Fall 2023

Cricothyrotomy and Transtracheal Jet Ventilation Best Practices for Nurse Anesthesia

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CRICOTHYROTOMY AND TRANSTRACHEAL JET VENTILATION BEST PRACTICES FOR NURSE ANESTHESIA

by

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A Doctoral Project
Submitted to the Graduate School,
the College of Nursing and Health Professions
and the School of Leadership and Advanced Nursing Practice
at The University of Southern Mississippi
in Partial Fulfillment of the Requirements
for the Degree of Doctor of Nursing Practice

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December 2023

Published by the Graduate School

ABSTRACT

The doctoral project aimed to develop a mechanism that could be used to complete cricothyrotomy and transtracheal jet ventilation at The University of Southern Mississippi Nurse Anesthesia Program. The basis for this doctoral project was an objective structured clinical evaluation (OSCE) for achieving a cricothyrotomy and transtracheal jet ventilation. Best practice techniques were analyzed and executed in the creation of this OSCE.

Performing cricothyrotomy and transtracheal jet ventilation in a simulation environment before clinical practice allows student registered nurse anesthetists (SRNA) a greater degree of confidence while preserving patient safety. Increased competency and patient safety in the clinical setting were the main objectives of the OSCE. The cricothyrotomy and transtracheal jet ventilation OSCE was provided to all faculty, 2nd-year SRNAs, and 3rd-year SRNAs that invited participants to complete a voluntary, anonymous survey. Participants agreed that the OSCE clearly expressed the information on performing a cricothyrotomy and transtracheal jet ventilation. Through the survey, suggestions were provided, and modifications were made to the OSCE to improve OSCE efficacy. Survey results and a review of current literature indicate the OSCE on cricothyrotomy and transtracheal jet ventilation could benefit SRNAs as they enter clinicals.

ACKNOWLEDGMENTS

We want to thank our committee chair, Dr. Nina Mclain, for her direction, professional assistance, and reassurance throughout the process of conducting this doctoral project. We are also grateful for her valued research on trigger films that we were able to cite within this doctoral project. We would also like to thank our committee member, Dr. Michong Rayburn, for her motivation and support.

DEDICATION

First, we want to thank God for giving us the opportunity, drive, and ability to achieve more than we deserve. We want to dedicate this doctoral project to some extraordinary people in our lives, our families. The constant guidance, love, and support propelled us to be the best we could be since early childhood. To each of our wives, thank you for supporting our family and accepting more responsibilities to ensure we successfully close this chapter of our lives, all while showing us diligent support, love, and understanding. To our children, who will have no memory of this accomplishment, may you enjoy the fruits of our labor and learn from our path that you can accomplish any goal that is set before you.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF ILLUSTRATIONS

LIST OF ABBREVIATIONS

AACN	American Association of Colleges of Nursing
AANA	American Association of Nurse Anesthetists
ASA	American Society of Anesthesiologist
BMV	Bag-Mask Ventilation
CICO	Can't Intubate, Can't Oxygenate
CRNA	Certified Registered Nurse Anesthetist
CTM	Cricothyroid Membrane
DAA	Difficult Airway Algorithm
DAS	Difficult Airway Society
DL	Direct Laryngoscopy
DNP	Doctor of Nursing Practice
EBP	Evidence-Based Practice
ETT	Endotracheal Tube
HFJV	High Frequency Jet Ventilation
MJV	Manual Jet Ventilation
NAP	Nurse Anesthesia Program
NBCRNA	National Board of Certification and Recertification for Nurse Anesthetists
OSCE	Objective Structured Clinical Examination
OR	Operating Room
SRNA	Student Registered Nurse Anesthetist
TCM	Thyroid Cartlidge Membrane

TIVA	Total Intravenous Anesthesia
TTJV	Transtracheal Jet Ventilation
USM	The University of Southern Mississippi

CHAPTER I – INTRODUCTION

Throughout a Student Registered Nurse Anesthetists (SRNA) education, numerous lectures, textbooks, simulations, videos, and clinical rotations serve as checkpoints in advancing knowledge. The checkpoints listed above serve as a guide for instructors and SRNAs both to better prepare the SRNA for practicing anesthesia. This learning model integrates clinical practicum and didactics, producing a steep learning curve for SRNAs to climb.

"Professional knowledge and skills, especially in anesthesia, require continuous updating and enhancement with the most current evidence that informs practice" (National Board of Certification and Recertification for Nurse Anesthetists [NBCRNA], 2021, n.p.). Therefore, the education that SRNAs receive is ever-evolving by matching new evidence-based practice (EBP) and meeting the intellectual and clinical competencies presented by accreditation organizations.

Anesthesia providers must know diverse skills and procedures to meet the standards of distinctive preceptors and practices. A multitude of environments exist for the certified registered nurse anesthetist (CRNA) to practice anesthesia, such as: the office of a dentist, advanced surgical center, obstetrical surgery centers, and trauma centers (American Association of Nurse Anesthetists [AANA], 2019). Fluctuating standards and changing environments create a difficult path to mastering anesthesia. An opportunity presents itself to develop an Objective Structured Clinical Examination (OSCE) to aid in the learning process for SRNAs. Utilizing an OSCE, SRNAs can be more comprehensively prepared for didactic and clinical training via simulation-based training.

Problem Description

In The University of Southern Mississippi's (USM) Nurse Anesthesia Program (NAP), SRNAs have a robust simulation background because the program's first year is dedicated to building a knowledge-based foundation through didactics and simulation. Although SRNAs are adequately educated through the program's coursework, SRNAs lack clinical application. This inexperience can be exacerbated by high-stress environments and trauma situations that involve emergency airway techniques unfamiliar to many clinicians. A recent study found that over ten thousand intubations occurred over eleven years, and only twenty-three cricothyrotomies were performed during that same period (Kwon et al., 2019). The procedure's seldom used and critical nature creates a complex problem to surmount.

Patient safety is consistently the prerogative of anesthesia providers; it is necessary to equip SRNAs for critical situations in the simulation setting. The simulation-based practicum allows students to design, evaluate, and practice clinical skills in a controlled atmosphere (Aronowitz et al., 2017). Simulation-based training will enable SRNAs to learn without risking patient safety and gain competency in crucial, infrequently used procedures.

National Board of Certification and Recertification for Nurse Anesthetists (NBCRNA) (2021) states that "anesthesia is a lifelong learning process of acquiring skills and knowledge and the ability to apply those skills and knowledge to practice; therefore, learning is placed on a continuum" (p. 3). SRNAs can acquire foundational knowledge and evaluation from simulation experiences, then be tested in the simulation environment based on their level of competency (Bonanno, 2019). The simulation-based learning

grants the SRNA the ability to make mistakes, and take action to fix those mistakes without risking life and limb. That low-stakes environment can lead to successful learning experiences and improve competencies in the clinical setting.

Statement of the Problem

To meet the American Association of Nurse Anesthetists (AANA, 2019) Standards for Nurse Anesthesia Practice, section nine states that nurse anesthetists must "Continuously monitor ventilation by clinical observation and confirmation" (p.3). Clinicians who do not abide by this standard could endanger patient safety. Exhibiting another milestone in AANA standards, establishing a safety culture is paramount in critical situations. (AANA, 2019). Providing anesthesia requires a specific skill set necessary to handle life-and-death crisis events that may arise. SRNAs develop many techniques for ventilating patients, such as bag-mask ventilation, direct laryngoscopy (DL), video laryngoscopy, laryngeal mask airway, and other routine airway device management. If improperly learned or performed, these learned skills can put a patient's safety at risk.

