



***NorthShore University HealthSystem  
School of Nurse Anesthesia  
&  
DePaul University School of Nursing  
Class of 2019  
DNP Poster Presentations***

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**Background:** The pre-anesthetic evaluation (PAE) is a critical part of providing anesthesia and an important component of patient safety. Stress, anxiety, doubt, a novel environment and time constraints can result in an inefficient and inadequate assessment.

**Objectives:** To determine the overall readiness of student registered nurse anesthetists (SRNAs) to independently perform a thorough PAE upon entering clinical residency.

**Method:** A focus group was conducted with 10 SRNAs from NorthShore. Qualitative software and thematic analysis were used to analyze the data.

#### Focus Group Interview Guide

1. Thinking back to the first days of clinical, tell me about how were you feeling leading up to performing the pre-anesthetic evaluation (PAE)?
2. Describe your actual experiences conducting the PAE at the start of your clinical residency? Can you recount some of the feelings that you experienced at this time?
3. Tell me about any obstacles or barriers you faced in completing your PAE? Please describe/discuss what these were.
4. Can you describe what would have helped overcome these barriers?
5. Tell me about what you did to help you get ready or prepare for your first day, in particular performing the PAE?

**Results:** Four main themes were identified from the data.

Theme	Illustrative Quote
Barriers	Q1 "Expectations [for the pre-op assessment] definitely var[y] at different [clinical] sites."
	Q2 "We get lots of interruptions."
Emotions	Q3 "I felt like I was a little bird getting kicked off the tree. And... you either learn to fly now, or you're gonna send me home for the day."
	Q4 "I just felt... so overwhelmed with starting clinicals."
Facilitators	Q5 "Mock interview... so that it was... a practice run before you did one on your first patient. Which, was nice 'cause it helped you at least identify things that you were forgetting on the first time."
	Q6 "Heavily relying on the template."
	Q7 "Maybe if we just had some time during class [to] run through [the interview] on each other, like, partner up and run through it."
Role Transition	Q8 "I think one of the main struggles with us having been nurses is that, we were the leaders on our floor. We were the nurse leaders. We were extremely competent, and then all of a sudden, we're put in a situation where we're primed to feel insecure. And, to feel... as if our previous skills are no longer good enough."
	Q9 "We aren't new clinicians. We're experienced clinicians, just playing a different role."

**Discussion:** Our findings support previous literature that students entering clinical practice experience information overload, role ambiguity, anxiety and stress related to their new surroundings. These factors have a negative impact on clinical performance.

#### Implications for Nursing:

- Include a mock interview or simulation in addition to didactic education.
- Utilize a pocket sized guide for reference to help the SRNA establish a flow.

Pre-Anesthetic Evaluation Pocket Guide	
Name, DOB, why are you here?	
Allergies? Previous anesthesia? Problems? (PONV) Family problems with anesthesia?	
Medication review? (what did you take this morning?)	
NPO status?	
Medical History:	<ul style="list-style-type: none"> <li>• CV: HTN, IHD, CHF, angina, irregular rhythm, METS</li> <li>• Respiratory: asthma, COPD, OSA, recent cold/cough?</li> <li>• GI/Hepatic: GERD, hiatal hernia, diverticulitis, liver disease</li> <li>• Renal/endocrine: DM, thyroid, kidney disease</li> <li>• Neuro/Musculoskeletal: strokes, seizures, paralysis/neuropathy, arthritis</li> <li>• Misc: bleeding/clots, cancer, sickle cell</li> <li>• Pregnancy status</li> </ul>
Social history: alcohol, smoker, drugs	
Steroids in last 6 months?	
Physical exam: lungs, heart	
Airway assessment:	<ul style="list-style-type: none"> <li>• Mallampati, mouth opening, neck mobility, TMD</li> <li>• Dentition (loose/missing teeth? dentures/partials?)</li> </ul>
Explain Anesthesia plan: GA, MAC, Regional (risks & benefits)	

#### Conclusions:

The ability to practice the PAE prior to entering clinical residency and using a reference guide can help decrease the SRNAs' stress and anxiety allowing for a more consistent, thorough, and efficient PAE.

**Background/Significance:** A Venous Gas Embolism (VGE) is defined as the entrance of gases such as air or carbon dioxide into venous circulation, which may ultimately travel to the right side of the heart<sup>1</sup>. VGEs develop when air or other gases enter the vasculature from an existing pressure gradient and are considered to be potentially fatal<sup>2</sup>. Surgeries that present the highest risk for VGE development include neurosurgery, laparoscopic, orthopedic, obstetric-gynecological, and cervical laminectomies<sup>2</sup>. Posterior fossa surgeries that are performed in the sitting position have the highest rates of VGE incidence<sup>2</sup>. Sequelae of VGE development includes cardiac arrhythmias, systemic hypotension, decreased oxygen saturation, and ultimately cardiovascular collapse<sup>4</sup>. Mortality rates associated with VGE occurrence can be as high as 28%<sup>2</sup>.

Video-based learning acts as a supplemental adjunct to traditional lectures, reading material, and clinical experiences. An important benefit to this learning method is that it allows students to improve their performance without the risk of causing patient harm. This project aims to assess the effectiveness of video-based learning to educate novice NATs on the management of VGEs.

**Purpose:** The purpose of this project was to evaluate the effectiveness of an educational video in enhancing the appropriate crisis management of VGE among NATs as measured by their knowledge and confidence levels.

**Methods:** A quasi-experimental pretest-posttest design on a single group of participants was utilized for this project. A total of 14 first year NATs were recruited from NorthShore University HealthSystems School of Nurse Anesthesia (NSUHS) and participated in this study. An instructional video that simulates the proper management of VGE, a knowledge assessment tool (KAT) to assess non-technical skills knowledge pertaining to VGE, and a student confidence survey were developed for implementation of this study.

**References:**

- Gaba, D. M., Fish, K. J., Howard, S. K., Burden, A. R., (2015). Crisis Management in Anesthesiology. Philadelphia, PA: Elsevier Saunders
- Onder, J. (2017). Anesthetic management and considerations for venous air embolism. International Student Journal Of Nurse Anesthesia, 16(2), 9-12.

**Results:** Following exposure to the video, the mean score increased with every category assessed best illustrated in Figures 1 and 2. The mean prevention score improved from a pre-test score of  $M=1.79$  ( $SD=0.89$ ) to  $M=2.79$  with a ( $SD=0.42$ ); the recognition score improved from  $M=1.07$  ( $SD=0.91$ ) to  $M=3.57$  ( $SD=0.51$ ); and the decision-making score improved from  $M=2.00$  ( $SD=1.24$ ) to  $M=4.00$  ( $SD=0$ ). The prioritization section improved from a mean pre-test of  $M=2.50$  ( $SD=1.50$ ) and improved to  $M=6.79$  ( $SD=1.92$ ). The overall total score mean improved from a pre-test score of  $M=7.36$  ( $SD=2.240$ ) to a post-test score of  $M=17.14$  ( $SD=2.070$ ). The mean pre-test value for confidence in identification increased from  $M=2.43$  ( $SD=1.505$ ) to  $M=3.43$  ( $SD=0.514$ ); the confidence in managing score increased from  $M=2.07$  ( $SD=1.492$ ) to  $M=3.14$  ( $SD=0.770$ ); and confidence in learning increased from  $M=3.29$  ( $SD=0.469$ ) to  $M=3.64$  ( $SD=0.497$ ).

