


Authors: Liliya Spisovskiy, BSN, RN & Christine Balderas, BSN, RN
Committee: **Susan Krawczyk DNP, CRNA**, Shannon Simonovich PhD, RN, Joseph Tariman PhD, ANP, BC

Perioperative Non-opioid Modalities (PNOM) Questionnaire Implementation and Validation of its Psychometric Properties

Introduction: Over the past few decades, the opioid epidemic has grown substantially, evolving into a national crisis. Contributing factors to this epidemic include nonrestrictive opioid administration. Though solutions to the opioid epidemic by anesthesia providers have been discussed, there is lack of representation among CRNAs. This study seeks to describe barrier and facilitator constructs surrounding non-opioid administration in anesthesia practice via the Perioperative Non-Opioid Modalities (PNOM) questionnaire.

Materials and Methods: This study utilized a cross-sectional, 39-item questionnaire using Qualtrics, an online research platform, to collect data used in establishing the reliability and validity of the PNOM instrument. The 39 statement questions are structured according to a 7-point Likert scale, where 1 = "strongly disagree" and 7 = "strongly agree".

Results: Data were analyzed using SPSS software and exploratory factor analysis (EFA) was conducted to answer the primary research question. EFA revealed five themes associated with non-opioid administration: regional anesthesia time & efficacy, non-opioid outcomes belief system, non-opioid institutional support, opioids outcomes belief systems and non-opioid limited access & experience.

Conclusion: The underlying constructs impacting beliefs and behaviors of opioid vs. non-opioid administration among CRNAs have significant impacts on non-opioid policy, practice and education.

Keywords: *CRNA, multimodal analgesia strategies, Non-opioid, opioid alternatives, perioperative*

Authors: Nicole D'Amico, BSN, RN & Hia Alazzam, BSN, RN
Committee: **Susan Krawczyk DNP, CRNA, Shannon Simonovich PhD, RN,** Julia Feczko DNP, CRNA**,** Roxanne Spurlark, DNP, FNP

Methods to Reduce Waste Production in the Operating Room: A Systematic Review

Background: The healthcare system is one of the leading industries of waste production, and functions as a major contributor to environmental pollution production and increasing healthcare costs with the operating rooms (OR) being responsible for a substantial amount of overall hospital waste production.

Objectives: The purpose of this systematic review is to examine current waste reduction measures in the OR, identify barriers to proper waste management in the OR, and the financial and environmental implications of waste reduction in the OR

Method: Database search of: PubMed, CINAHL, Academic Search Complete, Web of Science, and ScienceDirect. Articles published from 2010 to May 2020 were reviewed resulting in 37 articles meeting inclusion criteria.

Results: The waste reduction method themes included equipment-single use (n=11), equipment-reusable (n=8), waste segregation (n=9), pharmaceutical waste (n=3), and waste anesthesia gases (WAG) (n=5).

Conclusion: The literature supports the need for identifying and perfecting OR waste reduction methods to promote healthcare cost reduction and decreasing environmental carbon footprint is possible and necessary.

Authors: Stephanie Knell, BSN, RN & Lauren Marks, BSN, RN
Committee: **Shannon Simonovich PhD, RN**, **Pamela Schwartz DNP, CRNA**, Anne Sauri DNP, CRNA

A Qualitative Examination of Opioid Sparing Anesthesia Practices Among CRNAs

Background: As current literature is highly specific, detailing Opioid Sparing Anesthesia (OSA) techniques for certain surgical procedures or examining OSA facilitators and barriers, no known study to date has described anesthesia providers' qualitative experiences with OSA.

Objectives: The study purpose was to address the gap in research and examine the expertise of CRNAs who consistently utilize OSA in their personal practice.

Methods: This qualitative descriptive study utilized a semi-structured interview protocol. Sixteen CRNAs completed interviews and data was analyzed using a professional transcription service and qualitative data analysis software.

Results: Redundancy of results was reached by the eighth interview, ensuring rigor and data saturation.