The SRNA develops many fundamental skills throughout training. Emergency airway techniques are one of the most challenging skills to obtain. Periodically, SRNAs are taught emergency airway management in the clinical setting by observation, but those opportunities rarely happen. Regardless, learning a new skill in the clinical environment can induce needless tension for the SRNA (Mesisca & Mainwaring, 2021). Implementing an OSCE, the SRNA should be less anxious and better prepared to confidently handle an emergency airway situation. Currently, The USM NAP is seeking an OSCE for simulation or reference regarding transtracheal jet ventilation (TTJV) and cricothyrotomy

for SRNAs. Equipping SRNAs with an OSCE for TTJV and cricothyrotomy may provide the education and resources needed to maintain patient safety in emergency airway management situations. Securing a temporary emergent airway can be the difference between life and death, but a permanent surgical solution should be conducted as soon as possible. Furthermore, this OSCE can serve as an educational refresher for CRNAs.

Significance of the Problem

When SRNAs begin clinical rotations, the primary focus is establishing an airway in a timely and safe manner. The SRNA uses skills learned from simulation and previous airway placements to be an airway expert before completing their training. The SRNA must be prepared for the "can't intubate, can't oxygenate" (CICO) situation at all times. Roughly 1 in 5,000 to 10,000 general anesthetics result in a CICO situation (Scott-Herring et al., 2020). The CICO situation can lead to brain damage or even death if the airway is not established promptly. The SRNA must obtain this skill set early in their practice to avoid patient harm when performing a general anesthetic and the CICO situation emerges.

Emergency invasive airway establishment has numerous techniques for performing cricothyrotomy in the CICO scenario that involve the use of different prepackaged cricothyrotomy kits. This OSCE will focus on two standard techniques that do not require the use of prepackaged cricothyrotomy kits. The SRNA will visit many different clinical sites where prepackaged cricothyrotomy kits are not available, therefore, the SRNA must be familiar with and understand the basic principles of performing an emergency cricothyrotomy in the rare instance of a CICO situation. In the CICO situation, the Difficult Airway Society (DAS) recommends performing the surgical

technique of scalpel-bougie-tube (Doody & Smart, 2020). Another technique in an emergency cricothyrotomy is using the needle cricothyrotomy with jet ventilation, although, the DAS recommends this technique for providers experienced with TTJV (Gupta & Ahmed, 2017).

For best patient outcomes, anesthesia care must be performed proficiently and safely. The most important skill for the SRNA, or any anesthesia provider, is maintaining the airway. When the airway is maintained, oxygen can be delivered to the patient to prevent injury related to hypoxia or worse death due to hypoxia. Being able to perform a cricothyrotomy or TTJV will ensure the SRNA has the skill set to maintain the airway during their career as an anesthesia provider. Therefore, this doctoral project will focus on a standardized evaluation tool that educates SRNAs on how to perform a cricothyrotomy and TTJV in the CICO situation.

Stakeholders and Departments

The primary stakeholders are SRNAs and faculty at USM, patients whom the SRNAs serve, clinical affiliations for the NAP, and preceptors utilized by the students. Faculty and students will participate in simulated emergency airway placement utilizing cricothyrotomy and TTJV techniques. The OSCE will grant students the ability to receive criticism and feedback on their performance. Furthermore, the OSCE will create a foundation for establishing emergency airway training concerning cricothyrotomies and TTJV for future NAP students at USM.

Patient Safety

Patient safety plays a vital role in the development of OSCE-based learning. Simulated learning implements a competency-focused guideline by analyzing the

performance of critical skills. Recently a study concluded that only an average of three cricothyrotomies will be seen in a provider's lifetime (Kwon et al., 2019). Furthermore, the infrequent use of jet ventilation creates a dangerous environment where mistakes could be made. The dangerous environment created by infrequent jet ventilation enhances the need for simulation-based learning for skill competency and patient safety.

Trigger Film

An OSCE with a video that uses step-by-step guidance to educate and inform viewers on proper procedures can lack the weight of the value of relayed information. Recently a study concluded that using trigger films for students who associated real-life situations resulted in enhanced retention of information and may also improve clinical performance (McLain et al., 2012). Inserting a fictitious case with the emotional weight that a real-life situation could further secure anesthesia providers to retain and perform in those critical moments.

Available Knowledge

Airway Anatomy

The SRNA must have a thorough understanding of human anatomy when administering anesthesia. More importantly, the SRNA must become an expert in airway anatomy and management to provide a safe anesthetic. To ensure airway control is maintained, the SRNA must understand the passage of oxygen through the airway. When this passage is compromised, the SRNA must have a skill set to re-establish oxygen delivery in the scenario of CICO. Numerous scenarios occur where CICO may emerge, while a few of the most common are as follows: Oral or maxillofacial trauma, cervical

spine trauma, anatomic abnormalities that prevent endotracheal intubation, and profuse oral hemorrhage (McKenna et al., 2022).

The anatomy of the human airway starts with the lips or nostril opening and extends through the vocal cords into the trachea, where the carina is found, giving way to the right and left lungs. As shown in Figure 1, the passage of oxygen travels via the oral or nasal route past the soft palate tissue into the oropharynx where the oxygen is introduced to the laryngeal opening. Oxygen then passes through the vocal cords into the trachea where it continues to the lungs. When DL is attempted, the SRNA must be able to identify anatomical features leading to the opening of the vocal cords to properly establish an airway where oxygen is delivered efficiently to the lungs.

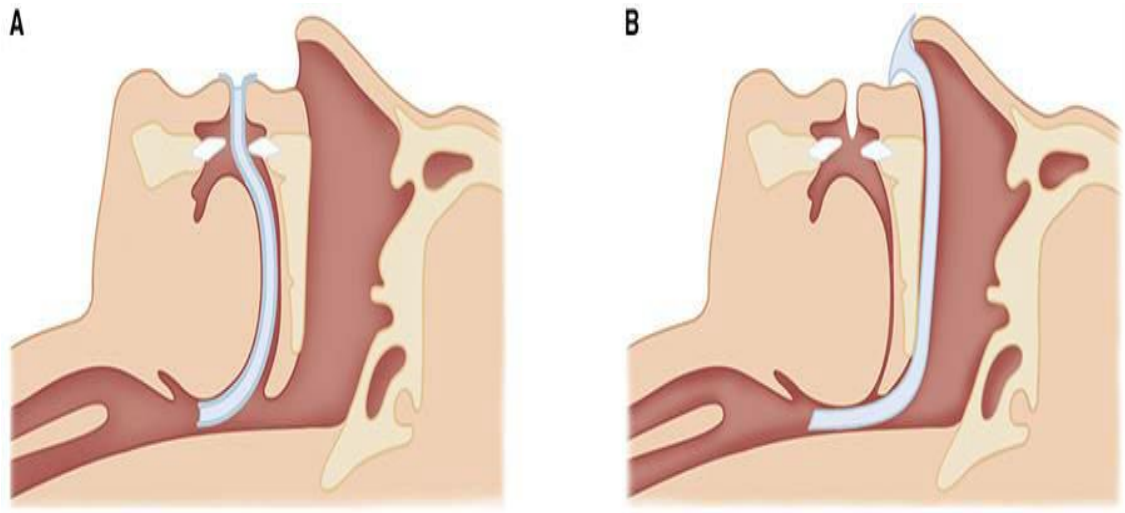

Figure 1. A. Oral ETT Passage B. Nasal ETT Passage

(Butterworth et al., 2018, p. 539)

When unsuccessful at delivering oxygen via nasal cannula, bag-mask ventilation (BMV), or supraglottic airway devices, DL must occur in an attempt to establish an endotracheal tube (ETT) as the means for delivering oxygen to the patient. Unsuccessful DL leads the SRNA to the Difficult Airway Algorithm (DAA), Figure 2, as set forth by

the American Society of Anesthesiologists (ASA) (Apfelbaum et al., 2022). Once the difficult airway algorithm has been initiated, the SRNA must be familiar with the adjuncts listed for means of delivering oxygen and establishing the airway including invasive procedures such as cricothyrotomy and TTJV.