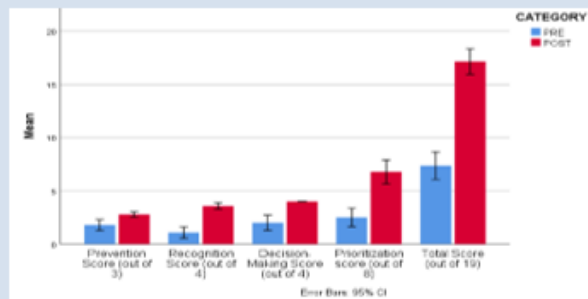


Figure 1: KAT Knowledge Categories Mean Scores

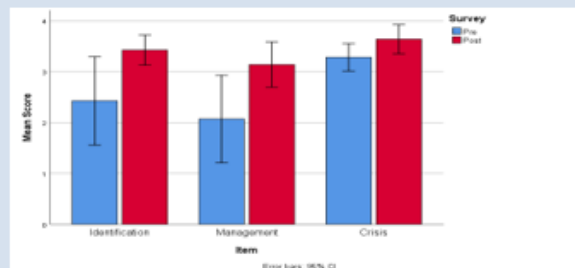


Figure 2: KAT Confidence Categories Mean Scores

**Discussion:** NATs that participated in the study gained knowledge and confidence from pre and post video implementation. The mean scores improved in every knowledge category (prevention, recognition, decision-making, and prioritization) and confidence category (identification, management, and learning crisis management). A Wilcoxon Signed Matched-Pairs Ranks Test determined that the median post-test scores of the KAT significantly increased compared to the pre-test scores after video implementation proving statistically significant. The instructional video improved knowledge and confidence among NATs for the management of VGE as demonstrated by significantly increased mean score [ $Z=-3.301$ ;  $p=0.001$  (2-tailed)]. This demonstrated that video simulation education is an effective method of learning crisis management.

**Future Recommendations:** Further research can build upon current findings by assessing other educational modalities such as live simulation or traditional lecture. This will allow for another subset to be analyzed in comparison to video-based education. Another opportunity is to assess long-term retention of crisis management by utilizing video-based education as an adjunct to traditional lecture style learning. The strength of the study may improve by assessing retention with a future study through implementing a secondary post-test at a later date. This also would allow for a useful population subset analysis, which can be accomplished by assessing multiple nurse anesthesia programs first year students.

**Conclusion:** Crisis management is an essential skill required of CRNAs and depends on the practitioner's ability to identify individuals at risk, incorporate prevention strategies, recognize key signs and symptoms, incorporate appropriate decision-making skills, and prioritize actions. All of these non-technical skills are essential for patient care and safety as NATs enter the anesthesia arena. An instructional video can be used as an adjunct to didactic courses in the nurse anesthesia curriculum.



A closer look at cultural competence...

Cultural Competence is a process wherein a healthcare provider never assumes his or her own cultural proficiency and continually and willingly endeavors to function within a client's cultural milieu.

# Cultural Competence in Student Registered Nurse Anesthetists in Illinois

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A closer look at cultural competence...

Cultural competence is defined and measured in terms of its constructs: cultural awareness, cultural knowledge, cultural skill, and comfort in multicultural encounters.

## Abstract

**Objective:** To determine the level of perceived cultural competence in student registered nurse anesthetists (SRNAs) in Illinois and make educational recommendations.

**Methods:** A descriptive, cross-sectional study was completed using the Clinical Cultural Competency Questionnaire (CCCCQ) to evaluate the perceived level of cultural competence among SRNAs in Illinois. Four domains of clinical cultural competency (knowledge, skills, attitudes [awareness], and encounters) were evaluated and reported.

**Results:** The survey response rate was 16.7% (N=57). A statistically significant positive correlation was observed between cultural knowledge and age ( $p=0.03$ ). There was a statistically significant difference in cultural knowledge between students attending a nurse anesthesia program in suburban Northeastern Illinois and students attending a large, urban university in the city of Chicago, with CCCCQ knowledge Mean Rank scores of 38.44 and 13.77, respectively. The overall level of perceived clinical cultural competence of SRNAs was low ( $M=3.13$ ;  $SD=0.54$ ; Range=2.17 to 4.89) in this study.

**Conclusion:** SRNAs need additional cultural education and training in their program of study to enhance their perceived level of cultural competence and to deliver culturally competent anesthesia care.

## Introduction: Why is Cultural Competence Important?

- The U.S. population is diversifying
  - By 2020, 1 in 4 patients will not share the same cultural background as their provider.
  - Underrepresented minorities comprise 8.6% of the anesthesia workforce yet account for 32% of the U.S. population.

Population by Race and Hispanic Origin: 2014 and 2000

Race and Hispanic origin	2014		2000		Change, 2014 to 2000	
	Number	Percent	Number	Percent	Number	Percent
<b>Total population</b>	393,749	100.0	416,759	100.0	23,010	5.5
<b>White</b>	279,720	71.0	286,712	68.8	-6,992	-2.8
<b>Black or African American</b>	246,940	62.6	281,214	67.5	-34,274	-12.2
<b>Hispanic or Latino</b>	180,700	45.9	181,093	43.5	-1,393	-0.8
<b>Asian</b>	41,000	10.4	39,460	9.5	1,540	3.9
<b>American Indian and Alaska Native</b>	3,807	1.0	3,807	0.9	0	0.0
<b>Native Hawaiian and Other Pacific Islander</b>	17,000	4.3	36,460	8.8	-19,460	-53.1
<b>Two or More Races</b>	7,942	2.0	26,000	6.2	-18,058	-50.5
<b>Race Alone or in Combination</b>						
White	281,000	71.4	288,201	69.2	-7,201	-2.5
Black or African American	246,940	62.6	281,214	67.5	-34,274	-12.2
Hispanic or Latino	180,700	45.9	181,093	43.5	-1,393	-0.8
Asian	41,000	10.4	39,460	9.5	1,540	3.9
American Indian and Alaska Native	3,807	1.0	3,807	0.9	0	0.0
Native Hawaiian and Other Pacific Islander	17,000	4.3	36,460	8.8	-19,460	-53.1
Two or More Races	7,942	2.0	26,000	6.2	-18,058	-50.5
<b>Hispanic or Latino Origin</b>						
Hispanic	180,700	45.9	179,000	42.9	1,700	1.0
Not Hispanic	213,049	54.1	237,759	57.1	-24,710	-10.4

- Patient safety**
  - Minorities are hesitant to seek medical care for fear of being misunderstood, leading to neglect.
  - Communication barriers between patients and providers lead to patient harm.

## Methodology

### Design

- This project was a descriptive, cross-sectional, online survey study.

### Sample

- SRNAs attending nurse anesthesia programs in Illinois.
  - Nurse anesthesia programs in Illinois:
    - NorthShore University HealthSystem School of Nurse Anesthesia
    - Rosalind Franklin University of Medicine and Science Nurse Anesthesia Program
    - Rush University College of Nurse Anesthesia
    - Southern Illinois University Edwardsville School of Nurse Anesthesia
    - Milikin University and Decatur Memorial Hospital Nurse Anesthesia Program

- Estimated total number of SRNAs: 340

- Desired sample size: 60

### Setting

- The Qualtrics Online Survey Research Platform allowed participants to complete the online survey using any electronic device with internet access.

### Instrument

- The Clinical Cultural Competency Questionnaire.

- Quantitatively measures 4 constructs of cultural competence via 5-point Likert-type scale questions.

- Scores of each construct are added to determine total level of perceived cultural competence.

### Recruitment and Data Collection

- Electronically prepared study materials (CCCCQ survey, recruitment email, study information sheet) were electronically distributed to participants by the executive director of the Illinois Association of Nurse Anesthetists.

- Initial recruitment measures did not meet the desired sample size and an IRB amendment for additional measures was submitted.

- Following the IRB amendment approval, the electronically prepared materials were sent the directors of all the nurse anesthesia programs in Illinois. The directors were instructed to forward the materials to students.

- The survey was closed after the desired sample size was met.

### Data Analysis

- The data collected from the online survey were analyzed using the International Business Machine (IBM) SPSS software version 25.

- The Cronbach's alpha coefficient value was calculated for each subscale of the CCCCQ.

- The mean scores for each subscale were calculated, added, and then averaged to determine the total level of cultural competence among all participants.

- The Likert-type questions in the CCCCQ inherently resulted in skewed data distributions and required the employment of nonparametric inferential statistics.

