



***NorthShore University HealthSystem
School of Nurse Anesthesia
&
DePaul University School of Nursing
Class of 2018
DNP Poster Presentations***

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Background and Significance:

- There is a growing body of research aimed at identifying, intervening, and treating SUD in professionals while aiding with their reentry into practice.
- Little to no research on identifying SUD in students and thus no developed model to assist SRNAs who wish to reenter their academic programs after they overcome SUD.
- The purpose of this research project is to examine existing professional SUD mentorship policies, and highlight the need for a comprehensive policy for SRNAs with SUD who desire to complete or reenter their academic program.

Research Question:

- Are comprehensive policies in place for SRNAs in Illinois with SUD to provide a structured reentry into an academic program?

Methodology:

- George L. Engel’s Biopsychosocial Theory
- Descriptive, qualitative design
- Qualitative interview method utilizing snowball sampling

Results:

Eleven common themes were identified among those interviewed:

- *Existent and Non-existent SUD policies*
- *Inconsistent methods on how to access a policy*
- *Variability in the components of SUD policies*
- *Difficulty in determining SUD among SRNAs*
- *Difficulty in confronting an individual*
- *Effectiveness of components of SUD policies are equivocal*

- *Ineffective components of a policy*
- *Knowing a person with SUD is not uncommon*
- *Variable amount of time needed for SUD treatment*
- *Differing opinions for the need for a student specific SUD policy*
- *Reasons for need*

Discussion:

Alignment of the identified themes with suggestions for SUD reentry made by the American Association of Nurse Anesthetists, the American Nurses Association, and the model substance abuse policy for anesthesia developed by Roche were performed.

Alignment of identified themes, recommendations, and policy components was used to create comprehensive reentry policy for SRNA’s with SUD.

Policy Template:

The policy is adapted with permission from the model substance abuse policy for anesthesia developed by Roche (2007).

- 1) The (name of school/institution that SRNA is part of) will provide mandatory education on SUD in SRNAs. Education should include information on how to access the SUD policy for SRNAs.
- 2) If an SRNA of suspected of or exhibiting signs of SUD, the (name of school/institution that SRNA is part of) has a procedure for the intervention, referral for assessment and treatment, and monitored reentry of an SRNA with SUD.
- 3) The (name of school/institution that SRNA is part of) is responsible for identifying SRNAs with deteriorating clinical performance, behavioral changes, and excessive absenteeism but is not responsible for diagnosing the nature of the problem.

- 4) Upon identification of SUD in an SRNA the (name of school/institution that SRNA is part of) must develop an intervention team to confront the SRNA. The intervention team should include the person who initially identified the SRNA in question, a faculty member of (name of school/institution that SRNA is part of), a close family member or friend of the SRNA, and a professional who can assist the SRNA in beginning treatment.
- 5) Self-referral will be encouraged and a SRNA position in the (name of school/institution that SRNA is part of) will not be jeopardized by a voluntary request for assistance with SUD. The (name of school/institution that SRNA is part of) must be notified if the individual enters treatment.
- 6) A leave of absence will be granted for assessment, and/or treatment.
- 7) The cost of assessment, treatment, and recovery programs is the responsibility of the SRNA. However, if the SRNA is unable to finance their treatment, (name of school/institution that SRNA is part of) will aid with identification of possible sources of financial support.
- 8) Prior to reentry of an SRNA to (name of school/institution that SRNA is part of), a reentry plan will be developed. The reentry plan will detail when the SRNA will reenter (name of school/institution that SRNA is part of), when the SRNA will start or resume their clinical rotations, who will act as a faculty mentor, what resources are available at (name of school/institution that SRNA is part of), measures that will be taken to bridge the SRNA into professional practice, any additional educational requirement, and expected date of graduation.
- 9) Mentoring for the SRNA with SUD should be required by (name of school/institution that SRNA is part of) throughout their enrollment as a student and up to graduation.

- 10) Confidentiality is essential. No information regarding a SRNA participation in drug testing, intervention, assessment, or treatment will be documented in the SRNAs academic file. A separate, confidential file will be maintained by the (director of the school or institution/designee) and will be available for review by the individual SRNA at any time.
- 11) The written consent of the SRNA will be required for disclosure of any information related to their assessment, intervention, or treatment for SUD.
- 12) Violations of this policy constitute professional misconduct and are subject to disciplinary action including suspension or dismissal from (name of school/institution that SRNA is part of), or conditional reentry following treatment.
- 13) SRNAs have the right to due process and may appeal any decision that adversely affects their student/practice status to the (grievance/problem resolution committee.)

Implications for Nursing:

- May be used with intent to expand the literature on the topic of SUD in SRNAs.
- Policy can be used as basis for plan of action aimed at assisting an SRNA with SUD who desires to reenter their academic program and successfully transition into a professional role
- Tool for academic anesthesia programs that lack an SUD reentry policy specific to SRNA’s or has no SUD reentry policy in place.

Conclusion:

All institutions that educate and utilize SRNAs should have a comprehensive reentry policy in place for SRNAs with SUD, that includes SRNA reentry to their educational program.

A Malignant Hyperthermia Competency Training for Nurse Anesthesia

Trainees: Development, Implementation, and Evaluation

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Introduction

- Video simulation is an alternative method of teaching that can play an important role in nurse anesthesia education.
- MH can be triggered by frequently used anesthetic gases such as **sevoflurane, desflurane, and isoflurane** and also a frequently used short acting muscle relaxant called **succinylcholine**
- Symptoms of MH crisis include increased blood carbon dioxide level, muscle spasms or rigidity, increased respirations, increased heart rate, and increased temperature. It also causes severe electrolyte shifts causing blood potassium levels to be extremely high and the blood to become acidotic
- This crisis can be difficult to recognize and manage without proper training. It is a time sensitive and critical situation that must be recognized and managed properly to ensure patient survival.

Clinical Question

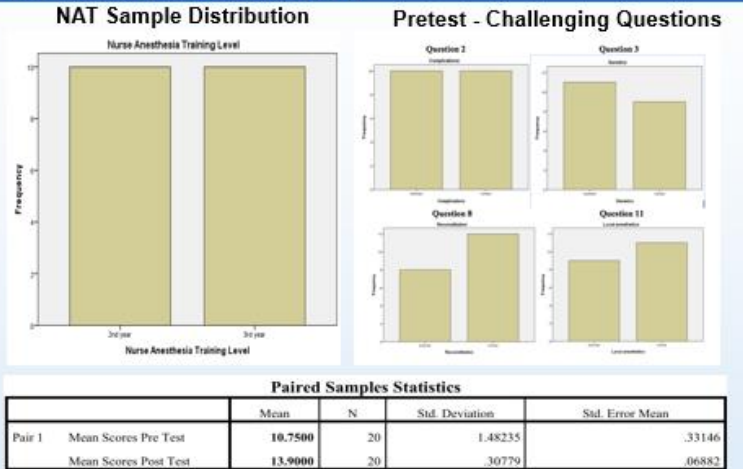
- Does viewing an instructional video on management of a MH crisis improve knowledge of 2nd and 3rd year nurse anesthesia trainees (NATs)?