Two themes emerged: (1) perioperative benefits of opioid sparing anesthesia and (2) prospective benefits of opioid sparing anesthesia.

Perioperative benefits include: reduction or elimination of postoperative nausea and vomiting, superior CRNA-managed pain control (immediate perioperative period), and improved short-term recovery (accelerated recovery from anesthesia in the OR and PACU, related to the sparing of opioids).

Prospective benefits include: higher surgeon satisfaction, superior surgeon-managed pain control (beyond the PACU, influenced by CRNAs' intraoperative OSA techniques), increased patient satisfaction, reduction of opioids in the community, and CRNA awareness of positive prospective benefits of opioid sparing anesthesia (cognizant of patient outcomes beyond the PACU).

Conclusion: This study navigated uncharted territory, focusing on experiences of CRNAs consistently utilizing OSA. OSA is a critical step toward a paradigm shift of perioperative pain management. Traditional opioid-based techniques only address the mu receptor and allow susceptibility to deleterious side effects. Balanced OSA yields superior pain management via control of numerous pain receptors, attenuation of the sympathetic nervous system response, improved efficacy of opioids when used on virgin mu receptors, and enhanced recovery from anesthesia and surgery. Future studies should examine the perspectives of more diverse CRNA populations and institutions. Additionally, research focusing on anesthesia and surgical team collaboration for pain management is critical.

OSA techniques embody the Advanced Practice Nurse model by providing holistic patient care. OSA positively impacts the patient beyond the PACU and combats excess opioids in the community. CRNAs are pain specialists with a unique opportunity to improve the long-term health of patients. These findings will guide providers to adopt modern methods of pain management.

Authors: Stephanie Mazanek, BSN, RN & Ariana Drury, BSN, RN
Committee: **Julia Feczko DNP, CRNA,** Anne Sauri DNP, CRNA

Choose Your Own Airway Adventure: Nonlinear Learning for the Advanced Airway Algorithm

Background: All anesthesia providers must master the critical skill of airway management and know the proper strategy to quickly and safely obtain a patent airway in a difficult airway scenario.

Purpose: The purpose of this study was to create a Choose Your Own Adventure (CYOA) decision-based video simulation for the Advanced Airway Algorithm and examine its impact on confidence and knowledge in Student Registered Nurse Anesthetists (SRNAs) prior to beginning clinical residency.

Method: A quasi-experimental pretest-posttest design was used to determine knowledge and confidence of SRNAs in the Advanced Airway Algorithm and management of a difficult airway scenario. Second year SRNAs completed the pretest, participated in a nonlinear video simulation and were then given the posttest.

Results: Mean scores in confidence in identifying a difficult airway showed statistically significant improvements in confidence ($p=0.002$). Mean scores of confidence in managing an unanticipated difficult airway also demonstrated statistically significant improvements ($p=0.000$). Measurements of pretest to posttest knowledge assessment scores did not yield statistically significant results.

Conclusion: Participation in the CYOA video simulation increased SRNA confidence in difficult airway crisis management. There is a need for a larger sample size to determine the efficacy of CYOA simulation on knowledge and confidence in difficult airway management and other anesthesia crisis scenarios.

Authors: Corinne Novelli, BSN, RN & Elizabeth Higginbotham, BSN, RN
Committee: **Karen Kapanke DNP, CRNA**, **Shannon Simonovich PhD, RN**

Examining the Pulmonary Implications of Electronic Vapor Delivery Systems (EVDS) for Anesthesia Management: A Systematic Review

Study Objective: Despite the popularity of vaping and electronic vapor delivery systems (EVDS), the healthcare community remains largely unfamiliar with their potential to induce harm. The purpose of this systematic review is to identify how EVDS use affects pulmonary function in order to guide the clinical anesthetic management of patients who vape.

Design: Systematic Review

Data Sources: A search of the CINAHL and PubMed databases was performed in October 2020.