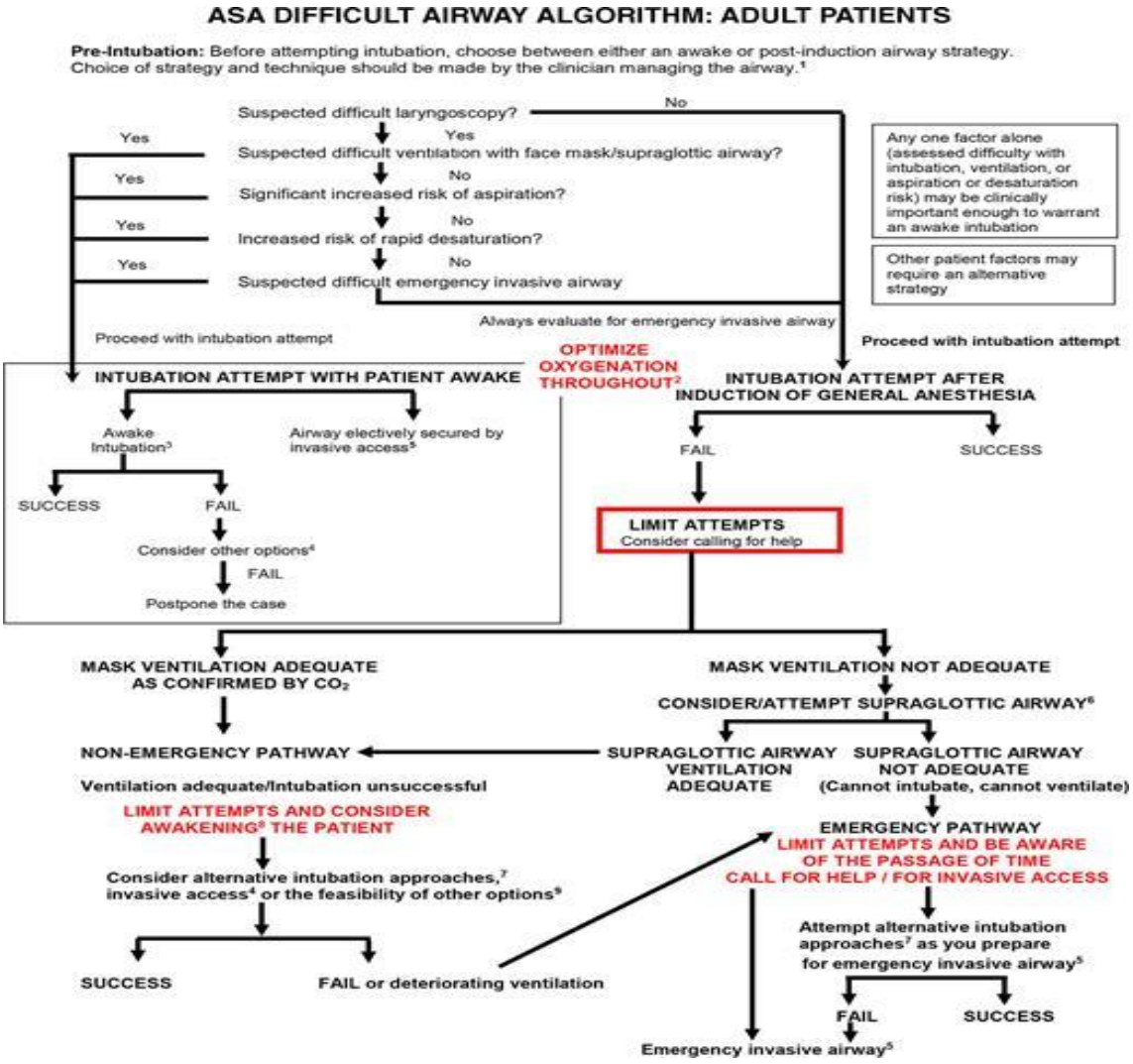

Figure 2. Difficult Airway Algorithm

(Apfelbaum et al., 2022, p. 56)

Importance of Emergency Invasive Airway Procedures

Performing an emergency invasive airway procedure is not common in the practice of anesthesia but is a skill that must be obtained for the CICO situation. The DAA gives step-by-step instructions and insight on handling critical airway situations. Unfortunately, the algorithm stops at the emergency airway, and no further steps are utilized to establish ventilation. According to (Scott-Herring et al., 2020), 1 in 50,000 general anesthetics requires an emergency invasive airway procedure. Performing an emergency invasive airway procedure in a timely fashion can help prevent poor outcomes in relation to CICO situations. Brain damage and death are consequences of respiratory events in 17% of Closed Claims outcomes with 27% of those claims being due to difficult intubations (Steadman et al., 2017). Brain cell death begins in as little as five minutes of low oxygen levels and brain death occurs when there is no oxygen delivered to the brain for ten minutes. Therefore, the skill set of performing an emergency invasive airway is paramount for the SRNA to obtain before practicing anesthesia independently.

Cricothyrotomy

Cricothyrotomy is an invasive airway procedure that is used as a last resort to oxygenate and ventilate a patient in the CICO scenario. Many different techniques are used to perform cricothyrotomy that include performing the procedure via open surgical technique (scalpel-bougie-tube) or the use of commercial kits. An incision is made through the skin and cricothyroid membrane providing an opening in the tracheal lumen for the open surgical approach. Commercial kits can be divided into two broad categories where the cricothyrotomy is performed via a needle and guidewire, or with a device that employs a cutting device to create a lumen in the cricothyroid membrane large enough to

accommodate the supplied tube (Langvad et al., 2013). All techniques are designed to accomplish the establishment of an airway in the CICO situation.

Implications

Cricothyrotomy is performed when death is imminent if an airway is not established and all steps of the DAA have been attempted without success by the provider (Langvad et al., 2013). Many different techniques exist and according to recent literature, the data is conflicting as to which technique is superior when comparing success rate and time to successful cannulation and oxygenation. The SRNA must become proficient in one technique of performing cricothyrotomy in preparation for the CICO scenario.

Application

Cricothyrotomy is a last resort means of establishing an airway for the CICO scenario. The SRNA must have the basic knowledge and skill set to perform a cricothyrotomy at any clinical site visited. Various clinical sites may stock cricothyrotomy kits, while others do not carry cricothyrotomy kits. The aforementioned establishes the need for an OSCE that entails a surgical approach using the scalpel-bougie-tube technique. The supplies needed for this technique are found within all clinical sites and are readily available in the CICO scenario. Therefore, this technique should be learned by all USM SRNAs before the start of year two when the SRNAs begin clinical rotations.

Jet Ventilation

Functionally jet ventilation uses pressurized oxygen through a cannula or other airway device to deliver breaths. Furthermore, expiration is achieved passively due to the recoil of the elasticity of the lungs. Good time management is vital in allowing expiration

to be fully complete to avoid breath stacking or barotrauma. Jet ventilation can be implemented as supraglottic, infraglottic, transtracheal, or transluminal. Percutaneous TTJV is a fast and invasive technique of oxygenation and ventilation in the CICO scenario when more conservative measures fail (Artime & Hagberg., 2020). The ASA DAA details TTJV as an emergent invasive method utilized in patients who cannot be ventilated or intubated (Apfelbaum et al., 2022). Methods and implications for jet ventilation circumvent special situations that range from emergency airway management to direct airway operations.

Implications

Implications for jet ventilation typically involve emergency airway management or surgery directly on laryngeal structures. New data suggest that jet ventilation is an adequate ventilation method in neonates and low birth weight infants. A significant cause of mortality and morbidity in low-birth-weight infants is a chronic lung disease. Recently a study concluded that high-frequency jet ventilation was associated with lower mortality rates among low-birth-weight infants (Rojas-Reyes & Orrego-Rojas, 2015).

