



## Abstracts for the 2022 TANA Poster Symposium

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## **Will the Intraoperative Use of Intravenous Ketamine Decrease the Use of Fentanyl in Adults, Aged 65 and Older During the Postoperative Period?**

### **Presenters**

Matthew McGuire, BSN, RN

Chad Merkle, BSN, RN

Jason West, BSN, RN

### **Abstract**

With the ever-evolving role of anesthesia in reducing the amount of narcotics needed for postoperative pain control, we move to alternatives that have previously existed but have not been well studied to reduce narcotic use postoperatively. Will the intraoperative use of intravenous ketamine decrease the use of intravenous fentanyl in adults aged sixty-five and older during the postoperative period?

### **Methods**

Cochrane Database of Systematic Reviews, CINAHL, and PubMed, were used to search for high-level evidence studies. Eight articles were selected for this evidence-based analysis using the described search method. Two articles were double-blind, randomized controlled trials, two were systematic reviews, one clinical practice guideline, and one literature review.

### **Results**

Five of the six studies showed ketamine was successfully used as an adjuvant to reduce pain severity and the dosage of opioids required postoperatively, while one trial did not. Five of the six studies showed ketamine was successfully used as an adjuvant to reduce the severity of pain and reduce the dosage of opioids required postoperatively, while one trial did not.

## **Discussion**

Based on the literature review and the high quality of studies, substantial evidence supports further research into this topic. Ketamine alone or in addition to multi-modal anesthesia can reduce opioid consumption in the elderly (>65yrs) population. Based on the literature review and the high quality of studies provided, there is strong evidence to support further research into this topic. Ketamine alone or in addition to multi modal anesthesia can reduce opioid consumption in the elderly (>65yrs) population.

## **Ketamine Use for Pain Control in the Substance Abuse Patient**

### **Presenters**

Hailey Newell, BSN, RN

Tyler Newell, BSN, RN

Erin Schell, BSN, RN

Rachel Shaughnessy, BSN, RN

### **Abstract**

Adequately controlling postoperative pain in the opioid-dependent surgical population continues to be a challenging endeavor. Uncontrolled pain is well known to increase the stress response, leading to a variety of unfavorable consequences. Despite having a multitude of alternative pain management techniques, opioids remain the cornerstone of pain management in the surgical patient. Patients who struggle with substance abuse carry the added challenge of postoperative pain that can be resistant to opioid treatment. Abnormally intensified pain responses due to opioid induced hyperalgesia (OIH) is another major challenge related to long-term opioid use. Multimodal pain control is necessary in both of these situations. Ketamine, an N-methyl-D-aspartate (NMDA) receptor antagonist, is a unique non-opiate analgesic medication that provides pain relief via central sensitization and spinal cord hyper-excitability. This paper attempts to determine if in the substance abuse patient undergoing surgery, does the use of ketamine, compared to opioid analgesics, improve postoperative pain management outcomes? Search models included CINAHL, Cochran Library, and MEDLINE. Results review determined that using ketamine as an adjunct in the anesthetic plan was shown to reduce postoperative pain scores and decrease opioid consumption. Researchers found the use of ketamine infusions suppressed the physiological response to opiate withdrawal and aided in the recovery from cocaine and alcohol abuse. Implications of these results would include the use of a ketamine bolus at induction of 0.25-0.5 mg/kg followed by an infusion at 0.15-0.25 mg/kg/hr as a tool for multimodal pain control in the complex pain patient.

### **Disclosure**

Funded by Lincoln Memorial University, no conflicting relationships.

THIS POSTER IS ENTERED INTO THE POSTER CONTEST

Lincoln Memorial University Student Presenters

## **Effects of Healthy Stress Reduction Strategies on Student Registered Nurse Anesthetists' Clinical and Academic Performance**

### **Presenters**

Antigone Constantine, BSN, RN

Valerie Fearn, BSN, RN

Kayla Hinkle, BSN, RN

Shermi Sivaji, BSN, RN

### **Abstract**

Staggering research data has been collected on the mental health of Student Registered Nurse Anesthetist (SRNAs) and methods to help mitigate negative consequences of stress. Exploring various stress reduction strategies can be invaluable in limiting or preventing anxiety and depression, other mental health disturbances, and burnout. Techniques discussed, such as exercise, meditation, emotional intelligence, counseling, and quality sleep suggest improvement in SRNA performance. This evidenced-based practice analysis aims to determine if healthy stress reduction and coping strategies positively impact the clinical and didactic performance of the SRNA.

### **Methods**

Cochrane Database of Systematic Reviews, CINAHL, PubMed, and Google Scholar were used to search for article studies. Thirteen research articles were used, including a randomized controlled trial, a systematic review, an evidenced based project, and a variety of level IV evidence studies.

### **Result**

One research and one review article defined the causes of SRNA stress. Three research articles discussed the adverse effects of stress, with five studies naming substance abuse as a prevalent unhealthy coping mechanism among SRNAs and graduate students. Eleven studies listed various methods of stress reduction strategies that are linked to improved mood, performance, and less burnout. Two studies determined anesthesia program resolutions linked to increased SRNA wellness.

## **Discussion**

This analysis suggests that healthy coping mechanisms and stress reduction techniques are shown to have a positive impact on both clinical and didactic performance. While many academic, clinical, and external stressors play roles in a stressful environment, negative consequences associated with chronic stress can be attenuated by introducing a combination of strategies. The anesthesia program also can affect the stress level of SRNAs and mitigate anxiety and burnout.

