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RAPID SEQUENCE INDUCTION VERSUS TRADITIONAL INDUCTION: AN OBJECTIVE STRUCTURED CLINICAL EXAM

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RAPID SEQUENCE INDUCTION VERSUS TRADITIONAL INDUCTION: AN OBJECTIVE STRUCTURED CLINICAL EXAM

by

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A Doctoral Project
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ABSTRACT

Every surgical procedure requiring general anesthesia begins with the induction process. Induction of general anesthesia can be altered by using a number of combinations of pharmacological agents and airway management techniques to place the patient in an anesthetic state while providing adequate oxygenation. Mastering the induction process as well as airway management are integral parts of being a competent anesthesia provider.

Twenty million endotracheal tubes are placed within the United States annually by medical professionals (Grant, 2013). Endotracheal tube placement can be a stressful process for anesthesia students to master. The aim of this doctoral project is to provide anesthesia students and providers current evidence-based information on general anesthesia induction and rapid sequence induction processes. The doctoral project investigators conducted research compiling current up to date literature on the general induction processes. This objective structured clinical exam (OSCE) allows students to simulate the induction processes within a low-stress environment before experiencing the clinical setting. The research helped mold this observed structured clinical exam as well as a post-examination anonymous survey. Feedback collected from the surveys helped modify this doctoral project for future anesthesia providers.

Sixteen participants including four expert panelists and twelve current students within The University of Southern Mississippi Nurse Anesthesia Program provided feedback through the form of a survey. The survey results showed all sixteen participants felt that information provided within the OSCE was evidence based and currently the standard of practice. Current anesthesia providers and students alike, expressed the idea

that providing this doctoral project to anesthesia students would aid in readiness for the clinical setting.

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ASA	American Society of Anesthesiologists
BMV	Bag Mask Ventilation
DNP	Doctor of Nursing Practice
ETT	Endotracheal Tube
GABA	Gamma-amino-butyric acid
Kg	Kilogram
Mg	Milligram
NAP	Nurse Anesthesia Program
OSCE	Objective Structure Clinical Exam
RSI	Rapid Sequence Intubation
SRNA	Student Registered Nurse Anesthetist
USM	The University of Southern Mississippi

CHAPTER I - INTRODUCTION

Problem Background

Every general anesthetic begins with the induction or onset of anesthesia. Here, the provider uses a combination of pharmacological agents and techniques to place the patient in an anesthetic state. The anesthesia provider has the responsibility to be well versed in these techniques and to provide their patients with safe and adequate anesthesia.

The insertion of an endotracheal tube (ETT) is often required for patients undergoing surgery. According to Nagelhout, this process, known as intubation, is the foundation of airway management and one of the most routinely performed procedures performed by anesthesia providers (Nagelhout & Plaus, 2014). With more than 20 million endotracheal tubes placed in the United States annually, airway management is, therefore, the primary focus for Student Registered Nurse Anesthetists (SRNAs) in their nurse anesthesia programs (Grant, 2013). Lack of familiarity with airway management intensifies student's anxiety. As students transition from simulation to clinical, successful intubation requires both knowledge and experience (Wands & Minzola, 2015). This project aims to increase novice SRNAs clinical competency for the induction and intubation process in the direct laryngoscopy and/or rapid sequence induction (RSI) for direct laryngoscopy techniques.

The process that was developed for assessing the clinical competency on direct laryngoscopy versus rapid sequence intubation of SRNAs and anesthesia was completed with an objective structured clinical exam (OSCE). An OSCE is a step-by-step assessment method designed to assess a healthcare professional's clinical competency. The OSCE is considered the gold standard of measuring clinical competency skills in a

direct observation environment that a traditional paper test does not provide. After performing the OSCE, surveys are provided to students who were tested with an OSCE. The survey is used to determine whether the student felt that the OSCE prepared him or her for the clinical setting (Wunder et al., 2014).

Purpose and Problem Statement

Currently, there are few evidence-based OSCEs for USM NAP SRNAs to be evaluated within the simulation laboratory. This DNP project's purpose is to provide SRNAs with evidence-based information on the induction process of general anesthesia. First, baseline knowledge and clinical competence of the induction process was assessed before providing information on both traditional induction and rapid sequence induction as well as when each process is appropriate. Each student was provided with structured evidence-based instructions on the proper intubating and induction techniques. Providing the student with this evidence-based OSCE increased aptitude in both a simulated environment and aims make for a safer anesthesia provider in the clinical environment.

Needs Assessment

Nurse anesthesia programs are designed to teach student registered nurse anesthetists how to safely and effectively deliver anesthesia to patients. This education is accomplished through didactic lectures, clinical training, and simulations. Intubation is the foundation of airway management and one of the most routinely performed procedures by anesthesia provides (Nagelhout & Plaus, 2014). SRNAs are expected to be able to manage a patient's airway in a variety of situations whether it be through traditional direct laryngoscopy, rapid sequence induction for direct laryngoscopy, or the use of various intubation tools. Lack of adequate clinical preparation can increase

student's anxiety, decrease intubation success, and lead to poor patient outcomes (Wands & Minzola, 2015).

There is a need for a structured method to assess clinical competence in nurse anesthesia students in induction and intubation by traditional direct laryngoscopy and by rapid sequence. An OSCE is a step-by-step assessment method designed to assess a healthcare professional's clinical competency on a given subject matter (Wunder et al., 2014). OSCE is considered to be a comprehensive means of assessment with limited bias and standardized grading (Siddaram & Anil, 2018). This assessment tool can be utilized by The University of Southern Mississippi's Nurse Anesthesia Program as both a teaching and testing tool for SRNAs on intubation clinical competency in a realistic manner. This DNP project provides an evidenced-based objective structured clinical examination on rapid sequence intubation versus traditional direct laryngoscopy to The University of Southern Mississippi Nurse Anesthesia Program.

Available Knowledge

Objective Structured Clinical Exam

The objective structured clinical exam (OSCE) is a multi-system examination tool that is used on simulated or real patients, to evaluate clinical skills. The tool was first developed in the 1970s by Dr. Ronald Harden to provide medical students with a standardized approach to be evaluated for clinical competency (Siddaram & Anil, 2018). Since its inception, the OSCE has been adopted by other professional healthcare schools, including nursing to evaluate clinical reasoning skills (Siddaram & Anil, 2018, Traynor & Galanouli, 2015).

OSCE is considered to be the most valid and reliable test to effectively measure psychomotor skills, cognitive thinking, and interpersonal communication (Siddaram & Anil, 2018). When compared to traditional examination, OSCE has been determined to be a more effective form of formative evaluation for physical examination of real patients (Traynor & Galanouli, 2015). OSCE is considered to be a fair and comprehensive means of assessment of clinical competency (Siddaram & Anil, 2018).

One reason this tool is effective in assessing the clinical skills of healthcare professionals is its adaptability. The tool can be modified to fit different healthcare programs and individuals. The OSCE provides both a teaching and testing tool that can be altered for SRNAs in any nurse anesthesia program to aid in diverse, dynamic training (Ballister, 2018).