Additional uses of jet ventilation involve the need for a “quiet lung” during procedures (Masters et al., 2020). Jet ventilation allows for an almost stationary lung field due to exceedingly high respiratory rates and low tidal volumes. This minimal movement allows for accurate biopsies where normally accuracy is minimal due to large movements in the lung fields (Masters et al., 2020).

Application

Ventilator settings can influence a patient's gas exchange. Many different techniques exist for implementation of jet ventilation with and without ventilators. Two

of the most popular methods are manual jet ventilation (MJV) and high-frequency jet ventilation (HFJV). Jet ventilators can set respiratory rate, driving pressure, oxygen concentration, and inspiration time just as it is on a standard ventilator. Both MJV and HFJV are incapable of delivering an anesthetic agent and total intravenous anesthesia (TIVA) techniques must be utilized. Key differences and uses outline practical situations and equip providers with the knowledge to use jet ventilation. Careful consideration must be applied when utilizing jet ventilation. A firm understanding of the delivery of PSI and the needed expiration time is critical in conducting safe ventilation without causing barotrauma. Another concern is securing the airway while using jet ventilation. Losing the airway can be a critically missed step and become a catastrophic event in an emergency.

Manual Jet Ventilation

Manual jet ventilation is an infrequently used method that uses a handheld device. The hand-triggered, low-frequency jet hose is used for emergency airway rescue intervention. The device is capable of delivering pressures between 0-50 psi. MJV is subjective, the method is based on the operator's satisfaction with chest rise and oxygen saturation. Typically end-tidal carbon dioxide and peak pressure values are not available. A key disadvantage is ventilation must be interrupted during periods when the anesthesia provider's hands are needed to attend to the management of the required TIVA technique.

High Frequency Jet Ventilation

High-frequency jet ventilation delivers numerous cutting-edge clinical advantages, such as obtaining an almost motionless lung field with minimal chest movement. HFJV can sustain respiratory rates at 120/min to 150/min at low tidal

volumes. Creating minimal chest movement while adequately oxygenating the patient allows for complicated procedures with precise accuracy and increased risk to take place safely. The infrequent use of this modality increases the need for further instruction and training for providers and students.

Rationale

A critical standard of Nurse Anesthesia Practice is producing a culture of safety (AANA, 2019). Unfamiliarity is the paramount issue in cricothyrotomies and jet ventilation. Focusing on instruction to address these competencies while being mindful of patient safety is the purpose of the OSCE. Establishing a knowledge foundation and introducing accurate techniques will create an environment best suited for SRNAs performing cricothyrotomies and TTJV in the clinical setting. Utilizing the OSCE evaluations will produce appropriate feedback on improvement areas, furthermore, promoting efficiency and patient safety.

DNP Essentials

The American Association of Colleges of Nursing (AACN) introduced essentials requiring fulfillment to receive a doctoral degree. These requirements are the same standards that USM's College of Nursing and Health Professions require SRNAs to complete for their doctoral award. Cricothyrotomy and TTJV OSCEs meet all eight DNP Essentials but prioritize Essentials I, VI, VII, and VIII.

Essential I: Scientific Underpinnings for Practice

Scientific Underpinnings for Practice incorporates doctoral research into the practice of advanced nursing. The essential was fulfilled by producing an evidence-based OSCE to aid in the instruction of unfamiliar airway management, specifically

cricothyrotomies and jet ventilation. The OSCE was constructed with a plan to enhance SRNA competency. Furthermore, the OSCE cornerstone sought to improve techniques and establish a knowledge foundation of procedures and parameters while maintaining patient safety for future SRNAs at USM.

Essential VI: Interprofessional Collaboration for Improving Patient and Population Health Outcomes

Essential VI implicates the communication and cooperation of numerous healthcare professionals in creating and executing new methods to make a change in healthcare facilities. SRNAs and USM's NAP faculty are the primary stakeholders. Implementing the OSCE regarding cricothyrotomies and jet ventilation is how the doctoral project met Essential VI criteria. The completed OSCE could aid the clinical advancement and instruction of SRNAs now and in the future.

Essential VII: Clinical Prevention and Population Health for Improving Nation's Health

The AACN defines Essential VII as advancing health care and preventing disease (AACN, 2006). Developing instruction to SRNAs regarding patient safety when dealing with unfamiliar airway management met the requirements to satisfy Essential VII. The OSCE provides SRNAs the capability to understand the techniques, risks, and benefits associated with cricothyrotomies and jet ventilation.

Essential VIII: Advanced Nursing Practice

Essential VII was met by delivering future SRNAs with evidence-based practice research that displays cricothyrotomies and jet ventilation procedures and implications. Addressing techniques so rarely seen in a clinical environment will allow SRNAs to be competent in clinical and critical situations. The foremost objective of advancing nursing

practice regarding the OSCE is to develop the appropriate skills and knowledge to perform cricothyrotomies and jet ventilation.

Specific Aims

This doctoral project strives to develop an OSCE that will operate as a standardized instruction and evaluation tool for SRNAs in USM's NAP. The OSCE benchmarks will enable students to be evaluated based on supplied standardization and facilitate learning. Upon completing the OSCE, SRNAs will be better equipped to handle unfamiliar airway management regarding cricothyrotomies and jet ventilation.

Summary

Instructing techniques and implementation of cricothyrotomy and jet ventilation can significantly benefit patient care, safety, and outcome. Airway management is a cornerstone of the anesthetist's practice. The infrequent practice of cricothyrotomy and jet ventilation skills convey unnecessary risk due to unfamiliar procedural techniques and knowledge gaps. The development of this OSCE will seek to address those knowledge gaps and unfamiliar practices. Simulated practice can potentially decrease performance stress and exhibit improved outcomes in the clinical setting (Aronowitz et al., 2017).

CHAPTER II – METHODS

The project aims to deliver SRNAs with a standardized and structured review tool that accurately exhibits how to perform a cricothyrotomy and jet ventilation. The discrepancies in knowledge between the didactic and clinical levels explain why SRNAs often enter clinical with insufficient training on cricothyrotomies and jet ventilation. Utilizing the OSCE, critical information and training about cricothyrotomies and jet ventilation will become readily available. The availability of the OSCE will allow SRNAs to explore and learn the appropriate situations and approaches for performing cricothyrotomies and TTJV. The general purpose of the OSCE is to improve SRNA competency by supplying a uniform technique on how to perform cricothyrotomies and TTJV in different circumstances appropriately.

Context

Presently the purpose is to develop the OSCEs for second-year students enrolled in the NAP program. Second-year students have completed the strenuous didactic part of the NAP and are entering into clinical rotations. Currently, 23 new students were admitted in January 2022 who then are educated in the didactic course by five faculty CRNAs who maintain a clinical practice as well. The didactic program consists of anesthesia and doctoral research courses conducted primarily via traditional face-to-face and a few online courses. Toward the middle of the program, incorporates a demanding clinical schedule followed by a reduced number of didactic anesthesia and Doctor of Nursing Practice (DNP) courses.

Simulation-based learning can be found throughout the three-year program; however, a heavy portion is present during the first year. Thus, SRNAs starting clinicals

in the second year have minimal hands-on experience. Further, the USM's NAP program of study while inclusive can only offer a limited amount of time on jet ventilation and cricothyrotomies in didactic education. The USM's College of Nursing and Health Professions delivers a clinical simulation center, which contains an array of unit-specific care models including an operating room (OR). The OR is reserved for the NAP and is dedicated to anesthesia use. The mock OR is arranged to resemble a real OR. The anesthesia instructors utilize the lab in teaching and are available for individual instruction, but the lab is also readily open for individual practice.

Developing a structured content presentation for student practice and testing pertaining to cricothyrotomies and jet ventilation is the project's intended purpose. Fundamentally the project was established following the USM NAP faculty's examination that students requested additional training in techniques to perform jet ventilation and cricothyrotomies. Addressing this prior mentioned problem, evidence-based guidelines were established, and literature was reviewed from current research to develop the OSCEs. Employing the OSCEs will provide a standard learning tool for SRNAs in performing cricothyrotomies and TTJV.