Methods

- A **single group pretest-posttest design** was used to determine the effectiveness of video simulation on improving knowledge of junior and senior NATs at NorthShore University HealthSystem School of Nurse Anesthesia
- **Three phases:** (1) development of the simulation video, (2) development of the pre-test and post-test, and (3) evaluation of the video simulation on NAT knowledge via the pre-test and post-test.
- **Sample** – convenience sample of Junior and Senior NATs at NorthShore University HealthSystem School of Nurse Anesthesia

MH Learning Session

- **Pretest** -The first page of the pre-test was a face sheet that identified whether the participant is a junior or senior NAT. This was completed, followed by the pretest to determine baseline knowledge regarding MH recognition and management. The pretest and posttest were the same for consistency in comparing data.
- **MH Simulation Video** – 10 minute educational simulation video demonstrating the proper management of MH.
- **Posttest** - After the video was completed, the post-test was given to the NATs to complete.
- The pretest and posttest results were compared to determine if there was significant knowledge gained after viewing the educational video simulation.



Results

- N = 20 Nurse Anesthesia Trainees
- **10 Junior NATs**
- **10 Senior NATs**
- Average pretest score including both junior and senior NATs was $M=10.75$ ($SD=1.48235$)
- The average score on the posttest was $M=13.9$ ($SD= .30779$)
- The overall NAT pretest score on average **improved by 3.15 points** (95% confidence interval, 3.799, 2.501) after viewing the video simulation
- **The paired t-test showed statistically significant improvement** between pretest and posttest scores with a p value of 0.00 on the two-tailed paired t-test
- The most frequently missed questions on the pretest were questions 2, 3, 8, and 11 - these questions had at least 40% of participants answered incorrectly on the pretest

Conclusion

- The use of technology is useful in enhancing traditional learning methods.
- The findings of this study show that viewing a video simulation on the proper management of malignant hyperthermia increased knowledge in both second and third year nurse anesthesia trainees.
- The results of this anesthesia crisis study were consistent with previous literature that demonstrated the positive effects of video simulation in medical and nursing education.
- The strong results of this pilot study conclude that there is a significant role for video simulation in the curriculum of nurse anesthesia programs.
- Further research is needed to explore this new and exciting educational strategy.



Photos from the simulation video shown to the NATs between the pretest and posttest

Discussion

- The results show NATs that participated in the study gained knowledge regarding the management and treatment of MH.
- NATs improved their scores after viewing the video simulation. The seniors scored slightly higher on the pretest (11.5), than the juniors (10), suggesting that some advanced clinical experience provided them with a slight advantage going into the study.
- Levene's Test for Equality of Variances showed statistically significant variances for questions 7, 12, and 13. This could help educators in the future identify knowledge gaps for the junior NATs.

Future Research

- Larger studies involving recognition and treatment of various crisis using video simulation as a learning tool for NATs

Background and Significance:

- Smartphones, computer tablets, and other forms of personal electronic devices (PEDs) have become ubiquitous in medicine.
- Despite arguments for and against PED use in the operating room there are no concrete statements regarding their use from major medical associations in the face of increased PED use.
- The purpose of this research project is to examine existing PED use policies by top-rated, as well as local healthcare institutions.

Research Questions:

- Among hospitals examined, what institutional policies are in place regarding PED use in the OR?
- What are the common themes in these policies?
- How do the policies define PEDs?

Methodology:

- Culture of Safety Concept
- Originated from Institute of Medicine's "To Err Is Human Report" of 1999
- Examined US News and World Reports Top 20 Honor Roll Hospitals and Chicago area hospitals

Results:

Institution demographics			Statistics						
	Level 1 Trauma Center	Number of Beds	Top 20 Honor Roll Distinction	Chicago Area	Type of Institution	University Affiliation	Teaching Hospital	Location	
N	Valid 10	9	10	10	10	10	10	10	
	Missing 0	1	0	0	0	0	0	0	
Mean	.90	698.22	.30	.80	1.90	.50	.50	1.40	
Median	1.00	749.00	.00	1.00	2.00	.50	.50	1.00	
Std. Deviation	.316	304.145	.463	.422	.316	.527	.527	.516	
Range	1	879	1	1	1	1	1	1	
Minimum	0	288	0	0	1	0	0	1	
Maximum	1	1187	1	1	2	1	1	2	

Six themes were identified and examined:

- *Definitions of PEDs*
- Highly variable among institutions
- Defined either by type of PED or by function
- *Acceptable Use of PEDs*
- 70% of institutions have some language of acceptable use
- Stringent criteria as to type of use
- *Anesthesia or OR Specific Use of PEDs*
- 20% addressed specific use
- Enhancing patient care key criteria
- *Data Security, Safety, and Confidentiality*
- Top priority concern among 50% of institutions
- Recording of patient data or loss of secure data source of concern
- *Negative Impact of PED Use*
- Did not overshadow positive impact
- Distraction and consequences cited
- *Social Media Usage*
- Cross-linked with breach of confidentiality
- Protection of institutional proprietary data cited

Discussion:

Despite policies focused on the same subject, there was little homogeneous language found among the policies. The most consistency found was inconsistency.

Further thematic analysis of policies brought this out in greater detail.

- 1) *Definitions of PEDs*
Some defined in generic terms (cell phone, smart phone, tablet) while others used named brand devices (iPhone, iPad) demonstrating major corporate influence in medical policy making. Listing devices as to their function, is an attempt to shield institutions from liability.
- 2) *Acceptable Use of PEDs*
"Assisting and improving patient care" was the strongest endorsement of PED use. The same policy went on to cite "anesthesia-specific applications and electronic textbooks" as acceptable use.
- 3) *Anesthesia or OR Specific Use of PEDs*
This dovetailed with the Acceptable Use theme. The institutions permitting PED use where also the institutions with most specific criteria on how that use should occur.
- 4) *Data Security, Safety, and Confidentiality*
This sought to specify not only patient information, but information that may jeopardize the financial status of the institution. "The Department has an interest to ensure the integrity of proprietary information; preserve the privacy of employees and patients, and ensure that unauthorized surveillance does not breach the reasonable expectations of privacy in the workplace"
- 5) *Negative Impact of PED Use*
While "distraction" was the most used term with regards to negative impact of PED use, it was also cited by institutions who permit PED use, signaling the nuance needed in the language of such policies.
- 6) *Social Media Usage*
Policy regarding social media usage mostly aimed at protecting institutional liability. It should be noted that the policies were crafted prior to concerns of data collection by social media entities.

Discussion (cont.):

- When recruiting institutions to share their policies, it was discovered that many do not have a formal policy on the topic.
- The language for such policy formation may be ambiguous and vague presently.
- McBride (2015) found that the literature on the subject lacked clear definition of distraction as it relates to PEDs and presented a significant barrier to further research on the subject.
- This ambiguous language related to this form of distraction directly contributes to the lack of formal policies (McBride, 2015). As a result, policies that do exist often vary greatly from one institution to the next.

Implications for Nursing:

- Regardless of the policy an institution may have in place, it is clear that anesthesia providers are utilizing PEDs in their practice.
- While there are some studies that survey the use of PEDs within a hospital system, there is little knowledge as to the what the broad picture of PED use looks like.
- This also contributes to the quality of statements on PED use made by governing bodies and associations. Most statements made are vague at best.

Conclusion:

Wide variability was found in policies regarding PED use, from how institutions acknowledged their use, the degree in which their use was allowed, as well as how institutions described PEDs. It is evident that further research should focus on how PEDs are actually used day-to-day, and how this use is aligns or conflicts with existing policies. Only by assessing the current state of PED use, as a whole, may institutions and governing bodies be able to craft policy to best inform practice.

