the pressing issue.

The second step is the moving or transitioning step of the three-step module. Lewin discusses how change should be viewed “as a process rather than an event” (Shirey, 2013, p. 70). In this step, it is essential to develop a plan to assist in the transition of change. The plan should address apprehension about the change and renew focus on the reason change is necessary. CRNAs participating in the online workshop were provided with tools to assist with the implementation of ANTS into their practice. These tools were simple, empowering CRNAs to change their practice according to their comfort level. Examples of these tools include encouraging closed loop communication during a crisis situation, learning the name of the circulating nurse in the morning to ensure open communication, and performing a visual sweep of the operating every 15 minutes during cases.

The final step of Lewin’s three-step module is freezing. In this stage, the changed behavior is “embedded into existing systems such as culture, policies, and practices.” (Shirey, 2013, p. 70). This step is essential for the change to be lasting. In this study, the online workshop
focused on easy to use tools, discussing the clinical relevance of each one in order to allow CRNAs to pick which are necessary for their practice. Furthermore, the one month follow up survey assessed the retention of any potential change in ANTS knowledge, as well as any planned changes in training ANTS in their students.

Lewin’s Theory of Planned Change closely reflects the intended goals of this study. For this reason, Lewin’s Theory of Planned Change was selected for the theoretical framework.

**Literature Review**

The literature review sought to identify various methods used for training ANTS. A thorough search was conducted, using CINAHL, American Association of Nurse Anesthetists Journal, MEDLINE and PubMed. Key search terms included: anesthesia non-technical skills (ANTS), training anesthesia non-technical skills (ANTS), student registered nurse anesthetist (SRNA), certified registered nurse anesthetist (CRNA), and education. To be included in this review, the study had to be in English, a full text article and published in the last five years. To gain an understanding of the literature on training non-technical skills for anesthesia providers, articles studying anesthesiologists (residents and attendings), CRNAs, SRNAs and medical students were also reviewed.

Ten studies were identified to be included in this review. Five of the studies were level 1b (Blaine et al., 2018; Bong et al., 2017; Gu et al., 2017; Hagemann et al., 2017; Skelton et al., 2016), while five were level 2b (Cafferkey et al., 2018; Sidi, Baslanti, Gravenstein, & Lampotang, 2014; Sidi, Gravenstein, Vasilopoulos & Lampotang, 2017; Stiegler et al., 2017; Wunder, 2016). One study focused on SRNAs (Wunder, 2016), one focused on medical students (Hageman et al., 2017), seven focused on resident anesthesiologists (Blanié et al., 2018, Bong et al., 2017; Cafferkey et al., 2018; Gu et al., 2017; Sidi et al., 2014; Sidi et al., 2017; Stiegler et al.,
2017), and one focused on anesthesia technicians and resident anesthesiologists (Skelton et al., 2016). Of these, six studies were randomized (Blanié et al., 2018; Bong et al., 2017; Gu et al., 2017; Skelton et al., 2016; Stiegler et al., 2017; Hagemann et al., 2017). All studies were prospective except for Cafferkey et al. (2018), which was a retrospective review of a mandatory simulation course. Sidi et al. (2017) and Blaine et al. (2018) studies were longitudinal.

The type of intervention differed slightly across studies. Five studies used high-fidelity simulation (Blanié et al., 2018; Bong et al., 2017; Stiegler et al., 2017; Skelton et al., 2016; Wunder, 2016) while one study (Gu et al., 2017) compared the effectiveness of high-fidelity versus low-fidelity simulation. Three studies used a combination of education (formal or informal) and simulation (Hagemann et al., 2017; Skelton et al., 2016; Wunder, 2016), while three studies used a combination of debriefing and simulation (Bong et al., 2017; Gu et al., 2017; Stiegler et al., 2017).

Regardless of study design and measurement technique, the research indicates that simulation improves anesthesia providers’ non-technical skills (Blanié et al., 2018; Bong et al., 2017; Gu et al., 2017; Skelton et al.; Stiegler et al., 2017; 2016; Wunder, 2016). Furthermore, the findings are robust, holding true for all variations in study design. The specific form of the simulation is less important, as simulation can either be high-fidelity or low-fidelity (Gu et al., 2017), and with or without education (Hagemann et al., 2017; Skelton et al., 2016; Wunder, 2016). All the included studies reported a statistically significant improvement in non-technical skills.

Few studies explicitly consider the role of education in the training of ANTS. Bong et al. (2017) examined the effect of simulation and education on non-technical skills, where participants were randomized into “hot seat” and “observer” roles. In this work, the ability to
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observe a simulation is a form of education, and the results indicated that observation provides a stress-free learning environment. Skelton et al. (2016) evaluated ANTS, with a control group participating in simulation and an intervention group with education and simulation, with the group receiving both education and simulation experiencing a higher increase in ANTS. Wunder (2016) studied first year student nurse anesthetists, and found that education improved anesthesia nontechnical skills.

While the current literature supports the use of simulation to improve non-technical skills in anesthesia providers, and simulation along with education, there are limitations to the current research. First, CRNAs and SRNAs are poorly represented, with only Wunder (2016) focusing on SRNAs. Because CRNAs comprise approximately half of all anesthesia providers (AANA, 2019a; Statista, 2019) in the U.S, one would expect comparable representation in research. Second, an insufficient amount of research looked at the effect of education, in isolation, on ANTS. Third, there is inadequate research exploring if education augments the effect of simulation on non-technical skills in anesthesia providers.

Methods

Research Design

This study has a non-experimental, longitudinal design consisting of three surveys and one 1-hour online educational workshop. Data was collected at three different time points: 1) before the educational workshop, 2) immediately after the educational workshop, and 3) one month after completion of the educational workshop. The online preceptor workshop was based on the University at Buffalo School of Nursing (UBSON) undergraduate preceptor tutorial (University at Buffalo, 2015), the University at Pittsburgh’s CRNA preceptor training tutorial (CPiTT) (Easton, O’Donnell, Morrison & Lutz, 2017), and evidence-based research that was
gathered as part of the literature review for this project. The survey questions were based on the validated ANTS tool (Boet et al., 2018; Patey, Flin, Fletcher, Maran & Glavin, 2005).

**Sample**

A convenience, snowball sample of CRNAs, currently practicing in NY, that precept SRNAs, were the recruitment method for this study. Participants were from varying educational backgrounds, with the inclusion criteria of being a CRNA that, within the last six months, served as a clinical preceptor for SRNAs. Sample size was determined by the number of responses. Exclusion criteria included CRNAs practicing in any state other than NY, as well as CRNAs that do not serve as clinical preceptors for SRNAs.

The pre-workshop survey had 38 valid participants (n=38). One respondent did not meet the inclusion criteria, thus was removed from the data set. Of the participants, all but two precepted UB SRNAS. Roughly 75% of the participants reported practicing for fewer than ten years. Seventy six percent of the participants reported spending 1-50% of their full-time employment working with students (40% reported 26-50%, while about 38% reported 1-25%). The sample characteristics are described in Table 1.1. The post-workshop survey had 29 valid participants (n=29), while the one-month follow-up yielded 22 valid participants (n=22).

**Recruitment Procedure**

CRNAs were recruited through Facebook pages (New York State Association of Nurse Anesthetists [NYSANA], CRNAs and SRNAs, CRNA Preceptors, and NY CRNAs and SRNAs [appendix D]), through the UBSON adjunct faculty LISTSERV (appendix C), and by contacting clinical site coordinators via email. The DNP student’s DNP Project Advisor distributed the recruitment email to the clinical sites. The recruitment email was composed by the co-primary investigators (PIs) to ask for CRNA participation, detailing the requirements and the voluntary,
anonymous nature of the study. Recruitment began in the Fall 2019 semester. Multiple contacts were made, over time, with the potential respondents.

Since no contact information was collected from respondents, special efforts were placed on encouraging CRNA preceptors to complete the 1-month post educational module survey. Due to the risk of attrition at this stage, the study design included a raffle for eight $10 gift cards upon completion of the follow-up survey. The co-PIs sent follow up emails to the UB LISTSERV and posted to the Facebook pages (appendix H), to remind participants about the follow-up survey. Of note, the NYSANA Facebook post was “shared” by multiple people on Facebook, adding to the snowball sample recruitment technique.

**Data Collection and Analysis**

Quantitative and qualitative data was collected using a survey constructed by the co-PIs. Survey questions for this study were based on the reliable and valid ANTS tool (Boet et al., 2018; Patey et al., 2005) (appendix F, G, H). The ANTS tool was successfully used in numerous studies examining the effect of simulation on non-technical skills in anesthesia providers (Bong et al., 2017; Skelton et al., 2016; Wunder, 2016). The ANTS tool measures anesthesia non-technical skills, the desired outcome of improvement for this study, in four categories: task management, team working, situation awareness and decision making. The survey was posted on SurveyMonkey, with a link provided to participants on the educational workshop’s website (https://ubwp.buffalo.edu/ub-crna-preceptor-guide/). The survey contained five ANTS-specific questions, with four collecting quantitative data and one soliciting qualitative data, all from the validated ANTS tool. A Likert-scale was used for quantitative data and open-ended answers for qualitative data. Other information captured includes years of experience as a CRNA, age of respondent, gender, degree, and percent of time devoted to precepting SRNAs. Participants
received reminders for the second survey right after they complete the educational workshop, and one month later, as previously described. Survey responses were anonymous, with respondent answers unable to be linked over the three surveys. The datasets were downloaded into Microsoft Excel, cleaned, and coded for analysis.

SPSS Statistics version 26 was used to analyze data collected from participant surveys. The dependent variables (Likert scales) in the sample are classified as ordinal (McCrum-Gardner, 2008). Because ordinal data is non-parametric, following standard practice, the Kruskal-Wallis test (also referred to as one-way ANOVA on ranks test) was used to analyze the dataset (McCrum-Gardner, 2008). Chi square tests of independence were used when the Kruskal-Wallis test was statistically significant, resulting in the need to examine the data in detail using demographic information (for example, the experience of the CRNA or the degree). It is important to note that the survey responses are not linked, thus an individual’s change over time cannot be determined.

The data were tested to study 1) the differences in the groups’ ANTS knowledge over the three points in time, 2) the effect of the educational workshop on the CRNAs perceived effectiveness in training SRNAs’ ANTS, 3) whether the relationships identified in the first two questions vary by degree or years experience, and 4) whether the relationship between CRNAs perception of the clinical application of ANTS vary with years of experience or degree.

The qualitative data collected through the open-ended question was recoded by theme. Recurring themes were noted and analyzed.

**Human Rights Protection and Ethical Considerations**

Approval for this study was gained through the Institutional Review Board (IRB) from the UB (STUDY00003663) (appendix A). During the recruitment process, potential participants
were informed of the voluntary nature of this study, as well as the ability to withdraw at any point in time without penalty. Consent was received from each participant. All data collected was anonymous and kept secure in order to protect participants’ self-evaluations. The email addresses for the raffle entry was separated from the survey responses, to protect the confidentiality of the participants and maintain anonymity of the participants.

CRNA programs accept students from all cultural backgrounds, which results in a culturally diverse workforce. ANTS target the providers’ ability to manage potentially stressful. Reactions to stressful situations may differ across cultures, which may result in varying responses from CRNAs. There was no language barrier anticipated as all participants must be licensed CRNAs, thus are fluent in English.

The online pre-educational, post-educational, and one month follow up surveys were created through the online site SurveyMonkey. The online surveys are password protected through the website. No identifiable information was collected from participants in this project. Following completion of the project, data will be retained for three years and subsequently destroyed in accordance with the UB IRB protocol. Demographic data was non-identifiable, and categorical. Coded data was stored on a password protected computer and backed up on a password protected hard drive. The researcher was analyzed on a password protected home network, or through the UB secured network. Physical, paper files were not collected as part of the DNP project.

Results

Data was collected anonymously via SurveyMonkey. For the pre-workshop survey (Time 1), the total number of eligible responses was 38. One respondent did not meet the inclusion criteria, thus was removed from the data set. The post-workshop survey (Time 2), completed
immediately after the workshop, had 29 responses. The one-month follow up survey (Time 3) had 22 responses. Data was coded and cleaned for analysis.

The first research question examined was whether CRNA preceptors’ knowledge of ANTS varied over the three points in time. Table 2.1 describes the level of reported anesthesia non-technical skills knowledge, in all four keys skills (situational awareness, decision making, teamwork and task management). The Kruskal-Wallis one-way ANOVA test showed no statistically significant differences for the four anesthesia non-technical skills over the three time points. These findings are likely the result of high level of knowledge in ANTS reported on the pre-workshop survey. Nearly all CRNAs reported they were at least somewhat knowledgeable in all four ANTS (Table 2.1). Of these respondents, many reported they felt very knowledgeable regarding the matrix skills measured. Few respondents reported a low level of ANTS knowledge. Due to the lack of statistical significance, the effect of the workshop on ANTS knowledge was not explored further.

