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Task-management Training for Recognition, Prioritization and Decision-Making for the SRNA

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Task-management Training for Recognition, Prioritization and Decision-Making for the SRNA

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Glossary

Abstract.....	3
Introduction.....	5
Literature Review.....	8
Methods.....	17
Results.....	23
Discussion.....	29
Recruitment Email.....	34
Information Sheet.....	35
Demographic Information Questionnaire.....	36
Surveys.....	37
Instructional Video Checklist.....	40
Letter of Permission.....	46
Figures.....	47
Acknowledgement.....	49
References.....	50

Abstract

Background: Non-technical skill deficiency can increase the chance of error, which can result in adverse events. While the traditional anesthesia teaching plays a significant role on knowledge acquisition and development of technical skills, non-technical skills have been identified to be the key determinant of successful anesthesia particularly during crisis management (Yee et al., 2005). Task-related non-technical skills, such as recognition, prioritization, and decision-making are essential for safe administration of anesthesia (Wunder, 2016).

Purpose: The purpose of this study is to improve three non-technical skills (recognition, prioritization, and decision-making) in SRNAs new to the clinical setting with the use of an instructional video demonstrating the appropriate management of an airway obstruction during monitored anesthesia care (MAC).

Methods: A quasi-experimental pre-test and post-test and critical action survey design were used to investigate the effect of a pre-recorded instructional video demonstrating proper task-management skills, specifically recognition, prioritization, and decision-making of the SRNA during airway obstruction in MAC anesthesia. A convenience sample approach was used to obtain student volunteers in their second or third year of graduate school as SRNAs at NorthShore University HealthSystem School of Nurse Anesthesia, Evanston, IL.

Results: Using a sample of 23 SRNAs, the effect of an instructional video on the task-management skills of recognition, prioritization and decision-making in airway obstruction during MAC anesthesia was evaluated. Wilcoxon Signed Ranks Test demonstrated statistically significant differences in the participants' level of comfort in recognition and prioritization, pre and post-instructional video [$Z = -3.507$; $p = .000$ (2-tailed).] A positive correlation was

demonstrated between comfort, with use of the post-video survey, and confidence, with use of the Critical Action Survey, by using Spearman's r . Results demonstrated a significant positive relationship, where increases in comfort with non-technical tasks was associated with increased critical action mean scores for confidence both in the pre test mean score of comfort ($r=0.843$; $p<0.001$) and post-test mean score for comfort ($r=0.931$; $p<0.001$) characterized by very strong positive correlations (correlation being significant at the 0.01 level). The highest mean score was achieved for the variable, placing a facemask: venti mask, rebreather and non-rebreather at a mean of 4.57 and the lowest mean score for the variable, performing induction, intubation, and mechanical ventilation if needed at a mean of 4.13.

Conclusions: The findings demonstrate the effectiveness of an instructional video on task-management skill training, with the focus on airway obstruction during MAC anesthesia, for SRNAs. Using an integrated pre-recorded instructional video, there was an improvement in comfort and confidence levels of the following task-management skills: recognition, prioritization and decision-making of SRNAs during airway obstruction in MAC anesthesia.

Key words: Task-management, student/student registered nurse anesthetist(s), non-technical skills, decision-making, airway management, procedural sedation/MAC/Monitored Anesthesia Care/Sedation

Introduction

Background and Significance

When things go wrong in high-risk organizations, the consequences can be dire. Feared consequences include damage to equipment, damage to the environment, and damage to people, as injury or death. One such high-risk organization is the health care industry. Patient safety is a highly recognized issue and top priority in health care. As technology advances and becomes safer and more reliable, the human contribution to accidents has become more apparent. Although human error cannot be eliminated, efforts can be made to minimize and catch errors early. Ensuring that people working in these high-risk organizations have appropriate non-technical skills must be a part of these efforts (Flin, O'Connor, & Crichton, 2013).

According to Flin, Patey, Glavin and Maran (2010), “non-technical skills can be defined as the cognitive, social and personal resource skills that complement technical skills and contributes to safe and efficient task performance (p.38).” The common non-technical skills that are important for safe operations in high-risk organizations were narrowed down into four hierarchical categories: situation awareness; decision-making; teamwork; and task management (Flin, Glavin, Maran & Patey, 2012). Each category is divided into skills elements and then further divided into positive and negative human behaviors associated with the skills element. The skills elements under situation awareness consist of: gathering information; recognizing and understanding; anticipating. The skills elements under decision-making consist of: identifying options; balancing risks and selecting options; re-evaluating. The skills elements under teamwork consist of: coordinating activities with team members; exchanging information; using authority and assertiveness assessing capability supporting others. Finally, the skills elements

under task-management consist of: planning and preparing; prioritizing, providing and maintaining standards; identifying and utilizing resources (Flin, Glavin, Maran & Patey, 2012).

Much of the background on non-technical skills in human behavior has been developed from the aviation industry following traumatic accidents. Flin, O'Connor, and Crichton (2013), emphasize that non-technical skills are critical for many different tasks, and human behavior is remarkably similar across all workplaces, especially in high-risk organizations like health care. According to Flin, Patey, Glavin and Maran (2010), "the field of anesthesiology in the United States is the first to adapt the aviation Crew Resource Management (CRM) approach for the development of anesthetic non-technical skill (ANTS) training. CRM identifies vigilance, anticipation, clear communication and team coordination as influences needed for successful non-technical skills."

Problem Statement

Non-technical skill deficiency can increase the chance of error, which can result in adverse events. Traditional nurse anesthesia education plays a significant role in knowledge acquisition and development of technical skills but not on the development of non-technical skills. According to Yee et al (2005), 'non-technical skills have been identified to be the key determinant of successful anesthesia practice, particularly during crisis management.'