The OSCE incorporates specific learner results and purposes for the SRNA to accomplish. The examination tool also contains a list of assignments, lessons, media, a step-by-step process, and a content outline with a patient scenario, which SRNAs must finish prior to advancing to the examination portion. Additionally, the tool includes a student debriefing form and an examination rubric detailed to the supplied patient scenario.

After the project's focused evidence-based research was completed, the OSCE templates, standard online informed consent, recruitment email, and researcher CITI training certificates were completed and submitted to USM's Institution Review Board (IRB) (protocol # 22-2811). The anesthesia providers who asked to be included in DNP project surveys that are known to the USM NAP and anesthesia providers who have publicly available email addresses will be emailed a standard online informed consent, the OSCE templates, recruitment information, and investigator contact information will be delivered electronically. Within the recruitment email, the link to the anonymous online survey platform will be included. Improvements will be made to the OSCE based on collected and analyzed data. The OSCEs will then be presented to the NAP administration for inclusion into the NAP curriculum.

Specialists in the selected population are the five staff members who also practice currently as CRNAs. The expertise and experience of the faculty members present significant importance to critiquing and assessing the specified skillset in the OSCE. Additional recruitment will include current anesthesia providers from the USM NAP clinical affiliates. Evaluations provide an anonymous critique related to the benefits and areas for improvement in the OSCEs. Using feedback from the survey, after analysis a table will be created. Adjustments to the OSCEs will be made, pending committee and chair approval. Upon approval, a video will be created demonstrating cricothyrotomies and TTJV techniques and strategies.

Measures

The anticipated result of this project contains current and evidenced-based research guidance about performing cricothyrotomies and TTJV to present and future

USM NAP students. The OSCE's method is to aid SRNAs in both didactic and clinical practice by relieving any unknowns in conducting cricothyrotomies and jet ventilation.

Once the OSCE is completed, SRNAs should be more assured in their skillset and understanding of cricothyrotomies and jet ventilation. The OSCE should potentially help SRNAs to deliver the greatest care to patients, in performing infrequently used jet ventilation and cricothyrotomy techniques, thus improving patient outcomes when these skills are needed. Stakeholders in this project include students in the USM NAP, faculty, clinical preceptors, clinical affiliations, and most importantly, the community of patients we serve through the administration of quality anesthesia. Throughout compiling research, the OSCEs have the potential to be an important educational tool for SRNAs. The stakeholders will be given the link to the questionnaire after reviewing the OSCE template and online informed consent. This survey calculates and assesses the OSCE's significance and permits an opportunity for constructive feedback. The survey is in Appendix B and includes questions regarding the agreement with standard online informed consent; clarity of instruction; identification of appropriate landmarks; and evidence based; stepwise approach to the skills. The questionnaire includes a total of 15 Yes/No questions, two questions requiring a Likert scale rating (1 – 7), and five open-ended questions asking for feedback.

Data Collection and Analysis

The qualitative data gathered from the open-ended questions will be analyzed using content thematic analysis. The qualitative data from the Likert scale questions will be coded into quantitative data. The collected information will be analyzed, organized, and summarized upon completion. Based on evaluation feedback, changes will be

implemented to develop the OSCE on conducting cricothyrotomies and TTJV. The data analysis will be used to gain insight into the overall clarity and quality of the OSCEs and used to enhance competencies for SRNAs while potentially improving patient safety.

Ethical Considerations

All healthcare providers should put ethical concerns at the forefront of patient safety. Incorporating this OSCE for future students can encourage patient safety during the implementation of jet ventilation and cricothyrotomies. Nevertheless, the faculty of the USM NAP could discern as though this OSCE is lacking in training emergency airway techniques and opted to resume with the current curriculum of the NAP. Without implementing this OSCE into the USM NAP curriculum, SRNAs could be considered inadequate in providing adequate emergency airway management.

Summary

The two topics selected, jet ventilation and cricothyrotomies in the clinical setting were selected as the need was identified by the NAP administration for an OSCE related to the content. Thus, the OSCEs could bolster the curriculum of the NAP and provide SRNAs to be better prepared for the clinical setting with practical knowledge and a strong skill set. After the focused evidence-based research was completed, the OSCE templates were developed and submitted for proposal to the IRB (protocol # 22-1187). The anesthesia providers who volunteered and those known to the USM nurse anesthesia program will be emailed a standard online informed consent, OSCE template, recruitment information, and investigator contact information will be delivered electronically within the recruitment email. The link to the anonymous survey platform will be included.

Improvements will be made to the OSCE based on collected data. The OSCE will then be presented to the NAP committee for possible inclusion into the NAP curriculum.

CHAPTER III – RESULTS

Steps and Analysis

The doctoral project objective was to develop and implement an OSCE for hands-on experience and educational purposes regarding cricothyrotomy and TTJV. The Cricothyrotomy and Transtracheal Jet Ventilation OSCE will also be an educational tool for students at USM in the nurse anesthesia program. The OSCE template is designed based on current practice and evidence-based literature. Evaluations were completed by second and third-year USM NAP students and current CRNAs to include the USM NAP faculty. Recruitment emails were dispersed by the committee chair of the doctoral project to offer volunteer participation in this study. Included in the emails were the following: 1) Informed Consent, 2) The OSCE template, and 3) Link to a Qualtrics™ survey regarding the steps and details in the OSCE. The evaluation committee consisted of CRNA staff for the NAP. Second and third-year students along with current CRNAs were asked to evaluate the OSCE. Results for the Cricothyrotomy and Transtracheal Jet Ventilation OSCE depicted a positive impact, respectively. All results are conclusive to be 100% beneficial for the outcomes of each OSCE. The results concluded to be 100% in meeting the objectives established for each OSCE. Statistics from the surveys are included in Tables 1 and 2.

Table 1

Cricothyrotomy OSCE Survey Results

Do you feel this OSCE includes all the necessary information on cricothyrotomies for anesthesia providers to be successful in the clinical setting?	Yes	No
	23	0

Table 2

Transtracheal Jet Ventilation OSCE Survey Results

Do you feel this OSCE includes all the necessary information on transtracheal jet ventilation for anesthesia providers to be successful in the clinical setting?	Yes	No
	23	0

The survey comprised 23 questions to determine the efficacy, precision, and clarity of each OSCE. Question one asked: Do you agree to the online consent to participate in the evaluation of the OSCE for transtracheal jet ventilation and cricothyrotomy? This query is asked to ensure willingness to participate in the study. Question two asked: Please select one that applies to your current anesthesia practice role. This question is asked to identify survey participants' role in anesthesia. Question three asked: Did the OSCE present clear, appropriate stepwise instructions on executing a cricothyrotomy? This question determines whether the cricothyrotomy OSCE provided an accurate depiction and is usable in practice. Question four asked: Did the OSCE present clear, appropriate stepwise instructions on implementing transtracheal jet ventilation? This question determines whether the transtracheal jet ventilation OSCE

provided an accurate depiction and is usable in practice. Question five asked: Did you find the cricothyrotomy OSCE content understandable? This question determines if the information was relayed proficiently. Question six asked: Did you find the jet ventilation OSCE content to be understandable? This question determines if the information was delivered proficiently. Question seven asked: After reviewing this OSCE, can you identify the indications for performing a cricothyrotomy? This question aims to confirm if participants can indicate the reason for performing a cricothyrotomy. Question eight asked: After reviewing this OSCE, can you identify the indications for performing transtracheal jet ventilation? This question aims to confirm if participants can indicate the reason for performing transtracheal jet ventilation. Question nine asked: After reviewing this OSCE, can you identify the appropriate landmarks to perform a cricothyrotomy? This question aims to inquire if participants can correctly identify landmarks. Question ten asked: After reviewing this OSCE, can you determine the appropriate landmarks for transtracheal jet ventilation? This question aims to inquire if participants can correctly identify landmarks. Question 11 asked: After reviewing this OSCE, on a scale of 1 – 7, with 1 being not at all and 7 being extremely, how would you rate your knowledge of the steps required to perform a Cricothyrotomy based on this OSCE? This question aims at a graded scale to identify how comprehensible the learning is for completing a cricothyrotomy. Question 12 asked: After reviewing this OSCE, on a scale of 1 – 7, with 1 being not at all and 7 being extremely, how would you rate your knowledge of the steps required to perform transtracheal jet ventilation based on this OSCE? This question aims at a graded scale to identify how comprehensible the learning is for completing transtracheal jet ventilation. Question 13 asked: After reviewing this OSCE, would you