The next research question examined CRNAs’ self-perception of their effectiveness in training SRNAs’ ANTS. Table 3.1 describes the survey responses of CRNAs’ self-perception of their ability to effectively training SRNAs’ ANTS over the three periods. Prior to the workshop, no CRNA reported feeling very uncomfortable with this skill, while 15% of respondents indicated feeling uncomfortable post-workshop and 19% one-month later. Overall, the percent of those reporting being comfortable prior to the workshop was 81%, which declined to 44% and 48% at the next two points in time. The Kruskal-Wallis one-way ANOVA test revealed that the distribution of responses across the Likert scales was statistically significant over the three time periods $X^2 (2) = 11.741$, $p=0.003$. Further analysis of these findings using a pairwise comparisons of time period change and comfort in training ANTS showed that the change in the
comfort of training SRNAs’ ANTS occurred between Time 1 and Time 2, with a p=0.003 (Table 3.1). This showed a decrease in CRNAs’ self-perception of their effectiveness in training ANTS in SRNAs.

Further analysis of CRNAs’ self-perception of their effectiveness in training SRNAs’ ANTS was conducted, to consider differences by CRNA years of experience and degree attained. CRNAs were grouped as novice (10 or fewer years of experience) and experienced (>10 years of experience). The education was categorized by CRNAs who were doctorally prepared (DNP, DNAP, PhD) and those who were non-doctorally prepared (masters and certificate). A chi-square test of independence was conducted to analyze these more detailed questions, using experience level and degree as layers. When considering experience level, the reports of novice CRNAs were significantly different (Pearson chi² (2, 84) =10.8, p=0.032) (Table 3.4). For the more experienced CRNAs, any differences over time were not statistically significant. The reported level of comfort in training SRNAs’ ANTS, based on the survey responses, decreased after the pre-workshop survey for novice CRNAs.

A similar analysis was completed between CRNAs’ self-perception of their effectiveness in training SRNAs’ ANTS and degree (masters/certificate compared to DNP/DNAP/PhD). The results revealed a statistical difference across the three time periods for CRNAs with doctoral degrees, reflected by a Pearson chi² (4, 84) =9.53, p=0.049 (Table 3.6). The self-reported confidence in their ability to effectively train SRNAs’ ANTS decreased after completing the online workshop (descriptive data in Table 3.6 and 3.7).

Next, CRNA perception of the clinical application of ANTS was analyzed using the Kruskal-Wallis one-way ANOVA test. CRNAs were asked to indicate how important they thought ANTS were in the following scenarios: patient satisfaction, timely administration of
dantrolene during malignant hyperthermia (MH), during a “can’t intubate, can’t ventilate” induction, and intraoperative management of an ASA 1 patient. For the high acuity scenarios (timely administration of dantrolene during MH and a “can’t intubate, can’t ventilate” induction), CRNAs placed a high priority to ANTS across Time 1, Time 2 and Time 3. There was no statistically significant change in these two scenarios (timely administration of dantrolene during MH (Kruskal-Wallis one-way ANOVA (2)=3.974, p=0.137) and “can’t intubate, can’t ventilate” induction (Kruskal-Wallis one-way ANOVA (2)= 4.614, p=0.100).

For the patient satisfaction and intraoperative management of an ASA 1 patient, the CRNAs’ perception of the importance of ANTS was statistically significant over Time 1, Time 2 and Time 3 (patient satisfaction Kruskal-Wallis one-way ANOVA (2)=9.501, p=0.009 and intraoperative management of an ASA 1 patient Kruskal-Wallis one-way ANOVA (2)=10.464, p=0.005). This was further analyzed through pairwise comparison. For patient satisfaction, the statistically significant change happened between Time 2 and Time 3 (p=0.003). For the intraoperative management of ASA 1, the statistically significant change also occurred between Time 2 and Time 3 (p=0.001) (Table 4.1). The results of these two questions suggest that CRNA perception of the importance of ANTS in non-crisis situations increased after viewing the workshop. The increase occurred between Time 2 and Time 3, showing that there was a delay in their thought process changing.

The one-month follow up survey asked respondents three questions about the impact of the workshop: (1) whether they better understood the role of ANTS in their practice, (2) whether they planned to change their practice, based on what they learned, and (3) whether they planned to provide feedback to foster their students’ development of ANTS. As Figure 1.1 depicts, nearly all respondents at Time 3 indicated the workshop strongly or somewhat helped their
understanding of ANTS (91%). Nearly 75% of respondents plan to change their practice, while approximately 75% similarly indicated they would foster the development of SRNAs’ ANTS. Finally, at Time 3, 96% of CRNAs thought this workshop would be beneficial to all precepting CRNAs.

The final question relates to barriers of implementing ANTS in the operating room, which was analyzed by examining responses to an open-ended question. On the pre-workshop survey (Time 1), 24 participants chose to complete a free answer question seeking to understanding the barrier CRNAs currently face with ANTS. Answers were coded into four main categories: personalities, students, communication, and time (figure 2.1). While 24 respondents participated in this question, one response contained two themes. This resulted in 25 coded responses. About 40% of the barriers stemmed from personalities, with CRNA comments similar to this example of “difficult personalities in the operating room.” Students also posed a barrier to the implementation of anesthesia non-technical skills (roughly 30%), as indicated by comments such as “students may not always understand how important that is, as well as their technical skills,” and “openness of the SRNA to receive constructive criticism.” Comments regarding communications included other team members lack of receptiveness to ANTS. Additionally, some CRNAs pointed to their own personal weakness with communication. This theme made up roughly 20% of responses. Time was mentioned as another barrier, as CRNAs highlighted the need for the operating room to run on schedule (12.5%). Note that the percentages reported sum more than 100% due to one response containing two themes. All frequencies are reported in figure 2.1.
Discussion

The literature review pointed to lack of ANTS as a contributing factor to perioperative morbidity and mortality; thus, the expected finding of this study was a low knowledge of ANTS. The anticipated result of this project was that the educational workshop would positively affect the knowledge of ANTS in CRNAs. Furthermore, it was assumed that the training would increase the frequency of CRNs training ANTS in SRNAs. The study instead indicated that CRNAs reported a high understanding of ANTS in Time 1 (pre-workshop survey) which was unexpected. Although not statistically significant, the reported knowledge of ANTS decreased in Time 2 and Time 3. This result is a striking when compared to the state of the literature. Additionally, approximately 70% of CRNAs self-reported that the workshop had a positive impact on their understanding of the use of anesthesia non-technical skills in their practice. This is contradictory to the statistically insignificant change in self-reported knowledge of ANTS. One explanation for these findings could be that the surveyed CRNAs had a superficial understanding of ANTS in the pre-workshop survey. Anesthesia non-technical skills are becoming increasingly well represented in current literature. CRNAs may be familiar with these skills without having a true understanding of clinical application of ANTS. Perhaps through the workshop, the participants realized that non-technical skills are more complex than originally thought.

This hypothesis also may translate to CRNAs’ ability to train SRNAs’ anesthesia non-technical skills. The statistically significant decrease in self perceived effectiveness between Time 1 and Time 2 could be due to the complexity of these skills. When this result was further analyzed, it became apparent that novice CRNAs (10 years and fewer of practice) were the driving factor behind the statistically significant difference. One explanation for this could be
that anesthesia non-technical skills are learned over time, rather than trained. Because novice CRNAs have fewer years of clinical experience, they might still be developing their own non-technical skills rendering it more difficult to elicit them in their students. However, if these skills can be trained, this study suggests they are not being trained effectively by CRNAs. This is supported by the fact that the experienced CRNAs did not report a statistically significant change in their self-perceived ability to train ANTS over this study. Additionally, doctorally prepared CRNAs reported a statistically significant decrease in their self-perceived ability to train ANTS between Time 1 and Time 2. This could be due to the recent shift from masters to doctoral degrees, resulting in a larger percent of new graduates being doctorally prepared.

When applying ANTS to crisis and non-crisis scenarios, the CRNAs reported an increased perception of the importance of ANTS in non-crisis scenarios over time. The statistically significant increase was between Time 2 and Time 3. With no increase in CRNA reported importance of ANTS in non-crisis scenarios between Time 1 and Time 2, there may be a component of clinical practice in their perception. Because there was a one-month time lapse between Time 2 and Time 3, CRNAs may have continued to think about the importance of ANTS in their practice during this time. Conversely, the perception of the importance of ANTS in crisis scenarios is well understood through all three points in time. This suggests that CRNAs are better trained in the use of non-technical skills in crisis situations. Perhaps the importance of ANTS in everyday patient interaction is not well understood. This suggests that an amendment to the current student education may be needed. Perhaps a shift to include more benign patient management, in addition to the high acuity crisis management training many SRNAs receive, may help support the use of ANTS in non-crisis situations during clinical practice.
When assessing the barriers currently faced with the implementation of ANTS in the perioperative period, one suggestion to the findings is to cultivate a no blame environment. CRNAs pointed to personalities as a major barrier faced. With a no blame, patient centered environment, perhaps providers would be more communicative and open to suggestions to others. Another barrier of interest is the need to turn over cases quickly. With the changes in our healthcare system, perhaps operating room billing is due for a reevaluation, with the focus on patient safety instead of production.

**Deliverables**

The deliverables of this study included an online educational workshop for CRNA preceptors. The workshop focused on providing NY CRNAs with current evidence-based research on ANTS. This included the working definition of ANTS and the clinical implication and role of ANTS in the perioperative period. The co-PIs workshop is currently awaiting approval of the copyrights. The workshop was presented on a website constructed by the co-PIs in order for CRNAs to access the workshop remotely. UB hosted to website, through WordPress, to ensure access to the workshop after the completion of the PI's DNP projects. The second deliverable was an analysis of the barriers CRNAs faced, prior to using the educational module, when implementing ANTS. The third deliverable included an analysis of how the educational workshop influenced the practice of participating CRNAs, and most importantly, the impact on the SRNAs they precept.

**Advanced Practice Nurse Contributions to Practice**

As health care continues to focus on patient experience, health care providers must evolve to meet patient expectations (Mohammed et al., 2016). King, van Dijk, Overbeek, Hagemann and Ring (2017), found that over half of the complaints filed by patients were
regarding non-technical aspects of their care. The primary goal of the study was to improve CRNAs preceptors’ non-technical skills through an educational module, as well as their ability to train these skills in SRNAs. With CRNAs administering a large portion of anesthetics in the U.S. this may positively impact the patient experience (AANA, 2019a).

By improving practicing CRNAs’ non-technical skills, SRNAs’ practice may also benefit. SRNAs are taught by CRNAs in their clinical rotations. Role modeling has been found to be an effective tool for teaching students in the clinical setting (Jack, Hamshire & Chambers, 2017). By improving practicing CRNAs ANTS, SRNAs may have high quality anesthesia care modeled for them in their clinical rotations.

Another portion of this study is the determination of the barriers CRNAs currently face to implementing non-technical skills in the operating room. While non-technical skills are currently being taught through simulation and clinical rotations, in practice, the rate of errors related to a failure of non-technical skills remains elevated. Before we can make any policy changes or recommendations for curricular adjustment, it is important to understand why ANTS are not being effectively used.

Doctorate of Nursing Practice Essentials

One DNP Essential this study addressed was Essential I, Scientific Underpinnings for Practice (American Colleges of Nursing [AACN], 2006). Non-technical skills may be overlooked in the educational process by students or faculty, with more emphasis placed on technical skills. This study implemented an educational module focusing on ANTS in CRNAs practicing in NY. Emphasis was placed on how to implement non-technical skills into practice. Furthermore, this study examined the barriers that are currently being faced while using ANTS.
Through improving the use of ANTS in the operating room, this project attempted to positively influence patient experiences and outcomes.

This study also addressed DNP Essential VIII, Advanced Practice Nursing (AACN. 2006). One of the main roles of an advanced practice nurse is to bridge the gap between literature and current practice. Currently, the literature points to simulation-based learning (Blanié et al., 2018; Nguyen et al., 2015; Sidi et al., 2014) or a multifaceted approach (Hagemann et al., 2017; Skelton et al., 2016; Wunder, 2016) as key ways to develop non-technical skills. Through implementing an online educational module in CRNAs, this study sought to facilitate the adoption of ANTS by anesthesia providers in the perioperative period.