The common non-technical skills that are important for safe operations in high-risk organizations are narrowed down into four hierarchical categories: situation awareness; decision-making; teamwork; and task management (Flin, Glavin, Maran & Patey, 2012). The ability to coordinate, direct, assess, organize and motivate team engagement falls under the category of task-management (Wunder, 2016). Failure to anticipate, making wrong decisions, and having poor judgments contributed to 56% of the 75 cases assessed by the 4th National Audit Project

(NAP4), a project designed to estimate and analyze the incidence of major complications of airway management during anesthesia in the United Kingdom (Flin, Patey, Glavin & Maran, 2010). Task-related non-technical skills, such as recognition, prioritization, and decision-making are essential for safe administration of anesthesia (Wunder, 2016).

With a minimum of two years experience in intensive care nursing, Student Registered Nurse Anesthetists (SRNAs) possess many technical and non-technical skills suitable for a critical care setting; however, the advancement in education and practice role requires the SRNA to learn a new set of skills. SRNAs lack specific technical skills related to the practice of nurse anesthesia, as well as non-technical skills related to a new role and new environment. Non-technical skills deficiency in new anesthesia providers contributes to medical error and adverse events, typically related to airway management (Flin, Patey, Glavin and Maran, 2010). Competence in decision-making is significantly influenced by level of experience, familiarity of the situation, and practice in responding to problem situations. As decision-making is a cognitive skill, it is affected by stress, fatigue, noise, distraction, and interruption. In a stressful situation, decision-making is extremely vulnerable, especially when time and mental effort are required to compare and evaluate optional courses of action. SRNAs not only lack competence in decision-making as they begin their nurse anesthesia education and training, he or she frequently experiences the factors of stress and fatigue as well.

Purpose of the Project

The purpose of this study is to improve three non-technical skills (recognition, prioritization, and decision-making) in SRNAs new to the clinical setting with the use of an instructional video demonstrating the appropriate management of an airway obstruction during monitored anesthesia care (MAC).

Clinical Question:

The clinical questions are as follows:

- Does an instructional video demonstrating the appropriate management of an airway obstruction during MAC anesthesia improve the task-management skill, *recognition*, among SRNAs?
- Does an instructional video demonstrating the appropriate management of an airway obstruction during MAC anesthesia improve the task-management skill, *prioritization*, among SRNAs?
- Does an instructional video demonstrating the appropriate management of an airway obstruction during MAC anesthesia improve the task-management skill, *decision-making*, among SRNAs?

Literature Review

A review of the literature was conducted using Pubmed, ProQuest, and CINHALL. The following keywords were used: “task-management;” “student/student registered nurse anesthetist;” “nontechnical skills;” “airway management;” “procedural sedation/MAC/sedation;” and “decision-making.” The time frame for the data retrieval was from 2002 to 2016 focusing primarily on peer-reviewed nursing and medical journals. 18 journal articles were used in this literature review focusing on topics related to task-management, student/student registered nurse anesthetist(s), non-technical skills, decision-making, airway management, procedural sedation/MAC/monitored anesthesia care/sedation

Non-technical Skills

Traditionally, the emphasis for training in anesthesia and other health care professions has been directed towards the acquisition of knowledge and development of technical skills

(Patey, 2008). Knowledge base and technical competency in the health care field are essential, and organizations invest a significant amount of resources to ensure technical competence of their students or employers. However, factors such as situation awareness, task management, team work, and decision making, termed together as non-technical skills, are equally important in the delivery of safe and high quality medical care (Sharma et al., 2011). Non-technical skills can be more clearly defined as “the cognitive, social and personal resource skills that complement technical skills and contribute to safe and efficient task performance (Flin, Patey, Glavin & Maran, 2010).

Most of the training of non-technical skills that exists now stems from the aviation industry. In aviation simulation centers, non-technical skills are trained through Crew Resource Management (CRM) courses. CRM is a training program that was introduced in 1979 during a NASA workshop. The goal of the program was to improve air safety and reduce the number of deaths attributable to human error. At the time, studies demonstrated that the leading cause of aviation accidents were due to human error, primarily due to failure of interpersonal communication, leadership, and decision-making within the high-risk cockpit (Powell & Hill, 2006). In 1999, *To Err is Human: Building a Safer Health System* was published by the Institute of Medicine with the recommendation for the health care industry to adopt the aviation industry’s approach to safety and human error management.

Anesthetists’ Non-Technical Skills

As with the aviation program, anesthesia educators at simulation centers turned to behavior marker systems to identify and assess non-technical aspects of performance that they were witnessing (Patey, 2008). Behavior marker systems are rating scales that are used to

evaluate observable behavior that underlie performance The Anesthetists' Non-Technical Skills (ANTS) behavioral marker system is a taxonomy of non-technical skills developed specifically to evaluate the anesthesia provider. ANTS development began in 1999 by a team of psychologists and anesthetists at the University of Aberdeen in Scotland, UK. The researchers identified non-technical skills that were specifically important for the practice of anesthesia. According to Patey (2008), "the skills identified in the research had already been recognized by expert anesthetic practitioners, however, they had not been defined and ordered. The skills were sorted to produce a structure with four categories and 15 elements, and a rating system was provided. Definitions for each category and element for devised to aid the trainer and trainee in understanding the system." The four non-technical skill categories include: situation awareness; decision-making; teamwork; and task-management. The category terms are defined by Flin, Glavin, Maran and Patey (2012) as follows:

Situation Awareness: an overall awareness of the work setting based on observing all relevant aspects of the theatre environment (patient, team, time, displays, equipment); understanding what they mean, and thinking ahead about what could happen next. Situation awareness has three skill elements: gathering information; recognizing and understanding; anticipating.

Decision-Making: reaching a judgment to select a course of action or make a diagnosis about a situation, in both normal conditions and in time-pressure crisis situations. Decision-making has three skills elements: identifying options; balancing risks and selecting options; re-evaluating.

Teamwork: working in a group context, in any role, to ensure effecting joint task completion and team member satisfaction; the focus is particularly on the team rather than the task. Teamwork has five skill elements: coordinating activities with team members; exchanging information; using authority and assertiveness assessing capability supporting others.

Task-management: organizing resources and required activities to achieve goals. Task management has four skill elements: planning and preparing; prioritizing, providing and maintaining standards; identifying and utilizing resources.