feel comfortable practicing a cricothyrotomy in a simulation center? This question determines the participant's comfort level in performing the task in the simulation center. Question 14 asked: After reviewing this OSCE, would you feel comfortable practicing transtracheal jet ventilation in a simulation center? This question determines the participant's comfort level in performing the task in the simulation center. Question 15 asked: After reviewing the OSCE, can you identify the possible complications of performing a cricothyrotomy? This question aims to determine if participants can identify complications with performing a cricothyrotomy. Question 16 asked: After reviewing the OSCE, can you identify the possible complications of transtracheal jet ventilation? This question aims to determine if participants can identify complications with performing transtracheal jet ventilation. Question 17 asked: Do you feel this OSCE includes all necessary information on cricothyrotomies for anesthesia providers to be successful in the clinical setting? This question's purpose is to determine if all the information needed to perform the task was relayed. Question 18 asked: Do you feel this OSCE includes all necessary information on transtracheal jet ventilation for anesthesia providers to be successful in the clinical setting? This question's purpose is to determine if all the information needed to perform the task was relayed. The final five questions' purpose is to provide participants with a place to comment on their concerns or recommendations. The results of the survey can be reviewed in Tables 1 and 2.

Feedback

Altogether, the survey delivered the desired feedback and comments of the submitted OSCE. The comment(s) received for the Cricothyrotomy OSCE included the following: “Good info on a situation that many providers rarely experience but requires a

prompt response and a level head". No comments were received for the Transtracheal Jet Ventilation OSCE.

Summary

The OSCE has served as a training, educational, and evaluation tool for the nurse anesthesia students at USM. The OSCE was presented to the evaluation panel and the second and third-year students. Evaluators completed a survey to identify the clarity, accuracy, and effectiveness of the presented OSCE. Feedback from the survey indicated the OSCE was of high quality and would be well received by the students and instructors of the USM NAP.

CHAPTER IV – DISCUSSION

The purpose of the doctoral project was to create an OSCE that improved the curriculum of the NAP at USM. Furthermore, providing SRNAs with critical instruction while housed in a simulated patient care area enhanced the skills of the SRNAs entering the clinical environment. Data from evidence-based practice was utilized to develop the OSCEs, and best practice guidelines were used to demonstrate the cricothyrotomies and transtracheal jet ventilation techniques. AACN DNP Essentials were met within the development of the OSCE.

Survey respondents answered anonymously and unanimously relayed that the cricothyrotomy and TTJV OSCE were plainly and efficiently understood. Participants in the project comprised current CRNAs, USM NAP staff members, who presently practice anesthesia, and USM NAP SRNAs in their junior and senior years of the program. The knowledge collected from the respondents supplied insightful guidance on how to enhance the OSCE. Respondents ultimately agreed that the OSCE delivered the pertinent information and adequately equipped SRNAs to conduct a cricothyrotomy and TTJV in the clinical setting.

Implications for future study could encompass testing a group of students on check-offs in the simulation center for each OSCE versus a group who was not given each OSCE but only lectured content was provided. Testing would help validate learning from the repetitive use of the OSCE. A written test after practicing the OSCE to test the memory application of the content would provide an overall effectiveness of the delivery of content.

Interpretation

Unanimous agreement from the survey respondents stated that the cricothyrotomy and transtracheal jet ventilation OSCE, auxiliary information, and video demonstration prepared SRNAs for clinical practice. Using this OSCE within the simulation center allowed SRNAs to learn through a hands-on technique, and when failures occur, inquiries and faults can be brought forth without endangering patient safety. From the collected data, it can be deduced that implementing the cricothyrotomy and TTJV OSCE into the USM NAP curriculum competently prepared SRNAs for transitioning into the clinical setting.

Limitations

Our study's limitations included limited sample size, USM-associated faculty and students, and not implementing the OSCE at other NAPs. The small scope of participants was founded on voluntary participation, potentially limiting the analysis of the OSCE. The sample consisted of eighteen SRNAs and five CRNAs, including faculty. Participants are associated with the USM NAP, and there is a possible bias in the answers. Further, the absence of research on OSCE enactment in other NAPs restricted the results of this study.

Adding the first-year USM NAP students could expand the sample size. Including these participants could further examine the OSCEs effectiveness on novice anesthesia students. Furthermore, participants outside of USM affiliation could better enhance the OSCE before the implementation into the USM NAP curriculum.

Conclusion

This OSCE has been submitted to USM's NAP for consideration in the program's OSCE library. Likewise, the OSCE and its other corresponding documents can be used in additional medical programs. If put into practice, this OSCE would entitle SRNAs to become capable and confident in executing cricothyrotomies and transtracheal jet ventilation in the simulation environment. Familiarizing these skills in a controlled setting will allow SRNAs the possibility to fail while not endangering patient safety, permitting questions and the benefit of becoming more comfortable and confident in their capabilities. This doctoral project strives to ensure that SRNAs establish the essential proficiency to perform a cricothyrotomy and TTJV.

APPENDIX A – OSCE

ANESTHESIA OBJECTIVE STRUCTURED CLINICAL EXAM

Cricothyrotomy and Transtracheal Jet Ventilation

LEARNER OUTCOMES:

The student will be able to:

1. Identify the need for advanced airway procedures in the "Can't Intubate, Can't Oxygenate" scenario.
2. Demonstrate knowledge of cricothyrotomy and transtracheal jet ventilation methods.
3. Appropriately select equipment needed to perform cricothyrotomy and transtracheal jet ventilation.
4. Perform cricothyrotomy and transtracheal jet ventilation safely.

DOMAINS: Assessment, Didactic Knowledge, Clinical Skill

PURPOSE: Exposure to advanced airway/oxygenation techniques with a demonstration of the ability to perform cricothyrotomy and transtracheal jet ventilation to improve clinical skills.

LEARNER OBJECTIVES:

1. Demonstrate an understanding of the anatomy of the human airway.
2. Identify indications for cricothyrotomy and transtracheal jet ventilation.
3. Demonstrate the ability to utilize specific equipment needed to perform cricothyrotomy and transtracheal jet ventilation.
4. Appropriately demonstrate the proper steps to perform cricothyrotomy and transtracheal jet ventilation.

5. Analyze clinical skills and self-evaluate the technique.

INDIVIDUAL OR GROUP OSCE: Individual

REQUIRED READING and ASSOCIATED LECTURES:

1. Barash, P., Cahalan, M., Cullen, B., Stock, M., Stoelting, R., Ortega, R., Sharar, S., & Holt, N. (2017). *Clinical anesthesia* (8th ed.). Lippincott, Williams, & Wilkins. Chapter 28
2. Butterworth, J., Mackey, D., & Wasnick, J. (2018). *Morgan & Mikhail's clinical anesthesiology* (6th ed.). McGraw-Hill. Chapter 19
3. Nagelhout, J. J., & Elisha, S. (2017). *Nurse anesthesia* (6th ed.). Elsevier Chapter 22

REQUIRED VIDEOS: Cricothyrotomy and Transtracheal Jet Ventilation Demonstration Video

REQUIRED PARTICIPANTS: NAP anesthesia volunteers, NAP faculty examiner, clinical skills lab staff

VENUE: University of Southern Mississippi's School of Nursing Simulation Lab Operating Room

STUDENT LEVEL OF OSCE: Semester 2-4 (Prior to the start of clinical rotation)

TIME ALLOTTED: 30 minutes

RECOMMENDED PRACTICE PRIOR TO EXAMINATION: Required readings, required videos, review of OSCE and expected performance, review, and practice of Cricothyrotomy and Transtracheal Jet Ventilation steps X 3.