**Strengths and Limitations**

The biggest strength to this study was the importance of the topic examined. Anesthesia non-technical skills are crucial for patient safety, which has already been well documented in the literature. The results suggest that CRNAs are open to examining their use of ANTS, including their effectiveness in training ANTS in their students. The CRNAs also reported willingness to change their practice to include more non-technical skills.

Although the focus of this study is clinically relevant, the study design had several limitations. The study was short term in length, covering a 30 day period. The sample size was small, with the population being homogenous. Because many of the CRNAs practice in the same city, the barriers described in this study may not be generalizable. Because of the anonymous nature of this study, individual prompts for survey completion could not be sent. This resulted in a high rate of attrition. Bias may have been introduced because the group of CRNAs that completed the pre-workshop only may differ from the rest of the sample. Recruitment for this study was difficult. Participants may have seen little personal benefit from participation.
Additionally, the workshop was long, at about an hour in length, which also could have been a deterrence for completion. Lastly, because the survey responses were unable to be linked across time (Time 1, Time 2, Time 3), data analysis was challenging. The samples are not independent, however they are not paired.

**Conclusion and Recommendations**

The literature points to the prevalence the failure ANTS, however CRNAs reported a high level of ANTS understanding. This points to knowledge not being the driving factor for deficits in the application of ANTS. Experienced CRNAs’ ANTS knowledge and self-perceived ability to train ANTS in SRNAs shows that clinical experience may be the best predictor of non-technical skills. Further studies may wish to investigate if years of critical care experience, prior to becoming a CRNA, contribute to well-trained ANTS.

Additionally, CRNAs gained more knowledge about ANTS, the less confident they seemed to be in their ability to effectively train ANTS in SRNAs. Perhaps ANTS are more dynamic than educators and practicing anesthesia providers currently think. This calls for a reevaluation of the current training of ANTS in SRNAs. Currently, most CRNA programs focus on high-fidelity simulation while training ANTS. Perhaps the integration of low-fidelity simulation into SRNAs education could assist in establish strong ANTS.

CRNAs highlight barriers faced when attempting to implement ANTS, all of which pointed toward the culture in the perioperative period. As this topic continues to be discussed, perhaps one focus should be to address the perioperative culture. Creating a no blame environment allows all care team members to actively participate without fear of repercussion. Another recommendation for future research is including CRNAs that practice in geographic locations to increase the diversity of the CRNA population. This would result in a larger, more
diverse sample. While there was change in ANTS after this workshop, it was not the expected result. Perhaps a one year follow up is needed to identify long term change in behavior. A one-year follow up would help identify whether the results of this study were long-term behavior changes. Other methods of training ANTS should be explored, starting at the SRNA level.
References


doi.org/10.1155/2016/4237523


Tables and Figures

Table 1.1 *Sample Descriptive Analysis*

<table>
<thead>
<tr>
<th>Age</th>
<th>Years of Practice</th>
<th>Degree</th>
<th>Gender</th>
<th>Percent of Time Precepting</th>
</tr>
</thead>
<tbody>
<tr>
<td>25-30 yr</td>
<td>7.9% 0-2 yrs</td>
<td>23.7% Cert.</td>
<td>2.6% Male</td>
<td>28.9% &gt;75% 0%</td>
</tr>
<tr>
<td>31-35 yr</td>
<td>34.2% 3-5 yrs</td>
<td>26.3% MS</td>
<td>55.3% Female</td>
<td>65.8% 50-74% 15.8%</td>
</tr>
<tr>
<td>35-40 yr</td>
<td>21.1% 6-10 yrs</td>
<td>23.7% DNP/DNAP</td>
<td>36.8% Prefer not to answer</td>
<td>7.9% 25-49% 36.8%</td>
</tr>
<tr>
<td>41-45 yr</td>
<td>13.2% 11-15 yrs</td>
<td>5.3% PhD</td>
<td>5.3%</td>
<td>1-24% 39.5%</td>
</tr>
<tr>
<td>45-55 yr</td>
<td>15.8% 16-20 yrs</td>
<td>3.7%</td>
<td></td>
<td>0% 5.3%</td>
</tr>
<tr>
<td>56-65 yr</td>
<td>7.9% &gt;20 yrs</td>
<td>15.8%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: Demographic data collected at Time 1, n=38.
<table>
<thead>
<tr>
<th>Situational Awareness</th>
<th>Reported level of knowledge (\textquotedbl{}knowledgeable\textquotedbl{})</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Very</td>
</tr>
<tr>
<td></td>
<td>(n)</td>
</tr>
<tr>
<td>Time 1 (n=38)</td>
<td>22</td>
</tr>
<tr>
<td>Time 2 (n=29)</td>
<td>18</td>
</tr>
<tr>
<td>Time 3 (n=22)</td>
<td>14</td>
</tr>
</tbody>
</table>

Kruskal-Wallis One-Way ANOVA(2) =0.228, \(p=0.892\)

<table>
<thead>
<tr>
<th>Decision Making</th>
<th>Reported level of knowledge (\textquotedbl{}knowledgeable\textquotedbl{})</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Very</td>
</tr>
<tr>
<td></td>
<td>(n)</td>
</tr>
<tr>
<td>Time 1 (n=38)</td>
<td>24</td>
</tr>
<tr>
<td>Time 2 (n=29)</td>
<td>15</td>
</tr>
<tr>
<td>Time 3 (n=22)</td>
<td>10</td>
</tr>
</tbody>
</table>

Kruskal-Wallis One-Way ANOVA (2) =1.958, \(p=0.376\)

<table>
<thead>
<tr>
<th>Team Work</th>
<th>Reported level of knowledge (\textquotedbl{}knowledgeable\textquotedbl{})</th>
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<tbody>
<tr>
<td></td>
<td>Very</td>
</tr>
<tr>
<td></td>
<td>(n)</td>
</tr>
<tr>
<td>Time 1 (n=38)</td>
<td>22</td>
</tr>
<tr>
<td>Time 2 (n=29)</td>
<td>14</td>
</tr>
<tr>
<td>Time 3 (n=22)</td>
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</tr>
</tbody>
</table>

Kruskal-Wallis One-Way ANOVA (2) = 1.698, \(p=0.428\)

<table>
<thead>
<tr>
<th>Task Management</th>
<th>Reported level of knowledge (\textquotedbl{}knowledgeable\textquotedbl{})</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Very</td>
</tr>
<tr>
<td></td>
<td>(n)</td>
</tr>
<tr>
<td>Time 1 (n=37)</td>
<td>23</td>
</tr>
<tr>
<td>Time 2 (n=29)</td>
<td>16</td>
</tr>
<tr>
<td>Time 3 (n=22)</td>
<td>14</td>
</tr>
</tbody>
</table>

Kruskal-Wallis One-Way ANOVA (2) =0.474, \(p=0.789\)
Table 3.1 CRNAs’ Self-Perception of Effectiveness in Train SRNAs’ ANTS

<table>
<thead>
<tr>
<th>Reported Comfort to Effectively Train ANTS</th>
<th>Comfortable</th>
<th>Neutral</th>
<th>Uncomfortable</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>Percent</td>
<td>n</td>
</tr>
<tr>
<td>Time 1 (n=36)</td>
<td>29</td>
<td>81</td>
<td>7</td>
</tr>
<tr>
<td>Time 2 (n=27)</td>
<td>12</td>
<td>44</td>
<td>11</td>
</tr>
<tr>
<td>Time 3 (n=21)</td>
<td>10</td>
<td>48</td>
<td>7</td>
</tr>
</tbody>
</table>

Pairwise Comparisons of Time Period Change and Comfort Training ANTS

<table>
<thead>
<tr>
<th>Time Period Change</th>
<th>Test Statistic</th>
<th>Significance (p-value)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time 1 - Time 3</td>
<td>15.659</td>
<td>0.007</td>
</tr>
<tr>
<td>Time 1 - Time 2</td>
<td>16.167</td>
<td>0.003</td>
</tr>
<tr>
<td>Time 2 - Time 3</td>
<td>-0.508</td>
<td>0.934</td>
</tr>
</tbody>
</table>

Notes: Due to the small sample size, the Likert scale responses were condensed for this question, with comfortable representing those who reported be very comfortable or comfortable, and uncomfortable including very uncomfortable or uncomfortable.
Table 3.4 CRNAs’ Self-Perception of Their Effectiveness in Training SRNAs’ ANTS and Years of Practice

<table>
<thead>
<tr>
<th>Practice</th>
<th>Chi-Square Tests</th>
<th>Value</th>
<th>df</th>
<th>Asymptotic Significance (2-sided)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-10 yrs</td>
<td>Pearson Chi-Square</td>
<td>10.573b</td>
<td>4</td>
<td>.032</td>
</tr>
<tr>
<td></td>
<td>Likelihood Ratio</td>
<td>10.950</td>
<td>4</td>
<td>.027</td>
</tr>
<tr>
<td></td>
<td>Linear-by-Linear Association</td>
<td>8.051</td>
<td>1</td>
<td>.005</td>
</tr>
<tr>
<td></td>
<td>N of Valid Cases</td>
<td>62</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;10yrs</td>
<td>Pearson Chi-Square</td>
<td>5.825c</td>
<td>4</td>
<td>.213</td>
</tr>
<tr>
<td></td>
<td>Likelihood Ratio</td>
<td>7.019</td>
<td>4</td>
<td>.135</td>
</tr>
<tr>
<td></td>
<td>Linear-by-Linear Association</td>
<td>2.162</td>
<td>1</td>
<td>.141</td>
</tr>
<tr>
<td></td>
<td>N of Valid Cases</td>
<td>22</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>Pearson Chi-Square</td>
<td>12.798a</td>
<td>4</td>
<td>.012</td>
</tr>
<tr>
<td></td>
<td>Likelihood Ratio</td>
<td>15.670</td>
<td>4</td>
<td>.003</td>
</tr>
<tr>
<td></td>
<td>Linear-by-Linear Association</td>
<td>9.616</td>
<td>1</td>
<td>.002</td>
</tr>
<tr>
<td></td>
<td>N of Valid Cases</td>
<td>84</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table 3.5 CRNAs’ self-perception of their effectiveness in training SRNAs’ ANTS and degree

<table>
<thead>
<tr>
<th>Degree</th>
<th>Chi-Square Tests</th>
<th>Value</th>
<th>df</th>
<th>Asymptotic Significance (2-sided)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MS/certificate</td>
<td>Pearson Chi-Square</td>
<td>7.042</td>
<td>4</td>
<td>.134</td>
</tr>
<tr>
<td></td>
<td>Likelihood Ratio</td>
<td>9.568</td>
<td>4</td>
<td>.048</td>
</tr>
<tr>
<td></td>
<td>Linear-by-Linear Association</td>
<td>4.511</td>
<td>1</td>
<td>.034</td>
</tr>
<tr>
<td></td>
<td>N of Valid Cases</td>
<td>52</td>
<td></td>
<td></td>
</tr>
<tr>
<td>DNP</td>
<td>Pearson Chi-Square</td>
<td>9.530</td>
<td>4</td>
<td>.049</td>
</tr>
<tr>
<td>DNAP</td>
<td>Likelihood Ratio</td>
<td>9.236</td>
<td>4</td>
<td>.055</td>
</tr>
<tr>
<td>PhD</td>
<td>Linear-by-Linear Association</td>
<td>6.791</td>
<td>1</td>
<td>.009</td>
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<tr>
<td></td>
<td>N of Valid Cases</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>Pearson Chi-Square</td>
<td>12.798</td>
<td>4</td>
<td>.012</td>
</tr>
<tr>
<td></td>
<td>Likelihood Ratio</td>
<td>15.670</td>
<td>4</td>
<td>.003</td>
</tr>
<tr>
<td></td>
<td>Linear-by-Linear Association</td>
<td>9.616</td>
<td>1</td>
<td>.002</td>
</tr>
<tr>
<td></td>
<td>N of Valid Cases</td>
<td>84</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table 3.6 *Comfort with Training ANTS and CRNA Experience, Survey Responses*

<table>
<thead>
<tr>
<th></th>
<th>Time 1</th>
<th>Time 2</th>
<th>Time 3</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Novice CRNAs (10 or less years of practice)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Uncomfortable</td>
<td>0%</td>
<td>5%</td>
<td>18.8%</td>
</tr>
<tr>
<td>Neutral</td>
<td>23%</td>
<td>50%</td>
<td>33.3%</td>
</tr>
<tr>
<td>Comfortable</td>
<td>76.9%</td>
<td>45%</td>
<td>43.8%</td>
</tr>
<tr>
<td>** Experienced CRNAs (&gt;10 years of practice)**</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Uncomfortable</td>
<td>0%</td>
<td>42.9%</td>
<td>20%</td>
</tr>
<tr>
<td>Neutral</td>
<td>10%</td>
<td>14.3%</td>
<td>20%</td>
</tr>
<tr>
<td>Comfortable</td>
<td>90%</td>
<td>42.9%</td>
<td>60%</td>
</tr>
</tbody>
</table>
Table 3.7 *Comfort with Training ANTS and CRNA Degree, Survey Responses*