Nurse Anesthetists' Non-Technical Skills

Nurses were the first healthcare providers dedicated to the delivery of anesthesia. Nurse anesthetists in the 1800s gave care to wounded soldiers in the Civil War (American Association of Nurse Anesthetists, nd). Today, Certified Registered Nurse Anesthetists (CRNAs) are masters, and, more recently, doctorate prepared advanced practice nurses who have a high degree of autonomy and professional respect. They are the primary provider in almost all rural surgical settings and the main provider of anesthesia in the U.S. Armed Forces. They practice in all settings, and for every type of surgery (American Association of Nurse Anesthetists, nd). CRNA's administer general anesthesia in collaboration with the anesthesiologist during induction and may work independently depending on their state regulations.

Lyk-Jensen et al. (2014) developed a behavior marker system titled Nurse Anesthetist Non-Technical Skills (N-ANTS) to adequately describe CRNAs non-technical skills as tasks and working conditions can differ between CRNAs and anesthesiologists. Lyk-Jensen et al. (2014) took a qualitative approach with focus groups for their study and they concluded with

development of the N-ANTS system after receiving expert opinions. This N-ANTS system comprises a three-level hierarchy of categories, elements, and behavior markers. At the highest level, the four main skill categories include situation awareness, decision-making, teamwork, and task-management with the categories overlapping at times. The N-ANTS system presents the two cognitive categories first-situation awareness and decision-making, followed by the two social categories-task-management and teamwork. According to Lyk-Jensen et al. (2014), the two social aspects of performance feed on essential cognitive skills, thereby the categories overlap. The N-ANTS provides a framework for the description of the behaviors of nurse anesthetists in the operating room. According to Lyk-Jensen et al (2014), “this is necessary in order to be able to make reliable and valid assessments of nurse anesthetists’ non-technical skills, and it provides a tool that can be used to evaluate training interventions. In a study done by Wunder (2016), SRNAs were given a three-hour education instruction on non-technical skills through digital slide lecture of the ANTS system. The results demonstrated significantly improved nontechnical skills scores in the post-test ($P=0.028$). Ultimately, her study concluded that by educating providers, from the novice to expert level, on nontechnical skills, there is heightened awareness and acquisition of nontechnical skills, which is crucial to patient safety.

For the purpose of this study, the researchers will focus on the behavior markers identified in the N-ANTS study for the category of task management and decision-making, specifically recognition and prioritization.

Task-Management and Decision-Making

According to both the ANTS and N-ANTS System, task-management and decision-making can be divided into skill elements. For task management, the four skills elements are: planning, setting priorities, making use of resources, and maintaining standards. For decision-making, the skills elements are: identifying options, assessing and weighing up options, and re-assessing decisions. The differences between the ANTS and N-ANTS lie where the behavior markers are listed.

The element ‘planning’ under task management is developing in advance strategies for managing primary or contingent tasks, as well as reviewing and updating them to ensure plans can be achieved. ‘Prioritizing’ is scheduling tasks, activities, issues, and information according to their importance, as well as identifying key issues and avoiding being distracted by lesser matters. ‘Providing and maintaining standards’ is supporting of safety and quality by adhering to accepted principles, protocols, and guidelines of anesthesia practice. Lastly, ‘identifying and utilizing resources’ is establishing the necessary requirements for task completion and utilizing them so accomplish goals with minimum interruptions and issues. Under the category decision-making, the element “identifying options” is generating alternative possibilities or courses of action to be considered in making a decision or solving a problem. The element ‘balancing decisions and selecting options’ is assessing hazards to weigh up the threats or benefits of a situation and considering the advantages and disadvantages of different courses of action. Lastly, the element ‘re-evaluating’ is continually reviewing the suitability of the options identified, assessed, and selected, and then reassessing the situation prior to implementing it. Under each of these four skills elements are behavior markers for good practice and behavior markers for poor practice. These behavior practices help indicate the presence or absence of the skill elements.

They were derived from examples given by anesthesiologists during interviews, where they described their experiences on a variety of cases (Flin, Glavin, Maran & Patey, 2012).

The N-ANTS system identifies good and poor behavioral markers under each element of task management for the CRNA. A good behavioral marker for the element 'planning' includes departing from a procedure when it is necessary to act differently. A good behavior marker for the element 'setting priorities' includes using a systematic approach in prioritizing tasks. For the element 'making use of resources', it is working on more than one task at a time when required. Lastly, for the element 'maintaining standards', it is having knowledge about guidelines for hygiene, treatment regimes, and documentation requirements. In decision making, the good behavioral markers under the element 'identifying options' is exhibiting knowledge of when it is necessary to call for help or seek professional dialogue. The good behavioral marker for 'reassessing and weighing up options' is declining tasks that exceed own competencies. Lastly, the good behavioral marker for 'res-assessing decisions' is exhibiting knowledge about when to switch from Plan A to Plan B. The poor behavioral marker for each element is the opposite of the good behavioral marker. (Lyke-Jensen et al., 2014).

As reported by Jepsen et al. (2015), inadequate use of non-technical skills is the causative factor to more than 70% of in-hospital adverse events. Also, non-technical skills failures in the operating rooms have been linked with a higher risk of technical error. Non-technical skills have been identified to be the key determinant of successful anesthesia particularly during crisis management (Yee et al., 2005). In a study by Flin et al. (2013), adverse events related to airway management reported to the National Audit Project of the Royal College of Anesthetists and the Difficult Airway Society (NAP4) were analyzed. The results identified the frequently occurring

human factors related to the adverse events. Human factors defined as the study of environmental, technical, organizational, psychological, and physiological influences on human performance (Flin et al., 2013). The most frequent human factors listed in the NAP4 were failure to anticipate and making wrong decisions, which they labeled 'situation awareness' but which are related to the non-technical category of decision-making and task-management according to the ANTS and N-ANTS frameworks. Other human factors listed were job factors related to staffing and time pressure and personal factors related to tiredness and hunger. Flin et al (2013), state that in a safety-critical work domain, task-related skills, such as attention, anticipation, and decision-making are essential for safe administration of anesthesia.