Study Eligibility Criteria: Studies were included if they were deemed original research published in English, were performed exclusively in humans or on human tissue, they examined the effects of EVDS on pulmonary function or tissue, and/or they produced quantitative data. Studies were excluded if they utilized animal samples, studied subjects under the age of 18, presented expert opinions or reviews, offered qualitative data, reported case studies, evaluated the use of EVDS as a smoking cessation tool, or compared the effects of specific e-liquid flavors.

Methods: Five committee members selected articles based on predetermined inclusion and exclusion criteria. Evidence was collected and synthesized following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) 2009 Checklist.

Results: This review identified six EVDS-induced pulmonary implications warranting anesthetic consideration: disrupted pulmonary function and increased airway resistance, alterations in ventilation, impaired mucociliary clearance, tissue destruction, disrupted immune response, and oxidative stress with DNA fragmentation.

Limitations: Although many adolescents use EVDS, the results of this review cannot be generalized to all age groups. Only studies that examined the effects of EVDS use in adults were included in the final synthesis of evidence. This review also only examines the short term effects of EVDS use. There are few studies available that report the long term effects of chronic EVDS use.

Conclusion: 31 studies described the effects of EVDS on pulmonary function, airway epithelial tissue, and inflammatory mechanisms that may lead to chronic pulmonary disease. Anesthesia providers are encouraged to assess patients for EVDS use during the preoperative period and use the information generated by this systematic review to drive subsequent care.

Registration Number: The systematic review proposal was registered with PROSPERO, the International Prospective Register of Systematic Reviews, in May 2020 (registration number CRD42020176062).

Authors: Danielle Smith, BSN, RN & Kayla Steinhorst, BSN, RN
Committee: **Pamela Schwartz DNP, CRNA,** Julia Feczko DNP, CRNA

Implementing a Problem-Based Learning Activity to Enhance Perceived Knowledge and Confidence of SRNAs Starting Anesthesia Residency

Aim: This study's purpose was to examine if implementing a problem-based learning activity that incorporated classroom knowledge improved student registered nurse anesthetists' perceived confidence and knowledge in managing scenarios of a patient on the anesthesia machine.

Background: The didactic courses in nurse anesthesia curriculum introduce many new, complicated concepts that learners are expected to integrate into clinical anesthesia practice. Unfortunately, many nurse anesthesia programs are largely based on lecture. Exclusively lecture-based learning methods fall short in aiding student registered nurse anesthetists (SRNAs) in translating these fundamental textbook concepts into clinical practice. Alternatively, problem-based learning (PBL) has proven itself a useful adjunct to lecture-based learning by enhancing student knowledge, confidence, clinical success, and recall. Current research investigating the effectiveness of problem-based learning in nurse anesthesia curriculum is lacking.

Design: This study utilized an intervention with pre-survey/post-survey methodology.

Methods: The intervention was a PBL activity that took place in the Evanston Hospital simulation lab. Fifteen SRNAs were presented with three scenarios involving a patient on the anesthesia machine and asked to discuss and apply concepts learned in lecture to manage each scenario. Identical surveys were administered before and after the intervention to assess participant anxiety, intimidation, confidence, and knowledge regarding management of the anesthesia machine, along with their approval or disapproval of PBL as an adjunct to lecture.

Results: Analysis of pre- versus post-survey scores revealed statistically significant increases in the following measures: confidence and knowledge in managing the three scenarios (p = .004, .006, .003); perceived strength and ability to manage a patient on the anesthesia machine (p = .003, .004); and view of PBL as a useful adjunct to lecture (p = 004). Comparison of pre- and post-survey levels of anxiety (p = .052) and intimidation (p = .052) regarding management of the anesthesia machine showed no significant change in response by the participants.