<table>
<thead>
<tr>
<th></th>
<th>Time 1</th>
<th>Time 2</th>
<th>Time 3</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>CRNAs with Masters or Certificate Degree</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Uncomfortable</td>
<td>0%</td>
<td>25%</td>
<td>21.4%</td>
</tr>
<tr>
<td>Neutral</td>
<td>14.3%</td>
<td>25%</td>
<td>21.4%</td>
</tr>
<tr>
<td>Comfortable</td>
<td>85.7%</td>
<td>50%</td>
<td>57.1%</td>
</tr>
<tr>
<td><strong>CRNAs with Doctoral Degree (DNP, DNAP, PhD)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Uncomfortable</td>
<td>0%</td>
<td>0%</td>
<td>14.3%</td>
</tr>
<tr>
<td>Neutral</td>
<td>21.4%</td>
<td>63.6%</td>
<td>57.1%</td>
</tr>
<tr>
<td>Comfortable</td>
<td>78.6%</td>
<td>36.4%</td>
<td>28.6%</td>
</tr>
</tbody>
</table>
Table 4.1 *Pairwise Comparisons of Time Period Change, Patient Satisfaction, and ASA 1*

<table>
<thead>
<tr>
<th>Time Period Change</th>
<th>Test Statistic</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time 1 - Time 3</td>
<td>5.107</td>
<td>0.024</td>
</tr>
<tr>
<td>Time 1 - Time 2</td>
<td>1.143</td>
<td>0.285</td>
</tr>
<tr>
<td>Time 2 - Time 3</td>
<td>8.940</td>
<td>0.003</td>
</tr>
</tbody>
</table>

*Pairwise Comparisons of Time Period Change and ASA 1*

<table>
<thead>
<tr>
<th>Time Period Change</th>
<th>Test Statistic</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time 1 - Time 3</td>
<td>7.232</td>
<td>0.007</td>
</tr>
<tr>
<td>Time 1 - Time 2</td>
<td>0.612</td>
<td>0.434</td>
</tr>
<tr>
<td>Time 2 - Time 3</td>
<td>10.232</td>
<td>0.001</td>
</tr>
</tbody>
</table>

Asymptotic significances (2-sided tests) are displayed. The significance level is .05. A Significance values have been adjusted by the Bonferroni correction for multiple tests.
Figure 1.1 *The Impact of the Workshop on CRNA Preceptor Practice*

- **Increased Understanding of the Role of ANTS in Practice**: 61.9% Strongly Agree, 9.5% Somewhat Agree, 12.3% Neutral
- **Anticipated Change in Practice**: 57.1% Strongly Agree, 14.3% Somewhat Agree, 27.1% Neutral
- **Plan to Provide Feedback to Foster ANTS in SRNAs**: 45.5% Strongly Agree, 27.3% Somewhat Agree, 27.1% Neutral
Figure 2.1 *Main Barriers Reported by NY CRNA Preceptors to Implementing ANTS*

Note: Themes identified in barriers to ANTS implementation as reported by CRNAs at Time 1.
Appendix A

IRB Approval Form

August 24, 2019

Dear Alexis Stachowski:

On 8/24/2019, the IRB reviewed the following submission:

<table>
<thead>
<tr>
<th>Type of Review:</th>
<th>Initial Study</th>
</tr>
</thead>
<tbody>
<tr>
<td>Title of Study:</td>
<td>In New York certified registered nurse anesthetists, what is the effect of an online educational workshop on precepting student registered nurse anesthetists?</td>
</tr>
<tr>
<td>Investigator:</td>
<td>Alexis Stachowski</td>
</tr>
<tr>
<td>IRB ID:</td>
<td>STUDY00003663</td>
</tr>
<tr>
<td>Funding:</td>
<td>None</td>
</tr>
<tr>
<td>Grant ID:</td>
<td>None</td>
</tr>
<tr>
<td>IND, IDE, or HDE:</td>
<td>None</td>
</tr>
<tr>
<td>Documents Reviewed:</td>
<td>• Post-educational survey, Category: Surveys/Questionnaires; • Recruitment email, Category: Recruitment Materials; • Recruitment post to NYSANA Facebook page, Category: Recruitment Materials; • Post-workshop 1 month follow up email, Category: Recruitment Materials; • Consent form, Category: Consent Form; • Educational workshop content, Category: Other; • 1-month follow up post to NYSANA Facebook page, Category: Recruitment Materials; • one-month follow up survey, Category: Surveys/Questionnaires; • Pre-educational survey, Category: Surveys/Questionnaires; • IRB Protocol, Category: IRB Protocol;</td>
</tr>
</tbody>
</table>

The IRB approved the study from 8/24/2019 to 8/25/2020 inclusive. Before 8/25/2020 or within 30 days of study closure, whichever is earlier, you are to submit a continuing review with required explanations. You can submit a continuing review by navigating to the active study and clicking Create Modification / CR.

If continuing review approval is not granted before the expiration date of 8/25/2020, approval of this study expires on that date. The initial study materials for the project referenced above were reviewed and approved by the SUNY University at Buffalo IRB (UBIRB) by Initial Study Review. The IRB has determined that the study is no greater than minimal risk. Before
8/24/2020 or within 30 days of study closure, whichever is earlier, you are to submit a continuing review application with required explanations. In order to avoid a lapse in IRB approval, it is recommended that you submit your continuing review at least 30 days for an expedited study and at least 45-60 days for a full board study, prior to the approval end date of the study. You can submit a continuing review application by navigating to the active study in Click IRB and selecting ‘Create Modification / CR’. Studies cannot be conducted beyond the expiration date without re-approval by the UBIRB.

In conducting this study, you are required to follow the requirements listed in the Investigator Manual (HRP-103), which can be found by navigating to the IRB Library within the IRB system.

UBIRB approval is given with the understanding that the most recently approved procedures will be followed and the most recently approved consent documents will be used. If modifications are needed, those changes may not be initiated until such modifications have been submitted to the UBIRB for review and have been granted approval.

As principal investigator for this study involving human participants, you have responsibilities to the SUNY University at Buffalo IRB (UBIRB) as follows:

1. Ensuring that no subjects are enrolled prior to the IRB approval date.
2. Ensuring that the study is not conducted beyond the expiration date without re-approval by the UBIRB.
3. Ensuring that the UBIRB is notified of:
   - All reportable information in accordance with the New Information SOP (HRP-024).
   - Project closure/completion by submitting a Continuing Review/Modification submission.
4. Ensuring that the protocol is followed as approved by UBIRB unless a protocol amendment is prospectively approved.
5. Ensuring that changes in research procedures, recruitment or consent processes are not initiated without prior UBIRB review and approval, except where necessary to eliminate apparent immediate hazards to subjects.
6. Ensuring that the study is conducted in compliance with all UBIRB decisions, conditions, and requirements.
7. Bearing responsibility for all actions of the staff and sub-investigators with regard to the protocol.
8. Bearing responsibility for securing any other required approvals before research begins.

If you have any questions, please contact the UBIRB at 716-888-4888 or ub-irb@buffalo.edu. Please include the project title and number in all correspondence with the UBIRB.
Appendix B

Consent to Participate in Research Study

Title of research study:

1. The development of an online preceptor education workshop to improve certified registered nurse anesthetists’ communication skills, and the consistency of the clinical education they provide to student registered nurse anesthetists.

2. In certified registered nurse anesthetists who precept student registered nurse anesthetists, what is the effect of an online educational workshop on their perception and use of non-technical skills in the perioperative period?

Version Date: 7/5/2019 Version 1.1

Investigator: Alexis Stachowski and Melanie Schutt

Key Information: The following is a short summary of this study to help you decide whether or not to be a part of this study. More detailed information is listed later on in this form.

Why am I being invited to take part in a research study?

You are being invited to take part in a research study to determine if an online clinical preceptor workshop would improve the perception of your anesthesia non-technical skills, communication skills and the consistency of clinical education that you provide to student registered nurse anesthetists.

What should I know about a research study?

Someone will explain this research study to you. Whether or not you take part is up to you. You can choose not to take part. You can agree to take part and later change your mind. Your decision will not be held against you. You can ask all the questions you want before you decide.
Who can I talk to?

If you have questions, concerns, or complaints, or think the research has hurt you, talk to the research team at (716) 870-9108. You may also contact the research participant advocate at 716-888-4845 or researchadvocate@buffalo.edu.

This research has been reviewed and approved by an Institutional Review Board ("IRB"). An IRB is a committee that provides ethical and regulatory oversight of research that involves human subjects. You may talk to them at (716) 888-4888 or email ub-irb@buffalo.edu if:

- You have questions about your rights as a participant in this research
- Your questions, concerns, or complaints are not being answered by the research team.
- You cannot reach the research team.
- You want to talk to someone besides the research team.
- You want to get information or provide input about this research.

Why is this research being done?

The purpose of this research is to determine if an online clinical preceptor workshop would improve certified registered nurse anesthetist perceptions of their communication skills and the consistency of clinical education that they provide to student registered nurse anesthetists. Most certified registered nurse anesthetists (CRNAs) never receive formal preceptor training. Educational programs that target clinical preceptors have been shown to have positives effects on both students and preceptors. These programs are an effective way to improve preceptor communication skills, non-technical skills, and a reduce stress levels for both the preceptor and student.

How long will the research last and what will I need to do?
As part of this research project you will be asked to sign this consent form to participate in this project. You will then be asked to complete a pre-educational online electronic survey, view the online educational preceptor workshop, and then complete a follow up survey. One month after you complete the online preceptor workshop, an electronic link to a survey will be sent to you for your completion.

Your participation in this research is limited to the completion of the follow up electronic survey which will be distributed to you one month following the review of the online CRNA clinical preceptor guide, after which time the research team will require no further participation from you. Completion and presentation of the research and its findings is expected in the 2019-2020 academic year.

More detailed information about the study procedures can be found under “What happens if I say yes, I want to be in this research?”

1. Is there any way being in this study could be bad for me?
   a. There are no known risks associated with reviewing the online educational tutorial and completion of the pre-educational, post-educational, and one month follow up surveys. Additionally, there are no added costs to you by participating in this research project.

2. Will being in this study help me in any way?
   a. We cannot promise any benefits to you or others from your taking part in this research. However, educational programs that target clinical preceptors have been shown to have positives effects on both students and preceptors. These programs are an effective way to improve preceptor communication skills, non-technical skills, and reduce stress levels for both the preceptor and student.
3. What happens if I do not want to be in this research?
   a. Participation in research is completely voluntary. You may choose not to enroll in this study. Your alternative to participating in this research study is to not participate.

4. How many people will be studied?
   a. We expect about 200 people will be in this research study.

5. What happens if I say yes, I want to be in this research?
   a. You will be provided a link to the online certified registered nurse anesthetist clinical preceptor workshop.
   b. You will be asked to review the online consent form, and agree to the consent (the first question of the pre-educational survey)
   c. You will be asked to continue to fill out a pre-educational survey prior to viewing the preceptor workshop.
   d. You will view the online preceptor workshop.
   e. You will than fill out a post-educational survey immediately after the preceptor workshop.
   f. You will be contacted by the research team one month following the review of the preceptor workshop and provided a link to complete a one-month follow up survey. Contact will be through UB email (if affiliated with UB) or on the NYSANA Facebook page.
   g. You will then complete the follow up survey.

6. What happens if I say yes, but I change my mind later?
a. You can leave the research at any time it will not be held against you. Because all data is unidentifiable, data already collected will not be able to be removed for the study.

7. What happens to the information collected for the research?

a. Efforts will be made to limit the use and disclosure of your personal information, including research study and medical or education records, to people who have a need to review this information. We cannot promise complete secrecy. Organizations that may inspect and copy your information include the IRB and other representatives of this organization. No identifiable information will be collected.

All potential identifiers are removed from any potential identifiable information.

By checking “I agree” I consent to being part of this study.
Appendix C

Recruitment Email

Dear New York Nurse Anesthetists,

Melanie Schutt and Alexis Stachowski are third year student registered nurse anesthetist at the University at Buffalo (UB). They are conducting a research study aiming to learn how an online workshop effects certified registered nurse anesthetists’ (CRNAs) perception of clinical precepting of student registered nurse anesthetists (SRNA). Additionally, they seek to explore the online workshop’s effect on the knowledge and use of anesthesia non-technical skills. This research will fill the requirements of their doctorate in nursing practice degree at UB. They are asking all New York CRNAs, who have precepted SRNAs in the last 6 months, to participate.