THIS POSTER IS NOT ENTERED INTO THE POSTER CONTEST

Middle Tennessee School of Anesthesia Student Presenters

## **Determinants of Job Selection by Student Nurse Anesthetists Entering the Workforce**

### **Presenters**

Clay Awishes, CRNA

Hallie Evans, DNP, CRNA

Chris Hulin, DNP, MBA, CRNA

Bill Johnson, DNAP, CRNA

### **Impact Statement**

The study will assess SRNAs to determine what practice factors will influence their first professional job selection when they enter the workforce as a CRNA.

### **How the Study/Abstract Will Impact or Potentially Impact the Care That CRNAs Deliver**

The results of the survey may encourage hospital administrators to utilize an anesthesia delivery model that promote CRNA job satisfaction, retainment, and reduce turnover.

### **Introduction**

CRNAs practice in different models of care, ranging from independent or solo anesthesia practice to care team models. The review of the literature identified the impact of anesthesia delivery models on the CRNA workforce. However, the literature lacks the opinions of the upcoming CRNA workforce. An online descriptive, cross-sectional survey was developed to measure factors most important to student registered nurse anesthetists when selecting their first professional position as a CRNA.

### **Methods**

The survey was sent to approximately 2400 student registered nurse anesthetists currently enrolled in their final year of their nurse anesthesia programs. The survey was sent via AANA distribution list. All data collection occurred online. A random sample of students were sent an email inviting them to participate in the study. Email addresses were obtained from the AANA



distribution list and results were coded and stored by AANA for privacy and evaluated with spss software. Data from surveys will be stored at a secure hosting facility with both physical and software-based security systems. The survey site provides SSL encryption for survey participants. At no time will the researcher have access to AANA member email addresses or any members' identified information. The survey will take approximately 5-10 minutes for students to complete.

## **Results**

SRNA entering the workforce seek employment with practices that do not overly restrict the CRNAs scope of practice and allow CRNAs to make the best use of their education and training.

## **Discussion**

Facilities and practices wishing to increase job satisfaction and retainment among CRNA staff should encourage delivery models that do not overly restrict scope of practice and allow CRNAs to make the best use of their education and training.

## **Funding**

Middle Tennessee School of Anesthesia Alumni Grant

## **Conflict of Interest**

The authors have no conflicts of interest to declare.

## **References**

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## Sonographic Evaluation of the Effect of Gum Chewing on Gastric Volume

### Presenters

Matthew Johnson, BSN, RN, SRNA

Samuel L. Seaton, BSN, RN, SRNA

### Abstract

This scholarly project aims to demonstrate the importance of understanding and utilizing gastric ultrasonography in patients who do not fit the standard NPO guideline. This is done by assessing subjects who chewed gum but were otherwise NPO. Aspiration pneumonitis is a condition that leads to lung tissue injury and severe respiratory damage. Aspiration in the perioperative setting significantly increase morbidity and mortality (Faylar & Kantzavelos, 2018). Doyle (2019) conducted a meta-analysis of multiple randomized control trials that summarizes a clinical problem related to inconsistency in proceeding with surgery if a patient chewed gum during his/her preoperative fasting period. For this project, three individuals were used to collect data on. The three subjects remained NPO for >12 hours. All subjects were scanned using a Mindray ultrasound with curvilinear probe in the supine and RLD positions. The gastric antrum was identified, and the gastric cross-sectional area (CSA) was calculated using the ellipse function under direction of an experienced Point of Care Ultrasound (POCUS) expert. Subjects were each provided sugar-free gum to chew. Subjects were re-evaluated at 15, 30, 45 minutes, and CSA measurements were obtained. All patients had a CSA <10 cm<sup>2</sup>, except for subject three at 30 min, who exceeded NPO basal secretions with a gastric antrum measurement of 10.23 cm<sup>2</sup>. Images and videos were captured during the process to develop an instructional video that will be offered to anesthesia providers for educational purposes. It is determined that NPO guidelines are frequently unreliable, and patients often chew gum, eat candy, dip tobacco, etc. before their surgical procedure. The use of POCUS aids in providing a safe and consistent anesthetic when NPO status is questionable. The study results support training CRNAs and implementing gastric POCUS into anesthesia practice.

**Educational Video:** <https://www.youtube.com/watch?v=yk73oVuDBSA>

## **Disclosure**

The following project was developed between January 1st, 2022, and August 30th, 2022, by Matthew Johnson and Sam Seaton, two DNP Anesthesia students from Union University. This project was overseen by DNP advisor Dr. Andrew Rice. All ultrasound measurements were obtained using a Mindray Ultrasound curvilinear ultrasound. Study participants provided adequate consent to be included in the project, and all patient information remained secured in a password-protected folder.

## **3D Printing Meets Anesthesia: A Predictive Study Correlating ETT Size for Tracheal Stenosis via POCUS**

### **Presenters**

Codie Moszczynski, BSN, RN, CCRN, TCRN

Samantha Pickarts, BSN, RN, CCRN

### **Background and Significance**

After the COVID-19 pandemic, anesthesia providers should anticipate delivering care to patients with iatrogenic tracheal stenosis due to prolonged tracheal intubation. Without extreme caution, the deleterious effects of unrecognized, severe tracheal stenosis can pose a significant health and safety risk to patients undergoing anesthesia. This scholarly project assessed the relationship between the diameter of a stenotic tracheal lesion using point-of-care ultrasound (POCUS) and how it correlates to endotracheal tube (ETT) size using 3D-printed tracheas.