Monitored Anesthesia Care

According to the American Society of Anesthesiologist's, Monitored Anesthesia Care (MAC) describes a specific anesthesia service in which an anesthesia provider has been requested to participate in the care of a patient undergoing a diagnostic or therapeutic procedure. While MAC may include the administration of sedatives and/or analgesics, the provider must be prepared and qualified to convert to general anesthesia when necessary. Additionally, a provider's ability to intervene to rescue a patient's airway from any sedation-induced compromise is a prerequisite to the qualifications to provide MAC. According to Yee et al. (2005), being prepared and being able to prioritize are key elements under the non-technical skill of task management. Knowledge and training in these elements, and the elements classified under decision-making, will aid the anesthesia provider in managing a patient who has complications while undergoing MAC.

Video and Simulation Training

The use of videos and simulation training in medical education programs has made fast strides in training the medical domains of anesthesiology, pediatrics and emergency medicine. It enables instructors and learners to approach clinical experiences tailored to medical discipline and level of experience (Coolen et al., 2011). Video-based teaching allows for flexibility of time of the viewer and demonstrates a skill or teaching concept(s) without a facilitator or instructor present (Mohd Saiboon et al., 2014). According to Marshall and Mehra (2014), video-based training promotes a better understanding amongst the team about the goals and tasks required. It also helped the participants to reduce the mental workload required to remember a particular sequence of actions needed to intervene appropriately during an emergency event, allowing anesthetists to make educated decisions.

In recent years the use of the simulation laboratory has become a popular approach to teaching in the medical field, primarily due to concerns for patient safety and advances in learning theory (Laschinger et al., 2008). According to Morgan, Cleave-Hogg, McIlroy, and Devitt (2002), “simulation-based learning allows for the application of knowledge in a hands-on approach, offering a means to problem-solving in a real life situation without patient risk,” however, “practical issues related to acquisition and maintenance costs of anesthesia simulators, as well as availability of faculty resources, cannot be ignored.” Patient simulations allow educators to recreate important but rare clinical situations that most students would miss if left to random clinical encounters (Laschinger et al., 2008). Simulators are being used to teach basic and advanced clinical skills to help students recognize often-complex clinical problems including difficult airway management.

Morgan, Cleave-Hogg, McIlroy, and Devitt (2002) demonstrated that simulator-assisted and video-assisted small group teaching provided equivalent short-term outcomes in both same-

day performance-based assessments and written examinations taken at a later date. Also, in a study by Coolen et al. (2012) video-based training was demonstrated to be an effective educational tool that significantly improved clinical performance in comparison to other teaching methods. Although there have been many studies showing the effectiveness of simulation training, the use of video-based learning can provide a cheaper alternative when there are time-constraints, lack of resources, and or the financial ability to maintain or create a simulation lab (Coolen et al., 2011).

In summary, the literature review supports video-based training as an aid to learning in the health care field. Non-technical skills, like task management and decision-making are vital skills to have in the field of anesthesia, which can be difficult to teach in the classroom. Incorporating video-based learning to teach non-technical skills, specifically on task managing airway obstruction in MAC anesthesia, could be found beneficial for SRNAs.

Methods

Research Design

A quasi-experimental design consisting of a pre-instructional video confidence survey, a post-instructional confidence survey, and a critical action survey were used to investigate the effect of a pre-recorded instructional video demonstrating proper task-management skills, specifically recognition, prioritization, and decision-making of the SRNA during airway obstruction in MAC anesthesia. The pre- and post-instructional video confidence surveys and critical action survey are a modified version of “Mechanical Ventilation Boot Camp: A Simulation-Based Pilot Study,” created by Yee et al. (2016.) Survey questions used from this study are associated with the factors in our model that focuses on: (1) Recognition (2)

Prioritization (3) Decision-Making. The author of the survey granted permission to the researchers to modify the original survey.

Sample

A convenience sample of SRNAs was recruited for the study. The volunteers were from DePaul University/NorthShore University HealthSystem School of Nurse Anesthesia with 4 to 12 months of anesthesia-related clinical experience. Inclusion criteria were comprised of full-time SRNAs, second year level and third year level in NorthShore University HealthSystem School of Nurse Anesthesia. Participating SRNAs had a minimum requirement of a Bachelor's Degree in Nursing, intensive care unit – registered nursing experience required, with no minimum or maximum years of experience needed. Exclusion criteria included first year SRNAs and incomplete surveys.

Recruitment Procedure

Email addresses on file with the NorthShore University HealthSystem School of Nurse Anesthesia class of 2017 and 2018 were used to recruit and notify the subjects of the research objectives. Research committee member Dr. Susan Krawczyk DNP, CRNA was the third party sender of the emails regarding study participation to the class of 2017 and 2018. The recruitment email was sent 7 days prior to the seminar. The recruitment email was composed by the researchers, asking for SRNA participation, see Appendix A. An Information Sheet prepared for this study was attached to the recruitment email, see Appendix B, and contained purpose of the study, inclusion criteria, the requirements of participation, and the voluntary and anonymous nature of the study.

Description of the Surveys

Demographic Survey. A demographic survey was developed to identify the characteristics of the sample. Demographic information asked included years of critical care nursing experience, highest level of education prior to anesthesia school, and year in anesthesia training.

Pre and Post-Instructional Confidence Survey. The pre- and post-instructional video confidence surveys and critical action survey were modified versions from “Mechanical Ventilation Boot Camp: A Simulation-Based Pilot Study,” created by Yee et al. (2016.) Survey questions used from this study are associated with the factors in our model that focuses on: (1) Recognition (2) Prioritization (3) Decision-Making. Permission to use and modify the original survey was obtained prior to beginning the study, see Appendix F. The pre-instructional video confidence survey consists of 6 questions (see Appendix C) assessing the baseline confidence of the SRNA on task management skills, specifically focusing on recognition and prioritization of airway obstruction during MAC anesthesia. The post-instructional confidence survey listing the same 6 questions as the pre-instructional confidence survey was distributed after the video, to demonstrate whether the SRNAs level of confidence in recognition and prioritization of airway obstruction improved.