If you agree to be in this study, you will be asked to take a short pre-workshop survey before beginning the online workshop (https://ubwp.buffalo.edu/ub-crna-preceptor-guide/, with the survey under the “pre workshop” tab). All surveys will be online, with links posted on the project’s website. Each survey will take approximately five to ten minutes to complete. Responses will be anonymous, collecting data focused on SRNA precepting experiences and use of anesthesia non-technical skills. Some personal information such as age, education level and number of years of experience as a CRNA will also be collected.

Upon completion of the pre-workshop survey, CRNAs will view an online workshop in the form of a self-guided PowerPoint. This can be accessed online through the project’s website: https://ubwp.buffalo.edu/ub-crna-preceptor-guide/. The workshop should take about one hour to complete. Immediately after completion of the workshop, a post-workshop survey will need to be completed.
A third survey will be done one month after viewing the online workshop. A reminder will be posted on the New York Association of Nurse Anesthetists Facebook page. Upon completion of the third survey, you will have to option to enter a raffle for one of eight $10 Amazon gift cards. For the raffle, your contact information will be kept separately from your survey responses in order to maintain anonymity.

You may withdraw your participation at any time. Because the surveys are anonymous, your data will be unidentifiable. Therefore, your data will not be able to be removed from the study. There are no known risks to participating in this study. Upon completion of the workshop, CRNAs will be eligible to submit 1 class B continuing education credit on the American Association of Nurse Anesthetists website. Dr. Cheryl Spulecki may be used as a contact for verification.

If you have questions, concerns, or complaints about this study or you want to get additional information or provide input about this research, please contact Melanie Schutt at mschutt3@buffalo.edu, Alexis Stachowski at afs22@buffalo.edu, or our project advisor, Cheryl Spulecki at spulecki@buffalo.edu.

Thank you so much for taking the time to participate in this study!
Appendix D

Recruitment Facebook Posts

Dear New York Certified Registered Nurse Anesthetists,

Melanie Schutt and Alexis Stachowski are third year student registered nurse anesthetist at the University at Buffalo (UB). They are conducting a research study aiming to learn how an online workshop effects certified registered nurse anesthetists’ (CRNAs) perception of clinical precepting of student registered nurse anesthetists (SRNA). Additionally, they seek to explore the online workshop’s effect on the knowledge and use of anesthesia non-technical skills. This research will fill the requirements of their doctorate in nursing practice degree at UB. They are asking all New York CRNAs, who have precepted SRNAs in the last 6 months, to participate.

If you agree to be in this study, you will be asked to take a short pre-workshop survey before beginning the online workshop (https://ubwp.buffalo.edu/ub-crna-preceptor-guide/, with the survey under the “pre workshop” tab). All surveys will be online, with links posted on the project’s website. Each survey will take approximately five to ten minutes to complete. Responses will be anonymous, collecting data focused on SRNA precepting experiences and use of anesthesia non-technical skills. Some personal information such as age, education level and number of years of experience as a CRNA will also be collected.

Upon completion of the pre-workshop survey, CRNAs will view an online workshop in the form of a self-guided PowerPoint. This can be accessed online through the project’s website: https://ubwp.buffalo.edu/ub-crna-preceptor-guide/. The workshop should take about one hour to complete. Immediately after completion of the workshop, a post-workshop survey will need to be completed.
A third survey will be done one month after viewing the online workshop. A reminder will be posted on the New York Association of Nurse Anesthetists Facebook page. Upon completion of the third survey, you will have to option to enter a raffle for one of eight $10 Amazon gift cards. For the raffle, your contact information will be kept separately from your survey responses in order to maintain anonymity.

You may withdraw your participation at any time. Because the surveys are anonymous, your data will be unidentifiable. Therefore your data will not be able to be removed from the study. There are no known risks to participating in this study.

If you have questions, concerns, or complaints about this study or you want to get additional information or provide input about this research, please contact Melanie Schutt at mschutt3@buffalo.edu, Alexis Stachowski at afs22@buffalo.edu, or our project advisor, Cheryl Spulecki at spulecki@buffalo.edu.

Upon completion of the workshop, CRNAs will be eligible to submit 1 class B continuing education credit on the American Association of Nurse Anesthetists website. Dr. Cheryl Spulecki may be used as a contact for verification.

Thank you so much for taking the time to participate in this study!
Appendix E

Follow Up Recruitment Email and Facebook Posts

Dear New York Certified Registered Nurse Anesthetists,

Melanie Schutt and Alexis Stachowski are third year student registered nurse anesthetist at the University at Buffalo. They are conducting a research study aiming to learn how an online workshop effects certified registered nurse anesthetists’ perception of clinical precepting of student registered nurse anesthetists.

If you have already completed the educational workshop, we ask that you now complete the 1 month post-workshop survey (https://ubwp.buffalo.edu/ub-crna-preceptor-guide/1-month-follow-up-survey/). Upon completion of the third survey, you will have to option to enter a raffle for one of eight $10 Amazon gift cards. For the raffle, your contact information will be kept separately from your survey responses in order to maintain anonymity.

If you have questions, concerns, or complaints about this study or you want to get additional information or provide input about this research, please contact Melanie Schutt at mschutt3@buffalo.edu, Alexis Stachowski at afs22@buffalo.edu, or our project advisor, Cheryl Spulecki at spulecki@buffalo.edu.

Thank you so much for taking the time to participate in this study!

Melanie and Alexis
Appendix F

Pre-Workshop Survey

1. I have read and reviewed the consent on the Preceptor Guide Project website (https://ubwp.buffalo.edu/ub-crna-preceptor-guide/consent/). I agree to be included in this study.
   a. Yes
2. In the last 6 months, have you precepted student registered nurse anesthetists (SRNAs)?
   a. Yes
   b. No
3. If you have served as a clinical preceptor in the last 6 months, what school do the SRNAs you precept attend?
   a. University at Buffalo
   b. Albany Medical College
   c. Columbia University
   d. Other
   e. I don’t know
   f. I have not served as a clinical preceptor in the last 6 months.
4. In the last month, what percentage of your full-time employment was spent working with a SRNA as a clinical preceptor?
   a. >75%
   b. 50-74%
   c. 25-49 %
   d. 1-24%
   e. 0%
5. How many years have you been practicing as a CRNA?
   a. 0-2 years
   b. 3-5 years
   c. 6-10 years
   d. 11-15 years
   e. 16-20 years
   f. >20 years
6. What is the highest degree you have?
   a. Certificate
   b. Master
   c. Doctorate in nursing practice or doctor of nurse anesthesia practice
   d. PhD
7. How old are you:
   a. 25-30 years old
   b. 31-35 years old
   c. 35-40 years old
   d. 41-45 years old
   e. 45-55 years old
   f. 56-65 years old
   g. >65 years old
8. Please select the gender you identify as:
   a. Female
   b. Male
   c. Prefer not to say

9. When precepting SRNAs, the three areas I most often focus on are: (select three)
   a. Providing constructive feedback
   b. Teaching new technical skills (ex: placing double lumen ETT)
   c. Being welcoming and friendly
   d. Teaching physiologic changes
   e. Pointing out SRNAs mistakes
   f. Becoming a mentor
   g. Providing SRNA with areas for improvement
   h. Teaching pharmacology
   i. Reinforcing important skills and behavior

10. Overall, how would rate your effectiveness as a preceptor of SRNAs?
    a. Very effective
    b. Somewhat effective
    c. Effective
    d. Somewhat ineffective
    e. Very ineffective

11. Please rate your comfort level with the following: (this will be in a big table)
    a. Conflict management and resolution with SRNAs
       i. Very comfortable
       ii. Somewhat comfortable
       iii. Comfortable
       iv. Somewhat uncomfortable
       v. Very uncomfortable
       vi. N/A
    b. Verbally correcting unsatisfactory SRNA behaviors:
       i. Very comfortable
       ii. Somewhat comfortable
       iii. Comfortable
       iv. Somewhat uncomfortable
       v. Very uncomfortable
       vi. N/A
    c. Providing positive feedback on satisfactory SRNA behaviors:
       i. Very comfortable
       ii. Somewhat comfortable
       iii. Comfortable
       iv. Somewhat uncomfortable
       v. Very uncomfortable
       vi. N/A
    d. Providing constructive feedback to SRNAs:
       i. Very comfortable
       ii. Somewhat comfortable
       iii. Comfortable
e. Addressing areas in which SRNAs skills need improvement
   i. Very comfortable
   ii. Somewhat comfortable
   iii. Comfortable
   iv. Somewhat uncomfortable
   v. Very uncomfortable
   vi. N/A

f. Providing constructive written feedback of SRNA performance on daily evaluations
   i. Very comfortable
   ii. Somewhat comfortable
   iii. Comfortable
   iv. Somewhat uncomfortable
   v. Very uncomfortable
   vi. N/A

12. I feel uncomfortable providing a formal debriefing of a SRNAs performance at the end of the clinical day.
   a. Strongly agree
   b. Somewhat agree
   c. Neither agree nor disagree
   d. Somewhat disagree
   e. Strongly disagree
   f. I have no experience precepting SRNAs

Proficiency table

13. When reflecting upon your previous precepting experiences, please indicate how much you agree with the following statements regarding your proficiency level. I feel proficient...

   a. Discussing the anesthetic plan with SRNAs at the start of the day.
      1. Strongly agree
      2. Somewhat agree
      3. Neither agree nor disagree
      4. Somewhat disagree
      5. Strongly disagree
      6. N/A

   b. Managing and resolving conflict with SRNAs.
      i. Strongly agree
      ii. Somewhat agree
      iii. Neither agree nor disagree
      iv. Somewhat disagree
      v. Strongly disagree
      vi. N/A

   c. Providing feedback to SRNAs in a way that promotes positive interactions, and change in behavior.
14. It is important for CRNA clinical instructors to discuss the plan of care for each patient with SRNAs.
   a. Strongly agree
   b. Somewhat agree
   c. Neither agree nor disagree
   d. Somewhat disagree
   e. Strongly disagree
   f. N/A

15. When reflecting upon your previous precepting experiences, please indicate how much you agree with the following statements regarding your interactions with SRNAs. I feel I provide…
   a. Adequate feedback by means of a daily verbal and a daily written evaluation.
      i. I have no experience precepting SRNAs
      ii. Strongly agree
      iii. Somewhat agree
      iv. Neither agree nor disagree
      v. Somewhat disagree
      vi. Strongly disagree
      vii. I have no experience precepting SRNAs
   b. A formal debriefing of SRNAs’ performance at the end of every clinical day.
      i. Strongly agree
      ii. Somewhat agree
      iii. Neither agree nor disagree
      iv. Somewhat disagree
      v. Strongly disagree
      vi. N/A
   c. I provide SRNAs with constructive criticism.
      i. Strongly agree
      ii. Somewhat agree
      iii. Neither agree nor disagree
      iv. Somewhat disagree
      v. Strongly disagree
      vi. N/A

16. How would you rate your level of knowledge about the following topics?
a. Decision making (Defined as: Skills for reaching a judgement to select a course of action in both normal conditions and in time-pressed crisis situations)
   i. Very knowledgeable
   ii. Somewhat knowledgeable
   iii. Somewhat unknowledgeable
   iv. Very unknowledgeable
b. Task management (Defined as: Skills for organizing resources and required activities to achieve goals)
   i. Very knowledgeable
   ii. Somewhat knowledgeable
   iii. Somewhat unknowledgeable
   iv. Very unknowledgeable
c. Team work (Defined as: Skills for working in a group context, in any role, to ensure effective joint task completion and team member satisfaction)
   i. Very knowledgeable
   ii. Somewhat knowledgeable
   iii. Somewhat unknowledgeable
   iv. Very unknowledgeable
d. Situation awareness (Defined as: Skills for developing and maintaining an overall awareness of the work setting based on observing all relevant aspects of the operating room)
   i. Very knowledgeable
   ii. Somewhat knowledgeable
   iii. Somewhat unknowledgeable
   iv. Very unknowledgeable
17. In the last week, how often did you use the following
   a. Decision making (Defined as: Skills for reaching a judgement to select a course of action in both normal conditions and in time-pressed crisis situations)
      i. >75% of cases
      ii. 50-74% of cases
      iii. 25-49% of cases
      iv. <25% of cases
      v. N/A
   b. Task management (Defined as: Skills for organizing resources and required activities to achieve goals)
      i. >75% of cases
      ii. 50-74% of cases
      iii. 25-49% of cases
      iv. <25% of cases
      v. N/A
   c. Team work (Defined as: Skills for working in a group context, in any role, to ensure effective joint task completion and team member satisfaction)
      i. >75% of cases
      ii. 50-74% of cases
      iii. 25-49% of cases
      iv. <25% of cases
d. Situation awareness (Defined as: skills for developing and maintaining an overall awareness of the work setting based on observing all relevant aspects of the operating room)
   i. >75% of cases
   ii. 50-74% of cases
   iii. 25-49% of cases
   iv. <25% of cases
   v. N/A