Induction Process

To successfully manage a patient's airway, one must develop an airway management plan. A thorough airway assessment should be conducted to predict possible difficult airway conditions. Nagelhout lists airway assessment components that are predictors of airway difficulty. Thyromental distance is an assessment of the length from a person's chin to the neck, a distance of fewer than three fingerbreadths is a predictor of a difficult airway. The mouth opening is another airway assessment tool, an opening of fewer than four centimeters is a predictor of a difficult airway (Nagelhout & Plaus, 2014).

When assessing the oral cavity, noting the relation of maxillary to mandibular incisors is part of the preoperative airway assessment, the inability to protrude mandibular teeth anterior to maxillary is a predictor of a difficult airway (Buttars, 2018). A patient's neck range of motion is another airway component that should be assessed, a

patient who is unable to touch their chin to their neck or extend their neck backward may have a difficult airway. Physical assessment of the neck is another part of the airway exam, a short neck with fewer than two fingerbreadths between the chin-neck junction and the hyoid bone is a predictor of difficult intubation. Additionally, a patient with characteristics, such as redundant soft tissue, masses, or scarring can be difficult intubations. A Mallampati score between I and IV is assigned to a patient based on the visualized posterior oropharyngeal structures. Upon completing the physical airway exam, and review of the patient anesthetic history that SRNA should be able to determine if the patient has the indication for difficult direct laryngoscopy intubation and may at this time choose to use other tools such as a video laryngoscope or fiberoptic both of which fall outside the scope of this project (Nagelhout & Plaus, 2014).

In addition to assessing the airway for difficult intubation, the SRNA should assess a patient's indications for difficult bag-mask ventilation (BMV). An edentulous patient may prove to be a difficult BMV as the lack of teeth leads to improper facial structure. A patient with facial hair may be difficult to BMV as the hair can impede a proper mask seal. Additionally, a patient with altered facial anatomy or those with medical devices in place, such as nasogastric tube are predictors of difficult BMV (Nagelhout & Plaus, 2014).

Once all preoperative assessments have been completed and the patient is in the operating room and on the operating room table with required monitors attached to the patient. The SRNA may position the patient in a manner that avoids compression of the airway. A supine position with a ramp of pillows or blankets may be required if the patient is obese (Mosier et al., 2017). With the patient in position, the SRNA may then

place the oxygen mask lightly to the patient's face and begin preoxygenation to an oxygen saturation greater than 93% (Davis et al., 2008). By denitrogenation of the lung's alveoli, the functional residual capacity serves as a reservoir for oxygen allowing the maintenance of hemoglobin saturation during periods of apnea (Mosier et al., 2017). The use of preoxygenation not only delays the onset of desaturation but can improve the success rate of endotracheal intubation (Davis et al., 2015).

During the 45 to 90 seconds following administration of induction drugs, the patient becomes apneic, the SRNA must begin BMV (Davis et al., 2015). The thumb and index finger encircle the top of the mask and the remaining three fingers grasp the mandible; this will secure the mask to the face. With the mask secured onto the patient's face, the SRNA may attempt positive pressure ventilation. If unable to ventilate the patient, the SRNA should reposition the head into the sniffing position in an attempt to properly seal the face mask to the patient's skin (Butterworth et al., 2018). The sniffing position is flexion of the cervical spine and extension of the atlantooccipital joint. If the SRNA is still unable to ventilate with the patient in the sniffing position an oropharyngeal airway can be placed. In the event the SRNA is unable to ventilate with the patient in the sniffing position with an oropharyngeal airway, two-handed mask ventilation should be utilized. The two-handed mask technique is where the provider holds the mask similar to that of the one-handed technique but uses two hands to create a better seal. After two-handed mask ventilation has been attempted, in the event the provider is still unable to ventilate a supraglottic device may be placed or proceed to intubation (Nagelhout & Plaus, 2014). Ideally, after adequate ventilation is established neuromuscular blockers

may be given and ventilation continued until its effect has taken place. The SRNA would then proceed with direct laryngoscopy.

Induction Pharmacology

Pre-induction drugs such as benzodiazepines and opioids are given to patients to provide a synergistic effect and reduce induction dosages. Midazolam (Versed™) and fentanyl (Sublimaze™) are among the most widely used benzodiazepines and opioids used in anesthesia. These drugs are favored for their short duration and quick onset. Another drug commonly seen during the induction process is lidocaine (Xylocaine™). Lidocaine is given intravenously, which decreases pain associated with the administration of intravenous induction agents and blunts laryngeal and sympathetic reflexes (Nagelhout & Plaus, 2014).

Induction refers to the start of the anesthesia process in which the patient is rendered unconscious. The induction process can be done through inhalation or intravenous. For this project, only the use of intravenous induction was discussed. Intravenous induction agents allow for patients to experience a loss of consciousness rapidly to surgical levels of anesthesia (Nagelhout & Plaus, 2014). Commonly used intravenous pharmacological agents are propofol, etomidate, and ketamine. Choosing induction agents depends on patient history, physical exam, or other factors.

Propofol (Diprivan™) is a nonbarbiturate lipid-based intravenous anesthetic. Propofol is favored by anesthesia providers for its rapid distribution into the brain. Propofol, like many other sedative agents, interacts with the inhibitory neurotransmitter Gamma-aminobutyric acid or GABA. Propofol is given in 1-2 milligrams per kilogram (mg/kg) doses and is eliminated by the liver in about ten minutes. Propofol should be

given with caution in cardiac-compromised patients because of its mild to moderate transient decrease in blood pressure. Propofol is contraindicated in patients with egg allergies though this topic is controversial (Nagelhout & Plaus, 2014).

Etomidate (Amidate™) is an intravenous induction agent that is the agent of choice in patients who would not tolerate the hypotensive effect of propofol. Like propofol, etomidate binds to the GABA receptor and enhances the affinity of the neurotransmitter. Etomidate is given in 0.2-0.3 mg/kg dosages, effectively rendering the patient unconscious in less than one minute. Etomidate is eliminated in three-ten minutes by the liver and plasma cholinesterase. Myoclonic or involuntary movement and pain during injection are common with the use of the drug. Etomidate should not be given to patients with porphyria and sensitivity to adrenal suppression (Nagelhout & Plaus, 2014).

Unlike etomidate or propofol, ketamine (Ketalar™) is an N-methyl-D-aspartate receptor antagonist. Ketamine is the drug of choice in high-risk patients (i.e. shock, trauma, severe asthmatics) because it produces dissociative anesthesia without causing hypotension or respiratory depression. This induction drug's dose is 2-4 mg/kg for intubation and begins working in two to five minutes. Ketamine is metabolized by the liver and should be used with caution in hepatic patients. Also, ketamine should not be used where increases in intracranial pressure or intraocular pressure are not desired (Nagelhout & Plaus, 2014).

Neuromuscular blocking drugs are an essential part of the practice of anesthesia. Neuromuscular blocking agents allow for easy airway manipulation by relaxing the vocal cords and the muscles by which they are surrounded. These agents vary in onset,

duration, mechanism of action, and elimination and selection should be made by what best fits the patient (Nagelhout & Plaus, 2014). This criterion could depend on patient history, surgical procedure, or various other factors. Succinylcholine, Rocuronium, Vecuronium, and Cisatracurium are few neuromuscular blocking drugs that are commonly used during the induction process.