### **Methods**

This project utilized a mixed methods approach incorporating analytical and qualitative methods. A predictive study model was utilized to correlate the measured cross-sectional diameter of a tracheal lesion with the recommended internal diameter of an ETT as set forth by The American Society for Testing and Materials. The study utilized innovative 3D-printed tracheas printed at Union University 3D Laboratory that were subsequently submerged in medical-grade ballistic gelatin for sonography. The study results were compiled to create an educational course to train anesthesia providers to predict ETT size in patients with suspected tracheal stenosis utilizing ultrasonography.

### **Results**

A Likert survey measuring self-reported outcomes after completion of the educational course addressing confidence and knowledge of POCUS, the usability and usefulness of POCUS in personal practice, and potential perceived barriers to implementation. 57.7% of respondents (n=26) reported ultrasound knowledge was the primary barrier to using POCUS in their current practice. After completing the educational course for airway POCUS, 84.6% of respondents felt

more confident in their ability to perform upper airway assessment and predict ETT size for patients with tracheal stenosis.

## **Conclusion**

Utilization of an innovative 3D-printed airway model with varying degrees of stenosis can help eliminate barriers to airway POCUS assessment for patients with suspected iatrogenic tracheal stenosis. Additional studies are needed for clinical correlation and success of anesthesia providers in the clinical setting performing airway sonography.

## **Disclosures**

The authors declare no relevant financial or material interests related to the research described in this paper.

## **Keywords**

Tracheal stenosis, subglottic stenosis, ultrasound, point of care ultrasound, POCUS, endotracheal tube, airway management, COVID-19

## **Cadaveric Evaluation of Different Approaches for the Serratus Plane Blocks**

### **Presenters**

Joshua Morse, BSN, RN

Justin Woods, BSN, RN, SRNA

### **Abstract**

The anterior serratus plane block (ASPB) was developed to provide chest wall analgesia to patients experiencing rib fracture pain, anterolateral wall surgeries, breast surgery, or as an adjunct to intrathoracic surgeries in 2013 (Shang et al., 2020). Due to the relatively easily identifiable landmarks, the anterior serratus plane block is quickly gaining popularity among anesthesia providers. However, despite the block's growing utility, current guidelines give no definitive recommendation as to which technique is superior (Superficial or Deep) in facilitating local anesthetic spread and subsequent better dermatomal coverage for patients receiving a serratus plane block.

A cadaveric dye study was performed to compare the two different approaches to the anterior serratus plane block and assess the anatomical spread and staining of nerves in the chest wall. This study was conducted using a phenol alcohol embalmed cadaver, 0.01% methylene blue dye, and linear array ultrasound probe, along with the assistance of a regional anesthesia expert and clinical anatomist. Injections were performed with 30ml of 0.01% methylene blue in either the deep to- or superficial to the anterior serratus muscle. After two hours, a gross dissection comparison showed a similar dermatomal coverage with the superficial and deep to anterior serratus injection techniques. However, staining of the thoracodorsal, long thoracic, and lateral cutaneous branches of intercostal nerves was noted with the superficial approach. Therefore, the superficial approach has superior staining of nerves supplying innervation to the anterior chest wall. Cadaveric findings should be correlated with further clinical studies; however, the findings imply better analgesia with the superficial approach.

### **Disclosure**

The authors of this study have no financial relationships with any commercial interest related to the content of this activity.

THIS POSTER IS ENTERED INTO THE POSTER CONTEST

Union University Student Presenters

## Applied Virtual Reality Simulation for Anesthetic Block Education

### Presenters

Joshua Lawson, BSN, RN

Garrett Rhodes, BSN, RN

### Abstract

Virtual reality is an emerging technology that has the potential to revolutionize the teaching and training of anesthesia professionals. The latest wireless self-contained devices offer learners a depth of immersion unseen before with previous virtual applications. Therefore, there are few studies evaluating the effectiveness of these newer devices. In our study, we use the latest, consumer grade, virtual reality devices and applications available to immerse students in an interactive virtual cadaver dissection, where they are taught, hands-on, the anatomy and methodology of an ultrasound-guided popliteal nerve block. Nineteen students were guided through this educational experience and evaluated pre-experience and post-experience for improvements in understanding, performance confidence, perception, and comfort of the experience. Students involved had a 39.2% increase in perceived ability to perform the block, a 34.2% increase in confidence in attempting the block in clinical or lab, 100% reported a greater understanding of the blocking process, 100% post-study perception of VR being useful for anesthesia education, with 100% stating they would recommend the experience for a fellow student or colleague. 89.5% report no discomfort with factory standard comfort measures, and there were 0 instances of nausea or disorientation (previous barriers of older virtual reality devices). Respectfully submitted for judging in the TANA poster competition.

### Disclosure

We have no financial interest, sponsorships, or influence to disclose for this project.