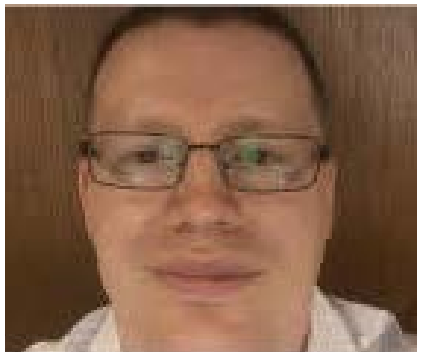
Conclusions: The results of this study emphasized that PBL as a lecture-adjunct does increase SRNAs' perceived confidence, knowledge, and ability to incorporate didactic knowledge into management of the anesthesia machine. The results also indicate that SRNAs approve of PBL when incorporated with lecture-based methods of learning.

Keywords: *confidence, knowledge, nurse anesthesia education, problem-based learning*


Authors: Ryan Beattie, BSN, RN, Nick Kling, BSN, RN
Committee: **Julia Feczko DNP, CRNA,** Karen Kapanke DNP, CRNA

Ultrasound Guided Gastric Volume Assessment: Video-Based Education for Nurse Anesthesia Trainees

When assessing aspiration risk, current anesthesia practice relies on patient-provided information regarding fasting status to assess for aspiration risk but lacks direct confirmation of gastric volume.[1] Ultrasound Guided Gastric Volume Assessment (UGGVA) provides clinicians with direct confirmation of gastric volume which can provide reliable and quantitative data regarding risk of aspiration. The purpose of this study was to measure nurse anesthesia trainee's (NATs) knowledge and confidence of UGGVA after and educational video was implemented. The researchers hypothesized that viewing an educational video would improve both knowledge and confidence levels of this skill. A single group pre-test/post-test design was used to evaluate the impact of the educational video. A convenience sample of 27 NATs enrolled in the NorthShore University HealthSystem (NSUHS) School of Nurse Anesthesia participated in this study. A Wilcoxon Signed Matched-Pairs Ranks Test demonstrated that post-test scores were significantly higher than the pre-test scores for both knowledge [Z= -4.151; p=0.000 (2-tailed)] and confidence [Z= -4.465; p=0.000 (2-tailed)]. Post-test survey results demonstrated substantial improvement in the number of correct responses for all six knowledge assessment questions and higher mean scores for all five confidence questions. In conclusion, NATs who participated in the study gained both knowledge and confidence in UGGVA following the implementation of an educational video.



Authors: Phil Kaiser, BSN, RN & Amanda Lamacki, BSN, RN
Committee: **Karen Kapanke DNP, CRNA,** Kathryn Coletto DNP, CRNA

Implementation of an Emergency Reflex Action Drill to Improve Perceived Knowledge and Confidence in Intubation Skills of Nurse Anesthesia Trainees

Background: Literature is lacking that evaluates the use of Emergency Reflex Action Drills to improve perceived knowledge and confidence of Nurse Anesthesia Trainees in implementing
stepwise, evidence-based actions to improve poor glottic view during direct laryngoscopy.

Objectives: Evaluate the impact of an investigator-developed educational video demonstrating "Head-Neck-Reset," ERAD on nurse anesthesia trainee's perceived knowledge and confidence for success when faced with a poor vocal cord view.

Method: Single center, convenience sample of 23 Nurse Anesthesia Trainees were administered a demographics survey and pretest. Video-based intervention then immediately implemented followed by posttest.

Results: A significant improvement in perceived knowledge (1.78) and confidence (1.73) denoted by mean scores.

Conclusion: Larger and more comprehensive studies needed. The Head-Neck-Reset ERAD improves perceived knowledge and confidence in Nurse Anesthesia Trainees.

Authors: Amanda Parker, BSN, RN& Sona Wardius, BSN, RN
Committee: **Pamela Schwartz DNP, CRNA**, Karen Kapanke DNP, CRNA

Implications of an Education Tool as a Noise Reduction Strategy in the OR

Background: Noise in the operating room (OR) can be from many sources and can lead to distractions, interruptions, stress, and medical errors.

Aim: The goal of this study was to bring awareness of noise levels in the OR, the most common noise distractions, and how these relate to adverse events for the patient.