Critical Action Survey was distributed at the same time as the post-instructional confidence survey to assess the SRNAs level of confidence in their decision-making regarding airway obstruction intervention via 10 questions (see Appendix D).

Ethical Considerations

Institutional Review Board (IRB) approval was obtained from both DePaul University and NorthShore University HealthSystem. The protection of human subjects was upheld throughout the research. Participants were given information about the voluntary and

anonymous nature of the study prior to participation. There was also no identifiable information or IP addresses obtained about the participants. An email was sent out 7 days prior to the study by a third party to the participants, which contained an information sheet detailing the purpose of the study, the ability to leave the room and opt out of the study at any point, privacy of the study, and the contact information of the researchers if there were any questions.

Description of the Instructional Video

An instructional video was created to educate second and third year SRNAs in the development of task-management skills, specifically focusing on airway obstruction management during MAC anesthesia. The video simulation required approximately 45 hours of initial preparation and was created at the Grainger Center for Simulation and Innovation at NorthShore University Health System, Evanston Hospital and operating room at Glenbrook Hospital. Preparation included the development of surveys, questionnaires, simulation case scenarios, and video production.

A pre-recorded instructional video simulating airway obstruction during MAC anesthesia, and step-by-step sequence with corresponding intervention on how to manage airway obstruction was provided. Using the Practice Guidelines for Sedation and Analgesia, reported by American Society of American Anesthesiologists (ASA) Task Force (2002), investigators demonstrate the appropriate ASA recommended interventions in the event of airway obstruction and or altered response to sedation and analgesia (Gross et al., 2002). To increase the validity of the simulation, the following standard anesthesia equipment were included: source of oxygen, nasal cannula, suction, face masks (venti mask, rebreather, non-rebreather), ambu bag, oral and nasal airways and advanced airway equipment. While designing the scenario, we aimed at procuring a high level of standardization, minimizing the influence of extraneous variables.

The instructional video is 12 minutes in length. The title and purpose of the video are established as part of the introduction, followed by a step-by-step instruction demonstrating task management of airway obstruction during MAC anesthesia. After completion of the video, Dr. Julia Feczko DNP, CRNA, Dr. Susan Krawczyk DNP, CRNA, and Dr. Pamela Schwartz DNP, CRNA provided feedback and modifications. Upon final approval of the edited film, the investigators proceeded with the study.

The pre-instructional video confidence survey consists of 6 questions (see Appendix C) assessing the baseline confidence of the SRNA on task management skills, specifically focusing on recognition and prioritization of airway obstruction during MAC anesthesia. The pre-instructional video confidence survey was derived from “Mechanical Ventilation Boot Camp: A Simulation-Based Pilot Study,” by Yee et al. (2016) (see Appendix F.) Following the pre-instructional video confidence survey, the SRNAs were shown the 12-minute pre-recorded instructional video (see Appendix E.) The pre-recorded instructional video will begin with a list of the teaching objectives. Following the objectives, the four hierarchical non-technical skills categories are explained, emphasizing the studies focus on the category of task-management. The essential equipment for MAC anesthesia are listed and shown. Next, the definition of the three levels of sedation are provided, focusing on recognizing the responsiveness of the patient, airway status, spontaneous ventilation, and cardiovascular function. Each of the three levels of sedation has its own corresponding patient scenario. The scenario is played with direct visualization of the monitor displaying vital signs. Roles in the video were played by one of the researchers and a volunteer actor. The researcher/anesthetist demonstrated prioritization and decision-making of managing airway obstruction based on the recognized changes in responsiveness, airway status, spontaneous ventilation, and cardiovascular function of the patient

(Appendix E).

The post-instructional confidence survey listing the same 6 questions as the pre-instructional confidence survey was distributed after the video, to demonstrate whether the SRNAs level of confidence in recognition and prioritization of airway obstruction improved. A critical action survey was distributed at the same time as the post-instructional confidence survey to assess the SRNAs level of confidence in their decision-making regarding airway obstruction intervention via 10 questions (see Appendix D).

Data Collection

Survey completion procedure was as follows: Each participant was given two envelopes with a randomly assigned, paired number. One numbered envelope contained the demographic and pre-instructional confidence surveys. The second like-numbered envelope contained the post-instructional confidence survey along with the critical action survey. The participants were asked to open the first manila envelope and complete the enclosed surveys. After completion of the surveys, the participant placed them back in the first envelope and the researchers collected them. The 12-minute instructional video was then shown to the participants. Following the video, the participants were asked to open the second envelope, fill out the surveys and return them in the envelope. The second envelopes were collected by the researchers.

Analysis

The pre-video and post-video survey data were computed using the median and interquartile range across the 6 pre and post-video survey items. In order to test the null hypothesis that there was no difference in the comfort level in recognition and prioritization of airway obstruction during MAC anesthesia between pre and post-instructional video, a Wilcoxon Signed Ranks test was used. Wilcoxon Signed Rank test is a non-parametric test indicated for

ordinal data obtained from a Likert-type scale. The relationship between the comfort levels from the pre- and post instructional video surveys and confidence levels from the critical action survey in initiating intervention associated with decision-making was examined using Spearman's correlation coefficient (r). Spearman's r is a non-parametric test measuring the strength and direction of a monotonic association between two ranked variables, in this case the correlation between the mean scores for comfort using the pre and post instructional video and the mean scores for confidence using the critical action scale.

Results

Using a sample of 23 SRNAs, the current study examined the effect of an instructional video to increase recognition, prioritization and decision-making in airway obstruction during MAC anesthesia. The participants' demographics in this study are reported in Table 1, which shows their years of critical care experience, highest level of education attained, and number of years in nurse anesthesia training. The majority of students had 3-5 years of critical care experience (65.21%: 15 out of 23), a Bachelor's Degree (91.3%: 21 out of 23), and 2 or more years of nurse anesthesia training (52.2%: 12 out of 23).