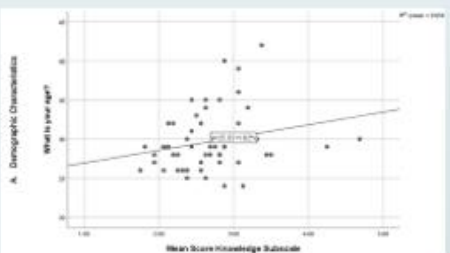
## Results

Table 1. Demographic Characteristics of Study Participants

Characteristic	n	%
<b>Gender</b>		
Male	17	29.8
Female	40	70.2
<b>Self-identified ethnicity</b>		
African American/Black	1	1.8
Asian American	7	12.3
Latino Hispanic	1	1.8
Native Hawaiian/Pacific Islander	1	1.8
White	45	78.9
Mixed Race	2	3.5
<b>Other Spoken Languages</b>		
Yes	24	42.1
No	33	57.9
<b>Nurse Anesthesia Program</b>		
Milikin University and Decatur Memorial Hospital Nurse Anesthesia program	2	3.5
NorthShore University HealthSystem School of Nurse Anesthesia/DePaul University	31	54.4
Rush University College of Nursing Nurse Anesthesia Program	7	12.3
Rosalind Franklin University of Medicine and Science Nurse Anesthesia Program	9	15.8
Southern Illinois University Edwardsville School of Nursing/Anesthesia Nursing Specialization	8	14.0
<b>Year of Program</b>		
First Year	18	31.6
Second Year	14	24.6
Third Year	25	43.9
<b>Education/Seminar/Course on Culture</b>		
Yes	30	52.8
No	27	47.4
<b>Type of Education/Seminar/Course</b>		
Seminar/Lecture	17	
Class/Course	8	
Other Experience	1	
No education reported	4	

Table 2. Reliability of Individual Subscale

CCCCQ Subscale	Number of Items	Cronbach's Alpha Coefficient
Knowledge	16	0.877
Skills	15	0.958
Encounters	12	0.917
Attitudes	20	0.942
Overall CCCCQ	63	0.981



## Conclusion

- The overall level of perceived cultural competence in SRNAs is low.
- No relationship exists between ethnicity and the total level of perceived cultural competence in SRNAs.
- A statistically significant correlation between cultural knowledge and age exists, with older participants reporting higher levels of cultural knowledge.
- SRNAs in the state of Illinois have moderate to high levels of cultural awareness but low levels of cultural knowledge, indicating a need for cultural education and multi-cultural encounters.

## Educational Recommendations

- Immersive Cultural Education**
  - Students receive both formal classroom cultural education plus an immersive cultural experience in a foreign country.
  - The addition of debriefing and reflective learning after these service-learning experiences enhances cultural competence.
- Lectures and Presentations Created and Disseminated by Minority Groups**
  - Educators must realize their limitations when teaching curricula about cultures other than their own and incorporate guest speakers and presenters.
- Culturally Diverse Student Mentors**
  - Pairing culturally versed students with those who have limited cultural encounters facilitates more meaningful learning and enhances cultural competence in both parties.

## Recommendations for Further Research

- Educational needs assessments should be performed on state and national levels to identify specific areas for improvement.
- Research to determine the most effective means to increase cultural competence in SRNAs is necessary.

## Acknowledgements

Permission:

This survey has been adapted with permission from the Clinical Cultural Competency Questionnaire (CCCCQ) developed by Robert C. Liko, MD, MS, Professor and Director of the Center for Healthy Families and Cultural Diversity, Department of Family Medicine and Community Health, Rutgers Robert Wood Johnson Medical School. The CCCCQ was used in a project entitled, "Assessing the Impact of Cultural Competency Training Using Participatory Quality Improvement Methods," funded by the Aetna Foundation.

([http://rwjms.rutgers.edu/departments\\_institutes/family\\_medicine/chfcd/grants\\_projects/aetna.html](http://rwjms.rutgers.edu/departments_institutes/family_medicine/chfcd/grants_projects/aetna.html))

Catherine Carman, RN, BSN, DNP(c) & Victoria Rosinski, RN, BSN, DNP(c)

## Background

Complementary alternative medicine has increased in popularity since the early 1990s. Herbal supplements are the most common form, with an estimated 50 million Americans taking herbal supplements → roughly half of all U.S. surgical patients.

- 70% fail to report herbal supplements as medications
- 50% do not stop taking herbal supplements before surgery

Dietary Supplement Health and Education Act of 1994: Exempts herbal supplements from FDA regulation. This leads to poor quality and/or highly potent herbal supplements being sold in the U.S.

Defining the Problem: While anesthesia providers recognize the importance of assessing for herbal supplements as proven in previous studies, this rarely transfers into practice. The failure of communication between patients and providers potentially endangers the patient due to the multiple adverse reactions between herbal supplements and perioperative medications.

## Objectives

- Identify CRNAs' current level of herbal supplement attitudes and knowledge.
- Assess if CRNAs' current practice includes the preoperative assessment of herbal supplements.
- Examine the impact of an online learning module on CRNAs' knowledge of herbal supplements and their perioperative interactions with other anesthetic agents.

## Methods

A descriptive survey design in the form of a pre and posttest was used to assess the effect of an investigator-developed online educational handout. This handout was available for review between pretest and posttest. CRNAs recruited through the IANA

Herbal Supplement Handout			
<p><b>Garlic</b></p> <p><i>Uses</i> High cholesterol, HTN, heart disease</p> <p><i>Effects</i> Inhibits platelet aggregation, ↑ bleeding risk</p> <p><i>Interactions</i> Anticoagulants, ASA, NSAIDs, immunosuppressants, antiplatelet effect</p>	<p><b>Ginger</b></p> <p><i>Uses</i> Antiemetic, anti-inflammatory</p> <p><i>Effects</i> Inhibits platelet aggregation, alters bleeding time</p> <p><i>Interactions</i> Anticoagulants, NSAIDs, warfarin</p>	<p><b>Ginkgo</b></p> <p><i>Uses</i> Alzheimer's disease, dementia, erectile dysfunction, asthma</p> <p><i>Effects</i> Inhibits platelet aggregation, ↑ bleeding risk</p> <p><i>Interactions</i> Anticoagulants, ASA, thiazide diuretics</p>	<p><b>Ginseng</b></p> <p><i>Uses</i> Improves energy, stress, immunity &amp; concentration</p> <p><i>Effects</i> ↑ bleeding risk, hypoglycemia, HTN, tachycardia</p> <p><i>Interactions</i> Warfarin, MAOIs, anticoagulants, diabetic medication, opioids</p>
<p><b>St. John's wort</b></p> <p><i>Uses</i> Depression, anxiety, insomnia</p> <p><i>Effects</i> Photosensitivity, induces CYP450 enzymes, drowsiness</p> <p><i>Interactions</i> Tricyclics &amp; SSRIs, cyclosporins, digoxin, birth control, HIV medications, benzodiazepines</p>	<p><b>Kava kava</b></p> <p><i>Uses</i> Anxiety, muscle pain, sedation</p> <p><i>Effects</i> Liver damage</p> <p><i>Interactions</i> Anesthetics, benzodiazepines, hepatotoxic drugs</p>	<p><b>Ephedra</b></p> <p><i>Uses</i> Appetite suppressant, weight loss, asthma, bronchitis</p> <p><i>Effects</i> HTN, arrhythmias, MI, seizure, stroke, restlessness, hemodynamic instability</p> <p><i>Interactions</i> MAOIs, caffeine, decongestants, desflurane</p>	

## Results

N = 111 CRNA's

### Demographics

Majority: female, ages 30-39 or 50-59, 10 or more years of experience with graduate degrees

\*No statistical significance found in mean scores for sociodemographic variables

Knowledge Variable	Frequency	Percentage of Respondents
Gender		
Male	31	23.0
Female	63	67.0
Age		
70+	1	1.1
60-69	16	17.0
50-59	26	27.7
40-49	17	18.1
30-39	27	28.7
20-29	7	7.4
Level of Education		
Anesthesia Certificate	5	5.3
Master's Degree	48	51.1
Doctorate Degree	34	36.2
Years Practicing as CRNA		
1-2	23	24.5
3-5	11	11.7
6-10	8	8.5
10+	52	55.3

### Attitudes & Beliefs

Table 2. Attitudes and Beliefs Pretest

Questionnaire Item	Mean	SD
I assess my patient's use of herbal supplements preoperatively.	3.26	0.922
I feel confident in my knowledge of the effects of herbal supplements' interactions with anesthesia.	3.23 <sup>b</sup>	0.873
I believe that herbal supplements can have a negative impact on anesthetic outcomes.	3.75	0.756
I would like more educational opportunities to learn about herbal supplements and anesthetic interactions.	3.99 <sup>a</sup>	0.681

<sup>a</sup>Highest mean score.  
<sup>b</sup>Lowest mean score.