THIS POSTER IS ENTERED INTO THE POSTER CONTEST

Union University Student Presenters

## Decreasing Opioid Adverse Drug Events and Enhancing Recovery after Cardiac Surgery Using Erector Spinae Plane Block: A Quality Improvement Project

### Presenters

Lauren Larsen, BSN, RN

Kellie McGiffin, MBA, BSN, RN

### Abstract

In this project, a retrospective chart review was conducted to examine the efficacy of using an erector spinae plane (ESP) block in decreasing opioid consumption in cardiac surgery via sternotomy. A literature review suggests that implementing an ESP block will reduce the incidence of opioid-related adverse events (ORADEs) and enhance recovery after surgery (ERAS). This paper examined the following variables: 24-hour postoperative morphine equivalents, length of hospital stay, and the incidence of postoperative nausea and vomiting. The Epic SlicerDicer system was utilized to collect the data for this project. The findings were a lower incidence of postoperative morphine equivalents and length of hospital stay in the group who received the ESP block preoperatively. No statistical difference was found in the incidence of postoperative nausea and vomiting between the two groups. The data was disseminated using a structured educational intervention on the ESP block and a pre-post-test questionnaire design.

### Disclosure

The authors of this project have no conflict of interest related to the topic presented.

## **Dexmedetomidine vs. Midazolam for Periprocedural Sedation**

### **Presenter**

Ashley Pratt, BSN, RN

### **Abstract**

Midazolam has been the preoperative drug of choice for sedation and anxiety for years despite its undesirable side effects. Dexmedetomidine is becoming more popular, and research has found it a better option for those with post-traumatic stress disorder, high risk of emergence delirium, and those patients we want to maintain spontaneous ventilation. Dexmedetomidine provides multiple benefits, such as attenuation of SNS response, anxiety relief, decreased coughing and gagging, and analgesia, which reduces opioid consumption and length of stay. Anesthesia providers, patients, and surgeons were satisfied or even preferred sedation with dexmedetomidine over midazolam. Dexmedetomidine should be considered for the right patient population for periprocedural sedation to avoid undesirable side effects and maximize patient satisfaction and outcomes.

### **Disclosure Statement**

I have no relevant financial or personal relationships to the products or services described, reviewed, evaluated or compared in this presentation.

THIS POSTER IS ENTERED INTO THE POSTER CONTEST

Union University Student Presenter

## Does Education on Magnesium Sulfate Change Practice?

### Presenter

Curtis Sutera, BSN, RN, SRNA

### Abstract

Pain management in the postoperative period is a multimodal approach encompassing various techniques, including nerve blocks, opioids, and other medications. Through an investigation of the literature, magnesium sulfate (MgSO<sub>4</sub>) was identified as a possible technique to lower postoperative pain scores and decrease opioid consumption. According to Gao et al. (2020), patients receiving magnesium sulfate had lower verbal numerical pain scores from one minute to four-hour postoperatively. In addition, Nadri et al. (2018) reported less overall morphine administration in the postoperative period. This Quality Improvement project aims to determine if providing education to anesthesia providers on current evidence on MgSO<sub>4</sub> will result in practice change. During a seven-week implementation phase at Hardin Medical Center in Savannah, TN, providers were evaluated on their knowledge of magnesium sulfate. The same providers were then educated and reassessed following the implantation phases. Results included an approximate 20% increase from pre to post-test scores and a p-value of 0.005 following a paired t-test. These results provide evidence that practice change has occurred. However, more extensive studies are needed due to the relatively small sample size and the need to determine standardized dosing for MgSO<sub>4</sub> for pain management.

### Disclosure

The author declares no relevant financial or material interests related to the research described in this paper.

## The Use of Diaphragmatic Ultrasound after Neuromuscular Blockade Reversal

### Presenters

Gleyndon Kern, BSN, RN, SRNA

Jennifer Kern, BSN, RN, SRNA

### Abstract

Diaphragm ultrasound (DUS) is commonly used to assess diaphragm function in the intensive care setting, but its use in the perioperative setting is new (Lang et al., 2021). Recent studies recommend implementing DUS in the operating room to guide extubation timing and prevent postoperative pulmonary complications (PPCs) and postoperative residual curarisation (PORC) (Lang et al., 2021). The diaphragm function can be evaluated using ultrasound assessment at the zone of apposition during inspiratory and expiratory respiratory activity (Yu et al., 2021). To assess the quality of the diaphragm function, a simple equation is used to measure the diaphragm's thickening fraction (TF%). In this study, two healthy subjects underwent a right-sided diaphragm ultrasound. The subjects were scanned using a MindRay ultrasound with a linear probe in the semi-recombinant position. The TF% of subject one and two were 210% and 110%, respectively. In a study by Yu et al. (2021), patients with lower postoperative diaphragm TF% developed more PPCs. Predicted extubation failure occurs at TF% of less than 36.3 to 37.1% (Mercurio et al., 2021). Patients at higher risk for PPCs or undergoing surgical procedures surrounding the phrenic nerve will most benefit from a DUS (Vetrugno et al., 2019). The authors developed an educational video demonstrating how to perform a DUS, followed by ultrasonographic images and reference values to follow. The authors of this project have no conflict of interest related to the topic presented.