Succinylcholine (Anectine™) is a depolarizing neuromuscular blocking agent. Succinylcholine attaches to one or both alpha subunits of nicotinic acetylcholine receptors and mimics the action of acetylcholine thus depolarizing the post-junctional membrane. The onset of action at the larynx is about thirty seconds. Because of this quick onset, succinylcholine is often the neuromuscular blocker of choice for rapid sequence induction. Succinylcholine is given in 1-1.5 mg/kg doses, and it is quickly hydrolyzed by plasma cholinesterase in five to fifteen minutes. Succinylcholine can cause a rise in serum potassium levels and should be avoided in patients with burns or any musculoskeletal disease. Additionally, succinylcholine should be avoided in any patient with a history of malignant hyperthermia or generic variants of pseudocholinesterase (Nagelhout & Plaus, 2014).

Rocuronium (Zemuron™) is a nondepolarizing neuromuscular blocking agent. Rocuronium causes paralysis is 45-90 seconds and is often used in higher doses for RSI when succinylcholine is contraindicated. Rocuronium is given in 0.6-1.0 mg/kg doses and 1.2 mg/kg doses when used for RSI. Rocuronium is eliminated primarily by the liver and 30% by kidneys. Since rocuronium is a steroidal-based neuromuscular blocking agent, the drug can be reversed with Sugammadex (Bridion™) in a can’t intubate, can’t ventilate situation (Nagelhout & Plaus, 2014).

Cisatracurium (Nimbex™) is a nondepolarizing muscle-relaxing agent, but it is a benzylisoquinolinium instead of a steroidal agent. This neuromuscular blocking agent takes three to five minutes to cause paralysis and is given in doses of 0.1-0.2 mg/kg for intubation. Cisatracurium is the favored paralytic agent for hepatic and renal patients because of its non-organ-dependent elimination. Instead, cisatracurium undergoes Hoffman elimination and hydrolysis (Nagelhout & Plaus, 2014). Because cisatracurium is not a steroidal muscle relaxant it cannot be reversed in an emergent situation with sugammadex and should be used with caution in patients with difficult airways.

Complications

Endotracheal intubation for general anesthesia is a procedure routinely done by anesthesia providers on a day to day basis all around the world. Although these providers are experts in this action, the placement of the endotracheal tube can be extremely challenging. Difficult tracheal intubation is one of the most common respiratory complications leading to death and brain damage reported by the American Society of Anesthesiologists, or ASA (Nagelhout & Plaus, 2014). Complications leading to difficult airway intubation include variables such as trauma and abnormal anatomy. Several tests allow anesthesia providers to identify difficult airways before they reach the operating room. These tests include Mallampati score, thyromental distance, inter-incisor distance, head and neck flexion, and mandibular mobility. Mallampati classification is a popular scoring technique that examines tongue size compared to the oral cavity. A higher Mallampati score is a predictor of a difficult airway. The thyromental distance test measures the distance from the thyroid cartilage to the lower mandibular bony prominence. In the average adult, a thyromental distance fewer than three fingerbreadths

may signify difficult endotracheal intubation. Inter-incisor distance allows the practitioner to view the patient's mouth opening ability. An inter-incisor distance of fewer than two fingerbreadths is an indication of difficult intubation. Head and neck movement is essential for a direct view of the vocal cords during endotracheal intubation. Mandibular mobility test is done by asking the patient to protrude their jaw forward, this allows for manipulation during direct laryngoscopy (Nagelhout & Plaus, 2014).

Direct laryngoscopy is a difficult act that must be mastered by the anesthesia provider. No single test should be relied upon when judging airways for potential difficulties. Complications may still arise with patients that "pass" all of these tests. These tests are used to help the practitioner better prepare for potential airway complications. The inability to intubate a patient may lead to hypoventilation and hypoxia, which if not corrected, leads to brain and tissue damage. Proper preparation may help reduce these complications (Butterworth et. al, 2018).

Direct Laryngoscopy

The goal of laryngoscopy is to directly visualize the larynx for tracheal intubation. Direct Laryngoscopy requires the alignment of oral, pharyngeal, and laryngeal axes, as well as displacement of the tongue for maximal visualization. When these three axes are aligned, this is known as a sniffing position. In this position, the neck is flexed 35 degrees, while the head is extended 15 degrees. Once the patient is in position, the mouth may be opened in one of two fashions. One option if the patient has a stable cervical spine is for the provider to extend the atlantooccipital joint with their right hand while passively allowing the mouth to open. The second option is to, with a gloved hand, scissor the gums or teeth with the thumb and first or second finger. The goal of both

techniques is to extend the temporomandibular joint, maximizing the inter-incisor gap (Barash et al., 2017).

Once the patient is in position, it is time to select the provider's choice of laryngoscope blade. Anesthesia providers performing direct laryngoscopy have the option to choose from a variety of laryngoscopy blades. There are many types of blades, but the two commonly seen blades are called the Macintosh blade and the Miller blade. The Macintosh blade is slightly curved and designed to displace the epiglottis out of the sightline of the user. The distal tip is placed in the vallecula, which causes the glossoepiglottic ligament to tense. The Miller blade is a straight blade designed to expose the glottis by compressing the epiglottis against the base of the tongue. Blade size should be chosen individually depending on patient gender and size (Barash et al., 2017).

For direct laryngoscopy, the handle of the blade should be held with the left hand and the mouth should be opened with one of the previously mentioned techniques. The provider will insert the blade into the right side of the mouth with care to avoid contact with the teeth and lips. Advance the blade to its desired position, this depends on the blade chosen by the provider, while sweeping the tongue to the left. The provider should then lift in an antero-caudad direction while avoiding cephalad rotation. This motion will prevent pressure placed on the upper incisors (Barash et al., 2017).

A grading system was created by Cormack and Lehane, which allows the operator of the laryngoscope to describe their view. Grade 1 signifies the complete view of the glottic opening, grade 2 states that only the posterior aspects of the glottic open are visualized, grade 3 describes only the tip of the epiglottis is seen, and grade 4 is the visualization of only the patient's soft palate (Barash et al., 2017).

Once visualization of the larynx is obtained, the tracheal tube may be placed with the operator's right hand. The operator should be careful not to obstruct their view during placement. If possible, the operator should visualize the tracheal tube passing through the vocal cords to decrease the likelihood of esophageal perforation. The cuff should be placed two centimeters below the vocal cords in a mid-tracheal position before the cuff is inflated (Barash et al., 2017). This distance correlates to about 21 cm for female patients and 23 cm for male patients. A size 6.0 to 7.0 tracheal tube is typically the size choice for females, and a 7.0- 8.0 size tracheal tube is typically chosen for males (Hu et al., 2013). The gold standard for the identification of proper tracheal tube placement is sustained exhaled carbon dioxide. Other verifications include visualization of chest rise with inhalation, auscultation over the chest and abdomen with a stethoscope, observation of humidity in the tracheal tube, or witnessing the tube placement through the vocal cords (Barash et al., 2017).

Rapid Sequence Induction

Rapid sequence induction (RSI) is a safe induction option when there are concerns of hypoxia, gastric regurgitation, or aspiration of gastric content during tracheal intubation (Okubo et al., 2017). The induction of anesthesia blunts the intrinsic muscles and their reflexes which protect the airway from foreign bodies. This is especially important when providing anesthesia for patients with a history of obesity, gastroesophageal reflux disease, bowel obstruction, are pregnant, or present with an unknown NPO status (Fenwick, 2014).