Background

- SRNAs experience multiple forms of stress on a daily basis
- Mentorship programs provide an encouraging environment that can help support a student during a stressful period
- Second-year SRNA's transition into clinical rotations is a known stressful time

Research Question

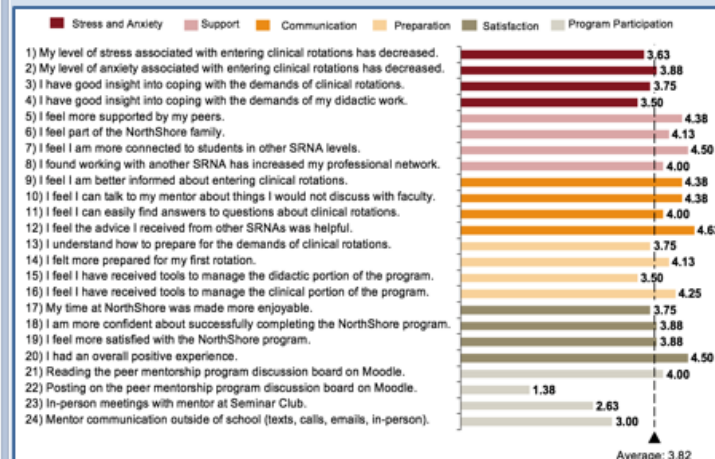
- Does participation in a NorthShore peer mentorship program effect a second-year SRNA's perceived level of *stress and anxiety, support, communication, preparation, and satisfaction* related to involvement in the anesthesia program?

Methodology

- Quantitative cohort study, piloted peer mentorship program
- Paired 8 second-year SRNA mentees with 10 third-year SRNA mentors
- In person meetings, online discussion, and alternative mutually agreed upon routes of communication for the matched peers to interact over 4 months
- Electronic survey with Likert-scaled statements to measure the program's effect on stress and anxiety, support, communication, preparation, and satisfaction as well as degree of program participation

Results

Subscale Mean Scores



- Overall highest rated *valid* statement: statement 7
 - the program increased second-year SRNA's feelings of connectedness to third-year SRNAs
- Overall lowest rated *valid* statements: statements 4 & 15
 - the only two statements to mention the didactic portion of the program - expected finding as the focus was the transition into clinical rotations

Descriptive Statistics

	Minimum	Maximum	Mean
Communication	16	19	17.39
Support *	15	20	17.00
Satisfaction	15	20	16.01
Preparation *	12	19	15.63
Stress and Anxiety *	10	18	14.75
Participation	8	14	11.01

- Support subscale: highest overall *valid* mean score
 - most positively influenced *valid* subscale
- Stress & anxiety subscale: lowest overall *valid* mean score
 - a weaker, positive impact

Reliability, Validity, and Internal Consistency

Cronbach's Alpha Coefficients

Stress and Anxiety *	0.864
Support *	0.771
Preparation *	0.714
Satisfaction	0.652
Communication	0.381
Participation	0.344

* subscales with score > 0.7 considered reliable and valid for internal consistency

Previous Research

- Results supported in literature
- Active support from fellow students reduced feelings of social isolation (Christiansen and Bell, 2010)
- Social support shown to increase self-efficacy & success for anesthesia students in stressful situations (Conner, 2015)

Nursing Implication

- Utilization of a peer mentorship program can help students and nurses through stressful transitions

Program Continuation

- Class of 2019 SRNAs continuing program

Conclusion

- Perceived level of support was most positively impacted by the peer mentorship program
- The peer mentorship program had an overall positive effect on participating second-year SRNAs as they transitioned into clinical rotations

Background:

According to the American Association of Nurse Anesthetists (AANA), patient safety is a concern raised by anesthesia professionals surrounding the use of Smartphones in the operating room. Another concern is the difficulty in assuring accurate clinical content and validity (AANA, 2015).

Anesthesia providers early in their careers as well as students of anesthesia readily depend on Smartphone technology to bridge gaps in knowledge while providing patient care (Lamarche et al., 2016). "The integration of mobile information technology into clinical practice can have meaningful advantages for clinicians and their patients" (AANA, 2015).

The current NorthShore University HealthSystems Employee Handbook is strictly restrictive of any Smartphone use in all patient care areas. Due to the restrictive verbiage of the employee handbook, it was important to assess workplace attitudes and beliefs regarding the use of Smartphones in the operating room in order to evaluate the appropriateness of the current policy. If necessary, it is important to establish policies that promote patient safety while allowing accessibility to educational technology.

Research Questions:

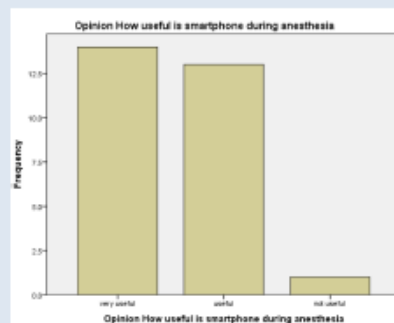
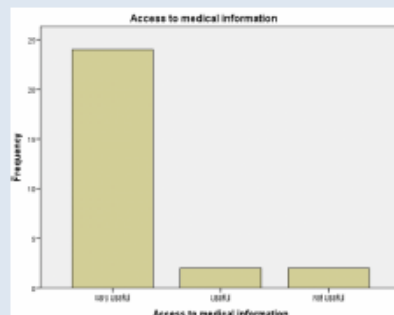
- What are the current attitudes and beliefs among anesthesia providers regarding use of Smartphones in the operating room?
- Is the current Employee Handbook policy regarding Smartphone use in the operating room concordant with anesthesia providers' beliefs and attitudes?

Methodology:

- Descriptive, cross-sectional survey design
- Target Population: Anesthesiologists, CRNA's, SRNA's, and anesthesia residents within the NSUHS organization

Results:

- 28 total respondents
- 50% of participants under the age of 40 years and 50% over the age of 41 years
- Anesthesiologists consisted of 28.6% of the participants, 32.1% were CRNA's and 39.3% were SRNA's
- None of the anesthesia residents responded to the survey
- 57.2% of participants have been in practice for less than 10 years, while 42.9% have been in practice for over 11 years
- Greatest use of Smartphones in the operating room: "medical apps" and a combination of "medical apps, writing/reading e-mail, and text messages"



Findings:

When asked whether there should be a restriction of Smartphone use in the operating room, 57.1% of participants responded "no." Our analysis showed that there were *no statistically significant correlations* between age, provider type, or number of years in practice and attitudes and perceptions of Smartphone use.

Significance and Future Implications:

The data demonstrates Smartphones are commonly utilized for productive work functions rather than unrelated tasks. Encouraging the proper use of Smartphone technology and embedding proper use in the department culture will facilitate realistic standards of use in the operating room. Data highlights the use of non-traditional educational tools used by students today as alternatives to clunky textbooks. It is beneficial for faculty and clinical instructors to evaluate the preparation of students before an anesthetic as well as their diligence to look up correct information intraoperatively. Learning about useful apps and their limitations are valuable ways to improve students' educational experience. Smartphone technology could lead to improved accessibility to information, especially in times that textbook references may not be available, as in the operating room.