## Quadratus Lumborum Block Approach Comparison: A Cadaveric Dye Study

### Presenters

Amanda Cox, BSN, RN, SRNA

Amanda Terwilliger, BSN, RN, SRNA

### Abstract

The Quadratus Lumborum (QL) block has recently become more popular due to its ability to provide multimodal pain coverage for various truncal surgical interventions in adults and pediatrics. Recent studies and case reports reveal that the QL block can successfully reduce postoperative pain and opioid consumption for up to 48 hours for procedures involving the abdominal wall, pelvic, and lumbar regions (Akerman et al., 2018; Uppal et al., 2020). An added benefit of the QL block is its somatic and visceral coverage, unlike other regional methods used for abdominal wall and pelvic procedures. The QL block has the potential to offer dermatomal distribution of local anesthetic from T7-L2 and can even extend to the paravertebral spaces and the sympathetic chain (Gupta et al., 2019). The QL block can be performed using three different approaches: lateral (QLB 1), posterior (QLB 2), and anterior (QLB 3). The primary purpose of this project was to evaluate which approach offers more somatic and visceral coverage when comparing the lateral and posterior approaches. A formalin-fixed human cadaveric dye study was conducted using methylene blue dye to simulate local anesthetic spread. Injections were performed using ultrasonography under the supervision of experienced nurse anesthetists. After four weeks, a gross dissection comparison indicated that the posterior approach offered greater dermatomal spread and visceral coverage when compared to the lateral approach. These findings suggest that the posterior approach may offer greater analgesia for those undergoing abdominal wall and pelvic surgeries. The results of this research should be correlated with current and future clinical studies.

### Disclosure

The authors and contributors to this research have no financial interests or commercial relationships related to the research conducted in this study.

## **The Effects of Endotracheal Epinephrine Administration in a Pediatric Cardiac Arrest Model**

### **Presenters**

Dawn Blouin, BS

Melissa Genczo, MSN, RN

1LT Anna Grauel, BSN, RN

Julie Hensler, PhD

Don Johnson, PhD

CPT Maggie Keating, BSN, RN

Mary Alana Rogers, BSN, RN

Joseph O' Sullivan, PhD, CRNA

COL John Yauger, PhD, CRNA

### **Introduction**

Euvolemic cardiac arrests in children include blunt trauma, respiratory, drowning, and infectious causes. Regardless of the etiology, rapid administration of epinephrine decreases morbidity and mortality. CRNAs need to know the most effective method of administering epinephrine for pediatric patients in cardiac arrest. Since endotracheal tube (ET) access may be obtained before intravenous (IV) access, the effectiveness of ET administered epinephrine must be investigated. Our aim was to determine if mean concentration (MC) over 5 minutes, area under the curve (AUC), maximum concentration (C<sub>max</sub>), time to maximum concentration (T<sub>max</sub>), frequency, and time of return of spontaneous circulation (ROSC) of epinephrine comparing ET and IV routes. There are currently no studies demonstrating the effectiveness of endotracheal epinephrine in a euvolemic pediatric model.

### **Methods**

**Design:** This prospective, experimental study used male pediatric swine weighing 24-37 kg, which represents the average weight of a child between 5-6 years of age.

**Intervention:** Four groups were used: ET (N=8), IV (N=7), cardiopulmonary resuscitation (CPR)+defibrillation (N=5) and CPR only (N=3). The latter two groups served as control. All swine were placed into cardiac arrest for 2 minutes and then CPR was initiated for 2 minutes. A dose of 0.1mg/kg of epinephrine was then administered by ET or 0.01 mg/kg for IV and continued every 4 minutes or until ROSC. Defibrillation was begun at 3 minutes and continued every 2

minutes for 30 minutes or until ROSC. The CPR only group did not have defibrillation. Blood samples were collected over a period of 5 minutes.

**Statistical Tests:** A multivariate analysis of variance was used to determine if there were significant differences between the groups relative to the pretest data, Cmax, Tmax, AUC, MC, and time to ROSC. A Chi-Square was used to determine if there were differences in occurrence of ROSC. The odds of ROSC were calculated.

## Results

No significant differences existed in pretest data in any group or in occurrence of ROSC between the IV and ET groups ( $p > 0.05$ ). All ET subjects (8 out of 8), 5 out of 7 IV subjects, and 2 out of 5 subjects achieved ROSC in the CPR+defibrillation group. Odds of ROSC were 14x greater for the ET vs. IV group. The plasma Cmax was significantly higher for the IV vs. ET group ( $p < 0.001$ ). The means  $\pm$  standard deviations (SD) for the IV and ET groups were  $428.2 \pm 38.6$  ng/mL and  $195.4 \pm 32.6$  ng/mL respectively. Tmax was significantly shorter for the IV vs ET Group ( $p < 0.001$ ). The means  $\pm$  SD for the IV and ET groups were  $42.0 \pm 10.4$  and  $145.7 \pm 8.8$  seconds respectively. There was no significant difference in AUC between the two groups. The means  $\pm$  SD for the IV and ET groups were  $30,324.6 \pm 7,985.2$  ng/mL and  $35,522.5 \pm 6,748.7$  ng/mL respectively. No significant difference existed in time to ROSC between the IV and ET groups ( $p = .616$ ). The means  $\pm$  SD in seconds for the IV and ET groups were  $398.4 \pm 73.4$  and  $348.6 \pm 62.1$  respectively.

## Discussion and Conclusion

**Synthesis and conclusion:** Based on the results of this study, the ET should be considered as a first-line intervention for pediatric cardiac arrest. Studies show that intubation time is approximately 34 seconds compared to a lengthier time for gaining IV access. The chances of ROSC are reduced by 9 percent for each minute of delay in administering epinephrine. The valuable time saved using the ET route may translate into a greater likelihood of achieving ROSC.

**Limitations:** One limitation of this study was that the swine model may not be generalizable to humans; however, pigs have similar cardiovascular structure and bone structures to humans. The study also had a small sample size, although there was a large enough sample size to yield statistical difference between groups.

**Recommendations for Future Research:** Recommendations for future research is to replicate this study with a larger sample size and to replicate the study in the adult normovolemic model. Research should also be completed to evaluate the effectiveness of implementing weight-based dosing of epinephrine into the adult advanced cardiovascular life support (ACLS) algorithm.