RSI is the rapid placement of a cuffed endotracheal tube within the trachea to prevent foreign body aspiration. The goal of this technique is to gain control of the

patient's airway as quickly and safely as possible after the loss of airway reflexes. When performing RSI, a fast-acting induction agent is administered intravascularly, followed by a fast-acting neuromuscular blocking agent. Cricoid pressure, or Sellick maneuver, is applied after the induction agents are administered in an attempt to close the lumen of the esophagus to prevent aspiration of gastric content. This pressure is not removed until confirmation of endotracheal tube placement. Intubation by laryngoscopy is performed by the anesthesia provider as soon as the neuromuscular blockade is confirmed (Barash et al., 2017).

Sellick's maneuver, also known as cricoid pressure, is often used in the clinical setting in anesthesia to help prevent regurgitation and aspiration of gastric contents. This maneuver is especially useful during a rapid sequence induction in an attempt to prevent aspiration pneumonitis, which greatly increases patient morbidity and mortality (Andruszkiewicz et al., 2016). The anesthesia provider is using proper technique when 30 to 44 Newtons (N) of pressure are applied to displace the cricoid cartilage against the patient's cervical vertebrae with the patient positioned with their head up at 20 degrees. The goal of Sellick's maneuver is to occlude the esophagus while allowing the patient's trachea to remain patent. This is an effective tool in the prevention of gastric insufflation and vomiting during ventilation of an unprotected airway of a patient where the nil per os (NPO) status is unknown (Fenwick, 2014).

Rationale

Miller's pyramid of assessment provides a framework assessing the clinical competency of medical professionals. This assessment tool assists educators in matching clinical competency to what the learners should be able to do. The pyramid is divided

into four sections, the lower sections provide the foundation for the higher sections. The foundational tier of the pyramid is called the *knows*, it tests students' knowledge in written form. Building off the *knows* foundation, the following tier is the *knows how*. This tier allows students to be tested on clinical problem-solving. On top of the *knows how* tier is the *shows how* tier. This tier is the testing of clinical skills, specifically the use of OSCEs. It is in this tier that clinical competency can be determined. The final tier is the *does* tier, and it can only be assessed during direct patient care observation (Thampy et al., 2019).

While the OSCE specifically assesses the *shows how* tier of the pyramid, it also assesses the *knows* and *knows how* tiers. The OSCE tests the foundational tier of the pyramid by requiring the student demonstrate knowledge of airway anatomy, induction pharmacology, and basic anesthesia principles. The second tier, or the *knows how* tier, tests the student on understanding and interpretation the information given. The second tier teaches students to develop a plan that is best suited to the patient. The student *shows* their clinical competency in the third tier by integrating knowledge and skills into a successful clinical performance. The OSCE assessment technique offers the best theoretical framework for this doctoral project (Thampy et al., 2019).

DNP Essentials

The Doctor of Nursing Practice (DNP) Essentials were fundamental in the development of this doctoral project, Appendix A. By using the following essentials as its foundation, the project was able to be developed. These Essentials allowed the authors to determine a need and implement findings into the form of an OSCE.

Essential One: Scientific Underpinning for Practice

The aim of this doctoral project was to provide an OSCE to USM's nurse anesthesia program by developing an induction and intubation assessment tool for traditional direct laryngoscopy versus rapid sequence intubation. The researchers developed the OSCE utilizing evidence-based literature and input from an expert panel. Members of the expert panel include USM NAP faculty, certified registered nurse anesthetists who are experts at airway management. The panel of experts reviewed the OSCE and provided feedback for revisions (Chism, 2019).

Essential Two: Organizational and Systems Leadership for Quality and Improvement and Systems Thinking

Two researchers developed an evidence-based OSCE and received feedback and suggestions from a panel of experts. The suggestions provided to the researchers allowed for changes to be made to the OSCE thus facilitating a more complete, cohesive delivery model to SRNAs (Chism, 2019). The feedback was attained in the form of a survey.

Essential Three: Clinical Scholarship and Analytical Methods for Evidence-Based Practice

Literature was collected from evidence-based articles and journals, then analyzed and evaluated. The collection of data helped the authors determine the best evidence-based practice. An OSCE was developed based on these findings. Outcomes following the implementation of the OSCE into the USM NAP curriculum was evaluated to determine if SRNAs' practice environment had improved (Chism, 2019).

Specific Aims

The design of this project aimed at developing an OSCE to improve the clinical competency of nurse anesthesia students on induction and intubation by traditional direct laryngoscopy or by rapid sequence. The specific aim was to assess a student's understanding of the induction process and application of clinical skills concerning the induction and intubation. By creating a structured assessment tool, educators can fairly evaluate the student with limited bias. The short-term goal of this project is to increase the USM nurse anesthesia student's foundational knowledge on airway management. Implementation of an OSCE will potentially lead to a decrease in stress levels related to intubation during clinical scenarios. Also, the OSCE will evaluate clinical skills in a standardized manner and provide students with feedback in areas of improvement. The overall goal is to improve patient outcomes by delivering a safe anesthesia provider.

Summary

The USM nurse anesthesia student benefits from the use of an OSCE. The evaluation tool allows students to be assessed in a low-stress environment. SRNAs should focus on the foundational airway knowledge obtained in didactic courses and apply the knowledge gained in the classroom to a clinical simulation. The OSCE allows students the opportunity to practice various scenarios to increase their preparedness for the clinical environment. Students should improve on induction and intubation workflow and troubleshooting techniques in an environment that should not allow for patient harm. By allowing for this unique learning scenario, it provides an opportunity to optimize a student's clinical learning experience on intubation and induction.

CHAPTER II - METHODOLOGY

Context

This project received approval from the USM Institutional Review Board (Protocol # IRB-20-276). By developing a structured assessment tool, the OSCE has the potential to improve the clinical competency of the nurse anesthesia student on induction and intubation by traditional direct laryngoscopy or by rapid sequence. The specific aim was to assess a student's understanding of the induction process and application of clinical skills in relation to induction and intubation. In addition, the OSCE offered a platform for educators to fairly evaluate the student with limited bias. The short-term goal of this project was to increase USM nurse anesthesia student's foundational knowledge on airway management. Implementation of an OSCE resulted in decreased stress levels related to intubation during clinical scenarios. Also, the OSCE evaluated clinical skills in a standardized manner and provided students with feedback in areas of improvement. The use of the OSCE in the nurse anesthesia program has the potential to improve patient outcomes by producing a safe anesthesia provider.

Transitioning from the classroom or simulation laboratory to the clinical setting can be a stressful and eye-opening experience. Students and new practitioners are seeing patients in the operative setting for the very first time with high expectations of their knowledge. Induction of anesthesia is a stressful time in which the anesthesia provider must administer pharmacological agents, place an endotracheal tube, and access a patient's vital signs almost simultaneously (Sato et al., 2016). The University of Southern Mississippi is currently placing 20 new students into the clinical setting each January. Implementation of an OSCE for traditional anesthesia induction with direct laryngoscopy

versus the use of RSI will be used as a tool to better prepare its students for the clinical setting. The OSCE is available for students at the USM NAP simulation laboratory located in Asbury Hall on the campus of USM in Hattiesburg, Mississippi. Within the simulation laboratory, students are divided into ten groups of two and assigned one faculty member to learn the induction processes. Within the scenario, the students assume the positions of two anesthesia providers inducing a patient for a general anesthetic.