Conclusion:

It is recommended that the current Smartphone policy be revised in order to reflect realistic practice standards regarding Smartphone technology in providing safe, high quality care. As the reliance on technology in operating rooms continues to progress, institutional policies and procedures must be made less restrictive in order allow access to educational technology that promotes a culture of safety and also protects providers in legal terms

Background or Introduction:

- There is evidence of music existing in medicine as far back as prehistoric Shamans usage of drums in healing rituals but was not a recognized specialty until the late 20th Century (Horden, 2000)
- Studies examining the use and effects of music in medicine were not widely conducted until the 1980s, but those studies have shown consistently positive results for patient outcomes.
- In modern medicine, music can be used in various ways such as creating music, dancing to music, or listening to music across many disciplines including physical therapy, occupational therapy, pain therapy, and stress and anxiety management.
- For most people, music is processed in the temporal lobe and auditory cortex with the modulation, or experience, processed in the right brain (Trangeberg and Stomberg, 2013).
- The right brain is also responsible for the modulation of production of endorphins, which may explain the reduction in pain experienced during music therapy (Trangeberg & Stomberg, 2013).

Research Question:

- Is music routinely included into nurse anesthesia programs as CAM for pain and anxiety, and if music is not included what barriers exist to implementation?

Methodology:

- Promoting Action on Research Implementation in Health Services (PARIHS) framework
- Quantitative anonymous survey sent via email

Descriptive Statistics

- SPSS software utilized
 - Independent t-test
 - Analysis of variance
 - Pearson's point biserial correlation
- P values of < 0.05 considered statistically significant

Results:

- 28 respondents- one survey left blank leaving 27 surveys
- Program degree
 - 9 MSN
 - 7 DNAP
 - 9 DNP
 - 2 unidentified
- Program length
 - 23 were 25-36 months
 - 2 were less than 25 months
 - 2 were more than 25 months
- Annual number of students admitted
 - 8 with 15 -25
 - 9 with 26-35
 - 2 with more than 35
- Simplification of categories for data analysis
 - Degree analysis of Masters and Doctoral level
 - Annual number of students less than 25 and more than 25
- Eleven of the twenty-seven program respondents included some kind of CAM education.
- When asked directly about music in curriculum as a CAM, 4 of the 9 respondents currently included CAM.
- Response to adding music as a CAM, 9 would consider adding music to their curriculum, 2 already included it, and 6 were opposed.
- The only statistically significant finding: doctoral level programs were more likely to know about the benefits of music use as CAM compared to master's level programs.
- Knowing benefit did not translate into a significant difference in more doctoral programs inclusion of music as a CAM into curriculum.
- Reasons given for opposition were lack of wide acceptance in the medical community, time constraints, lack of NBCRNA content, and a feeling of impracticality of implementation in the clinical setting. Time constraints, was the most often noted barrier for addition of music as CAM to curriculum.
- Programs currently including music as CAM, showed no statistically significant difference in program length, degree level, or annual number of students admitted.

How it related to previous research

- No previous research regarding the gap between music education and implementation of music use in the perioperative setting

Implications for Nursing

- Needs assessment survey show an inconsistency between CRNA programs within the United States regarding music as a CAM education
- Current drug shortages, and a national focus on reduction in opiate usage, it is important that all practitioners are knowledgeable regarding alternative modalities of pain and anxiety reduction.
- Key elements of the proposed curriculum addition include but are not limited to: benefits of music as a CAM, appropriate patient selection, and appropriate music selection.

Conclusion

- Literature has clearly and consistently shown use of music as a CAM can supplement traditional anxiolysis and analgesic treatments as well as improve patient outcomes.
- The findings of this project demonstrate that music as a CAM education lacks consistency.
- There are CRNA programs that know the benefits of and have found ways to integrate music as a CAM into their curriculum.
- Results showed there is a need to expand music as a CAM education for both students, and current practitioners to increase awareness of benefits as well as appropriate utilization.

Does a Teamwork Seminar Improve Nurse Anesthesia Student Awareness of High Performance Teamwork Behaviors?

Michael J. Sit BSN, RN, Julia Feczko DNP, CRNA; Pamela Schwartz DNP, CRNA
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Introduction

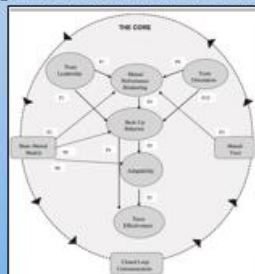
Teamwork is receiving increased attention as an essential component of high quality health care and patient safety. While the concept of teamwork is familiar to anesthesia providers, the explicit identification and training of high performance teamwork behaviors is often absent from formal anesthesia training.

The goal of this study was to improve nurse anesthesia student awareness of high performance teamwork behaviors through an interactive, video-assisted teamwork seminar. This study also aimed to facilitate debriefing on teamwork with the use of the Mayo High Performance Teamwork Scale (MHPTS).

The research questions for this project were:

- Does participation in a teamwork seminar improve awareness of high performance teamwork behaviors?
- Does use of the Mayo High Performance Teamwork Scale facilitate debriefing on a video-based simulation scenario?

Graphical Representation of the "Big Five" High Performance Teamwork Behaviors



(Salas, Sims & Burke, 2005, p. 571)

Methods

A teamwork seminar was generated based on the recommendations of current evidence, including a slideshow presentation and two video scripts. All elements underwent content validity approval by an expert panel.

A non-experimental, post-test only design was employed with a convenience sample of second and third year nurse anesthesia students via usefulness survey.

The validated and reliable MHPTS was used as a guide to facilitate debriefing on video-recorded simulations

Teamwork Seminar

Slideshow Presentation – 15 min.

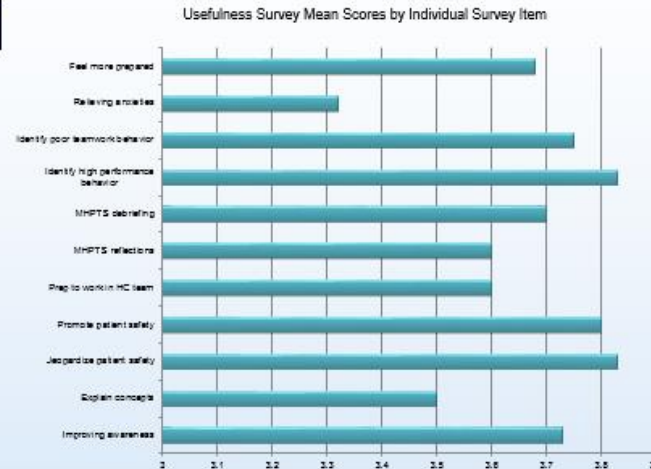
- "Big Five" high performance teamwork behaviors (Salas, Sims, & Burke, 2005)

Video/Debriefing Exercise – 15 min.

- Video #1 -poor teamwork behaviors
- Student evaluation via MHPTS
- Video #2 – excellent teamwork behaviors
- Student evaluation via MHPTS
- Facilitated debriefing

Completion of Usefulness survey

Completion of Demographic survey



Actors Tom Nigro MSN, RN, Victoria Rosinski BSN, RN, and Phyllis Sit CRNA portray a range of teamwork behaviors in the video/debriefing exercise.

Results

N = 30 nurse anesthesia trainees
Demographics

Majority: white (76.7%), females (83.3%), age 20-29 (50%)
ICU experience: 3-4 years (30%), 5-6 years (36.7%)
NAT 2: 17 participants, 56.7%
NAT 3: 13 participants, 43.3%

Usefulness survey:

Overall mean: 3.7/4.0
Standard deviation: 0.407
Cronbach's alpha: 0.920

Inferential statistics:

No significant relationships between demographic responses and usefulness responses

Conclusion

Second and third year nurse anesthesia students perceived the teamwork seminar as useful in a variety of fields, suggesting this is an ideal population for future teamwork training initiatives.