CONTENT OUTLINE

CONTEXT:

You are assigned to a rural clinical site with minimal advanced airway devices. A trauma is called to the OR for airway establishment. The patient arrives and has unstable cervical spinal fractures, facial trauma with moderate bleeding, and a stick impaled through the soft palate from the cheek. Upon visual inspection, it is determined that Glidescope intubation is safest. Upon moving the patient from the EMS stretcher to the OR table, the stick breaks falling into the airway and taking two molars with it. The patient immediately begins to desaturate, and the bleeding becomes heavy. The general surgeon is 15 minutes away and oxygenation must be established to avoid demise. A rapid sequence induction is performed with Succinylcholine and intubation is unsuccessful with the Glidescope attempts due to zero visibility of bleeding and foreign objects lodged in the airway. Emergency procedures must be undertaken.

Cricothyrotomy

EQUIPMENT & SUPPLIES:

- Anesthesia Machine with circuit
- Adult manikin
- Surgical Trachea manikin
- Monitors:
    - EKG
    - Pulse oximeter
    - Blood pressure
    - End-tidal

- Endotracheal Tube
    - Size 5 & 6
- 10cc syringe for cuff inflation
- Tape
- Skin prep solution
- Suction setup (including Yankauer)
- Scalpel (11 Blade Preferred)
- Trachea Hook or Hemostat
- Bougie/Wire
- Stethoscope

Transtracheal Jet Ventilation EQUIPMENT & SUPPLIES:

- Anesthesia Machine with circuit
- Jet ventilation device
- AMBU bag and 7.0mm ETT (just the connector is needed from the ETT)
- Adult manikin
- Surgical Trachea manikin
- Monitors:
    - EKG
    - Pulse oximeter
    - Blood pressure
    - End-tidal
- 14- & 16-gauge angiocath
- 3cc syringe

- Tape/Suture
- Skin prep solution
- Suction setup (including Yankauer)

SITE SELECTION: The anesthesia provider must be able to identify the anatomical structures of the anterior neck. The thyroid cartilage membrane (TCM) is palpated, and caudal to the TCM the cricothyroid membrane (CTM) is palpated. Medial to the TCM and CTM is the cricothyroid ligament. When the skin is stretched tightly with either the ring finger or thumb at the cricothyroid ligament and the other at the caudal aspect of the CTM.

TASK STATEMENT: The task is to demonstrate an understanding of cricothyrotomy and jet ventilation by appropriately identifying the anterior neck anatomy, equipment needed, and the process of performing cricothyrotomy and transtracheal jet ventilation.

Cricothyrotomy PROCESS:

1. Prepare the appropriate equipment (see equipment/supplies listed above).
2. Recognize situations where the skill must be executed.
3. Appropriately identify anatomical structures of the anterior neck.
4. Correctly place the finger and thumb of the non-dominant hand.
5. Cleanse the site with an available solution if time permits.
6. Make a 1-2cm incision vertically through the skin covering the CTM.
7. Now introduce the scalpel through the CTM into the trachea in a horizontal direction (best if CTM and trachea are cut 0.5-1cm in each direction from the center of the vertical incision).
8. Insert the bougie into the trachea in a caudal direction with the dominant hand.

9. Load ETT onto the bougie.
10. Now with a tracheal hook secure the caudal border of the trachea and pull the caudal enough to open the trachea for the ETT to pass with little resistance (if a tracheal hook is not available hemostats inserted into the trachea closed and opened will provide enough opening of the trachea to pass the ETT over the bougie/wire).
11. Slide the ETT tube over the bougie/wire until the balloon is caudal to the incision opening of the trachea (if the patient begins to cough, pull the bougie/wire back slowly until the tip is seen within the ETT tube. If the patient continues to cough SLOWLY pull the ETT back until the patient quits coughing or the balloon is visualized at the edge of the incision.
12. Inflate the cuff and bag the patient confirming chest rise/end-tidal (never take the non-dominant hand off the ETT until it is secured).
13. Tape the ETT to the patient's neck.
14. Confirm placement with bilateral breath sounds now that the ETT has been secured.
15. Continue to ventilate the patient manually or with appropriate ventilator settings.
16. Amnestic analgesia should be administered at this time if hemodynamics allow.

Transtracheal Jet Ventilation PROCESS:

1. Prepare the appropriate equipment (see equipment/supplies listed above).
2. Recognize situations where the skills must be executed.

3. Appropriately identify anatomical structures of the anterior neck.
4. Correctly place the finger and thumb of the non-dominant hand.
5. Cleanse the site with an available solution if time permits.
6. Insert the angiocath needle through the CTM in a slight caudal direction towards the carina until a pop is felt.
7. Pull the needle from the catheter and attach the syringe to aspirate air (if unable to aspirate re-insert the needle and advance slightly further, attempt to aspirate air again).
8. Once the air is aspirated advance angiocath to Luer-lock and connect to a jet ventilator or oxygen source that is available.
9. If a jet ventilation device is not available, connect the 3cc syringe without the plunger to the angiocath.
10. Place the 7.0mm ETT connecter in the syringe and connect the anesthesia circuit or AMBU bag.
11. Visualize chest rise, auscultate for bilateral breath sounds, or connect to end-tidal after oxygen delivery to confirm placement.
12. Secure the catheter with suture or tape (the high pressure from the jet ventilation device or oxygen source can cause the catheter to back out.
13. Ensure the catheter does not become kinked.
14. Deliver 1-second breaths with 50psi at a rate of 20 breaths per minute when using a jet ventilation device.

15. If using other means of oxygen delivery, ensure adequate time for expiration (may need to disconnect from the oxygen delivery source if the patient has complete obstruction of the upper airway).
16. This technique only provides oxygenation until a definitive airway can be established.

DEBRIEFING FORM:

1. Were you able to demonstrate the objectives correctly?
2. Did you find areas for improvement?
3. Were you satisfied with your ability to work through the simulation?
4. Has this OSCE better prepared you for clinical practice?

ASSESSMENT

Rubric for Cricothyrotomy

TASKS	PASS	FAIL	COMMENTS
1. Prepare the appropriate equipment.			
2. Identify situations where the skill must be executed.			
3. Appropriately identify anatomical structures of the anterior neck.			
4. Correctly place the finger and thumb of the non-dominant hand.			
5. Cleanse the site with an available solution if time permits.			
6. Make a 1-2cm incision vertically through the skin covering the CTM.			
7. Now introduce the scalpel through the CTM into the trachea in a horizontal direction (best if CTM and			

trachea are cut 0.5-1cm in each direction from the center of the vertical incision).			
8. Insert the bougie into the trachea in a caudal direction with the dominant hand.			
9. Load ETT onto the bougie.			
10. Now with a tracheal hook secure the caudal border of the trachea and pull the caudal enough to open the trachea for the ETT to pass with little resistance (if a tracheal hook is not available hemostats inserted into the trachea closed and opened will provide enough opening of the trachea to pass the ETT over the bougie/wire).			
11. Slide the ETT tube over the bougie/wire until the balloon is caudal to the incision opening of the trachea (if the patient begins to cough, pull the bougie/wire back slowly until the tip is seen within the ETT tube. If the patient continues to cough SLOWLY pull the ETT back until the patient quits coughing or the balloon is visualized at the edge of the incision.			
12. Inflate the cuff and bag the patient confirming chest rise/end-tidal (never take the non-dominant hand off the ETT until it is secured).			
13. Tape the ETT to the patient's neck.			
14. Confirm placement with bilateral breath sounds now that the ETT has been secured.			
15. Continue to ventilate the patient manually or with appropriate			

ventilator settings.			
16. Amnestic and analgesic should be administered at this time if hemodynamics allow.			