The development of an OSCE providing information on induction for a general anesthetic with direct laryngoscopy versus an RSI was needed for the SRNAs within the USM NAP due to its unavailability within the program. The OSCE was requested by the current faculty and program director of the USM NAP. The USM NAP program has begun including OSCEs as a teaching tool for their SRNAs and the project is being supported by the program's director. The program maintains the infrastructure to support and improve the OSCE as well as develop the project.

Intervention

Following IRB approval from USM and the USM NAP, and identification of a collaborating faculty member, the authors met with professors and collaborating faculty to determine existing policy or protocol for teaching, grading, and validation of competency for clinical preparation for traditional direct laryngoscopy and RSI. A review of current methods for delivery and testing of induction and intubation knowledge for nurse anesthesia students was performed. An expert panel questionnaire was developed to determine the quality of the OSCE development based on evidence-based literature to be utilized for simulation. This doctoral project was a pilot study, therefore there was no testing on validity and reliability.

A panel of experts (3-5) was developed from stakeholders for input: Faculty members from the USM NAP were chosen for their expertise in the evaluation of nurse anesthesia students, clinical preceptors at The University of Mississippi Medical Center were also chosen for their expertise in airway management. The panel of experts was invited via email and can be found in Appendix B. An evaluation of current traditional testing methods utilized at USM that establishes competence level related to airway assessment, induction, and airway management (before the implementation of an OSCE on traditional direct laryngoscopy versus RSI) was provided to participants. Following the evaluation, there was the implementation of an OSCE for traditional direct laryngoscopy and RSI via video demonstration and paperwork for the expert panel for evaluation and feedback. Recommendations were then collected and evaluated of the expert's confidence for the OSCE implementation through the emailed survey and comment section.

Following a review of the feedback from the initial demonstration, adjustments were made to reflect recommended changes that coincide with evidence-based literature. Final revisions to the plan were made for improvement to include panel input. Following revisions, submission for a plan of improvement was sent to the DNP chair for approval. After approval from the DNP chair, the approved OSCE was presented to USM NAP administration for consideration in adding to the current policy and curriculum. Results and literature were disseminated at USM Scholarship Day to faculty and participants. Upon conclusion of the project, all data and comments were deleted by placement into the computer trashcan and the trashcan was emptied.

Measures

This doctoral project provides SRNAs with further knowledge and newfound confidence for both the traditional direct laryngoscopy and RSI. Completion of the OSCE translates into a safe and prepared SRNA within the early clinical setting. The students are provided with currently recommended material, techniques, assessment criteria, and pharmacological information before completing the OSCE. This information gathered aims at providing SRNAs with adequate tools to assess the need for a specific induction technique. The OSCE content includes a rubric, goals, roles for participants, equipment needed for induction, setting, rules, and a patient scenario for the SRNAs to practice. A survey was given to the panel of experts and current USM SRNAs for evaluation of the OSCE and its effectiveness. The survey contains six questions for the panel of experts and SRNAs.

1. Do you consent to participation?
2. Are you an SRNA or CRNA?
3. Were the OSCE's objectives clearly presented?
4. Was the information provided in the OSCE evidence-based and up-to-date with current practice?
5. Does the OSCE provide didactic references needed to complete the procedure?
6. Do you have any suggestions or comments regarding the OSCE?

Analysis

Upon completion of the survey conducted through Qualtrics™, the feedback was qualitatively analyzed for statistical significance and interpretation. The data was entered

into a table for review. Assessment of the knowledge development of current and future nurse anesthesia students is an essential element of this project. The appropriate evaluation of the information provided the opportunity to critically review the efficacy of the OSCE. Data obtained from participants provided suggestions for elaboration and modification to the OSCE, shown in Appendix B. This doctoral project aimed to evaluate if the OSCE template was evidence-based, and, whether or not, an evidence-based OSCE would be a beneficial addition to the USM nurse anesthesia curriculum.

Summary

A need for this project was determined by the authors with the help of committee members. An assessment tool and a post-simulation survey were created for the evaluation of participants' clinical competency. The survey also assessed the opinion of participants on whether they felt the simulation would be a helpful tool if added to the USM NAP simulation lab. Data was collected in the form of surveys, feedback was collected and analyzed following each participant's assessment. This project aims at better preparing the SRNA for the clinical environment by providing a simulation of a real-life scenario within a low stress environment.

CHAPTER III – RESULTS

Analysis of Results

The total number of participants who completed the survey was sixteen. The participants included four expert panelists who are currently practicing anesthesia in the State of Mississippi and twelve anesthesia students. Figure 1 depicts the percentage of the number of CRNAs and SRNAs that participated in the survey. Sixteen participants consented to participate in the voluntary review and analysis of the OSCE. Feedback from the Qualtrics™ survey showed that all sixteen responses reported that the information provided in the OSCE was clearly presented, Figure 2. All sixteen participants indicated that they believed the information presented in the OSCE was evidence-based and up to current practice. When the OSCE was reviewed, all participants indicated that the OSCE provided the appropriate didactic references needed to complete the procedure. Both CRNAs and current SRNAs indicated that they believed this OSCE will aid future SRNAs in the induction and intubation process. The final question available on the survey was a text box that allowed for any additional feedback or questions regarding the OSCE, these responses can be found in Table 1.