The authors declare there is no conflict of interest connected to this work. The views expressed in this work are those of the authors and do not reflect the official policy or views of the US Army, the US Department of Defense, or the US Government.



THIS POSTER IS ENTERED INTO THE POSTER CONTEST

United States Army Graduate Program in Anesthesia Nursing Student Presenters

## **Comparison of Onset of Epinephrine Between Intravenous and Tibial Intraosseous Administration in a Pediatric Porcine Model**

### **Presenters**

Bryan Ainsworth, BSN  
Dawn Blouin, BS  
Tomás Eduardo Ceremuga, PhD, CRNA  
Trevor Hanson, BSN, RN  
Julie G. Hensler, PhD  
CPT Patrick Houston, BSN  
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### **Impact Statement**

Annually in the United States, 15,000 pediatric patients require epinephrine for cardiac arrest. CRNAs need to know the fastest route of onset of epinephrine to optimize chances of survival. (190/200 characters)

### **Introduction / Problem / Literature Review**

Obtaining reliable vascular access is essential in pediatric resuscitation. Without vascular access, the administration of epinephrine is delayed and the chance of survival decreases 9% each minute. Intraosseous (IO) access is a fast and reliable route to give medications in situations when vascular access cannot be rapidly achieved. The purpose of this study was to compare the onset of epinephrine by the intravenous (IV) versus the tibial intraosseous (TIO) route in a normovolemic pediatric model. Few studies have examined the onset of any drug when comparing IV and IO routes, and it is not known if a significant difference in onset exists. If a significant difference does not exist, this would support obtaining TIO access sooner when IV access cannot be established. TIO was chosen since it is the preferred site of IO access in pediatric emergencies. (862/875 characters)

## Methods

**Design:** This was an experimental study.

**Setting:** Tri-Service Research Facility was used. Subjects: 18 swine weighing between 20-40 kilograms, which is representative of a pediatric child.

**Measures:** G-Power was used to determine the number of subjects. A multivariate analysis of variance (MANOVA) was used to analyze the pretest data to determine equivalence of the groups. An independent t-test was used to analyze the differences in onset between the groups.

**Intervention:** The pigs were randomly assigned to the IV or TIO group. Swine were anesthetized, and after 15-minute stabilization, baseline blood pressure and pulse were recorded for each subject. Epinephrine 1:10,000 was then administered at a dose of 0.01 mg/kg followed by a 10 mL flush of 0.9% normal saline. A stopwatch was started on administration and stopped once a 10% increase above the baseline pulse and/or blood pressure was achieved. This value was recorded as onset of effect. (951/1050 characters)

## Results

Similar studies were used to calculate a large effect size, 0.6. Using a power of 0.80, an effect size of 0.6 and an alpha of 0.05, we calculated a sample size of 9 in each of the IV and TIO groups. A MANOVA indicated that there were no significant differences between the IV and TIO groups relative to weight, blood volume, systolic blood pressure, or pulse; indicating that the groups were equivalent on these variables ( $p > 0.05$ ). The initial systolic blood pressures and pulses by group are reported in means  $\pm$  standard deviations. The systolic blood pressures were as follows: TIO:  $99.4 \pm 27.7$ ; IV  $97.3 \pm 16.0$ . The initial pulses were as follows: TIO:  $83 \pm 21.0$ ; IV pulse:  $88 \pm 8.7$ . An independent t-test indicated that there was a significant difference in time to onset ( $p = 0.002$ ). The means  $\pm$  SD of time in seconds to increase systolic blood pressure and/or pulses by 10% were as follows: TIO:  $14 \pm 4$ ; IV:  $8 \pm 2$ . (921/1050 characters)

## Discussion

**Synthesis and Conclusion:** The American Heart Association recommends using the IV route for epinephrine administration; however, this recommendation is based primarily on expert opinion, rather than on research data. The difference in onset of action of epinephrine between IV and TIO was statistically significant, however this was not clinically significant. CRNAs can be confident that administration of epinephrine by the TIO route is efficacious.

**Relevance:** Initial placement of an IV may delay epinephrine administration. A TIO is easier and faster to place in a pediatric patient. Given the clinical similarities in time of onset of epinephrine in the IV versus TIO route, the faster placement of TIO may result in improved outcomes in pediatric arrest in terms of odds and time to return of spontaneous circulation.

**Limitations:** Swine may not be generalizable to humans; however, they do have similar cardiovascular systems and bone structure. Another limitation to this study was the small sample size, although the power was large enough to find a statistically significant difference.

**Recommendations for Future Research:** Future studies should include a larger sample size and other IO sites. Measuring peak and duration as well as time for elimination ( $t_{1/2\beta}$ ) from the body should also be investigated. (1313/1400 characters)

## **Funding Source**

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## **Conflict of Interest**

The authors declare that they have no conflict of interest. The views expressed are those of the authors and do not necessarily reflect those of the US Army or the Department of Defense.

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## **Dexmedetomidine to Reduce PONV**

### **Presenters**

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Joshua Lawrence, BSN, RN, SRNA

Staci Martinez, BSN, RN, SRNA

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### **Purpose/Background**

Postoperative nausea and vomiting (PONV) contribute to patient dissatisfaction, discomfort, adverse outcomes, and increased healthcare costs. Despite current protocols that aim to reduce PONV by prevention/antiemetic administration, PONV continues to be a common manifestation in many postoperative patients (Elvir-Lazo et al., 2020). This scoping review aimed to analyze available research on the efficacy of dexmedetomidine to reduce perioperative opioid requirements and PONV.