Table 1. Demographics of Study Participants		
	Frequency	Percent
Critical Care Experience		
<1 Year	0	0
1-2 Years	3	13.04
3-5 Years	15	65.21
6-8 Years	2	8.7
>8 Years	3	13.04
Highest Level of Education		
Associate's Degree	0	0
Bachelor's Degree	21	91.3
Master's Degree	2	8.6
Doctorate - DNP/PhD	0	0
Anesthesia Training		
First Year SRNA	0	0
Second Year SRNA	12	52.2
Third Year SRNA	11	47.8

Items for assessing comfort levels in recognition and prioritization before and after viewing the video were derived from “Mechanical Ventilation Boot Camp: A Simulation-Based Pilot Study,” by Yee et al. (2016) as shown in Appendix F. Survey scores were computed and means were obtained. The reliability of the surveys were examined using Cronbach's alpha. Pre-instructional video survey and post-instructional video survey scores were computed using mean scores across the 6 pre- and post-video survey items, respectively. Both the pre-instructional video survey (Cronbach’s alpha=0.91) and the post-instructional video scale (Cronbach’s alpha=0.94) were found to have excellent reliability alpha values. Due to the response format where a participant rates how comfortable they feel on a scale of 1—*very uncomfortable* to 5—*very comfortable* (i.e., ordinal data), Wilcoxon Signed Ranks test, a non-parametric test indicated for ordinal data obtained from a Likert-type scale, was used.

In order to test the null hypotheses that there is no difference in the level of comfort in recognition and prioritization after viewing the instructional video, the average pre- instructional video and post-instructional video survey scores were compared. The results demonstrated statistically significant differences in the participants' level of comfort in recognition and prioritization, pre and post-instructional video [$Z = -3.507$; $p = .000$ (2-tailed)]. These results are in Table 2.

		N	Mean Rank	Sum of Ranks	Z
Confidence Mean Score Post Video - Confidence Mean Score Pre-Video	Negative Ranks	1 ^a	8.00	8.00	-3.507^a
	Positive Ranks	18 ^b	10.11	182.00	P=.000 (2 tailed)
	Ties	4 ^c			
	Total	23			
a. Comfort Mean Scores Post Video < Comfort Mean Scores Pre-Video					a. Based on negative ranks.
b. Comfort Mean Scores Post Video > Comfort Mean Score Pre-Video					b. Wilcoxon Signed Ranks Test
c. Comfort Mean Score Post Video = Comfort Mean Score Pre-Video					

The Critical Action Survey's mean scores were computed across the 10 questions in the survey. The Critical Action Survey was found reliable (Cronbach's alpha=0.92). Item and total scale statistics are reported in Table 5. To test the null hypothesis that the video has no effect on increased confidence in decision-making, we checked the association of comfort level of participants with increased level of student confidence as measured by the critical action items, using Spearman's r . Results demonstrated a significant positive relationship, where increases in comfort with non-technical tasks was associated with increased critical action mean scores for confidence both in the pre test mean score of comfort ($r=0.843$; $p<0.001$) and post-test mean score for comfort ($r=0.931$; $p<0.001$) characterized by very strong positive correlations (correlation being significant at the 0.01 level), which indicates a positive effect of the instructional video, see Table 3.

			Mean Scores for Comfort	Mean Scores for Confidence
Spearman's rho	Mean Scores for Comfort	Correlation Coefficient	1.000	.843**
		Sig. (2-tailed)	.	.000
		N	23	23
	Mean Scores for Confidence	Correlation Coefficient	.843**	1.000
		Sig. (2-tailed)	.000	.
		N	23	23
**. Correlation is significant at the 0.01 level (2-tailed).				

			Mean Scores for Confidence	Mean Scores for Comfort
Spearman's rho	Mean Scores for Confidence	Correlation Coefficient	1.000	.931**
		Sig. (2-tailed)	.	.000
		N	23	23
	Mean Scores for Comfort	Correlation Coefficient	.931**	1.000
		Sig. (2-tailed)	.000	.
		N	23	23
**. Correlation is significant at the 0.01 level (2-tailed).				

Descriptive statistics for the survey items and item-level differences in the mean scores for pre-and post-instructional video education are reported in Table 4. The pre-instructional video survey achieved a highest variable score in comfort recognizing when to call for help (4.29) and least comfortable variable in initiating advanced airway (2.9). The correlation in post-instructional video survey signified improvement. Post-instructional video survey results showed a similar findings with pre-video survey exhibiting a highest variable in recognizing when to call for help (4.67) and least comfortable in initiating advanced airway (4.43).

Table 4. Descriptive Data of Each Item on Pre and Post-video Scale									
Item	Pre-video Scale					Post-video Scale			
	Min	Max	Mean	S.D.		Min	Max	Mean	S.D.
Comfortable recognizing airway obstruction	2	5	3.86	1.108		3	5	4.52	0.602
Comfortable identifying levels of sedation	1	5	3.19	1.401		4	5	4.48	0.512
Comfortable initiating obstructed airway intervention	1	5	3.33	1.528		4	5	4.57	0.507
Comfortable prioritizing intervention	1	5	3.29	1.419		3	5	4.48	0.602
Comfortable recognizing when to call for help	3	5	4.29	0.644		3	5	4.67	0.577
Comfortable initiating advanced airway	1	5	2.9	1.578		3	5	4.43	0.676

Mean scores for confidence were calculated from each item of the Critical Action Survey from highest to lowest as seen in Table 5. The highest mean score was achieved for the variable, placing a facemask: venti mask, rebreather and non-rebreather at a mean of 4.57 and the lowest

mean score for the variable, performing induction, intubation, and mechanical ventilation if needed at a mean of 4.13.