The lack of relationships between demographic variables and student responses suggest that no sub-group of students require special attention for future training initiatives, as they all perceived the seminar similarly.

This project demonstrated that the MHPTS could easily be incorporated into a student learning activity and be utilized as a tool to guide reflection and facilitate debriefing on teamwork.

Discussion

Most students found the seminar useful in improving awareness and the MHPTS useful in facilitating debriefing.

A lack of relationships between demographics and usefulness responses suggests students perceived the seminar similarly despite previous experience.

Future Research

Effect of on-going teamwork training on student perception of clinical residency, frequencies of sentinel events, institutional morbidity/mortality
MHPTS may be easily incorporated into nurse anesthesia simulation education and utilized as a metric for student progress.
References for this project are available upon request.

Background:

- Medication errors are a significant and detrimental issue in anesthesia practice
- Potential to have drastic effects on patients, providers, and hospitals
- 380,000 to 450,000 adverse drug events occur in hospitals each year with an annual cost of \$3.5 billion

Research Question:

- Does an educational video improve Nurse Anesthesia Trainees' (NATs) actual knowledge on safe medication handling?
- Do NATs perceive the educational video to be useful?

Methodology:

- Single group pretest-post test design
- Convenience sample of 19 voluntary second year nurse anesthesia trainees
- 4 Phases:
 - Development of educational video
 - Development of Knowledge assessment tool (KAT)
 - Evaluation of effectiveness of educational video using KAT
 - Evaluation of perceived usefulness of video using adapted survey

Results:

- Knowledge Assessment Tool: Statistically significant difference in pretest and posttest means ($p < 0.01$)
- Perceived Usefulness Survey: Moderately high perceived usefulness of safe medication handling video

Table 5. Perceived Usefulness of Safe Handling of Medications Video (N=19)

	Mean	Mode	Sum	Standard Deviation
Helped me understand the process of safe medication handling	4.421	5.0	84.0	0.7685
Helped me understand the importance of a clean workplace	4.158	5.0	79.0	0.8983
Helped me identify the steps of safe medication handling	4.632	5.0	88.0	0.4956
Helped me feel more comfortable with how to handle medications safely	4.158	4.0	79.0	0.7647
Was useful in preparing for clinical rotations	4.368	5.0	83.0	0.8307
Was useful in explaining the process of safe medication handling	4.389	5.0	79.0	0.7775
Was useful in identifying the importance of safe medication handling	3.895	5.0	74.0	1.1496
Was useful in relieving my anxieties about safe medication handling as an anesthesia provider	3.737	3.0	71.0*	0.9335
Was useful in making me feel more confident with medication handling in the operating room	4.000	4.0	76.0	0.7454
Explained what I wanted to know about the process of safe medication handling	4.158	4.0	79.0	0.6882

Table 3. Knowledge Assessment Tool Pre-Test and Post-Test (N=19)

	Mean Score	Standard Deviation	Standard Error Mean
Pre-KAT	3.6842	1.97351	0.45275
Post-KAT	7.6842	2.26207	0.51895

Table 4. Knowledge Assessment Tool Paired Samples Test

	t	df	Significance (2-tailed)
	-6.643	18	$p = 0.00^*$

*p<0.01

Conclusion:

- Educational video was found to be effective in education NAT-2's on safe medication handling
- Perceived as useful by participants
- Video can be used for future NAT-2's to improve knowledge and potentially decrease medication errors in the operating room

Table 2. Demographic Characteristics of Study Participants (N = 19)

Variable		Frequency	Percent	Cumulative Percent
Gender	Male	3	15.8	15.8
	Female	16	84.2	100.0
Age	20-29	11	57.9	57.9
	30-39	7	36.8	94.7
	40-49	1	5.3	100.0
	50-59	0	0.0	100.0
Ethnicity	White	14	73.7	73.7
	African American	1	5.3	78.9
	Asian	2	10.5	89.5
	Mixed	2	10.5	100.0
	Other	0	0.0	100.0
ICU Experience Prior to Start of Anesthesia School	1-2 years	6	31.6	31.6
	3-4 years	5	26.3	57.9
	5-6 years	6	31.6	89.5
	Greater than 6 years	2	10.5	100.0
	0 years	0	0.0	100.0
	7-9 years	0	0.0	100.0

What we found:

- Educational video increased knowledge and was perceived to be useful by NATs
- Tool and survey were found to be reliable

Relevance to Current Research:

- Literature clearly shows issues with medication safety in anesthesia, specifically novice providers
- Research shows video as an effective education tool

Implications for Nursing:

- Educational video may be used for future NATs to increase knowledge on safe medication handling

Future Recommendations:

- Conduct similar research with larger sample size
- Utilize wider sample population that involves all anesthesia providers
- Evaluation of perceived usefulness after beginning clinical experience

Background:

When anesthesia providers use GDFT protocols, intraoperative fluid therapy is "patient specific" via the use of dynamic patient-specific physiologic parameters

Research Questions:

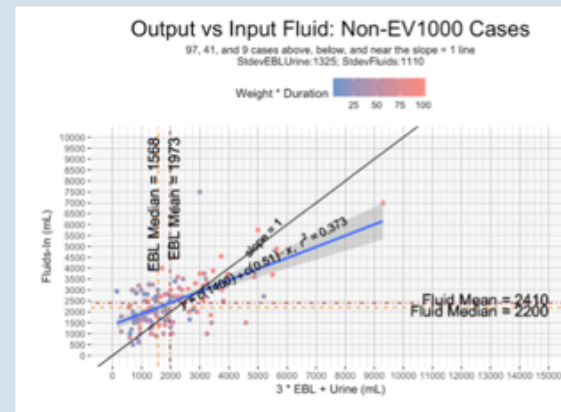
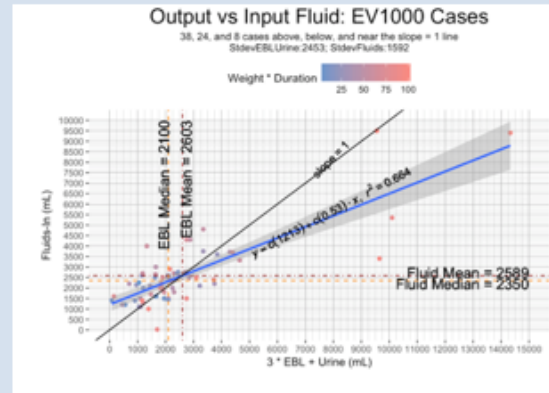
1. Does use of a GDFT protocol result in less fluid administration?
2. Does use of a GDFT protocol reduce variability in net fluid administration (i.e. Improve precision)?
3. What is the percentage of time that providers are compliant with the GDFT protocol when the EV-1000™ monitor is used?