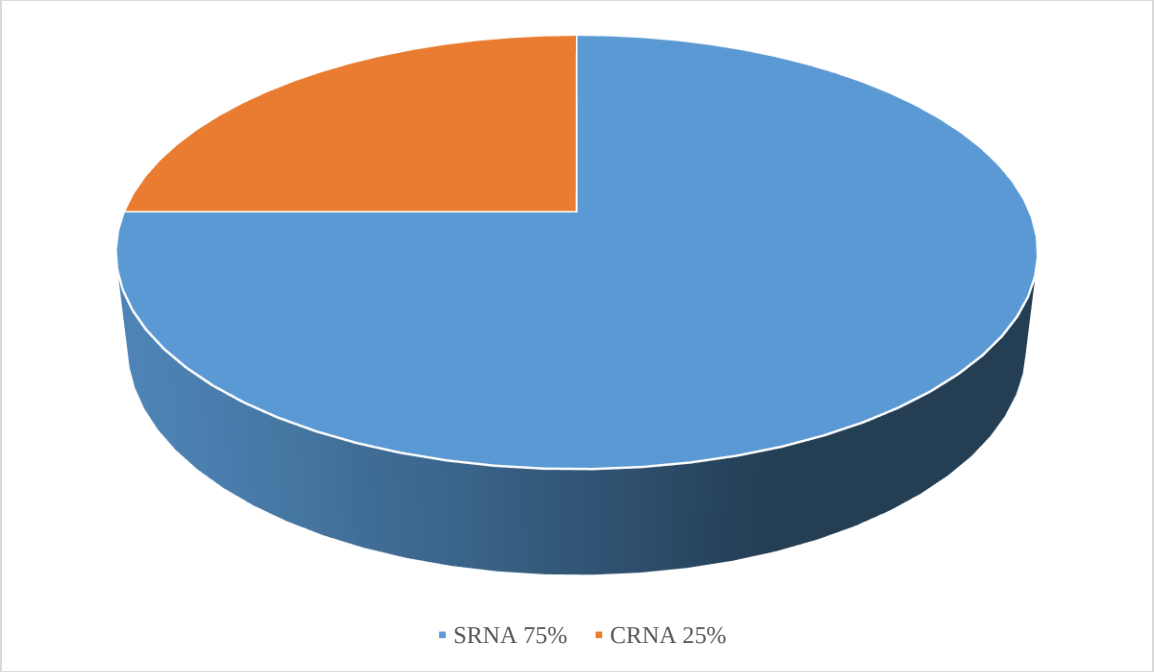

Figure 1. *Percentage of Participants.*

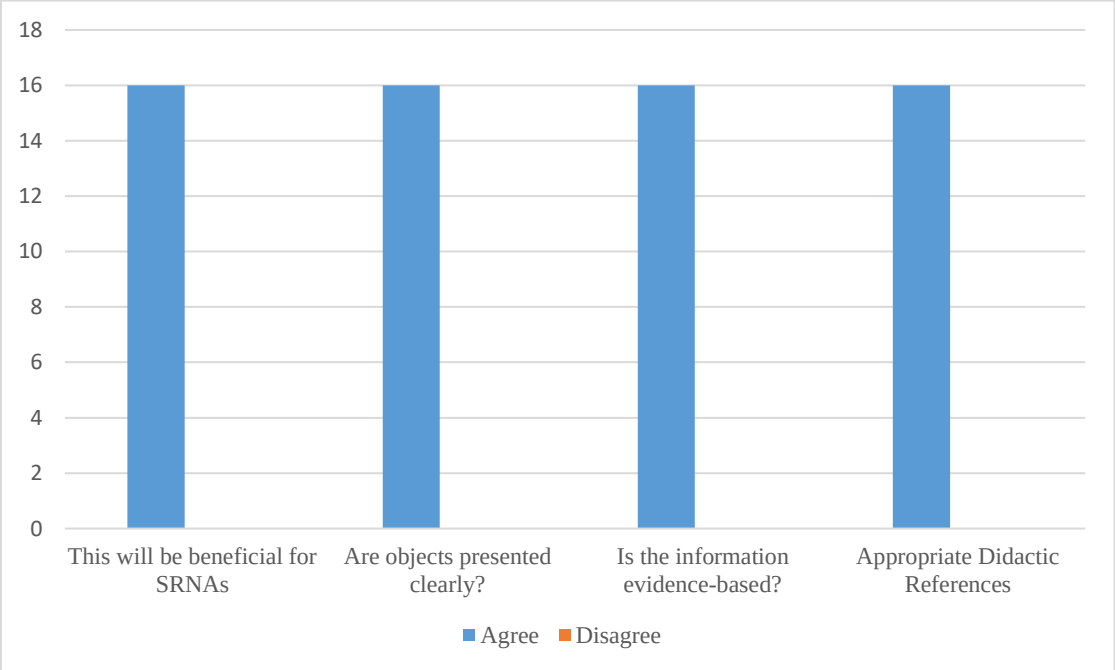

Figure 2. *Survey Results.*

Table 1

Participants' Responses

Participant 6	Should specific criteria for determining rapid induction vs DL be included in the OSCE? Currently, the OSCE does not say which scores for Mallampati, thyromental distance, etc. warrant rapid sequence intubation.
Participant 7	Great OSCE. One recommendation or thought, although there are referenced chapters for the educational part of the OSCE, could there be a very brief educational section within the OSCE that quickly debriefs the learner on the basics of how to decide whether to use RSI or traditional DL? Maybe just a quick compare and contrast chart?

Summary

Respondents to the survey unanimously agreed that the OSCE was both clearly presented and evidence-based. Also, the participants agreed the OSCE referenced didactic information that appropriately correlated with the information presented in the OSCE. Both CRNAs and current SRNAs agreed that the implementation of this OSCE into the USM nurse anesthesia program would be beneficial to future SRNAs in the induction and intubation process. Free text feedback was analyzed, and clarifying statements and information were added to OSCE based on remarks made by the respondents.

CHAPTER IV – CONCLUSION

Discussion

Simulation for nurse anesthesia practitioners is a way to prepare outside of the classroom, while not placing patients at harm. Allowing students and other practitioners the opportunity to rehearse real situations in a stressful environment makes for a prepared practitioner. Survey results yield significantly positive results concerning the didactic and clinical information provided by the general induction and rapid sequence induction OSCEs. The results show that the information provided is relevant to students and certified registered nurse anesthetists and can be beneficial in providing education on current practice within the aspect of anesthesia. Providing this OSCE within the simulation lab at USM will allow for students to practice clinical scenarios to better their skills before switching from the didactic portion to the clinical of their program. Application of the OSCE will benefit the students by providing them confidence when faced with these realistic scenarios, it will allow them to become more prepared, benefiting the patients when in the hospital setting. The feedback for the information provided to the participants is positive, from this point the panel of experts can guide future studies and potential projects on results for implementation of the OSCE.

Limitations

One significant limitation of this study was the sample size. Acquiring a larger sample size would allow more considerable feedback from participants. The smaller sample size provided a limited critique for possible improvements to the OSCE. An additional limitation of this study was that while the participants were random, the sample group all came from faculty or students of USM, so the potential for selection

bias was present, this may have skewed survey input. Our sample was limited to one anesthesia program rather than gathering opinions from students in similar programs. Another limitation of the study was the lack of literature evidence regarding prior implementation of OSCE into nurse anesthesia programs. Without further evidence, other nurse anesthesia programs may opt-out of any willingness to implement an OSCE into their curriculum.

Summary

There were limited options for OSCEs within the simulation lab at USM for nurse anesthesia students. The purpose of this project was to provide participants within the USM simulation lab with current accurate information so that they would be prepared for the clinical environment. A comfortable, well-educated provider makes for safer anesthesia provided to patients while decreasing sentinel events. Ideally, the nurse anesthesia program would supply students with many scenarios with varying patient characteristics. Offering multiple scenarios would allow students to use clinical judgment in preparation for real-world situations. The induction for general anesthesia, whether it be a traditional or rapid sequence, is a vital part of the surgical process. Confidence when securing a patient's airway is something that providers must be comfortable with. Future projects could focus on preparation for preoperative assessment as well as alternative endotracheal intubation devices. These projects could include but are not limited to fiberoptic intubation, videoscope intubations, nasal intubations, or awake intubations.