### **Methods**

Synthesis of this scoping review began with a systematic approach to search databases and identify eligibility criteria articles. Of the 21 articles that met criteria, a synthesis table was formed to visualize the qualitative (smoking status, surgery type, medical history, etc.) and quantitative (sex, age, American Society of Anesthesiology (ASA) status, etc.) data points of interest. Ten articles were then selected for review via Rapid Critical Appraisal (RCA). Finally, each article's comparison of two study groups (patients receiving dexmedetomidine without opioids and those who did not) were analyzed to find a direct correlation between dexmedetomidine administration and a decrease in PONV.

### **Results**

For 100% of studies analyzed, dexmedetomidine reduced the incidence and severity of PONV. 90% of studies showed decreased perioperative opioid requirements. The method of dexmedetomidine administration was the most potent predictor of undesirable hemodynamic changes, highlighting the need for further research on appropriate dosing of dexmedetomidine when using it in an opioid-sparing manner to reduce PONV.

## **Implications for Nursing Practice**

The evidence found highlights the efficacy of using dexmedetomidine to reduce perioperative opioid usage and PONV. Nevertheless, the practice of using two classes of antiemetics to prevent PONV remains the standard in anesthetic practice, making some providers hesitant to attempt using dexmedetomidine for this purpose. Providers should be educated on the findings of this scoping review, and further studies aiming to identify the efficacy of using dexmedetomidine should be conducted.

## **Disclosure**

The authors declare no financial incentive or other conflicts of interests that relate to the research described in this poster.

## **Effectiveness of Perioperative Ketamine vs. Opioid Analgesia on Extubation Time and Total Perioperative Opioid Requirement Abstract**

### **Presenters**

Robert Gray, BSN, RN  
Sarah Hardesty, BSN, RN  
Heidi Higginbotham, BSN, RN  
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### **Purpose/Background**

Opioid analgesics are a primary source of pain control in the perioperative patient. However, all opioids decrease ventilatory drive secondary to  $\mu_2$  receptor agonism in the brainstem. Ventilatory depression delays extubation after mechanical ventilation in post-operative patients, thus increasing the risk of complications such as ventilator-associated pneumonia and barotrauma. Non-opioid analgesics such as ketamine have been considered for use in order to reduce this risk. Ketamine is a noncompetitive *N*-methyl-*D*-aspartate receptor-antagonizing sedative that bears analgesic properties while preserving respiratory drive. Research suggests that ketamine provides effective perioperative pain control and decreases postoperative extubation time when given alone or with other non-opioids.

### **Methods**

Fifteen peer-reviewed studies published between 2009 and 2020 were chosen for the scoping review. Eligible studies compared the effects of opioid anesthetics versus ketamine anesthesia on extubation time, total perioperative opioid use, and perioperative adverse outcomes. A synthesis table was formulated to compare perioperative ketamine use with reduced post-operative extubation time and perioperative opioid requirements.

### **Results**

Of the study sample (N=15), all fifteen articles provide evidence that perioperative ketamine administration results in either decreased post-operative extubation time, reduced perioperative opioid requirements, decreased incidence of perioperative respiratory depression, or a combination of these in comparison to opioid use alone. Three systematic reviews, nine randomized controlled trials, one controlled trial without randomization, and one

cohort study were chosen in order to provide credible evidence across all research levels that perioperative ketamine use is beneficial towards reducing time to postoperative extubation.

### **Implications for Nursing Practice**

The scoping review provides evidence across multiple research levels suggesting that perioperative ketamine use reduces time to extubation in the postoperative patient. Evidence also suggests that perioperative ketamine use reduces post-operative opioid requirements. This practice may be implemented within surgical settings to reduce the risk of postoperative respiratory complications in surgical patients.

### **Keywords**

opioids, ketamine, perioperative, postoperative, extubation

## **Implementation of Enhanced Recovery After Surgery (ERAS) Guidelines: A Comprehensive Interdisciplinary Approach**

### **Presenters**

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### **Abstract**

Elective surgery is a major aspect of healthcare expenditure for the United States, with over 36 million surgical procedures being performed in 2012. As the US population ages, surgical volumes and the complexity of medical care are predicted to drastically increase. There is a wide variation in provision and outcomes of similar surgeries worldwide (Gan et. al., 2018). In the US, some surgical interventions for the same diagnostic intervention can vary up to 10-fold. Furthermore, the Medicare Access and CHIP Reauthorization Act of 2015 was implemented, which emphasizes value over volume for hospitals to receive reimbursements. According to Shodhan et. al. (2016), health care value is defined as positive patient outcomes, or quality, per dollar spent, which requires healthcare systems to improve patient outcomes while reducing costs. A standardized, patient-centered approach in the surgical specialty is critical to improve patient outcomes and combat escalating healthcare costs.