Method: The researchers measured decibel levels in the OR prior to and after the implementation of an educational tool for noise reduction in the OR. Seventeen surgical cases under general anesthesia were evaluated, and a post-intervention survey was sent out to OR staff.

Results: While there was no statistically significant difference between the sound levels pre- and post-intervention, 62% of healthcare providers defined excessive noise as a problem in the OR. Increased stress (35%) and miscommunication (27%) were the major consequences of excessive noise in the OR. Furthermore, there was no statistically significant correlation between number of people in the room and sound levels ($p=0.348$, $p=0.087$).

Conclusion: This study reiterated the apparent issue of excessive noise in the OR, while investigating the impact of an education tool as a noise reduction strategy. It also provided imperative information regarding demographics of providers, perceived sources of excessive noise, stress levels, and other useful data that can contribute to the overall goal of noise reduction. Future studies must be mindful of the challenges that this study faced, including the decisions about continuous decibel level monitoring, the types of surgeries, and the high variability of the surgical procedure process.

Authors: Ron Mack, BSN, RN & Ryan Lewandowski, BSN, RN
Committee: **Anne Sauri DNP, CRNA**, Kathryn Coletto DNP, CRNA

Simulation Education for Ultrasound Guided Peripheral Intravenous Catheter Insertion

Background: Current research on the education of ultrasound guided peripheral intravenous (UGPIV) catheter insertion is insufficient in the context of the student registered nurse anesthetist (SRNA) demonstrating a need to utilize video-based simulation training to addresses knowledge and confidence disparities.

Objectives: To evaluate SRNA knowledge and confidence of UGPIV catheter insertion before and after a video-based simulation intervention was provided by the authors.

Method: A convenience sample of first, second, and third year SRNAs (at NSUHS?) was used (N=31). The study participants completed a pre-survey to evaluate UGPIV knowledge and confidence, along with demographic questions. A post-survey was then administered after the participants viewed a ten-minute educational video where the results were analyzed to determine if an improvement in knowledge and confidence scores occurred.

Results: Analysis of pre/post-survey results showed that the mean knowledge assessment score was statistically significant, an increase from 13.84 to 19.58 ($p=0.005$). While the mean confidence scores increased from 12.58 to 19.26, it was not statistically significant ($p= 0.113$). The authors incidentally found that students who had prior UGPIV training used UGPIV more in practice. This is significant because it shows that the educational intervention could be positively correlated with future UGPIV use.

Conclusion: UGPIV video-based training improved standard knowledge and confidence among SRNAs enrolled at NorthShore University HealthSystem.

Authors: Karim Karim, BSN, RN & Joe Barin, BSN, RN
Committee: **Anne Sauri DNP, CRNA,** Julia Feczko DNP, CRNA

Comparison of 3D Printed Trachea Versus Pig Trachea for Cricothyrotomy

Emergency needle cricothyrotomy is a low-incidence, high-risk procedure that is the last step of the difficult airway algorithm during a cannot intubate, cannot oxygenate (CICO) situation. It is performed by puncturing the cricothyroid membrane with a peripheral intravenous catheter to establish a patent airway. The purpose of this study was to quantitatively compare the confidence levels of Student Registered Nurse Anesthetists (SRNAs) in the ability to perform cricothyrotomy on a 3D printed trachea versus a pig trachea and compare fidelity between the two models. Randomized participants first watched an instructional video demonstrating the cricothyrotomy procedure prior to hands-on simulation. Cricothyrotomy was performed on a randomized model and then on the opposite model. A 4-point Likert scale survey addressing confidence and fidelity was completed after each model. Overall, 34 participants included in the study reported increased confidence ($P = 0.008$) in favor of the 3D model after participating in the cricothyrotomy simulation and better fidelity ($P = 0.013$) with the 3D trachea model. The simulation provided an overall increase in confidence levels among anesthesia providers in the ability to perform needle cricothyrotomy. Fidelity was perceived higher when working with 3D printed trachea models.

Key Words: *Cricothyrotomy, pig trachea, 3d trachea model, airway training, simulation*