Table 3. Attitudes and Beliefs Posttest

Questionnaire Item	Mean	SD
I will assess my patient's use of herbal supplements preoperatively.	4.10 <sup>a</sup>	0.602
I now feel more confident in my knowledge base of herbal supplements' interactions with anesthesia.	3.87 <sup>b</sup>	0.620
I believe that herbal supplements can have a negative impact on anesthetic outcomes.	4.07	0.657
I found this educational module helpful and will use the information learned here in my daily practice.	4.06	0.737

<sup>a</sup>Highest mean score.  
<sup>b</sup>Lowest mean score.

### Knowledge

Table 4. Knowledge Pretest/Posttest

Knowledge Variable	Answer	Pretest Mean (SD)	Posttest Mean (SD)
May cause inhibition of platelet aggregation and possibly decrease cholesterol levels?	Garlic	.60 (.49)	.66 (.48)
May inhibit platelet activating factors and is used in cognitive disorders?	Ginkgo	.63 (.49)	.60 (.49)
May precipitate a benzodiazepine-like withdrawal syndrome if suddenly discontinued?	Kava kava	.40 (.49)	.45 <sup>b</sup> (.50)
May be used to improve energy and immunity and decreases the effect of opioids?	Ginseng	.24 <sup>b</sup> (.44)	.46 (.50)
May cause a serotonin syndrome if taken with SSRIs or tricyclic antidepressants?	St. John's Wort	.54 (.50)	.59 (.50)
May increase sympathetic stimulation, heart rate, blood pressure and dysrhythmias with anesthesia?	Ephedra	.81 <sup>a</sup> (.39)	.72 <sup>a</sup> (.45)
May be used as an antiemetic and may increase bleeding risk?	Ginger	.70 (.46)	.68 (.47)

<sup>a</sup>Highest mean score.  
<sup>b</sup>Lowest mean score.

## Discussion

The posttest scores regarding attitudes and beliefs improved as shown by the Cronbach's α coefficients increase: 0.332 to 0.817

→ Indicates adequate reliability of the handout

Questions with highest pretest mean (M=3.99) were items regarding more education about herbal supplements.

Questions with the largest increase in posttest mean pertained to the assessment of herbal supplements preoperatively (M= 3.16 to 4.10)

The educational tool had a small effect on improving CRNA knowledge of supplements (Cohen's d value -0.114)

## Future Research

Future research should be aimed at improving the knowledge regarding specific herbal supplements. Educational tools should explore other avenues for different learning styles such as in-person lectures or online videos.

Design of new preoperative assessments to include specific documentation on herbal supplements.

Focus on educating patients about supplement interactions and importance of discontinuing before surgery.

## Conclusion

The handout tool was effective at educating CRNAs' about the importance of herbal supplement and their perioperative interactions, as well as the need to assess for supplement use. Not as effective as a teaching tool for specific supplement interactions, indications or side effects.

More educational opportunities should be implemented specific to anesthesia providers regarding herbal supplements.

# What We Say Matters: A Survey of Anesthesia Providers' Knowledge and Beliefs

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## Abstract

Pain is a serious concern and fear of patients. Due to the Joint Commission's introduction of standards to address undertreatment of pain, it is now a focus of healthcare providers. Emerging research is focused on language in assessing pain. This study investigated the knowledge gap among anesthesia providers on positive language and pain assessment. The study objectives were to conduct a survey of Illinois Association of Nurse Anesthetists (IANA) members' current knowledge and beliefs on Positive Language and the Nocebo Effect related to patient outcomes, and to educate anesthesia providers with an evidence-based fact sheet. The fact sheet and Qualtrics survey were created by the authors and distributed via email. Anonymity was maintained and consent was implied by completion of the survey. Data was analyzed with IBM SPSS Statistics. Key findings included presence of a knowledge gap, increased scores after reading the fact sheet, and a difference in baseline knowledge between practice settings as evidenced by an H statistic of 10.457, df=2 and a p value of 0.005. This study is the first to report anesthesia providers' knowledge toward Positive Language and the Nocebo Effect and lead the way to the creation of a comfort scale.

## Research Questions

1. What are anesthesia providers' knowledge and beliefs on Positive Language and patient's perceptions of pain?
2. What are anesthesia providers' knowledge and beliefs towards incorporating the use of Positive Language and phrases into their practice?

## Introduction

Patients requiring anesthesia are vulnerable, so what words are used, and how they are said, matters.<sup>1</sup> No previous studies have determined how Positive Language affects patient-reported pain outcomes, but research supports the hypothesis that Negative Language correlates directly with increased reports of pain.<sup>2,3</sup>

### Positive Language:

- Powerful tool healthcare providers use, often subconsciously
- Improves patient outcomes by decreasing patients' perceived level of pain
- Examples: words and phrases associated with a pleasant connotation, such as comfort instead of pain

### Negative Language:

- Increases the nocebo effect
- Increases patient reports of pain and anxiety
- Associated with unpleasant emotional content, even though the provider may have good intentions
- Examples (obscure phrases such as "sting and a burn," or simply the use of the word "pain" with medical procedures)
- When used to warn patients about potentially painful or uncomfortable stimuli, it increases said level of discomfort

## Methods & Materials

### Sample

1,795 IANA members (CRNAs and trainees)

Fact sheet and survey sent via email

Participation voluntary; results anonymous through Qualtrics

### Survey

17 questions: 5 demographic, 10 related to knowledge before and after reading fact sheet

Likert scale format

2 questions related to implementation barriers

Data collected over one month; survey distributed twice

Information supported by literature, Fact Sheet underwent review for content validity

## Results

### Access Rate:

- 121 members accessed the survey (6.7%)
- 117 survey responses were complete, a response rate of 6%
- Reliability based on completed surveys from 107 participants

Cronbach's Alpha for responses before reading the fact sheet was 0.784, and after reading the fact sheet was 0.794.

Kruskal-Wallis H test was performed, pairwise comparisons were performed using Dunn's procedure with a Bonferroni correction for multiple comparisons. A p-value less than 0.05 indicated a statistically significant difference between pre and post fact sheet knowledge. Adjusted p-values were presented.

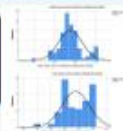
### Post hoc analysis revealed statistically significant differences:

- Between urban and rural, the p-value was 0.029
- Among age categories, 60-69 years vs. 30-39 years, the p-value was 0.003 and the adjusted p-value after pairwise comparison was 0.05.
- Among years in practice, comparing >20 years to 1-3 years in practice, the adjusted significance was 0.021.
- Regarding highest level of education, masters compared to doctorate revealed an adjusted significance of 0.005.

## Discussion

### Mean scores higher after reading fact sheet:

- Fact sheet was an appropriate method of facilitating learning
- Slight (positive) right skew after reading the fact sheet suggests participants learned, and knowledge was gained from the fact sheet



### Age:

- Age group that had the most influence over the data was 30-39 years old and the 40-49 years old
- 28% of the participants and 25.2% of the participants, respectively
- The p-value related to age before reading the fact sheet was 0.057 and after reading the fact sheet was 0.028
- Due to the fact that 0.028 is less than the confidence interval 0.05, it was concluded that age was a major influence in scores, specifically, a more seasoned age of 30-49.

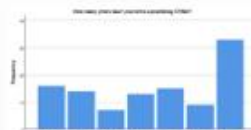
### Years in Practice:

- When examining the data of years practicing as a CRNA, that the study accurately depicted all levels of experience
- Participants with greater than 20 years of experience made up the largest percentage (30.8%) of study participants
- The Kruskal-Wallis test score for after reading the fact sheet was a p-value of 0.007 versus before reading fact sheet 0.140
- The null hypothesis would be rejected with the p-value 0.007
- Years of practice turns out to be the most statistically significant variable (p-value closest to 0.006)
- Like age, an increase in years of practice allows veteran practitioners to be more confident, allows exposure to continuing education, anesthesia publications and periodicals, and more people (including patients, operating room personnel, and anesthesia colleagues)

### Highest Level of Education:

- Largest group obtained master's degree (49.5%)
- The p-value before reading the fact sheet was 0.401 and the p-value after reading was 0.008
- This suggests that master's prepared anesthesia providers have the best education related to our topic (not doctoral degree)
- The most recent graduates of anesthesia programs in Illinois have been granted doctorate degrees. However, this group does not represent the most years of practice.