Enhanced Recovery After Surgery (ERAS) are evidence-based pathways utilizing all members of the interdisciplinary team in the surgical specialty. ERAS was initially developed for colorectal surgery, however, has successfully branched into many other surgical specialties (American Association of Nurse Anesthetists, 2021). The care pathways are initiated before admission and extend to the post-discharge period. Some of the key elements of ERAS are patient/family education and engagement; patient optimization before admission; minimal fasting that optimally includes a carbohydrate beverage and, at a minimum, clear fluids up until 2 hours before anesthesia; goal-directed fluid therapy, when appropriate; multimodal analgesia with appropriate use of opioids; return to normal diet and activities within 24 hours after surgery; and return home in an expedited time frame (Reede, Lukyanova & Chappell, 2017). Additionally, the success of ERAS depends on a multidisciplinary, team-based approach. The interdisciplinary team should consist of the surgical team, anesthesiology, nursing, nutrition, physical therapy, and other dedicated hospital team members (Shodhan et. al., 2016). Involvement from different disciplines is key for the success of ERAS implementation.

Implementation of ERAS pathways have reduced adverse effects from the surgical stress response, resulting in a critical shift in the perioperative management of patients. According to the American Association of Nurse Anesthetists (2021), evidence suggests that ERAS



contributes to improved patient outcomes, reduces postoperative complications, accelerates recovery, and supports early discharge, with savings from a decreased length of stay, complications, and readmission offsetting increased cost of care. Within nine months after implementation of an ERAS program at a community hospital, the hospital reduced length of stay by at least 50% and decreased direct cost by \$4,357 per surgical case (Shanahan et. al., 2016). The components of ERAS pathways decrease variability, thereby improving perioperative quality of care.

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## Comparing the Effectiveness of Perioperative Ketorolac to Opioids: A Scoping Review

### Presenters

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### Purpose/Background

Opioids are commonly administered in the perioperative period to manage surgical pain. However, the ongoing opioid epidemic in the United States makes it necessary to evaluate other modalities of pain management that do not cause respiratory depression, nausea, vomiting and addiction. Ketorolac is a nonsteroidal anti-inflammatory drug that can manage pain safely and effectively. This scoping review examines the available literature on the effectiveness and feasibility of using ketorolac to minimize perioperative opioid use.

### Methods

A comprehensive literature review was performed between October 2020 and September 2021 utilizing five scholarly databases: GoogleScholar™, PubMed, Ovid, Cochrane Library, and the University of Tennessee Health Science Center (UTHSC) library databases. The key terms searched were “narcotics,” “opioids,” “intraoperative,” “ketorolac,” and “Toradol.” 28 articles met the initial inclusion criteria and were subjected to a rapid critical appraisal by each team member. Fifteen articles were included in the final review and the results of the literature were organized in a synthesis table.

### Findings

The literature surveyed in this scoping review suggests that perioperative ketorolac administration reduces postoperative opioid consumption and postoperative pain scores in adult patients undergoing a variety of surgical procedures. Furthermore, perioperative ketorolac administration significantly reduced the incidence of PONV and was not associated with any significant adverse effects or negative postoperative outcomes in adult surgical patients. Finally, the authors identified significant heterogeneity in the current data, which limited their ability to provide specific guidance for practice.

## **Interpretations**

The scoping review authors suggest that further, more robust, and homogenous studies should be performed regarding the efficacy and safety of ketorolac in the perioperative period. In general, intraoperative ketorolac administration provided sufficient, opioid-sparing analgesia without the adverse effects of narcotics. Ketorolac is a valuable adjunct in a multimodal perioperative analgesia regiment. Anesthesia providers should strongly consider utilizing ketorolac as an alternative to perioperative opioids to improve postoperative patient outcomes and combat the opioid epidemic in America.

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## **Esmolol Compared to Fentanyl on Hemodynamic Effects: A Scoping Review**

### **Presenters**

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Timothy Moore, BSN, RN, SRNA  
Jamie Pitcock, BSN, RN, SRNA

### **Purpose/Background**

During endotracheal intubation via direct laryngoscopy, forty percent of patients will have hemodynamic changes due to a sympathetic response that has proven to be detrimental to individuals with cardiovascular disease, increased intracranial pressure, or anomalies of cerebral vessels (Hashemian et al., 2018). Blunting this sympathetic response is of the essence to improve patient outcomes and provide safe anesthesia to individuals, especially those at high risk. To attenuate the sympathetic response, practitioners utilize either a cardio-selective beta-blocker, Esmolol, or an opioid, Fentanyl. The purpose of this scoping review is to analyze which medication most effectively reduces the sympathetic response to tracheal intubation with fewer side effects to create standardized guidelines for best practice.

### **Methods**

A scoping review was performed on fifteen critically appraised articles from 2015-2020 to measure the efficacy of Fentanyl compared to Esmolol in blunting the hemodynamic response to direct laryngoscopy and tracheal intubation. The relationships of patient outcomes due to the administration of different doses of the drugs were explored. A summary evaluation table was composed to compare the efficacy outcomes of each medication to blunt the sympathetic nervous system response to direct laryngoscopy and endotracheal intubation based on a decrease of heart rate or blood pressure. laryngoscopy and endotracheal intubation based on a decrease of heart rate or blood pressure.

### **Results**

Of the fifteen peer-reviewed, full-text, academically resourced articles, seven provided significant statistical evidence to support Esmolol in attenuation of hemodynamic changes compared to only two articles that provided significant statistical evidence for Fentanyl.

## **Implications for Nursing Practice**

Results of the scoping review indicate that perioperative use of Esmolol is effective in attenuating the sympathetic nervous system response to direct laryngoscopy and endotracheal intubation for anesthesia practice. The utilization of Esmolol can be implemented as a standard of care, allowing safer practices, providing better patient outcomes, and avoiding intraoperative both stroke and heart attack, especially in high-risk populations.

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