Item	Minimum	Maximum	Mean	Std. Dev.
Placing a facemask: vent mask, rebreather mask or non rebreather mask	1	5	4.57	1.161
Performing head tilt	1	5	4.48	1.163
Performing jaw thrust	1	5	4.48	1.039
Using a bite block or mouth prop	1	5	4.39	1.158
Inserting oral airway	1	5	4.35	1.152
Performing bag-valve mask in an event of emergency	1	5	4.30	1.146
Identifying level of sedation	1	5	4.26	1.054
Identifying airway obstruction	1	5	4.22	1.166
Inserting nasal airway	2	5	4.17	.834
Performing induction, intubation, and mechanical ventilation if needed	1	5	4.13	.968
Note: Cronbach's alpha=0.92				
Mean Scores: Highest to Lowest				

To further evaluate the participants' survey responses, demographic analysis was performed. We analyzed each survey response to see if unfamiliarity and or lack of experience had contributing factors to the results. After comparing the comfort level among participants, SRNAs with 6-8 years of critical care experience showed a higher comfort level in survey items with a mean of 3.93 in pre-video survey and 4.70 mean in post-video survey. The SRNAs with 3-5 years of critical care experience had a comfort level mean score of 3.18 in pre-video survey, and 4.23 in post-video survey.

Item	Pre-video Scale		Post-video Scale	
	3-5 years ICU (n=15)	6->8 years ICU (n=5)	3-5 years ICU (n=15)	6->8 years ICU (n=5)
Comfortable recognizing airway	3.47	3.86	4.2	4.8

obstruction				
Comfortable identifying levels of sedation	3.13	3.19	4.27	4.6
Comfortable initiating obstructed airway intervention	3.07	3.33	4.27	4.8
Comfortable prioritizing intervention	3.0	3.29	4.2	4.6
Comfortable recognizing when to call for help	4.07	4.29	4.3	4.8
Comfortable initiating advanced airway	2.33	2.9	4.13	4.6
	3.18	3.93	4.23	4.70

Table 6b. Descriptive Data of Each Item on Pre and Post-video Scale based on Highest Level of Educational

Item	Pre-video Scale		Post-video Scale	
	Bachelor's Degree (n=21)	Master's Degree (n=2)	Bachelor's Degree (n=21)	Master's Degree (n=2)
Comfortable recognizing airway obstruction	3.61	3.25	4.61	4.5
Comfortable identifying levels of sedation	3.10	3.5	3.95	4.5
Comfortable initiating obstructed airway intervention	3.19	3.0	4.28	4.5
Comfortable prioritizing intervention	3.19	2.5	4.19	4.5
Comfortable recognizing when to call for help	3.95	4.5	4.10	4.5
Comfortable initiating advanced airway	2.90	2.5	3.86	4.5
	3.33	3.25	4.20	4.20

We also measured the confidence level for decision-making using the Critical Action Survey. The SRNAs with 6-8 years of experience scored the highest with a mean score of 4.66 as compared to 4.35 mean score result amongst SRNAs with 3-5 years of critical care experience.

Also, similar results were gathered for SRNAs with a Master's Degree scoring higher at a mean of 4.55 compared to those with a Bachelor's degree with a mean of 4.33 as seen in Table 7.

Item	3-5 years ICU (n=15)	6->8 years ICU (n=5)	Bachelor's Degree (n=21)	Master's Degree (n=2)
1. Identifying level of sedation.	4.2	4.8	4.24	4.5
2. Identifying airway obstruction.	4.2	4.8	4.19	4.5
3. Performing head tilt	4.6	4.6	4.57	5
4. Performing jaw thrust	4.53	4.6	4.43	5
5. Inserting oral airway	4.4	4.6	4.33	4.5
6. Inserting nasal airway	4.0	4.6	4.24	3.5
7. Using a bite block or mouth prop	4.7	4.6	4.38	4.5
8. Placing a facemask: vent mask, rebreather mask or non rebreather mask	4.67	4.8	4.52	5
9. Performing bag-valve mask in an event of emergency	4.27	4.6	4.29	4.5
10. Performing induction, intubation, and mechanical ventilation	3.93	4.6	4.10	4.5
Note: Cronbach's alpha=0.92 Mean Scores: Highest to Lowest	4.35	4.66	4.33	4.55

Discussion

SRNAs often do not have hands on training of airway management before beginning in the clinical arena, and mismanagement may result in sentinel events. Although anesthesia education has evolved to include simulation as a way for programs to educate and reinforce teaching points to SRNAs, airway obstruction is difficult to simulate in the lab. By providing a pre-recorded, instructional video on the management of airway obstruction during MAC

anesthesia, SRNAs were exposed to various non-technical skills. To the researcher's knowledge, this is the first study exploring the effect of an instructional video on task-management skills related to managing airway obstruction during MAC anesthesia at a Nurse Anesthesia Program.

During this study, SRNAs were given an instructional video to accommodate episodic memory enhancement for the task-management skills of recognition, prioritization, and decision-making during airway obstruction in MAC anesthesia. Wilcoxon Signed Ranks Test demonstrated that median score and interquartile ranges of comfort levels for recognition and prioritization were significantly higher after viewing the video. Therefore, the instructional video increased SRNAs comfort level in regards to recognition and prioritization of airway obstruction during MAC anesthesia. This answered the following research questions:

- Does an instructional video demonstrating the appropriate management of an airway obstruction during MAC anesthesia improve the task-management skill, *recognition*, among SRNAs?
- Does an instructional video demonstrating the appropriate management of an airway obstruction during MAC anesthesia improve the task-management skill, *prioritization*, among SRNAs?

A positive correlation was demonstrated between comfort, with use of the post-video survey, and confidence, with use of the Critical Action Survey, by using Spearman's r . The R^2 , which is the shared variance between comfort and confidence, improved from 0.843 to 0.931 indicating a stronger relationship between the variables ($p < 0.001$) seen in appendix G. Thus, the instructional video accounts for the increased strength of relationship between comfort and confidence levels among the study participants. Therefore, the instructional video increased SRNA's comfort and confidence in regards to decision-making during airway obstruction in

MAC anesthesia. This answers the following research question:

- Does an instructional video demonstrating the appropriate management of an airway obstruction during MAC anesthesia improve the task-management skill, *decision-making*, among SRNAs?