## Most Significant Variable: Years in Practice



Years in Practice	Mean	Median	Mode	Standard Deviation
0-20	10.5	10	10	5.2
21-30	25.5	25	25	4.8
31-40	35.5	35	35	4.5
41-50	45.5	45	45	4.2
51-60	55.5	55	55	3.8
61-70	65.5	65	65	3.5
71-80	75.5	75	75	3.2
81-90	85.5	85	85	3.0
91-100	95.5	95	95	2.8

## Conclusion

Anesthesia providers, particularly CRNAs, are in a unique position; they can build a rapport with patients before surgery and continue that therapeutic relationship into the recovery room, upon emergence from anesthesia. It is essential for CRNAs to understand how their language can impact patient outcomes regarding patient pain perception.

This study assessed the knowledge of anesthesia providers regarding positive language in the assessment of pain. No studies regarding knowledge of positive and negative language among anesthesia providers have been found. The researchers of this study have observed that there is no teaching tool of positive language, nor the thoughtful approach of word choice and phrases when discussing procedures and activities perceived as painful.

The results of this project can guide future practice in many ways. The Nocebo effect has detrimental consequences and health care professionals should be aware of their influential role, taking every measure to avoid and reduce nocebo influences. If providers can understand how they unintentionally increase reports of pain, becoming cognizant of positive language can assist in treating patients with multimodal therapy and reduce opioid use. The results of this project demonstrated to clinicians that simply stating questions and communicating differently is the first step to this multimodal approach. Lastly, the results of this project may give way for the creation of a new pain scale, possibly a comfort scale, that utilizes positive language.

## Acknowledgements

Special thanks to our committee members Karen Kapanke and Julia Feczko for all of their help and guidance throughout this process.

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## What We Say Matters: The Power of Positive Language

### 5 Fast Facts:

- 1 Positive Language** (subconscious)
  - Powerful tool healthcare providers use, often subconsciously
  - Improves patient outcomes by decreasing patients' perceived level of pain
  - Examples: words and phrases associated with a pleasant connotation, such as comfort instead of pain
- 2 Negative Language** (subconscious)
  - Increases the nocebo effect
  - Increases patient reports of pain and anxiety
  - Associated with unpleasant emotional content, even though the provider may have good intentions
  - Examples (obscure phrases such as "sting and a burn," or simply the use of the word "pain" with medical procedures)
  - When used to warn patients about potentially painful or uncomfortable stimuli, it increases said level of discomfort
- 3 Positive words in the "hippocampus"**
  - The hippocampus is a part of the brain that is involved in learning and memory.
- 4 Negative words in the "amygdala"**
  - The amygdala is a part of the brain that is involved in processing emotions, especially fear and anxiety.
- 5 Sample positive phrases to incorporate into your practice:**
  - "I will do the procedure and you will be comfortable."
  - "I would do this for you, so you will be safe."
  - "I will do this for you, so you will be safe."
  - "I will do this for you, so you will be safe."
  - "I will do this for you, so you will be safe."

**Background:**

Current nurse anesthesia education relies on the quality and duration of clinical experiences. Certain low frequency high acuity procedures are becoming increasingly difficult to learn. Insertion of a pulmonary artery (PA) catheter is an invasive procedure that carries serious risk. Simulation has been shown to improve a provider's ability to complete a skill on the first attempt lending it especially useful for teaching invasive procedures such as PA catheter insertion.

**Objectives:**

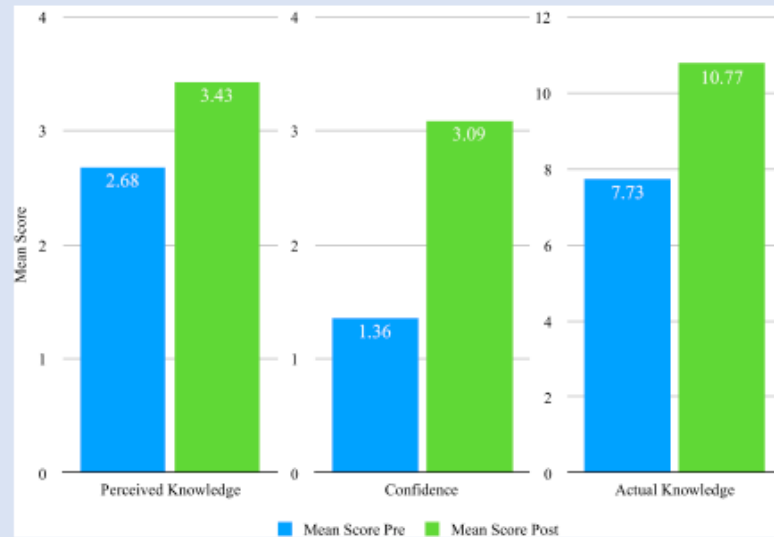
- What affect does simulation have on SRNA's knowledge of PA catheter insertion?
- What affect does simulation have on SRNA's confidence in inserting a PA catheter?
- Does perceived knowledge of PA catheter insertion correlate with actual knowledge?
- Do SRNAs believe one teaching method (educational video or low-fidelity simulation) is superior to the other?

**Method:**

**Design:** Single group pre-test and post-test  
**Population:** Convenience sample of second year SRNAs, 24 eligible 22 participants.  
**Setting:** The study took place at NorthShore University HealthSystem Evanston  
**Tools:** Four surveys were utilized and included a demographics survey, pre-test questionnaire, knowledge assessment tool (KAT), and post-test questionnaire. The pre and post test questionnaires used a 4-point Likert scale to assess perceived knowledge and confidence. The 14 question KAT was used to assess actual knowledge.

**Combined use of video and hands-on simulation is effective in increasing both knowledge and confidence in PA catheter insertion**

**All SRNAs agreed that hands-on simulation increased their confidence more than watching a video simulation**



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**Results:**

The mean score on the KAT increased from 7.73 (*SD* = 3.01) to 10.77 (*SD* = 3.29). Hypothesis testing using Related-Samples Wilcoxon Signed Rank Test rejects the null hypothesis that the median of differences between the mean pre and post study KAT scores equals 0 (*P* = 0.001).

The mean score of perceived knowledge were 2.68 (*SD* = 0.51) on the pre-study questionnaire and 3.43 (*SD* = 0.49) on the post-study questionnaire. Confidence mean scores increased from 1.36 (*SD* = 0.58) to 3.09 (*SD* = 0.68). Hypothesis testing using Related-Samples Wilcoxon Signed Rank Test rejects the null hypothesis that the median of differences between the mean pre and post study questionnaire scores equals 0 (*P* = 0.000) for both perceived knowledge and confidence.

The relationship between perceived knowledge and actual knowledge was determined using Spearman's rank order correlation. Pre and post study perceived and actual knowledge were statistically significant with the following values:  $r_s = 0.463$ ; *P* = 0.03 and  $r_s = 0.612$ ; *P* = 0.002, respectively.

**Discussion:**

The video and low-fidelity simulation were effective in increasing the mean perceived knowledge scores from 2.68 to 3.43 as well as the mean actual knowledge scores from 7.73 to 10.77. The video and low-fidelity simulation were also effective for increasing confidence in PA catheter insertion as evidenced by mean confidence scores increasing from 1.36 to 3.09 All of the SRNAs agreed that the hands-on simulation increased their confidence more than watching the video. This is consistent with what has been seen outside of healthcare for decades and is currently gaining momentum and is a focus of research within the healthcare community. SRNAs who thought they had more knowledge about the indications, contraindications, steps, and complications of PA catheter insertion scored better on the KAT.

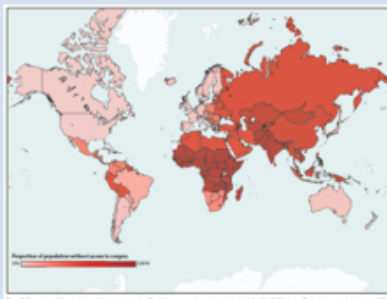
**Conclusions:**

The decline of PA catheter use due to the development of other noninvasive techniques has caused a decrease in teaching opportunities for actual placement. The findings of this study suggest watching an educational video and participating in a hands-on simulation can significantly increase both knowledge and confidence of those learning the skill of PA catheter insertion. Due to the positive results demonstrated in this study, the methodology used could be applied for teaching other anesthesia procedures.