Methodology:

- Quantitative
- Retrospective Chart Review

Results:

1. The mean net fluid administration for the non-EV1000 group was more than the EV-100 group but not at a significant level
2. Overall, the GDFT group had improved fluid administration precision
3. Over half the cases were compliant with the protocol and goal SVV for over 70% of the total surgical time



Conclusion:

GDFT protocols show promise in the THA population for improved patient-specific fluid administration

How this related to previous research:

This has been shown in other patient populations and proves validity among adult hip arthroplasties

Implications for Nursing:

- Trends towards improved precision with GDFT protocol
- Use of non-Invasive hemodynamic monitors has benefits in total hip arthroplasties

What's Next:

- GDFT Protocols should be explored among different patient populations
- Strict adherence to protocol for subsequent studies

INFECTION CONTROL OF THE ANESTHESIA WORKSPACE – DOUBLE GLOVE TECHNIQUE

Authors: Megan Callow RN, BSN & Debra Farida RN, MSN

Faculty Sponsor: Pamela Schwartz DNP, CRNA
DePaul University



BACKGROUND

- Current infection control practice has proven to be inadequate and pathogen transfer from anesthesia provider to patient is well established in literature, especially pertaining to contamination during direct laryngoscopy (DL), which exposes both surface and patient to disease, viruses, and bacteria (Biddle et al., 2016; Machan, Monaghan, McDonough, & Hogan, 2013).
- Anesthesia-related bacterial transmission is a “root cause of 30-day postoperative infections affecting as many as 16% of patients undergoing surgery” (Loftus, Koff, & Bimbach, 2015).
- Lack of knowledge, education, and training of the NAT on infection control may lead to infectious complications affecting anesthesia care outcomes.
- This intensifies the need to eliminate human error, noncompliance, and inadequate disinfection as a vector in potentially devastating disease transmission.

RESEARCH PROBLEM & PURPOSE

RESEARCH PROBLEM:

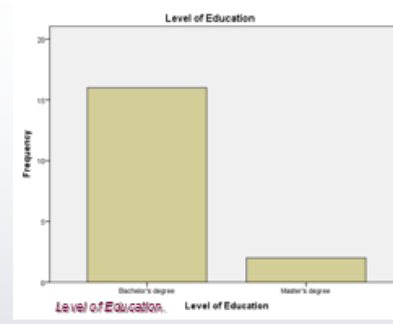
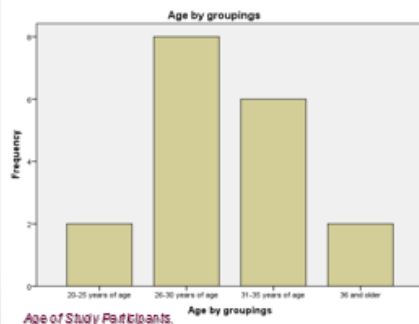
- Anesthesia providers frequently have contact with infectious fluids and blood, and as student learners, the researchers experienced a need for education regarding contamination of the anesthesia workspace.
- Oral contamination as a result of DL can be found on multiple areas of the anesthesia machine, patient’s intravenous access ports, the anesthesia drug cart, and the provider’s stethoscope (Biddle et al., 2016).
- In seeking best practice that effectively decreases the spread of microbe transfer, especially with respect to oral inoculum, double gloving technique employed during laryngoscopy and intubation, with immediate removal of outer set post-intubation, was determined to drastically reduce contamination of the anesthesia workspace (Bimbach et al., 2015).

PURPOSE:

- Examine NAT-2 confidence level and knowledge of proper handling of potential contaminants during induction and DL utilizing video and survey methodology.
- Using best practice, the double glove laryngoscopy technique, and video simulation, this study investigated whether there was an increased acquisition of confidence and perceived knowledge pertaining to infection control standards of the anesthesia work environment.

RESULTS

- A single intervention group composed of 18 second year NorthShore University Health System (NSUHS) nurse anesthesia trainees (NAT) (N = 18) participated in this study.
- The majority of the participants were 26 to 30 years of age (44.4%), followed by 31 to 35 years of age (33.3%), 20 to 25 years of age (11.1%), and 36 and older (11.1%).
- Most of the participants had Bachelor’s degree educations (88.9%) compared to Master’s degree education (11.1%).
- Years of critical care experience ranged from one to two years (27.8%), three to five years (38.9%), six to eight years (22.2%), and greater than eight years (11.1%).
- A paired samples *t* test was conducted to compare pre- and post-tests for confidence and perceived knowledge mean scores.
- The results demonstrated an increase in both outcomes during post-test.
- There was a statistically significant difference between pre-confidence ($M = 3.1, SD = 0.75$) and post-confidence ($M = 4.4, JD = 0.41$) mean scores with *t* test statistics showing $t(df = 17) = -7.41, p < 0.001$.
- Additionally, there was a statistically significant difference in the pre-perceived knowledge ($M = 0.0, SD = 0.00$) and post-perceived knowledge ($M = 0.6, JD = 0.50$) mean scores with *t* test statistics showing $t(df = 17) = -5.17, p < 0.001$.
- Demographic variables had no significant effect on the scores of confidence or perceived knowledge.



CONCLUSION

- Video simulation on the sequence of induction and DL using double glove technique increased both confidence and perceived knowledge among junior level NATs.
- This pilot study provides preliminary evidence to support that video simulation education demonstrating the proper handling of contaminants may reduce patient harm, and improve provider compliance of infection control standards if presented during nurse anesthesia curriculum to junior level NATs.
- Further research should be conducted on a larger scale to support evidence on the value of infection control video education to NATs.

METHODOLOGY

- Non-experimental design composed of an intervention group only.
- Pre-test post-test design evaluated confidence and perceived knowledge before and immediately after video simulation education in the NAT.

FUTURE RECOMMENDATIONS

- This pilot study provided preliminary evidence to support that video simulation education demonstrating the proper handling of contaminants may reduce patient harm, and improve provider compliance of infection control standards if presented during nurse anesthesia curriculum to junior level NATs.
- Further research should be conducted on a larger scale to truly determine if intervention at the novice level promotes better adherence to infection control standards at the expert level and if education can be linked to better long term compliance and outcomes.
- Research should also examine actual OR behavior, before and after an educational intervention, to quantify if education translates into actual practice.
- Longitudinal studies that examine the effect of video education as the training tool for NATs on the actual incidence of infection acquired in the OR are warranted.
- Additionally, studies should be undertaken to determine that the outer glove of the double glove technique can provide the proper barrier to contain oral pathogens from contaminating the anesthesia workspace and therefore, reduce patient harm.

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- Machan, M. D., Monaghan, W. P., McDonough, J., & Hogan, G. (2013). Emerging evidence in infection control: Effecting change regarding use of disposable laryngoscope blades. *American Association of Nurse Anesthetists Journal*, 21(2), 103-108.

Background & Introduction

- Most anesthesia providers use a 10 ml syringe to inflate the distal cuff of endotracheal tubes (ETTs), an airway device used for positive pressure ventilation
 - No evidence proving that using a 10 ml syringe to inflate the ETT cuff is necessary
- Sultan, Carvalho, Rose, and Cregg (as cited in Hagberg & Artime, 2015) state, "The cuff should be inflated to the minimum volume at which no air leak is present with positive pressure inspiration; **the cuff pressure should be less than 25 cmH2O**. Excessive cuff pressure may result in tracheal mucosal injury, vocal cord dysfunction from recurrent laryngeal nerve palsy, and sore throat." (p. 1942)
- Although emphasis is placed on performance of a minimal occlusive leak test (MOLT), routine cuff pressure monitoring may be overlooked
 - Leading to an incidence of ETT cuff overinflation

Research Questions

- Using the current methods, is there an incidence of cuff overinflation amongst anesthesia providers?
- When inflating ETT cuffs, would replacing a 10 ml syringe for cuff inflation with a 5 ml syringe reduce the incidence of cuff overinflation?
- Does educational intervention regarding proper cuff pressures lead to inflation of ETT cuffs of < 25 cmH2O?