APPENDIX A – DNP Essentials

Essential One: Scientific Underpinnings for Practice	This project combined the utilization evidence-based literature and input from an expert panel to develop this OSCE
Essential Two: Organizational and Systems Leadership for Quality Improvement and Systems Thinking	This doctoral project aimed to improve the induction and intubation process for SRNA through the expansion of knowledge and an evidence-based technique.
Essential Three: Clinical Scholarship and Analytical Methods for Evidence-Based Practice	This doctoral project was analyzed by faculty members from USM NAP, clinical preceptors from The University of Mississippi Medical Center, and current USM NAP students were sent a questionnaire to determine the quality of the OSCE developed for simulation.
Essential Four: Information Systems/Technology and Patient Care Technology for the Improvement and Transformation of Health Care	This essential was met through the development and implementation of an OSCE to evaluate the SRNAs didactic knowledge and clinical skills.
Essential Five: Healthcare Policy for Advocacy in Health Care	This essential is met by educating SRNAs on induction and intubation through an evidence-based technique thus providing a safer provider and improving patient outcomes.
Essential Six: Inter-professional Collaboration for Improving Patient and Population Health Outcomes	This project utilized professional communication and collaboration with an expert panel of CRNAs, faculty members, and USM students.
Essential Seven: Clinical Prevention and Population Health for Improving the Nation's Health	This essential was met by the demonstration of expansion in knowledge amongst SRNAs. These SRNAs also expressed that the utilization of this OSCE would likely benefit them in the clinical setting.
Essential Eight: Advanced Nursing Practice	This essential is met through a thorough evaluation of scientific literature and implementation of this OSCE to improve the clinical competency of SRNAs.

APPENDIX B – OSCE Template

ANESTHESIA OBJECTIVE STRUCTURED CLINICAL EXAM

Traditional Direct Laryngoscopy Intubation versus Rapid Sequence Intubation OSCE

LEARNER OUTCOMES:

1. Perioperative airway assessment skills
2. Evaluate patient's need for most appropriate intubation technique
3. Equipment selection and utilization
4. Safely perform laryngoscopy
5. Establish secure airway

DOMAINS:

1. Preoperative, intraoperative, and postoperative assessment
2. Formative feedback evaluation
3. Clinical skill

PURPOSE: Student practice and Formative Evaluation

LEARNER OBJECTIVES:

1. Performs airway assessment
2. Communicates need for rapid sequence intubation versus traditional direct laryngoscopy
3. Appropriate selection/assembly of laryngoscopy instruments
4. Demonstrates direct laryngoscopy
    a. Traditional direct laryngoscopy pharmacology
    b. Atraumatic insertion of a laryngoscope
    c. Visualization of the oral cavity/oropharynx

    d. Visualization of the larynx/glottis
    e. Suspension of the laryngoscope
5. Demonstrates rapid sequence intubation
    a. RSI pharmacology
    b. Atraumatic insertion of the laryngoscope
    c. Visualization of the oral cavity/oropharynx
    d. Visualization of the larynx/glottis
    e. Suspension of the laryngoscope
6. Confirm placement of the endotracheal tube

INDIVIDUAL OR GROUP OSCE: Individual

REQUIRED READING and ASSOCIATED LECTURES:

1. Morgan & Mikhails clinical anesthesiology Chapter 19
2. Basic Principles of Anesthesia Airway Lectures

REQUIRED PARTICIPANTS: Additional volunteer student

VENUES: The University of Southern Mississippi Nurse Anesthesia simulation laboratory

STUDENT LEVEL OF OSCE:

Semester 1-2, 3-4, 5-6, 7-9 (Circle one)

TIME ALLOTTED: 15 minutes

SEQUENTIAL PRACTICE & TESTING: Prior airway assessment knowledge is recommended

RECOMMENDED PRACTICE PRIOR TO EXAMINATION:

60 minutes total

CONTENT OUTLINE

CONTEXT:

You are assigned to intubate a patient for surgery. Your preceptor has asked you to determine whether a traditional direct laryngoscopy intubation or rapid sequence intubation is warranted for this patient and then use the laryngoscope to correctly insert the endotracheal tube.

Scenario #1:

Mr. Jones 30-year-old male that is scheduled to have an open reduction internal fixation of his femur.

Past Medication History: Sleep apnea

Allergies: None

Medications: None

NPO: 2100 last night

Airway assessment: Mallampati grade II, thyromental distance >3,

mouth opening >3, full neck range of motion, intact dentition.

Scenario #2:

Mrs. Brown is a 50-year-old female that is in need of an urgent exploratory laparotomy for evaluation of possible bowel obstruction

Past Medication History: Hypertension, Diabetes

Allergies: Penicillin

Medications: Metformin and hydrochlorothiazide

NPO: 0400 this am

Airway assessment: Mallampati grade I, thyromental distance >3,

mouth opening >3, full neck range of motion, intact dentition.

EQUIPMENT:

Mask

Oxygen

Positive pressure circuit

Endotracheal tube

Stylet (optional)

Gel

Laryngoscope Blade (Macintosh or Miller)

Laryngoscope handle

10cc syringe

Oral airway

Tongue blade (optional)

Tape (or another securing device)

TASK STATEMENT:

Your task is to perform an airway assessment, determine if the patient warrants direct laryngoscopy intubation or rapid sequence intubation, select appropriate equipment, demonstrate atraumatic intubation by identifying airway anatomy. Verbalizes proper ETT depth and confirms placement.

PROCESS:

1. Assess patient's airway: grade/measure Mallampati, thyromental distance, mouth opening, and neck range of motion, dentition, etc.

2. Determine if patient warrants traditional direct laryngoscopy intubation or rapid sequence intubation
3. Necessary equipment gathered and prepared:
    a. The operator correctly identifies appropriate ETT size, depth, and laryngoscope size based on weight.
    b. Equipment checked to ensure working properly (laryngoscope light, cuff leak).
    c. Any other necessary equipment gathered: stylet (if used), suction.
4. The operator ensures that all necessary parties are present and ready to begin the procedure
5. Time outperformed

OPTION ONE: DIRECT LARYNGOSCOPY INTUBATION

1. Pre-oxygenation is initiated for at least three minutes.
2. Induction drugs (ensure ventilation prior to administering paralytics)
3. Continue ventilation while waiting for the onset of the paralyzing agent.
4. The patient's head is positioned properly by flexing the neck forward and extending the head (sniffing position). If head or neck injury is suspected, provide manual inline stabilization of the cervical spine.
5. Insert the laryngoscope blade into the patient's mouth.
6. Obtain direct visualization of vocal cords.
7. ETT inserted to appropriate depth.
8. The stylet is then removed (if used).
9. Pilot balloon is now inflated.

10. Operator ensures the ETT placement verified using ETCO2/ auscultation of lungs/ chest rise and fall.
11. Secures ETT with tape or another securing device

OPTION TWO: RAPID SEQUENCE INDUCTION FOR DIRECT LARYNGOSCOPY

1. Pre-oxygenation is initiated for at least three minutes.
2. Rapid sequence induction agent, including paralytics (as ventilation is often not ensured prior to administering paralytics).
3. Have an assistant provide the patient with gentle cricoid pressure.
4. The patient's head is positioned properly by flexing the neck forward and extending the head (sniffing position). If head or neck injury is suspected, provide manual inline stabilization of the cervical spine.
5. The laryngoscope blade is inserted into the patient's mouth.
6. Obtain direct visualization of the vocal cords.
7. The ETT inserted to the appropriate depth.
8. The stylet is then removed (if used).
9. The pilot balloon is inflated.
10. The operator ensures the ETT placement, which is verified using ETCO2/ auscultation of lungs/ chest rise and fall.
11. Secures the ETT with tape or another securing device.