### Background:

There is a lack of surgical and anesthesia services in low-income and middle-income countries (LMICs) which creates an increased burden of disease from otherwise surgically treatable conditions. Nurse anesthesia trainees (NATs) can serve to fill this lack of anesthesia services while also gaining real life experience that can enhance their training.



- Limited studies on CRNAs/NATs volunteering in LMICs
  - More focus on surgical services
  - Pieczynski et al. (2013) focused on anesthesiologists/residents
- CRNAs/NATs may have similar experiences/barriers identified
  - But different background and training...

### Study aim:

The purpose of this study was to identify common experiences and barriers among NATs that have volunteered on a surgical brigade in Honduras.

### Method:

A retrospective thematic analysis of 23 written reflections of NATs who participated in a one-week volunteer surgical brigade to Honduras, from 2012-2017, was done to identify common experiences and barriers of NATs volunteering in Honduras.

### Results:

#### • Preparation

- Review regional anesthesia
- Review older anesthesia machines
- Talked to previous volunteers
  - Gain perspective
  - Set expectations

"The major thing I did in preparation was to review various peripheral nerve blockade techniques and expected anatomical structures, as I was pretty sure that I would be doing more blocks in this one week than I had previously done in my entire career up to this point."

"In the months leading up to the brigade, I spoke with several former ... students that participated in past brigades regarding what to expect at the surgery center."

#### • Prior Strengths and Experiences

- Clinical experience
- Flexible attitude
- Compassion
- Previous missions experience (proper expectations)

"The strengths I personally brought on this mission include my 18 months of clinical experience as a SRNA, my previous seven years of ICU experience, my flexibility and adaptability from experience working as an agency RN at numerous hospitals, and my passion of caring for others."

#### • Perspective of Healthcare Access

- Changed perspective on access to healthcare in LMICs
- New appreciation for healthcare access in US

"Working in an underprivileged country I quickly recognized how much we take for granted in the U.S., specifically pertaining to medical care that is easily accessible and more advanced compared to other countries. Several patients I encountered had to travel several hours to get to the surgery center. One gentleman walked two hours from the mountains in order to take a bus another two hours to have hand surgery. This made me realize how fortunate we are to have a hospital in close proximity as well as ease of transportation. Another patient that made an impact on me had traveled with two volunteers from Belize by boat, rented a car, spent the night in Tegucigalpa, drove another hour to the surgery center to undergo a 30-minute surgery to have pins removed from his arm that were causing him pain."

#### • Challenges

- Language barrier
- Working with unfamiliar equipment and OR environment
  - Often acknowledged as a learning experience
- Working long hours

#### • Changed Personal View

- Increased desire to volunteer/give in future
- Increased awareness of waste in US healthcare

"After my experience in Honduras I will continue to look for opportunities to help those less fortunate than myself, whether through volunteering my time or eventually sponsoring a child abroad. My experience with September's brigade also opened my eyes to the great need for anesthesia providers across similar medical missions."

"I learned to utilize what was available to me, minimize waste and maximize resources. I see how many extra supplies are used in the U.S. that is not necessarily needed to deliver safe and effective anesthesia. I am glad I could experience anesthesia in this way and will continue to incorporate this in my practice."

#### • Increased Competence in Anesthesia Practice

- Increased knowledge and skills in regional anesthesia
- Increased confidence and competence in personal practice

"As a result of the surgical brigade I feel like my confidence and competence in providing anesthesia has grown a lot. I feel like this experience forced me out of my comfort zone, and as a result it made me grow professionally in ways I never would have otherwise."

#### • Positive Experience

- "Rewarding"
- "Gratifying"
- "Life changing"

"Upon returning home I see more clearly just how fortunate I am. One piece of advice I would give a student preparing for a mission trip would be to keep an open mind, take in the environment, and immerse themselves in the experience. This was a really amazing experience and I am so grateful to have had the opportunity to participate in the brigade."

#### • Advice to Others

"Keep an open mind"

#### References:

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### Discussion:

NATs volunteering in Honduras experienced positive benefits while also providing valuable anesthesia services to a community in need. Other nurse anesthesia programs can implement similar volunteer surgical brigade experiences by increasing involvement of NAT volunteers and providing education on the positive benefits of volunteerism in LMICs.

### Recommendations:

Since volunteering is beneficial to NATs, further research is warranted on how nurse anesthesia programs may offer volunteer surgical brigade experiences to NATs within the time constraints of their program of study.

Nurse anesthesia programs that provide a volunteer surgical brigade experience could be surveyed for potential barriers or successes to implementing a NAT volunteer surgical brigade program.

Nurse anesthesia programs should also pursue additional sources of funding to cover NAT expenses and increase NAT participation.

The Council of Accreditation of Nurse Anesthesia Educational Programs (COA) does not recognize NAT experiences in LMICs as counting towards mandatory clinical experiences. Further research by the COA is warranted to support the approval or disapproval of supervised clinical experiences in LMICs. A change in COA requirements may support the development of more NAT volunteer surgical brigade programs by removing a perceived barrier of lost clinical time.

Further education of benefits of volunteerism for NATs.

### Conclusion:

There is a severe lack of surgical and anesthesia services to LMICs. CRNAs and NATs can assist with the provision of anesthesia services through multiple routes, especially by serving directly on surgical brigades. This study shows that NATs that have volunteered in Honduras have an increased knowledge of the limited access to healthcare that exists in LMICs, experience personal growth, and report increased competency in anesthesia skills and knowledge content. Volunteer NATs experienced common challenges consisting of dealing with a language barrier and working with unfamiliar equipment and operating room environments. These challenges are often identified as personal learning and growth opportunities, but also aid in recognizing areas where volunteer organizations can promote NATs involvement on surgical brigades. The positive benefits experienced by NAT volunteerism during their training should promote further research and development of similar surgical volunteer brigades for NATs to participate in.

### Acknowledgement:

Thank you to DNP committee:

- Chair: Bernadette T. Roche, EDD, APRN, CRNA
- Member: Pamela S. Schwartz, DNP, CRNA



# Peer Mentorship: Reported Outcomes Among Student Registered Nurse Anesthetists Enrolled in the DNP Program



Champaign Conner BSN, RN & Aja Rivera BSN, RN



## Abstract

**Background:** Student Registered Nurse Anesthetist (SRNAs) experience high levels of stress and anxiety while enrolled in a demanding nurse anesthesia program; a peer mentorship program fosters an encouraging support system for SRNAs.

**Purpose:** The purpose of this project was to evaluate if a peer mentorship program was effective at diminishing stress & anxiety, social isolation, enhancing preparedness amongst the first and second-year SRNAs, and to evaluate the perceived effectiveness of mentorship amongst students enrolled in the NorthShore University HealthSystem School of Nurse Anesthesia (NSUHS SONA).

**Methods:** This quantitative, descriptive, cross-sectional study design involved three cohorts of SRNAs. Participants communicated through personal interaction and Facebook discussion posts. They completed a post-participation survey with Likert-scale responses to evaluate the program's outcome on stress and anxiety, social isolation, preparedness for didactic and clinical rotations, and the perceived effectiveness of mentorship.

**Results:** The post-participation survey reported the following range of mean scores for each construct: stress and anxiety (M= 1.71-2.43), emotional support (M =1.14 -1.86), preparedness (M =1.86-2.50), and mentorship evaluation (M= 2.00-3.42). Lower mean scores were a positive reflection on the intended goals of the peer mentorship program. Overall, the participants in this mentorship program reported that the peer mentorship program should be continued at NSUHS SONA.

**Conclusion:** Mentorship is beneficial to SRNAs enrolled at NSUHS SONA. A well-structured and well-planned mentorship program should be integrated into the curriculum at NSUHS SONA.