18. How do you feel about your ability to effectively train student registered nurse anesthetists' non-technical skills?
   a. Very comfortable
   b. Somewhat comfortable
   c. Neither comfortable or uncomfortable
   d. Somewhat uncomfortable
   e. Very uncomfortable

19. What is the biggest challenge you face when trying to use non-technical skills in the perioperative period?
   a. Free answer

20. How important do you think non-technical skills are in the following scenarios:
   a. Anesthesia team response to "can't intubate, can't ventilate"
      i. Very important
      ii. Somewhat important
      iii. Somewhat unimportant
      iv. Not important
   b. Patient satisfaction with their surgical experience
      i. Very important
      ii. Somewhat important
      iii. Somewhat unimportant
      iv. Not important
   c. Timely administration of Dantrolene during MH
      i. Very important
      ii. Somewhat important
      iii. Somewhat unimportant
      iv. Not important
   d. Case management during a total knee on intubated an ASA 1
      i. Very important
      ii. Somewhat important
      iii. Somewhat unimportant
      iv. Not important
Appendix G

Post-Workshop Survey

1. I have read and reviewed the consent on the Preceptor Guide Project website (https://ubwp.buffalo.edu/ub-crna-preceptor-guide/consent/). I agree to be included in this study.
   a. Yes
2. Did you do the educational workshop?
   a. Yes
   b. No
3. In the last 6 months, have you precepted student registered nurse anesthetists (SRNAs)?
   a. Yes
   b. No
4. How many years have you been practicing as a CRNA?
   a. 0-2 years
   b. 3-5 years
   c. 6-10 years
   d. 11-15 years
   e. 16-20 years
   f. >20 years
5. What is the highest degree you have?
   a. Certificate
   b. Master
   c. Doctorate in nursing practice or doctor of nurse anesthesia practice
   d. PhD
6. How old are you:
   a. 25-30 years old
   b. 31-35 years old
   c. 35-40 years old
   d. 41-45 years old
   e. 45-55 years old
   f. 56-65 years old
   g. >65 years old
7. Please select the gender you identify as:
   a. Female
   b. Male
   c. Prefer not to say
8. When precepting SRNAs, the three areas I most often focus on are: (select three)
   a. Providing constructive feedback
   b. Teaching new technical skills (ex: placing double lumen ETT)
   c. Being welcoming and friendly
   d. Teaching physiologic changes
   e. Pointing out SRNAs mistakes
   f. Becoming a mentor
   g. Providing SRNA with areas for improvement
h. Teaching pharmacology
   i. Reinforcing important skills and behavior

9. Overall, how would rate your effectiveness as a preceptor of SRNAs?
   a. Very effective
   b. Somewhat effective
   c. Effective
   d. Somewhat ineffective
   e. Very ineffective

10. Please rate your comfort level with the following: (this will be in a big table)
    a. Conflict management and resolution with SRNAs
       i. Very comfortable
       ii. Somewhat comfortable
       iii. Comfortable
       iv. Somewhat uncomfortable
       v. Very uncomfortable
       vi. N/A
    b. Verbally correcting unsatisfactory SRNA behaviors:
       i. Very comfortable
       ii. Somewhat comfortable
       iii. Comfortable
       iv. Somewhat uncomfortable
       v. Very uncomfortable
       vi. N/A
    c. Providing positive feedback on satisfactory SRNA behaviors:
       i. Very comfortable
       ii. Somewhat comfortable
       iii. Comfortable
       iv. Somewhat uncomfortable
       v. Very uncomfortable
       vi. N/A
    d. Providing constructive feedback to SRNAs:
       i. Very comfortable
       ii. Somewhat comfortable
       iii. Comfortable
       iv. Somewhat uncomfortable
       v. Very uncomfortable
       vi. N/A
    e. Addressing areas in which SRNAs skills need improvement
       i. Very comfortable
       ii. Somewhat comfortable
       iii. Comfortable
       iv. Somewhat uncomfortable
       v. Very uncomfortable
       vi. N/A
    f. Providing constructive written feedback of SRNA performance on daily evaluations
i. Very comfortable  
ii. Somewhat comfortable  
iii. Comfortable  
iv. Somewhat uncomfortable  
v. Very uncomfortable  
vi. N/A  

11. I feel uncomfortable providing a formal debriefing of a SRNAs performance at the end of the clinical day.  
a. Strongly agree  
b. Somewhat agree  
c. Neither agree nor disagree  
d. Somewhat disagree  
e. Strongly disagree  
f. I have no experience precepting SRNAs  

Proficiency table  

12. When reflecting upon your previous precepting experiences, please indicate how much you agree with the following statements regarding your proficiency level. I feel proficient…  
a. Discussing the anesthetic plan with SRNAs at the start of the day.  
  1. Strongly agree  
  2. Somewhat agree  
  3. Neither agree nor disagree  
  4. Somewhat disagree  
  5. Strongly disagree  
  6. N/A  
b. Managing and resolving conflict with SRNAs.  
  i. Strongly agree  
  ii. Somewhat agree  
  iii. Neither agree nor disagree  
  iv. Somewhat disagree  
  v. Strongly disagree  
  vi. N/A  
c. Providing feedback to SRNAs in a way that promotes positive interactions, and change in behavior.  
  i. Strongly agree  
  ii. Somewhat agree  
  iii. Neither agree nor disagree  
  iv. Somewhat disagree  
  v. Strongly disagree  
d. Delivering constructive written feedback for SRNAs daily evaluations.  
  i. Strongly agree  
  ii. Somewhat agree  
  iii. Neither agree nor disagree  
  iv. Somewhat disagree  
  v. Strongly disagree  
  vi. I have no experience precepting SRNAs
13. It is important for CRNA clinical instructors to discuss the plan of care for each patient with SRNAs.
   a. Strongly agree
   b. Somewhat agree
   c. Neither agree nor disagree
   d. Somewhat disagree
   e. Strongly disagree
   f. N/A

14. When reflecting upon your previous precepting experiences, please indicate how much you agree with the following statements regarding your interactions with SRNAs. I feel I provide...
   a. Adequate feedback by means of a daily verbal and a daily written evaluation.
      i. I have no experience precepting SRNAs
      ii. Strongly agree
      iii. Somewhat agree
      iv. Neither agree nor disagree
      v. Somewhat disagree
      vi. Strongly disagree
      vii. I have no experience precepting SRNAs
   b. A formal debriefing of SRNAs’ performance at the end of every clinical day.
      i. Strongly agree
      ii. Somewhat agree
      iii. Neither agree nor disagree
      iv. Somewhat disagree
      v. Strongly disagree
      vi. N/A
   c. I provide SRNAs with constructive criticism.
      i. Strongly agree
      ii. Somewhat agree
      iii. Neither agree nor disagree
      iv. Somewhat disagree
      v. Strongly disagree
      vi. N/A

15. How would you rate your level of knowledge about the following topics?
   a. Decision making (Defined as: Skills for reaching a judgement to select a course of action in both normal conditions and in time-pressured crisis situations)
      i. Very knowledgeable
      ii. Somewhat knowledgeable
      iii. Somewhat unknowledgeable
      iv. Very unknowledgeable
   b. Task management (Defined as: Skills for organizing resources and required activities to achieve goals)
      i. Very knowledgeable
      ii. Somewhat knowledgeable
      iii. Somewhat unknowledgeable
      iv. Very unknowledgeable
c. Team work (Defined as: Skills for working in a group context, in any role, to ensure effective joint task completion and team member satisfaction)
   i. Very knowledgeable
   ii. Somewhat knowledgeable
   iii. Somewhat unknowledgeable
   iv. Very unknowledgeable

d. Situation awareness (Defined as: skills for developing and maintaining an overall awareness of the work setting based on observing all relevant aspects of the operating room)
   i. Very knowledgeable
   ii. Somewhat knowledgeable
   iii. Somewhat unknowledgeable
   iv. Very unknowledgeable

16. In the last week, how often did you use the following
   b. Decision making (Defined as: Skills for reaching a judgement to select a course of action in both normal conditions and in time-pressured crisis situations)
      i. >75% of cases
      ii. 50-74% of cases
      iii. 25-49% of cases
      iv. <25% of cases
      v. N/A

   b. Task management (Defined as: Skills for organizing resources and required activities to achieve goals)
      i. >75% of cases
      ii. 50-74% of cases
      iii. 25-49% of cases
      iv. <25% of cases
      v. N/A

   c. Team work (Defined as: Skills for working in a group context, in any role, to ensure effective joint task completion and team member satisfaction)
      i. >75% of cases
      ii. 50-74% of cases
      iii. 25-49% of cases
      iv. <25% of cases
      v. N/A

   d. Situation awareness (Defined as: skills for developing and maintaining an overall awareness of the work setting based on observing all relevant aspects of the operating room)
      i. >75% of cases
      ii. 50-74% of cases
      iii. 25-49% of cases
      iv. <25% of cases
      v. N/A

17. How do you feel about your ability to effectively train student registered nurse anesthetists' non-technical skills?
   a. Very comfortable
b. Somewhat comfortable
c. Neither comfortable or uncomfortable
d. Somewhat uncomfortable
e. Very uncomfortable

18. How important do you think non-technical skills are in the following scenarios:
   a. Anesthesia team response to "can't intubate, can't ventilate"
      i. Very important
      ii. Somewhat important
      iii. Somewhat unimportant
      iv. Not important
   b. Patient satisfaction with their surgical experience
      i. Very important
      ii. Somewhat important
      iii. Somewhat unimportant
      iv. Not important
   c. Timely administration of Dantrolene during MH
      i. Very important
      ii. Somewhat important
      iii. Somewhat unimportant
      iv. Not important
   d. Case management during a total knee on intubated an ASA 1
      i. Very important
      ii. Somewhat important
      iii. Somewhat unimportant
      iv. Not important

19. After participating in this educational workshop, please indicate how much you agree
    with the following statements:
   a. I better understand the role of non-technical skills in my practice
      i. Strongly agree
      ii. Somewhat agree
      iii. Neither agree nor disagree
      iv. Somewhat disagree
      v. Strongly disagree
   b. I am going to change my practice based off of what I learned about non-technical
      skills.
      i. Strongly agree
      ii. Somewhat agree
      iii. Neither agree nor disagree
      iv. Somewhat disagree
      v. Strongly disagree
   c. I plan to provide feedback to my students to foster the development of their non-
      technical skills
      i. Strongly agree
      ii. Somewhat agree
      iii. Neither agree nor disagree
      iv. Somewhat disagree
v. Strongly disagree
d. I feel better prepared to communicate expectations to SRNAs at the beginning of the clinical day
   i. Strongly agree
   ii. Somewhat agree
   iii. Neither agree nor disagree
   iv. Somewhat disagree
   v. Strongly disagree
e. I feel that I will provide clear written feedback on SRNA’s daily evaluation sheet.
   i. Strongly agree
   ii. Somewhat agree
   iii. Neither agree nor disagree
   iv. Somewhat disagree
   v. Strongly disagree
f. I feel prepared to successfully manage interpersonal conflict with SRNAs.
   i. Strongly agree
   ii. Somewhat agree
   iii. Neither agree nor disagree
   iv. Somewhat disagree
   v. Strongly disagree

20. Based off of your experience with this educational workshop, do you believe it should be provided to all CRNAs that may precept SRNAs?
   g. Yes
   h. No
   i. Maybe with some adjustments: (text box for comments)
Appendix H