DEBRIEFING FORM:

1. How would you rate the *knowledge* level in regard to the induction of the general anesthetic? Poor, Fair, Good, or Excellent

2. How would you rate the *confidence* level in regard to the induction of the general anesthetic? Poor, Fair, Good, or Excellent
3. Was there an area where the provider's knowledge could have been more extensive?
4. Does the provider appear prepared to induce a general anesthetic in the clinical setting?

   Please provide any feedback that you think might benefit future providers in preparing for their first intubating process.

DIRECT LARYNGOSCOPY

	Demonstrates and/or verbalizes with good flow	Does not perform
Airway Assessment	1	0
Selection/Assembly of Equipment	1	0
Verbalizes indication for RSI vs DL	1	0
Performs timeout	1	0
Positions head appropriately	1	0
Direct Laryngoscopy a. Atraumatic insertion b. Appropriate placement suspension c. Insert ETT	2	0

depth and stylet removed		
Verifies ETT placement a. Response to esophageal intubation	1	0
Secures ETT tube	1	0
Connects circuit	1	0

SCORE ___/10 correct

RAPID SEQUENCE INTUBATION

	Demonstrates and/or verbalizes with good flow	Does not perform
Airway Assessment	1	0
Selection/Assembly of Equipment	1	0
Verbalizes indication for RSI vs DL	1	0
Performs timeout	1	0
Positions head appropriately	1	0
Rapid Sequence Intubation d. Atraumatic insertion e. Appropriate placement suspension	2	0

f. Insert ETT depth and stylet removed		
Verifies ETT placement b. Response to esophageal intubation	1	0
Secures ETT tube	1	0
Connects circuit	1	0

SCORE ___/10 correct

The OSCE by the student demonstrate foundational knowledge and correct use of the laryngoscope to intubate the patient *PASS or FAIL*

Does the student need to repeat this OSCE at a later date to satisfy learning requirements? *YES NO* Date to return for evaluation: _____

EXAMINER: _____

DATE: _____

(Butterworth et al., 2018)

APPENDIX C – IRB Approval Letter

Office *of*
Research Integrity

THE UNIVERSITY OF SOUTHERN MISSISSIPPI

118 COLLEGE DRIVE #5125 • HATTIESBURG, MS | 601.266.6576 | USM.EDU/ORI

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 template on Cayuse IRB.
- The period of approval is twelve months. An application for renewal must be submitted for projects exceeding twelve months.
- FACE-TO-FACE DATA COLLECTION WILL NOT COMMENCE UNTIL USM'S IRB MODIFIES THE DIRECTIVE TO HALT NON-ESSENTIAL (NO DIRECT BENEFIT TO PARTICIPANTS) RESEARCH.

PROTOCOL NUMBER: IRB-20-246
PROJECT TITLE: Rapid Sequence Induction versus Traditional Induction: An Objective Structured Clinical Exam
SCHOOL/PROGRAM: School of LANP, Leadership & Advanced Nursing
RESEARCHER(S): William Scott, Nina Mclain, Courtney Parker

IRB COMMITTEE ACTION: Approved
CATEGORY: Expedited
7. Research on individual or group characteristics or behavior (including, but not limited to, research on perception, cognition, motivation, identity, language, communication, cultural beliefs or practices, and social behavior) or research employing survey, interview, oral history, focus group, program evaluation, human factors evaluation, or quality assurance methodologies.

PERIOD OF APPROVAL: May 15, 2020

Donald Sacco Jr.

Donald Sacco, Ph.D.
Institutional Review Board Chairperson

APPENDIX D –Invitation to Participate in the Study

To all,

We are seeking for volunteers to participate in the review of the attached OSCE regarding Traditional Direct Laryngoscopy Intubation versus Rapid Sequence Intubation and provided input via the survey provided in the link. SRNAs currently enrolled in the USM the Nurse Anesthesia Program, USM CRNA faculty members, and current CRNAs are needed. The title of the study is "Traditional Direct Laryngoscopy Intubation versus Rapid Sequence Intubation Objective Structured Clinical Exam". Review of the OSCE will take approximately 10 minutes with an evaluation survey to follow at the link provided.

All data collected will be done anonymously and no identifying information will be asked in the survey. Participation in this survey is voluntary. There are no repercussions for non-participation. The study has been approved by University of Southern Mississippi Institutional Review Board.

If you have any questions, please contact Courtney Shouse (c.parker@usm.edu) or William Scott (william.d.scott@usm.edu).

Regards,

Courtney Parker Shouse and Will Scott

APPENDIX E – Post-OSCE Participation Survey

1. Do you consent to participation?
2. Are you an SRNA or CRNA?
3. Were the OSCE's objectives clearly presented?
4. Was the information provided in the OSCE evidence-based and up-to-date with current practice?
5. Does the OSCE provide didactic references needed to complete the procedure?
6. Do you have any suggestions or comments regarding the OSCE?

APPENDIX F –Literature Matrix

Authors/Year/Title	Level/ Grade	Design	Sample/Data Collection	Findings	Recommendations
Buttars, C. (2018). The Mallampati Test versus the Upper Lip Bite Test in Predicting Difficult Intubation.	I	Meta-analysis	3,731 patients	Seven out of eight studies found the upper lip bite test to have a greater sensitivity in predicting difficult intubations	Though the upper lip bite test is not a perfect tool and cannot predict all difficult intubations, it should be used in conjunction with other assessment tools to better predict difficult intubations.
Davis et al. (2008). Rate of decline in oxygen saturation at various pulse oximetry values with prehospital rapid sequence intubation	I	Meta-analysis	87 patients	Intubation attempts that were begun after SpO2 was less than 93% showed a faster rate of desaturation than those begun with a SpO2>93%.	In patients presenting with SpO2<93%, bag-mask ventilation is recommended to get the value above 93% before intubation via direct laryngoscopy is attempted.
Davis et al. (2015). Preoxygenation Reduces Desaturation Events and Improves Intubation Success.	VI	Qualitative Study	155 Patients	In ideal patients, maximum pre-oxygenation "may result in apnea periods of up to 8 minutes without desaturation"	Preoxygenation reduces desaturation events and increased intubation success rate from 88 to 98 percent
Fenwick, R. (2014). Rapid Sequence Induction in Urgent Care Settings	IV	Non-experimental Cohort Study	0	Providing definition and step by step instruction on rapid sequence induction	Rapid sequence induction is a useful tool in the urgent care setting where NPO status and patient history may be unknown
Hu et al. (2013). The Size of Endotracheal Tube and Sore Throat after Surgery: A Systematic Review	I	Meta-analysis	509 patients	Female patients with a smaller size ETT (6.0 mm) had a lower incidence of POST when compared to	A smaller size of ETT could reduce the incidence of POST in PACU and at 24 h after surgery in female patients.

and Meta-Analysis.				larger ETT (7.0 mm).	
Okubo et al. (2017). The effectiveness of rapid sequence intubation (RSI) versus non-RSI in emergency department: an analysis of multicenter prospective observational study.	I	Meta-analysis	2365 patients	Intubations with RSI had a higher first-attempt success rate (73% vs 63%) than non-RSI intubation, while there was no major difference in complication rate.	Using RSI is a safe option if clinicians have any question about whether or not it is necessary. It does not lead to increased complications and increases the chance of first-attempt success.

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