Methodology

- Quantitative, quasi-experimental study evaluating anesthesia providers' choice of syringe type when inflating the ETT and subsequent real time cuff pressures
- 56 ETT cuff pressures measured at NorthShore University HealthSystem Evanston and Glenbrook Hospitals
- Anesthesia providers included:
 - Certified registered nurse anesthetists (CRNAs)
 - Anesthesiologists
 - Student registered nurse anesthetists (SRNAs)
 - Anesthesiology residents
- Study Design
 - Phase I: Pre-Educational Intervention
 - Data Collection w/ AG Cuffill digital manometers
 - Phase II: Educational Intervention
 - Creating and posting flyers on use of 5ml inflation syringe and proper minimal occlusive leak testing
 - Phase III: Post-educational Intervention
 - Data Collection w/ AG Cuffill digital manometers
- Inclusions
 - General anesthesia cases involving the use of an ETT
- Exclusions
 - Patients receiving nitrous oxide
 - The use of laser or neural integrity monitor (NIM) tubes due to their direct effect on ETT cuff pressures
 - Anesthesia provider refusal
 - Any operating room that had first ETT cuff pressure reading > 60 cmH2O



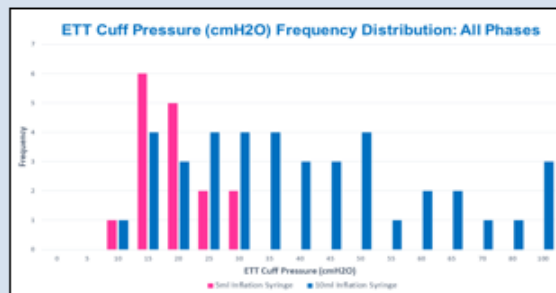
Descriptive Statistics

- SPSS software utilized
 - Independent t-test
 - Analysis of variance
 - Pearson's point biserial correlation
- p values of < 0.05 considered statistically significant



Results

Phase I (pre - educational intervention)	Phase III (post - educational intervention)
<ul style="list-style-type: none"> Total number of cuff pressures measured = 30 <ul style="list-style-type: none"> N = 30 via a 10 ml syringe <ul style="list-style-type: none"> M = 46.8 cmH2O Range = 16-100 cmH2O N = 0 via a 5 ml syringe <ul style="list-style-type: none"> M = N/A Range = N/A Overall mean cuff pressure = 46.8 cmH2O Overall range = 16-100 cmH2O 	<ul style="list-style-type: none"> Total number of cuff pressures measured = 26 <ul style="list-style-type: none"> N = 10 via a 10 ml syringe <ul style="list-style-type: none"> M = 36.8 cmH2O Range = 11-100 cmH2O N = 16 via a 5 ml syringe <ul style="list-style-type: none"> M = 21.1 cmH2O Range = 16-33 cmH2O Overall mean cuff pressure = 27.1 cmH2O Overall range = 11-100 cmH2O



- ETT size and ETT cuff pressure
 - Relationship was **not** statistically significant ($r=0.128, p=0.349$)
- Patient BMI and ETT cuff pressure
 - Relationship had a statistically significant positive correlation ($r=0.275, p=0.040$)
 - Mean patient BMI was not significantly different between study phases ($p=0.084$)
 - Patient BMI did not affect ETT cuff pressures pre and post educational intervention in this study
- Educational Intervention and ETT cuff pressure
 - Independent t-test between ETT cuff pressure in phase I & III (all syringes used) showed a statistically significant reduction in cuff pressure ($p=0.001$)
- Type of inflation syringe used (in phase I and phase III combined) and ETT cuff pressure
 - Resulted in a significant reduction in ETT cuff pressure with a 5ml inflation syringe (p value < 0.001)
- Critically high cuff pressures (>80 cmH2O)
 - 5ml inflation syringe
 - Zero cases
 - 10ml inflation syringe
 - Cuff pressures as high as 100 cmH2O even after educational intervention

Evidence Based Table

<p>Al Metwalli et al. (2011)</p>	<ul style="list-style-type: none"> In Saudi Arabia, compared methods of ETT cuff inflation and their effect on cuff pressures <ul style="list-style-type: none"> The prospective, controlled, randomized, double-blind experimental study was done on 73 patients <table border="1"> <thead> <tr> <th>Inflation Method</th> <th>ETT Cuff Pressure Achieved</th> <th>Inflation Volume Used</th> </tr> </thead> <tbody> <tr> <td>Manometer (control) group</td> <td>25 cmH₂O</td> <td>4.3 ml</td> </tr> <tr> <td>Sealing group (minimal occlusive leak test)</td> <td>20 cmH₂O</td> <td>3.8 ml</td> </tr> <tr> <td>Pilot balloon palpation group</td> <td>48 cmH₂O</td> <td>6.8 ml</td> </tr> </tbody> </table> <ul style="list-style-type: none"> Proved that measurement of an ETT cuff pressure via pilot balloon palpation was an unreliable, leading to overinflation of pilot balloons 	Inflation Method	ETT Cuff Pressure Achieved	Inflation Volume Used	Manometer (control) group	25 cmH ₂ O	4.3 ml	Sealing group (minimal occlusive leak test)	20 cmH ₂ O	3.8 ml	Pilot balloon palpation group	48 cmH ₂ O	6.8 ml
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Pilot balloon palpation group	48 cmH ₂ O	6.8 ml											
<p>Geng, Hu, and Huang (2014)</p>	<ul style="list-style-type: none"> Examined the effect of ETT cuff pressure changes on postoperative sore throat during gynecological laparoscopic surgery In the laparoscopic group, ETT cuff pressures rose as high as 34.2 ± 4.8 mmHg (46 cmH₂O ± 6 cmH₂O) just 5 minutes post-trendelenburg position change and abdominal CO₂ insufflation ETT cuffs were inflated to a set pressure of 23 mmHg (35 cmH₂O) using handheld manometers <ul style="list-style-type: none"> Then reassessed at intervals of 5, 15, 30, 45, and 60 minutes Pain Scores (0-10) at rest and at swallowing: <ul style="list-style-type: none"> Laparoscopic: 2.5, 2.7 Laparotomy: 0.7, 1.3 												
<p>Michlig (2013)</p>	<ul style="list-style-type: none"> Investigated pilot balloon palpation for ETT cuff inflation Experimental study on 33 different anesthesia providers An 8.0 ETT cuff was inflated using a 20 ml syringe set at 120 cmH₂O <ul style="list-style-type: none"> Providers were then asked to estimate the cuff pressure by pilot balloon palpation <ul style="list-style-type: none"> 18 participants believed the pressure to be too high 17 believed the pressure to be too low 18 believed the pressure was approximately correct/appropriate There was no statistical difference between answers given at random and answers given after assessment of pilot balloon palpation 												
<p>Hedberg, Eklund, and Hogqvist (2015)</p>	<ul style="list-style-type: none"> Tested to see if there was a difference in cuff pressure estimation between nurse anesthetists and anesthesiologists <ul style="list-style-type: none"> Via pilot balloon palpation on artificial tracheas ETT cuff had been inflated to 95 cmH₂O (which is high enough to completely occlude tracheal blood flow, leading to tissue necrosis) <ul style="list-style-type: none"> 89.1% of providers estimated the cuff pressure to be high 10.9% still thought the pressure was adequate to low Work experience and provider type (nurse anesthetist vs anesthesiologist) were not found to be statistically significant in determining appropriate cuff pressure 												

Previous Research

- Verified that pilot balloon palpation is an inaccurate inflation method
- Verified that type of anesthesia provider and level of experience had no correlation to ETT cuff pressure
- No previous studies looked at the use of a 5ml inflation syringe

Conclusion

- Goal is to prevent patient complications and ensure the best possible surgical experience
- Educational reminder of the minimal occlusive leak test can help to decrease overall ETT cuff pressures
 - Hypothesized that anesthesia providers may start to overinflate again as time passes
- Strong correlation found between inflation syringe size and ETT cuff pressure

It is recommended that all anesthesia providers start to use a 5ml syringe when inflating an ETT cuff

David Velasco, DNP, CCRN, RN, Shannon D. Simonovich, PhD, RN, Bernadette Roche, CRNA, EdD, Susan Krawczyk, CRNA, DNP

Background:

Opioids are powerful pain medications that have significant side effects. The U.S. now consumes approximately 80% of the world's supply of opioids. The AANA is urging healthcare professionals to “use opioid-sparing pain management techniques to better prevent opioid addiction and abuse.” Opioid alternative administration can treat analgesia and limit opioid administration.