One Month Follow Up Survey

1. I have read and reviewed the consent on the Preceptor Guide Project website (https://ubwp.buffalo.edu/ub-crna-preceptor-guide/consent/). I agree to be included in this study.
   a. Yes
2. Did you do the educational workshop?
   a. Yes
   b. No
3. In the last 6 months, have you precepted student registered nurse anesthetists (SRNAs)?
   a. Yes
   b. No
4. If you have served as a clinical preceptor in the last 6 months, what school do the SRNAs you precept attend?
   a. University at Buffalo
   b. Albany Medical College
   c. Columbia University
   d. Other
   e. I don’t know
   f. I have not served as a clinical preceptor in the last 6 months.
5. In the last month, what percentage of your full-time employment was spent working with a SRNA as a clinical preceptor?
   a. >75%
   b. 50-74%
   c. 25-49 %
   d. 1-24%
   e. 0%
6. How many years have you been practicing as a CRNA?
   a. 0-2 years
   b. 3-5 years
   c. 6-10 years
   d. 11-15 years
   e. 16-20 years
   f. >20 years
7. What is the highest degree you have?
   a. Certificate
   b. Master
   c. Doctorate in nursing practice or doctor of nurse anesthesia practice
   d. PhD
8. How old are you:
   a. 25-30 years old
   b. 31-35 years old
   c. 35-40 years old
   d. 41-45 years old
e. 45-55 years old
f. 56-65 years old
g. >65 years old

9. Please select the gender you identify as:
   a. Female
   b. Male
   c. Prefer not to say

10. When precepting SRNAs, the three areas I most often focus on are: (select three)
   a. Providing constructive feedback
   b. Teaching new technical skills (ex: placing double lumen ETT)
   c. Being welcoming and friendly
   d. Teaching physiologic changes
   e. Pointing out SRNAs mistakes
   f. Becoming a mentor
   g. Providing SRNA with areas for improvement
   h. Teaching pharmacology
   i. Reinforcing important skills and behavior

11. Overall, how would rate your effectiveness as a preceptor of SRNAs?
   a. Very effective
   b. Somewhat effective
   c. Effective
   d. Somewhat ineffective
   e. Very ineffective

12. Please rate your comfort level with the following: (this will be in a big table)
   a. Conflict management and resolution with SRNAs
      i. Very comfortable
      ii. Somewhat comfortable
      iii. Comfortable
      iv. Somewhat uncomfortable
      v. Very uncomfortable
      vi. N/A
   b. Verbally correcting unsatisfactory SRNA behaviors:
      i. Very comfortable
      ii. Somewhat comfortable
      iii. Comfortable
      iv. Somewhat uncomfortable
      v. Very uncomfortable
      vi. N/A
   c. Providing positive feedback on satisfactory SRNA behaviors:
      i. Very comfortable
      ii. Somewhat comfortable
      iii. Comfortable
      iv. Somewhat uncomfortable
      v. Very uncomfortable
      vi. N/A
   d. Providing constructive feedback to SRNAs:
i. Very comfortable
ii. Somewhat comfortable
iii. Comfortable
iv. Somewhat uncomfortable
v. Very uncomfortable
vi. N/A

e. Addressing areas in which SRNAs skills need improvement
   i. Very comfortable
   ii. Somewhat comfortable
   iii. Comfortable
   iv. Somewhat uncomfortable
   v. Very uncomfortable
   vi. N/A

f. Providing constructive written feedback of SRNA performance on daily evaluations
   i. Very comfortable
   ii. Somewhat comfortable
   iii. Comfortable
   iv. Somewhat uncomfortable
   v. Very uncomfortable
   vi. N/A

13. I feel uncomfortable providing a formal debriefing of a SRNAs performance at the end of the clinical day.
   a. Strongly agree
   b. Somewhat agree
   c. Neither agree nor disagree
   d. Somewhat disagree
   e. Strongly disagree
   f. I have no experience precepting SRNAs

Proficiency table

14. When reflecting upon your previous precepting experiences, please indicate how much you agree with the following statements regarding your proficiency level. I feel proficient...
   a. Discussing the anesthetic plan with SRNAs at the start of the day.
      1. Strongly agree
      2. Somewhat agree
      3. Neither agree nor disagree
      4. Somewhat disagree
      5. Strongly disagree
      6. N/A
   b. Managing and resolving conflict with SRNAs.
      i. Strongly agree
      ii. Somewhat agree
      iii. Neither agree nor disagree
      iv. Somewhat disagree
      v. Strongly disagree
vi. N/A

c. Providing feedback to SRNAs in a way that promotes positive interactions, and change in behavior.
   i. Strongly agree
   ii. Somewhat agree
   iii. Neither agree nor disagree
   iv. Somewhat disagree
   v. Strongly disagree

d. Delivering constructive written feedback for SRNAs daily evaluations.
   i. Strongly agree
   ii. Somewhat agree
   iii. Neither agree nor disagree
   iv. Somewhat disagree
   v. Strongly disagree
   vi. I have no experience precepting SRNAs

15. It is important for CRNA clinical instructors to discuss the plan of care for each patient with SRNAs.
   a. Strongly agree
   b. Somewhat agree
   c. Neither agree nor disagree
   d. Somewhat disagree
   e. Strongly disagree
   f. N/A

16. When reflecting upon your previous precepting experiences, please indicate how much you agree with the following statements regarding your interactions with SRNAs. I feel I provide...
   a. Adequate feedback by means of a daily verbal and a daily written evaluation.
      i. I have no experience precepting SRNAs
      ii. Strongly agree
      iii. Somewhat agree
      iv. Neither agree nor disagree
      v. Somewhat disagree
      vi. Strongly disagree
      vii. I have no experience precepting SRNAs
   b. A formal debriefing of SRNAs' performance at the end of every clinical day.
      i. Strongly agree
      ii. Somewhat agree
      iii. Neither agree nor disagree
      iv. Somewhat disagree
      v. Strongly disagree
      vi. N/A
   c. I provide SRNAs with constructive criticism.
      i. Strongly agree
      ii. Somewhat agree
      iii. Neither agree nor disagree
      iv. Somewhat disagree
v. Strongly disagree
vi. N/A

17. How would you rate your level of knowledge about the following topics?
   a. Decision making (Skills for reaching a judgement to select a course of action or make a diagnosis about a situation, in both normal conditions and in time-pressured crisis situations)
      i. Very knowledgeable
      ii. Somewhat knowledgeable
      iii. Somewhat unknowledgeable
      iv. Very unknowledgeable
   b. Task management (Skills for organizing resources and required activities to achieve goals)
      i. Very knowledgeable
      ii. Somewhat knowledgeable
      iii. Somewhat unknowledgeable
      iv. Very unknowledgeable
   c. Team work (Skills for working in a group context, in any role, to ensure effective joint task completion and team member satisfaction; the focus is particularly on the team rather than the task)
      i. Very knowledgeable
      ii. Somewhat knowledgeable
      iii. Somewhat unknowledgeable
      iv. Very unknowledgeable
   d. Situation awareness (Skills for developing and maintaining an overall awareness of the work setting based on observing all relevant aspects of the theater environment (patient, team, time, displays, equipment))
      i. Very knowledgeable
      ii. Somewhat knowledgeable
      iii. Somewhat unknowledgeable
      iv. Very unknowledgeable

18. In the last week, how often did you use the following?
   a. Decision making (Skills for reaching a judgement to select a course of action or make a diagnosis about a situation, in both normal conditions and in time-pressured crisis situations)
      i. >75% of cases
      ii. 50-74% of cases
      iii. 25-49% of cases
      iv. <25% of cases
      v. N/A
   b. Task management (Skills for organizing resources and required activities to achieve goals)
      i. >75% of cases
      ii. 50-74% of cases
      iii. 25-49% of cases
      iv. <25% of cases
      v. N/A
c. Team work (Skills for working in a group context, in any role, to ensure effective joint task completion and team member satisfaction; the focus is particularly on the team rather than the task)
   i. >75% of cases
   ii. 50-74% of cases
   iii. 25-49% of cases
   iv. <25% of cases
   v. N/A

d. Situation awareness (Skills for developing and maintaining an overall awareness of the work setting based on observing all relevant aspects of the theater environment (patient, team, time, displays, equipment)
   i. >75% of cases
   ii. 50-74% of cases
   iii. 25-49% of cases
   iv. <25% of cases
   v. N/A

19. How do you feel about your ability to effectively train student registered nurse anesthetists’ non-technical skills?
   a. Very comfortable
   b. Somewhat comfortable
   c. Neither comfortable or uncomfortable
   d. Somewhat uncomfortable
   e. Very uncomfortable

20. What is the biggest challenge you face when trying to use non-technical skills in the perioperative period?
   a. Free answer

21. How important do you think non-technical skills are in the following scenarios:
   a. Anesthesia team response to "can't intubate, can't ventilate"
      i. Very important
      ii. Somewhat important
      iii. Somewhat unimportant
      iv. Not important
   b. Patient satisfaction with their surgical experience
      i. Very important
      ii. Somewhat important
      iii. Somewhat unimportant
      iv. Not important
   c. Timely administration of Dantrolene during MH
      i. Very important
      ii. Somewhat important
      iii. Somewhat unimportant
      iv. Not important
   d. Case management during a total knee on intubated an ASA 1
      i. Very important
      ii. Somewhat important
      iii. Somewhat unimportant
iv. Not important

22. After participating in this educational workshop, please indicate how much you agree with the following statements:
   a. I better understand the role of non-technical skills in my practice
      i. Strongly agree
      ii. Somewhat agree
      iii. Neither agree nor disagree
      iv. Somewhat disagree
      v. Strongly disagree
   b. I am going to change my practice based off of what I learned about non-technical skills.
      i. Strongly agree
      ii. Somewhat agree
      iii. Neither agree nor disagree
      iv. Somewhat disagree
      v. Strongly disagree
   c. I plan to provide feedback to my students to foster the development of their non-technical skills
      i. Strongly agree
      ii. Somewhat agree
      iii. Neither agree nor disagree
      iv. Somewhat disagree
      v. Strongly disagree
   d. I feel better prepared to communicate expectations to SRNAs at the beginning of the clinical day
      i. Strongly agree
      ii. Somewhat agree
      iii. Neither agree nor disagree
      iv. Somewhat disagree
      v. Strongly disagree
   e. I feel that I will provide clear written feedback on SRNA’s daily evaluation sheet.
      i. Strongly agree
      ii. Somewhat agree
      iii. Neither agree nor disagree
      iv. Somewhat disagree
      v. Strongly disagree
   f. I feel prepared to successfully manage interpersonal conflict with SRNAs.
      i. Strongly agree
      ii. Somewhat agree
      iii. Neither agree nor disagree
      iv. Somewhat disagree
      v. Strongly disagree

23. Based off of your experience with this educational workshop, do you believe it should be provided to all CRNAs that may precept SRNAs?
   a. Yes
b. No

c. Maybe with some adjustments: (text box for comments)

24. If you wish to be entered into the raffle for one of eight $10 gift cards, please enter your email below (note- your email will be removed from survey response in order to maintain anonymity).

   a. Free text box
Appendix I

Oral Defense PowerPoint Slide Deck

Slide 1: The Efficacy of an Online Workshop in Improving Certified Registered Nurse Anesthetists' Non-Technical Skills

Slide 2: Background and Significance
- Medical errors currently third leading cause of death in the United States (Mekey & Daniel, 2014).
- In anesthesia, more than 70% of critical errors that directly contribute to brain damage and death stem from underdeveloped anesthesia non-technical skills, more specifically the lack of situation awareness (Schulte et al., 2015).
- Critical errors include medication errors, machine malfunctions and inadequate patient intubation (Schulte et al., 2017).
- With recent improvements in anesthesia technology, students are exposed to fewer emergency situations in the operating room (OR) during clinical training.

Slide 3: Anesthesia Non-Technical Skills (ANTS)
- ANTS are a key aspect of crisis management in anesthesia.
- The four main ANTS:
  - Decision making
  - Situational awareness
  - Team working
  - Task management

Slide 4: Notes
- A failure in the current anesthesia non-technical skills training, which is the foundation for this DNP project.
DNP Project Question

In New York certified registered nurse anesthetists who precept student registered nurse anesthetists, what is the effect of an online educational workshop on their perception and use of anesthesia non-technical skills in the perioperative period?