The OSCE performed by the student demonstrates foundational knowledge and skill of Cricothyrotomy: (Circle one)

PASS FAIL

Does the student need to repeat this OSCE to satisfy learning requirements? (Circle one)

NO YES DATE TO RETURN FOR EVALUATION: _____

EXAMINER: _____ DATE: _____

ASSESSMENT

Rubric for Transtracheal Jet Ventilation

TASKS	PASS	FAIL	COMMENTS
1. Prepare the appropriate equipment.			
2. Identify situations where the skill must be executed.			
3. Appropriately identify anatomical structures of the anterior neck.			
4. Correctly place the finger and thumb of the non-dominant hand.			
5. Cleanse the site with an available solution if time permits.			
6. Insert the angiocath needle through the CTM in a slight caudal direction towards the carina until a pop is felt.			

7. Pull the needle from the catheter and attach the syringe to aspirate air (if unable to aspirate re-insert the needle and advance slightly further, attempt to aspirate air again).			
8. Once the air is aspirated advance angiocath to Luer-lock and connect to a jet ventilator or oxygen source that is available.			
9. If a jet ventilation device is not available, connect the 3cc syringe without the plunger to the angiocath.			
10. Place the 7.0mm ETT connecter in the syringe and connect the anesthesia circuit or AMBU bag.			
11. Visualize chest rise, auscultate for bilateral breath sounds, or connect to end-tidal after oxygen delivery to confirm placement.			
12. Secure the catheter with suture or tape (the high pressure from the jet ventilation device or oxygen source can cause the catheter to back out.			
13. Ensure the catheter does not become kinked.			
14. Deliver 1-second breaths with 50psi at a rate of 20 breaths per minute when using a jet ventilation device.			
15. If using other means of oxygen delivery, ensure adequate time for expiration (may need to disconnect from the oxygen delivery source if the patient has complete obstruction of the upper airway).			

16. This technique only provides oxygenation until a definitive airway can be established.			

The OSCE performed by the student demonstrates foundational knowledge and skill of Transtracheal Jet Ventilation: (Circle one)

PASS FAIL

Does the student need to repeat this OSCE to satisfy learning requirements? (Circle one)

NO YES DATE TO RETURN FOR EVALUATION: _____

EXAMINER: _____ DATE: _____

APPENDIX B – Survey

Thank you for evaluating this DNP project for cricothyrotomy and transtracheal jet ventilation. Participation in this evaluation is completely voluntary and anonymous. Your feedback can provide valuable information to assist future SRNAs in the Nurse Anesthesia Program at the University of Southern Mississippi. There are no repercussions for non-participation. IRB Approval # 22-1187.

1. Do you agree to the online consent to participate in the evaluation of the OSCE for jet ventilation and Cricothyrotomy? Yes No
2. Did the OSCE present clear, appropriate stepwise instructions on the execution of a cricothyrotomy? Yes No
3. Did the OSCE present clear, appropriate stepwise instructions on the execution of transtracheal jet ventilation? Yes No
4. Did you find the cricothyroidotomy OSCE content to be understandable? Yes No
5. Did you find the jet ventilation OSCE content to be understandable? Yes No
6. After reviewing this OSCE, are you able to identify the indications for performing cricothyrotomy? Yes No
7. After reviewing this OSCE, are you able to identify the indications for performing transtracheal jet ventilation? Yes No
8. After reviewing this OSCE, are you able to identify the appropriate landmarks to perform a cricothyrotomy? Yes No

9. After reviewing this OSCE, are you able to identify the appropriate landmarks to perform transtracheal jet ventilation? Yes No
10. After reviewing this OSCE, on a scale of 1 – 7, with 1 being *not at all* and 7 being *extremely*, how would rate your knowledge of the steps required to perform a cricothyrotomy based on this OSCE? Yes No
11. After reviewing this OSCE, on a scale of 1 – 7, with 1 being *not at all* and 7 being *extremely*, how would rate your knowledge of the steps required to perform transtracheal jet ventilation based on this OSCE? Yes No
12. After reviewing this OSCE, would you feel comfortable practicing a cricothyrotomy in a simulation center? Yes No
13. After reviewing this OSCE, would you feel comfortable practicing transtracheal jet ventilation in a simulation center? Yes No
14. After reviewing the OSCE, are you able to identify the possible complications of performing a cricothyrotomy? Yes No
15. After reviewing the OSCE, are you able to identify the possible complications of transtracheal jet ventilation? Yes No
16. Do you feel this OSCE includes all the necessary information on cricothyrotomies for anesthesia providers to be successful in the clinical setting? Yes No
17. Do you feel this OSCE includes all the necessary information on transtracheal jet ventilation for anesthesia providers to be successful in the clinical setting? Yes No

18. For the cricothyroidotomy portions, if you answered NO to the appropriateness, stepwise, understanding, indications, landmarks, comfortable with, and possible complications and includes all necessary information, please add a note as to why you answered NO. This will help us revise and improve our OSCE.
19. For the transtracheal jet ventilation portions, if you answered NO to the appropriateness, stepwise, understanding, indications, landmarks, comfortable with, and possible complications and includes all necessary information, please add a note as to why you answered NO. This will help us revise and improve our OSCE.
20. Please add any recommendations or comments that you have that would make the OSCE for cricothyrotomy easier to understand for anesthesia providers.
21. Please add any recommendations or comments that you have that would make the OSCE for jet ventilation easier to understand for anesthesia providers.
22. We would appreciate any additional thoughts, advice, or feedback you would like to share.

Thank you so much for your willingness to review our project and its' OSCE. Your feedback as anesthesia providers will be invaluable to our project and the USM Nurse Anesthesia Program.

APPENDIX C – IRB Approval Letter

Office *of*
Research Integrity

THE UNIVERSITY OF SOUTHERN MISSISSIPPI

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NOTICE OF INSTITUTIONAL REVIEW BOARD ACTION

The project below has been reviewed by The University of Southern Mississippi Institutional Review Board in accordance with Federal Drug Administration regulations (21 CFR 26, 111), Department of Health and Human Services regulations (45 CFR Part 46), and University Policy to ensure:

- The risks to subjects are minimized and reasonable in relation to the anticipated benefits.
- The selection of subjects is equitable.
- Informed consent is adequate and appropriately documented.
- Where appropriate, the research plan makes adequate provisions for monitoring the data collected to ensure the safety of the subjects.
- Where appropriate, there are adequate provisions to protect the privacy of subjects and to maintain the confidentiality of all data.
- Appropriate additional safeguards have been included to protect vulnerable subjects.
- Any unanticipated, serious, or continuing problems encountered involving risks to subjects must be reported immediately. Problems should be reported to ORI via the Incident submission on InfoEd IRB.
- The period of approval is twelve months. An application for renewal must be submitted for projects exceeding twelve months.

PROTOCOL NUMBER:	22-1187
PROJECT TITLE:	Cricothyrotomy and Transtracheal Jet Ventilation Best Practices for Nurse Anesthesia
SCHOOL/PROGRAM	Leadership & Advanced Nursing
RESEARCHERS:	PI: Tony Sistrunk Investigators: Sistrunk, Tony~Mclain, Nina Elisabeth~Marchant, Kevin~
IRB COMMITTEE ACTION:	Approved
CATEGORY:	Expedited Category
PERIOD OF APPROVAL:	12-Aug-2022 to 11-Aug-2023

Donald Sacco Jr.

Donald Sacco, Ph.D.
Institutional Review Board Chairperson

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