## Background

- Admission to a nurse anesthesia program is a highly competitive and rigorous process.
- SRNAs have an increase in life stressors
  - loss of income,
  - information overload in courses,
  - lack of time for one's self and family,
  - and the ultimate goal of meeting self-expectations (Griffin, Yancy, & Dudley, 2017).
- These stressors can seriously impact the well-being of student registered nurse anesthetists (SRNAs).
- Strategies are needed to help manage the stress and maintain the well-being of the SRNA.
- The authors observed from personal experience the benefits of establishing a relationship with upperclassmen in the nurse anesthesia program.
- Benefits of establishing a peer mentorship program include:
  - provides a sense of security,
  - acts as a professional resource,
  - assists with strategies to boost academic performance,
  - supports mental health and well-being (Lombardo, Wong, Sanzone, Filion, & Tsimicalis, 2017).

## Objective

The purpose of this project was to evaluate if a peer mentorship program can be effective at diminishing stress and anxiety, social isolation, and enhancing preparedness amongst SRNAs in the NorthShore University HealthSystem School of Nurse Anesthesia.

## Methods

### DESIGN

A quantitative, descriptive, cross-sectional study design with three cohorts was implemented utilizing SRNAs enrolled at NSUHS SONA.

### SAMPLE

Voluntary convenience sample that consisted of eleven third-year SRNAs (n=11), seven second-year SRNAs (n=7), and three first-year SRNAs (n=3)

### INSTRUMENTS

- The study was evaluated with a post-participation peer mentorship evaluation survey
- Facebook was used as the social media platform to post discussion questions and allow participant engagement

### RECRUITMENT

- Recruitment was done by email.

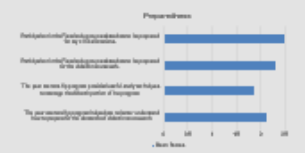
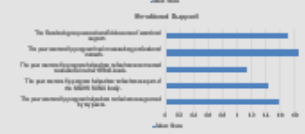
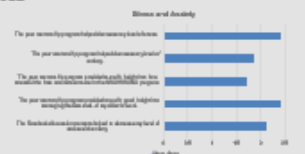
### IMPLEMENTATION

- This study attempted to make mentor-mentee matches more meaningful by pairing SRNAs together that have similar lifestyle factors (children, relocation for school, marital status, etc.)
- A list of matches was made from the demographics survey and then posted on the Facebook group.
- It was up to the individual students to determine the mode, scope, and frequency of communication.
- Third-year SRNAs functioned in the role of the mentor to second and first-year SRNAs.
- Second-year SRNAs functioned as a mentor to first-year SRNAs and a mentee to a third-year SRNA
- First-year SRNAs functioned in the role of mentee only.
- Evaluated if mentorship was perceived as effective by mentors through the mentorship evaluation section of the survey.

### EVALUATION

- At the end of the study (13 weeks), participants completed an online Peer Mentorship Evaluation Survey that was distributed via email through Qualtrics.

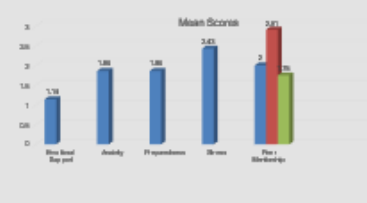
## Results



Group	Peer Mentorship Evaluation	Mean	Std. Deviation	Min.	Max.
Year 1 SRNAs	3	2.00	1.50	1	3
Year 2 SRNAs	7	2.42	1.50	1	3
Year 3 SRNAs	11	2.50	1.50	1	3

- Emotional support- was the construct with the lowest mean scores (1.14) of all constructs

- Mentor evaluation mean scores were higher among the SRNA 2 group- implying that the SRNA 3 group found this peer mentorship program more beneficial.



## Discussion

- The peer mentorship program yielded positive results based on the feedback from participants
- There are some improvements that should be made in the future so that participants can have an improved experience in the perceived reduction in stress and anxiety
- Based on the known fact that the life of an SRNA is always stressful despite having a mentor, this could be one area that would be difficult to adequately evaluate.
- Mentor and mentees interactions were not assessed in this study, which brings a recommendation to do so in future studies
- The peer mentorship program was able to serve as a functional coping mechanism by providing emotional support to the participants
- Mean scores in the *mentorship* construct revealed that participants perceived mentorship as both valued and useful to mentees.

## Implications for Nursing/ Recommendations

- Continuing this program at NSUHS SONA
- Program integrated into the curriculum with faculty support and participation
- Program could start from the time of matriculation and be continued until graduation
- Incorporate Certified Registered Nurse Anesthetists (CRNAs) as mentors into the program
- Use other social media platforms

## Conclusion

- Peer mentorship can be a valuable tool that can be utilized during all phases of the nurse anesthesia program
- A support person can serve as an indispensable tool to help improve the mental wellness of the SRNAs
- The continuation and expansion of the peer mentorship program at NSUHS SONA is beneficial for participating SRNAs
- The peer mentorship program proves to be a positive coping strategy to assist with a positive and successful progression through the nurse anesthesia program

## Acknowledgements

- CITI Training completed by both researchers
- IRB Approval: Approved by NorthShore IRB
- Institutional Review Board Authorization Agreement (IAA) form completed for DePaul University

## Background:

- Healthcare workers are inundated with patient-monitoring alarms every minute.
- 80-95% of these alarms do not result in provider intervention.
- False alarms cause “cry-wolf” phenomenon among providers.
- Responsiveness to alarms dangerously inconsistent due to desensitization.
- Anesthesia providers neglecting alarms or misusing alarms by silencing or shutting them off.
- Alarm fatigue and alarm mismanagement pose threat to patient safety and provider satisfaction.

## Objectives:

- To assess anesthesia providers’ perceptions of their alarm fatigue experience and interactions with alarms and monitors.
- To explore associations between sociodemographic factors and the various perceptions of alarm fatigue experience among anesthesia providers.

## Methodology:

- Anonymous online survey consisting of a 20-item Likert-scale questionnaire related to alarm management practice and alarm fatigue administered to all NorthShore University HealthSystem anesthesia providers.

## Results:

- Respondents consistently recognized alarm management as their responsibility and acknowledged false alarms and alarm fatigue as relevant to anesthesia practice.
- Anesthesia trainees and providers with less total years in practice exhibit higher levels of alarm fatigue and associated provider distress.

Set	Type	Questionnaire Item	Mean	SD
Subset 1 (reliability=0.714)	ASO	1. I routinely check functionality of monitors and equipment before a case.	3.35	.724
	ASO	2. It is my role and responsibility to check anesthesia alarm settings.	3.53	.563
	ASO	3. It is my responsibility to ensure alarms are audible at all times.	<b>3.69*</b>	.499
	ASO	4. I routinely place physiological electrodes and equipment uniquely for each patient/case to reduce interference or artifact.	3.32	.638
Subset 2 (reliability=0.147)	AF	5. I am sensitive to alarms and respond quickly.	3.41	.699
	CAP	6. Properly setting alarm thresholds is overly complex on existing devices.	<b>2.33*</b>	.589
	AI	7. There have been frequent instances where alarms could not be heard and were missed.	<b>2.27*</b>	.618
	AI	8. Background noise frequently interferes with alarm recognition.	2.74	.751
Subset 3 (reliability=0.802)	AI	9. Alarm tones properly represent the priority of the issue signaled by the alarm.*	2.68	.589
	AI	10. It would be helpful for critical alarms to also display a red banner on Epic.	<b>2.82*</b>	.797
	AF	11. When multiple devices are used with a patient, it can be confusing to determine which device is in alarm condition.	2.59	.743
	AF	12. False alarms disrupt patient care.	2.77	.554
Subset 4 (reliability=0.222)	AF	13. Nuisance alarms occur frequently.	<b>2.94*</b>	.689
	AF	14. I experience alarm fatigue from frequent false and/or non-actionable alarms.	2.77	.654
	AF	15. Frequent alarms cause me increased stress as the anesthesia provider.	<b>2.71*</b>	.629
	AF	16. Nuisance alarms reduce trust in alarms and cause anesthesia providers to inappropriately turn alarms off.	2.88	.640
CAP	CAP	17. I set unique alarm thresholds for my patient's unique conditions at the beginning of the case.*	2.38	.697
	CAP	18. I turn off alarms that I am not using at the beginning of the case.*	<b>1.79*</b>	.729
	CAP	19. I adjust alarm thresholds throughout the case to reduce the number of non-actionable alarms*	2.71	.676
	CAP	20. I widen alarm thresholds significantly, disabling the alarm from sounding.*	<b>3.89*</b>	.621