Purpose

- To educate certified registered nurse anesthetists (CRNAs) on anesthesia non-technical skills (ANTS)
- Assess the current barriers to implementing anesthesia non-technical skills in the perioperative period
- Encourage CRNAs to train anesthesia non-technical skills in student registered nurse anesthetists (SRNAs)

Theoretical Framework Selection

- Based on Kurt Lewin’s Theory of Planned Change (three-step model)
  - Step one: Unfreezing: Problem identification, preparing change
    - Identification of the perceptions of nurses in anesthesia sciences toward anesthesia non-technical skills
  - Step two: Moving or reorienting: Changing a pattern
    - This addressed apprehension to change and removed block to the desired change: necessary through providing CRNAs with adequate tools to implement change in their clinical practice
  - Step three: Freezing: Behavior is enculturated into current practice
    - Encouraged our team to assess the desired intervention of task redesign order to allow CRNAs to perceive their needs necessary for their practice

Facilitation

- The goals of this study closely mirror Kurt Lewin’s Theory of Planned Change (three-step model), resulting in the selection of the theoretical framework.
  (Huang, 2020; Bregar, 2011)

Literature Review

- CRNAs, American Association of Nurse Anesthetists (AANA), and American Society of Anesthesiologists (ASA) placebo study (ANS) (1975): Student registered nurse anesthetists (SRNAs) certified registered nurse anesthetists (CRNAs), educational and simulation
  - Study was conducted in a place that did not resemble the clinical environment
  - A randomized controlled trial: 130 CRNAs randomly assigned to either the experimental group (n = 65) or control group (n = 65)
  - CRNAs were randomized to receive either 10 or 20 hours of training in anesthesia non-technical skills
  - No significant differences were found in the outcomes of the two groups

- Cohen’s Kappa (κ): A measure of inter-rater reliability in performance evaluation
  - Cohen’s Kappa = 0.719
  - Intra-rater reliability and inter-rater reliability

- Hip-Hop and Non-Hip-Hop: The use of hip-hop and non-hip-hop in the development of educational interventions
  - Relationships between the educational interventions and the desired outcomes

The current literature suggests the use of simulation to improve non-technical skills in anesthesia providers, and education along with education.
**Study Design**
- The study designed was nonexperimental, longitudinal, with an educational workshop.
- **Study population:**
  - CRNAs in New York that have precepted SRNAs (within the last 6 months).
- **Sample:**
  - A convenience, snowball sample of CRNAs currently practicing in NY that precept SRNAs.
- **Setting:**
  - The study was all online, allowing CRNAs to complete the surveys and online workshop at their own pace in a setting they felt comfortable.

**Ethical Considerations and Protection of Human Rights**
- Prior to study implementation, approval was gained through the Institutional Review Board from the University at Buffalo (STUDY0000065).
- **Participation in the study was voluntary, and participants could withdraw at any point in time.**
- **Nurse anesthesia programs accept students from all cultural backgrounds, which results in a culturally diverse workforce. No language barrier was anticipated as all participants must be licensed CRNAs, thus are fluent in English.**
- Informed consent was obtained through the first question of the preworkshop survey. All subsequent surveys asked if they had completed the first survey. If the participant answered “yes” consent had already been acquired. If the participant answered “no” they were not included in the study.

**Recruitment**
- Study participants were recruited through the University at Buffalo School of Nursing (UBSON) listserv, as well as through professional Facebook pages.
- **UBSON LISTSERV:**
  - Critical site coordinators received an email sent by Dr. Fiorella containing information regarding study purpose, timeline and study participant involvement.
  - This recruitment method was used to target CRNAs that precept UB SRNAs.
- **The New York State Association of Nurse Anesthetists (NYSANA): Facebook**
  - Information regarding study purpose, timeline and study participant involvement was posted on the NYSANA Facebook page. A link was provided to the study website.
  - This recruitment method was used to target CRNAs in New York that precept SRNAs.

**Other professional Facebook pages that were used to recruit study participants:**
- CRNAs and SRNAs
- NY CRNAs and SRNAs
- CRNA Preceptors

**All Facebook pages received the same information regarding the study, how to participate and the link to the study website.**
Sample Selection and Size

- Inclusion:
  - CRNAs practicing in New York State that precept SRNAs (within the last six months)

- Exclusion:
  - CRNAs that do not serve as clinical preceptors for SRNAs in New York
  - CRNAs that have not precepted SRNAs within the last six months

- Sample size:
  - Pre-workshop survey (n=38)
  - Post-workshop survey (n=29)
  - One month follow-up (n=22)

Descriptive Analysis of Sample

- Of the participants, all but ten precepted SRNAs in New York
- Roughly 75% of the participants reported precepting for five to ten years
- Time spent in full-time employment working with students:
  - 10% reported 50-74%
  - 27% reported 25-49%
  - 40% reported 0-24%

Project Methods

- The project received a Certificate of Authorization for a Quality Improvement Project from the University at Buffalo Committee on Clinical Investigation.
- The project protocol was approved by the School of Nursing Institutional Review Board (IRB).
- Study participants were drawn from the population of CRNAs practicing in New York State.
- Inclusion criteria were based on precepting experience with SRNAs in New York.
- A pre-workshop 10-question survey, completed immediately after workshop.
- A second 10-question workshop, 30-question survey.
- A reminder email was sent via GROUPLOTTERY and posted on the virtual Facebook platform.
- All preceptors who precepted SRNAs were eligible to enter. An email address was not included in the survey (use of only E11 Amazon gift cards.

University at Buffalo Certified Registered Nurse Anesthetists’ Clinical Preceptor Surveys

- Welcome:
  - This form is part of a larger project that examines perceptions of preceptorship in clinical settings.
  - Please take a moment to review the instructions and complete the survey.
  - Thank you for your participation.
Data Collection and Review

- Quantitative and qualitative data were collected using a survey constructed by the investigators.
- Survey questions for this study were based on the reliable and valid ANTS test.
- All information received in participation in the study was included as the website.
- Data was collected anonymously with no identifiable information.
- Surveys were posted on SurveyMonkey.

- Data analysis:
  - Questionnaires were sent to study participants (pre-workshop, post-workshop, and mid-year post-workshop). The dataset was de-identified into specific focus, interests, and coded for analysis.
  - Body and head CTs were correlated. The NVCT scores were analyzed for quantitative survey data, comparing pre-workshop, post-workshop and 6 months later, for ANTS and CRNAs' self-perception of their effectiveness in training SRNAs.
  - ANTS test data were analyzed. Cochran's Q test was used to examine data.

Data Collection and Review Continued

- Data analysis:
  - Data was analyzed in order to determine:
    - 1) The effect of the educational workshop on CRNAs' perceived effectiveness in training SRNAs.
    - 2) Did the relationship identified in the first two questions vary by degree or experience?
  - 3) Did the relationship between perception of the clinical application of ANTS vary with years of experience or degree?

- Qualitative data analysis:
  - Similar themes were noted.
  - Qualitative data were used to highlight information that the quantitative data was unable to capture.
  - Aided to provide deeper insight into the qualitative data.

Results

- ANTS knowledge over time (Time 1, Time 2, Time 3):
  - No statistically significant changes were reported.
  - CRNAs consistently reported a very high understanding of ANTS.

- CRNAs' self-perception of their effectiveness in training SRNAs' ANTS:
  - Increased over time.
  - One-way ANOVA, p < 0.001, Time 1 to Time 3

Crosstabulation of Effectiveness of Training SRNAs' ANTS

- Crosstabulation of effective training SRNAs' ANTS and years of practice

- Crosstabulation of effective training CRNAs' ANTS and degree
Application of ANTS

• Application of ANTS in crisis and non-crisis scenarios:
  • Crisis scenarios: There was no statistically significant change in three key metrics:
    • Timing of administration of ceilexone during BM and a "can't/won't/can't tell" indicator
      • Non-crisis scenarios (Time 1 vs. Time 2):
        • Pain satisfaction: one-way ANOVA p=0.209
        • Intraoperative management of SVA T: one-way ANOVA p=0.05

Impact of the Workshop on CRNA Practice

• The impact of the workshop on CRNA practice:
  • On the impact of the workshop on CRNA practice:
    • Satisfaction with the content and delivery of the workshop:
      • Significant improvement in knowledge of ANTS
    • The culture in the OR is a barrier to implementing ANTS

Qualitative Analysis

Themes identified in barriers reported

<table>
<thead>
<tr>
<th>Themes</th>
<th>Pre occupancy</th>
<th>Post occupancy</th>
<th>Communication</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time</td>
<td>Pre occupancy</td>
<td>Post occupancy</td>
<td>Communication</td>
</tr>
</tbody>
</table>

Key Results

• CRNAs develop a high understanding of ANTS
  • CRNAs reported a decrease in their comfort in effectively using ANTS in SNA's
    • Specifically noting CRNAs and doctors prepared CRNAs
      • One potential factor is the recent shift toward doctorally prepared CRNAs
    • CRNAs have a strong understanding of the importance of ANTS in crisis situations
      • no change from Time 1 to Time 2
    • CRNAs reported an increase in the understanding of the clinical application of ANTS in non-crisis situations between Time 2 and Time 3
    • The culture in the operating room is a main barrier to the implementation of ANTS in the perioperative period
Study strengths
- The importance of the topic examined
- Anesthesia non-technical skills are crucial for patient safety, which has already been established.
- The results suggested that CRNAs are open to examining their use of ANTS, including their effectiveness in training ANTS in their students.
- The CRNAs also reported willingness to change their practice to include more non-technical skills.

Study limitations
- Sample:
  - Small sample and difficulty with recruitment
  - Homogenous sample
- Relevance:
  - Attrition for the one-month follow-up, unable to directly contact study participants in order to maintain anonymity.
  - Workshop length (one hour due to continuing education credit).
- Findings:
  - Results may only hold true for the sample population (i.e., CRNAs that currently precept CRNAs). Further studies would need to be done on a wider population to see if the study findings hold true for CRNAs in other states.
  - Anonymity responses were unable to be linked, which made data analysis more challenging.

Deliverables
- Creation of an online educational workshop for CRNAs focused on providing the most current evidence-based research on anesthesia non-technical skills.
- Includes the working definition of ANTS, the clinical implication and their role in the perioperative period.
- Development of a website containing the online educational module.
- Analysis of the barriers CRNAs faced, prior to using the educational workshop, when implementing ANTS.
- Analysis of how the educational workshop influenced the practice of participating CRNAs, including the potential impact on the CRNAs they precept.

DNP essentials
- Essential I: scientific underpinnings for practice:
  - ANTS may be overlooked in the educational process by students or faculty.
  - This study examined the barriers CRNAs are currently facing while using ANTS.
  - Through improving the use of non-technical skills in the operating room, this project may positively influence patient experience and outcomes.
- Essential VI: advanced practice nursing:
  - Advanced practice nursing aims to bridge the gap between literature and current practice.
  - The literature points to simulation-based learning or a multi-faceted approach as key ways to develop non-technical skills.
  - Through the implementation of an online educational workshop in CRNAs, this study sought to facilitate the adoption of anesthesia non-technical skills by anesthesia providers in the perioperative period.
Advanced Practice Nurses’ Contribution to Practice

• One study found that over half of the complaints filed by patients were regarding non-technical aspects of their care (Fried, van Dijk, Overbeek, Heijmstra, & Broe (2017)).
• Improving some aspects of the patient experience may positively impact the patient experience.
• Improving preceptor CRNAs’ non-technical skills may also benefit the clinical experience.
• Efforts to have high-quality patient care modeled for them in their clinical rotations.

Contribution to Practice

• Implications for preceptors: CRNAs that may have increased understanding of the complexity of ANTS.
• Increased use of ANTS will positively impact patient outcomes, as well as the patient’s perioperative experience.
• Implications for CRNAs:
  • Through modeling of ANTS by preceptor CRNAs, SRNAs may have increased exposure to the clinical application of ANTS.
  • This may result in newly graduating SRNAs having an improved understanding of ANTS.

Future Implications

• Regional Policy Change:
  • Through assessing barriers that CRNAs currently face with utilizing anesthesia non-technical skills in the perioperative period, this study provides data on areas of improvement.
  • This study points to ‘personalities’ as a main barrier to the use of ANTS in the perioperative period.
• Identification of the current knowledge of ANTS in NY preceptor CRNAs may be the translation for potential curriculum changes in nurse anesthesia programs. Continuing education for CRNAs, mandatory preceptor non-ANTS training in every hospital-wide venue.

Recommendations

• As this topic continues to be discussed, perhaps one focus should be to address the perioperative culture. Creating a no-blame environment allows all care team members to achieve participation without fear of repercussions.
• Future research should include CRNAs that practice in various geographic locations to increase the diversity of the CRNA population. This would result in a larger, more diverse sample.
• Other methods of training ANTS should be explored, starting at the SRNA level.
• Low-fidelity simulation
Conclusion

- The literature points to the prevalence the failure of anesthesia non-technical skills, however CRNAs reported a high level of ANTS understanding across all three surveys.
- This points to knowledge not being the driving factor for deficits in the application of ANTS.
- CRNAs highlight barriers faced when attempting to implement ANTS, many of which pointed to lack of culture in the perioperative period.
- Additionally, the more CRNAs learned about ANTS, the less confident they seemed to be in their ability to effectively train ANTS in SRNAs.
- More research is needed to identify the cause of their decreased confidence.

References