Study Objective:

To examine and describe CRNAs' beliefs, opinions, and practices on administering opioid medications versus opioid alternative strategies to treat intraoperative pain.

Study Methodology:

Qualitative, survey study design using semi-structured interviews. Twelve CRNAs were interviewed and audio recorded discussing their perspectives and opinions on administering opioid alternatives.

Illustrative Quotes:

Barriers to Opioid Alternatives

“I don't know, opioids just work way better and their effect is fast and predictable.”

“I don't care what the research shows, I anecdotally see a very poor outcome [with opioid alternatives].”

“The barrier to me is more what's available to me and what I can give (based) on the institution.”

“The barriers for me is what's available to me based [on the] institution.”

Promoting Factors for Opioid Alternatives

“I have found that if I attack pain receptors at every avenue, the patients are more comfortable and [require] less narcotic.”

“If your goal is to get somebody up quicker, regional blocks, peripheral blocks, TAP blocks, are a great additive to the anesthetic.”

“Options being encouraged are opioid sparing techniques such as ERAS.”

“[Opioid alternatives] save the [patient] nausea, any complications after, and they extubate faster.”

Results:

Prevalent barriers included: opioid superiority (83%), inconsistent analgesia effects of opioid alternatives (83%), and patient comorbidities (100%). Prevalent promoting factors included: avoiding adverse effects of opioids (92%), positive experiences with alternative administration (100%), regional superiority (100%).

Implications for Nursing:

Opioid administration can be reduced after realizing the factors that hinder or encourage opioid administration by CRNAs.

What's Next:

Future studies should aim to recruit a larger sample size with weighted assessments.



Conclusion:

Understanding the barriers and promoting factors to opioid alternative administration can be useful to enhance its usage.

Funded in part by the Zeta Sigma Chapter of Sigma Theta Tau International



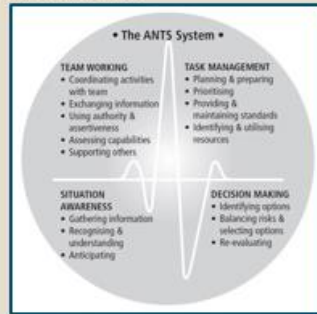
Use of Non-Technical Skills Training & Video Simulation to Improve Knowledge Among Nurse Anesthesia Trainees

By: Laurie McLaughlin RN, DNP and Kathryn Walus RN, DNP
Committee: Karen Kapanke DNP, CRNA and Julia Feczko DNP, CRNA



BACKGROUND

The transition from didactic component to clinical practice is challenging for nurse anesthesia trainees. When faced with an airway crisis, successful management involves non-technical skills, which include recognition, decision-making, and prioritization. Limited data is available on the efficacy of instructional video on enhancing non-technical skills during airway crisis management among nurse anesthesia trainees.



PURPOSE

The purpose of this study was to examine the efficacy of instructional video simulation on enhancing the nurse anesthesia trainee's knowledge of recognition, decision-making, and prioritization during bronchospasm and laryngospasm airway crises.

Clinical Questions

Does viewing an instructional video simulating the proper management of bronchospasm and laryngospasm improve the non-technical skill of

- ✦ recognition
- ✦ decision-making
- ✦ prioritization

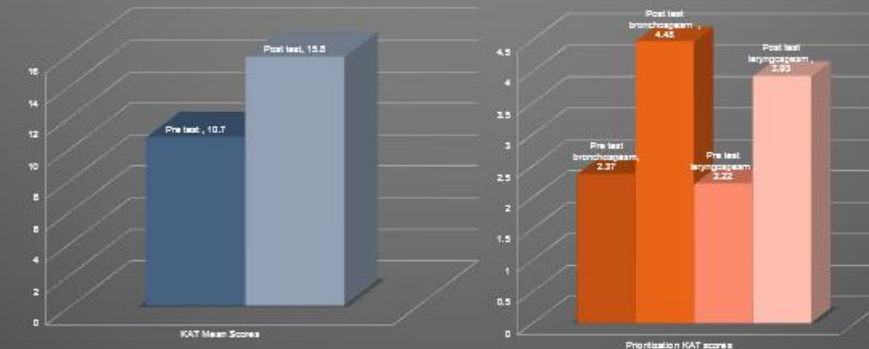
among nurse anesthesia trainees?

METHODS AND MATERIALS



RESULTS

A Wilcoxon Signed Ranks Test demonstrated that the median post-test scores were statistically higher than the median pre-test scores between pre and post-instructional video [$Z = -4.473$; $p = 0.000$ (2-tailed)] with adequate pre and post-test Kuder-Richardson-20 (KR-20) scores (0.533, 0.686). Specifically, post-test median prioritization scores for bronchospasm and laryngospasm were statistically higher than median pre-test scores [$t = -5.366$; $p = 0.000$ (2-tailed)]; [$t = -8.588$; $p = 0.000$ (2-tailed)].



RESULTS (continued)

Kuder-Richardson 20 (KR 20) Reliability Statistics

Pre-test KR 20	0.533
Post-test KR 20	0.686

Demographics - Mann Whitney U Test

	Mean Post Test Scores	P Value
≤ 30 years old	M= 13.33	
≥ 31 years old	M= 14.83	$p = 0.595$

The null hypothesis was retained that the distribution of post-test mean scores is the same across categories of age groupings between 30 years and younger and 31 years and older.

	Mean Post Test Scores	P Value
1-4 years critical care experience	M= 13.63	
≥ 5 years critical care experience	M= 14.45	$p = 0.77$

The null hypothesis was retained that the distribution of post-test mean scores is the same across categories of years of critical care experience between those participants with 1-4 years of critical care experience and those with 5 years or more of critical care experience.

	Mean Post Test Scores	P Value
NAT 2	M= 11.3	
NAT 3	M= 12.33	$p = 0.007$

The null hypothesis was rejected. This study found a statistically significant difference in the distribution of the post-test mean scores between second and third year anesthesia trainees.

DISCUSSION

These findings demonstrate:

- ✦ The effectiveness of using instructional video simulation to improve non-technical skills knowledge during airway crises such as bronchospasm and laryngospasm for nurse anesthesia trainees.
- ✦ NAT 3 students may have had an advantage over NAT 2 students due to more clinical experience
- ✦ Prioritization was specifically enhanced. There was a larger increase in prioritization knowledge for bronchospasm vs. laryngospasm probably due to less clinical experience with bronchospasm.

Limitations – Inadequate number of questions in the subgroups recognition and decision-making led to inadequate KR20 scores. Therefore, these results were considered unreliable.

Future Recommendations - Larger sample size, control group, more questions, readminister post-test again at a later date