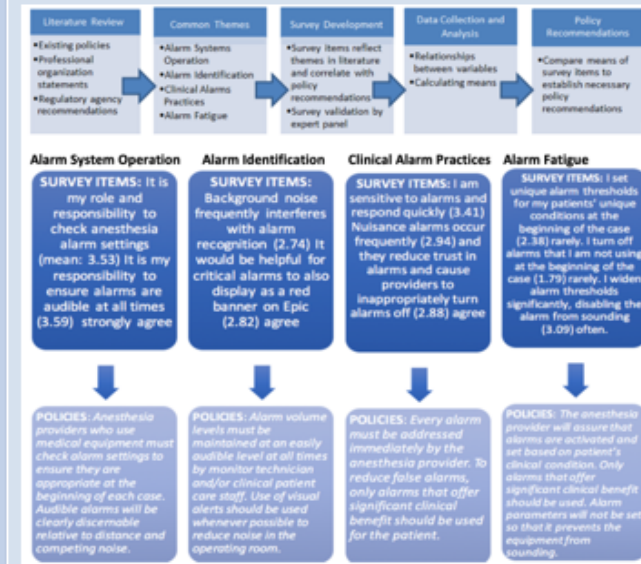
\*Items not included in data analysis. †Highest mean score for each subset ‡Lowest mean score for each subset  
ASO: Alarm System Operation AI: Alarm Identification AF: Alarm Fatigue CAP: Clinical Alarm Practices

## Discussion:

- ASA recommends every operating facility have alarm management policy specific to anesthesia equipment and monitors.
- Deleterious effects of excessive noise in the O.R. more frequently contributes to alarm fatigue in new, vulnerable providers already anxious in the stressful O.R. environment.
- Attention to alarm fatigue in anesthesia practice is warranted to improve provider relationship with alarms, monitors and patient safety.

## Conclusions:

- To improve interactions with monitors and alarms and minimize alarm fatigue among providers and its burden on patient safety, the researchers developed policies and procedures for managing patient monitoring alarms.
- The researchers’ policy recommendations focus on the assessed needs of the NSUHS Anesthesia Department with emphasis on equipment, device alarms, and telemetry alarms as well as the responsibility for alarm maintenance and management.



# Cost Differences Between Sugammadex and Neostigmine Use in Non-Operating Room Anesthesia Care

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## BACKGROUND

- Before the introduction of sugammadex, the only options to reverse rocuronium-induced neuromuscular blockade (NMB) were cholinesterase inhibitors (i.e., neostigmine) and anticholinergics (i.e., glycopyrrolate)
- Sugammadex administration has been shown to provide a more effective and complete reversal of rocuronium
  - The higher cost of sugammadex has been cited as a limiting factor to its use
- The medication costs of sugammadex and neostigmine with glycopyrrolate have been studied in the operating room setting. There is a lack of information regarding the usage and medication costs of sugammadex and neostigmine with glycopyrrolate for non-operating room anesthesia care (NORA).

## SIGNIFICANCE

- Sugammadex has been an alternative to the traditional NMB reversal since its FDA approval in 2016
  - Better safety profile
  - Significantly lower risk of respiratory and cardiac adverse events
  - Lower risk of post-operative weakness (Carron, Zarantonello, Tellaroli, & Ori, 2016)
  - Decrease recovery time in operating room (Cammu, 2018)
  - High-cost limits its use (Carron et al., 2016)
- Increase risks related to NORA procedures
  - Higher incidence of preventable mortality and adverse events (Carron et al., 2016)

## PURPOSE

- To examine the cost associated with the administration of neostigmine with glycopyrrolate versus sugammadex for NORA locations
  - NORA locations include:
    - Cardiac catheterization laboratory
    - Gastrointestinal laboratory
    - Magnetic resonance imaging room
    - Computed tomography room
    - Interventional radiology
    - Obstetrics unit
    - Electrophysiology laboratory

## METHODS

- Retrospective chart review was conducted over a 12-month period at NorthShore University HealthSystem using their electronic medical record, Epic
- Usage and cost associated with the administration of sugammadex, neostigmine, for anesthesia in NORA locations was analyzed
- This study consisted of 528 patient charts that fulfilled the inclusion criteria
- The following information was collected
  - Dosage of the NMB reversal agent
  - Age
  - Weight
  - Body mass index (BMI)
  - American Society of Anesthesiologist physical status (ASA PS) classification
  - NORA location

## RESULTS

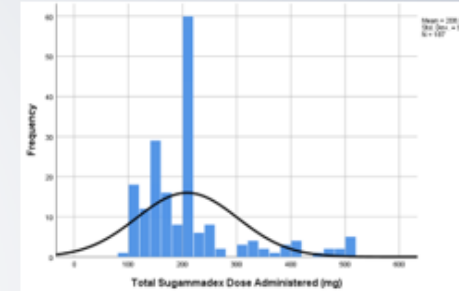
- Sugammadex was administered to 187 patients as NMB reversal agent
- Average ASA score was  $2.76 \pm 0.028$
- Mean weight was found to be  $85.15 \pm 1.00$  kg
- Mean BMI was  $28.68 \pm 0.27$  kg/m<sup>2</sup>
- There was a non-normal distribution of dose of sugammadex administered with a large number of patients receiving 200 mg of sugammadex
- Correlational data analysis revealed that there was a weak positive correlation between ASA physical status and use of sugammadex (Spearman's  $\rho = 0.0117$ ;  $p = 0.007$ )
- Statistically significant difference in the administration between NORA departments, notably in the electrophysiology laboratory ( $p = 0.000$ )
- No statistically significant correlation noted between age category, BMI category, and weight category compared to administration of sugammadex using Spearman's test.
- Pearson Chi-square analysis was performed and found that there was a statistically significant difference in the administration of sugammadex within NORA departments ( $p = 0.000$ ,  $\alpha = 0.05$ )
  - There was an evident preference in the choice of sugammadex in the electrophysiology lab
- Based on 2018 prices, these three medications used in NORA locations accounted for \$51,128.82. Based on 2019 prices with neostigmine and glycopyrrolate listed with a price range, the cost of the three medications ranged from \$33,466.41 to \$48,683.81. There was a notable drop in the price of neostigmine and a slight increase in the price of sugammadex in 2019
- Due to the fluctuating prices, wide price ranges of neostigmine and glycopyrrolate, and varying acquisition costs for healthcare facilities of the three medications, it is difficult to determine whether sugammadex or neostigmine and glycopyrrolate would have been more cost-effective as a NMB reversal agent in NORA locations

## CONCLUSION

There was a slight correlation between the use of sugammadex and ASA physical status classification. EP lab was the only department where sugammadex was administered more frequently than neostigmine. Cost-analysis could not be performed to determine if the choice of NMB reversal agent would lead to cost savings. The inability to perform cost-analysis was due to the constant fluctuating costs of sugammadex, neostigmine, and glycopyrrolate and a large range of acquisition costs of these medications. A potential explanation of the frequency of neostigmine and sugammadex use observed in this study may be due to the anesthesia provider preference of NMB reversal agent.

## Data Analysis

### Frequency of Sugammadex Dose



### Sugammadex usage within various NORA departments

	Cardiac catheterization lab	DEPARTMENT				Total
		GI lab	IR	EP	Electrophysiology lab	
Received sugammadex	182	47	24	59	27	339
Yes	59	41	14	32	41	187
Total	241	88	38	91	68	526

## NURSING IMPLICATIONS

- Nagrebetsky, Gabriel, Dutton, and Urman (2017) also found that the average age of NORA patients has increased, in addition to a greater number of patients with ASA PS classifications of III to IV in NORA locations compared to the OR.
- Patients in a NORA compared to anesthesia care in the traditional OR setting had a higher incidence of mortality and adverse events, which often were preventable.
- Despite the higher cost of sugammadex, the benefits of decreased recovery time in the operating room, quicker discharge to the recovery units, and decreased complications related to postoperative residual curarization may justify and offset medication cost differences (Cammu, 2018).

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