The descriptive statistics results demonstrated that, in both pre- and post-video surveys, SRNAs felt most comfortable recognizing and prioritizing when they needed to call for help (4.29) and least comfortable in initiating an advanced airway (2.9). This finding demonstrates that further research should involve teaching SRNAs when to initiate an advanced airway.

Previous research by Wunder (2016), supports the findings of our study; in her study, a three-hour educational instruction of nontechnical skills through digital slide (Microsoft Powerpoint and Microsoft Corp) lecture of the ANTS system was given to SRNAs. The results demonstrated significantly improved nontechnical skills scores in the post-test ($P=.028$). Ultimately, Wunder's study concluded that by educating providers, from the novice to expert level, on nontechnical skills, there would be a heightened awareness and acquisition of nontechnical skills, which is crucial to patient safety.

In a study by Coolen et al. (2012), video-assisted simulation was demonstrated to be an effective educational tool that significantly improved clinical performance in comparison to other teaching methods. Knowledge test and self-efficacy scores improved significantly in students after video assisted simulation ($P<0.001$), as well as post-intervention scenarios concerning structure and time ($P<0.05$).

The study by Burtscher et al. (2011), provides evidence for adaptive coordination and comfort in response to a video simulated critical event and its relationship to clinical performance. Analyses variance of this study revealed a significant effect on team coordination by spending more time on

information management during a critical event ($P=0.001$). The increase in information management was related to faster decision-making amongst trainees regarding how to respond to critical events (Burtscher et al 2011). Therefore, the initiation and findings of our study correlate with recent research. Ultimately, our results show improved task management skill acquisition in students trained using an instructional video.

Limitations

One limitation of this study is that there is no evaluation of effectiveness of the video by assessing actual patient care by the SRNA. The use of a video, however, gives the SRNA an opportunity to gain the task-management skills of recognition, prioritization, and decision-making during airway obstruction before performing these measures on an actual patient. With the ultimate goal of patient safety, the purpose of the video was to educate SRNAs prior to actual patient care to gain an improved level of comfort and confidence.

A second limitation is that the use of a pre-test and post-test design can decrease external validity since a pre-test has the potential to influence the results. Therefore, there is no way to make sure that an unaltered baseline assessment from participants is obtained.

A third limitation is that the study focuses on a small, convenience sample of SRNA's from one program. This decreases the generalizability of results to other SRNAs at other programs. Also, the small convenience sample could have generated false results. Non-random sampling may also create selection bias, which further skews generalizability of the results.

Recommendations for Future Research

The findings of this study demonstrate the effectiveness of an instructional video on task-management skills for SRNAs. To the researcher's knowledge, this is the first study exploring the effects of an instructional video on task-management skills for SRNAs. Further studies can

expand on this research by utilizing videos to enhance other non-technical skills. Also, further studies should examine the different impact of instructional videos on specific task-management skills as noted in the itemized data seen in Table 5, for example, in performing induction, intubation, and mechanical ventilation as it scored with the lowest mean of 4.13. This demonstrates a low confidence level of SRNAs in the execution of this critical action item.

Conclusion

The goals of this study were successfully met through implementation of this research project. The researchers examined if an instructional video on the task-management skills of recognition, prioritization and decision-making would be beneficial to SRNAs. The results of the study suggested that the participants found the instructional video helpful in improving comfort and confidence levels in these specific task-management skills.

These findings demonstrated that an instructional video could be used as an adjunct to other teaching methods for SRNAs. We demonstrated improved comfort and confidence of SRNAs regarding the following task-management skills: recognition, prioritization and decision-making during airway obstruction in MAC anesthesia with improved mean scores in all variables, which deemed statistically significant results. The results of the pre-and –post instructional video surveys and critical action survey demonstrated a favorable response from the participants. This provides preliminary evidence on the benefits of instructional video on task-management education to SRNAs, but more studies are needed.

Appendix A.

Recruitment Email

Dear fellow SRNAs,

Tomorrow, you are being asked to participate in a research study we are conducting as part of our DNP project. For the research you will be asked to attend a seminar that provides an educational video simulation. The goal of the seminar is to determine if a video will improve your level of confidence in recognition, prioritization and decision making in airway obstruction during Monitored Anesthesia Care (MAC) anesthesia. You will be asked to complete surveys; two prior to watching the video and two after watching the video. The surveys will include questions about your perceived confidence in task management for airway obstruction during MAC anesthesia. We will also collect some personal information about you such as education level, number of years of experience in intensive care unit, and year in nurse anesthesia school. We will not collect identifying information and when we collect them from the group setting your responses will for all purposes be anonymous. If there is a question you prefer not to answer, you may skip it. This educational video will take 10 minutes of your time. Each of the surveys will take approximately 3-5 minutes to complete.

You may choose not to participate and or leave the seminar at any point. Because of the anonymous nature of the surveys, we are unable to remove your responses from the data after they have been submitted. Attached is the information sheet for participation in research, which explains our project in more detail. Please review this information sheet prior to attending the seminar. We thank you in advance for your participation.

Sincerely,

Pauline Tselonis, RN and Laura Majewski, RN

Appendix B.

Information Sheet for Participation in Research Study Task Management Training for Recognition, Prioritization and Decision Making for the Student Registered Nurse Anesthetist.

Principal Investigator: Laura Majewski, RN; Pauline Tselonis, RN

Institution: DePaul University, USA

Collaborators: NorthShore University HealthSystem School of Nurse Anesthesia: Julia Feczko, DNP, CRNA

We are conducting a research study because we are aiming to learn more about the effectiveness of an educational video on task management skills for airway obstruction in Monitored Anesthesia Care (MAC) anesthesia of the student registered nurse anesthetist. We are asking you to be in the research because you are enrolled in the NorthShore University HealthSystem School of Nurse Anesthesia and are in your second year of training or third year of training. If you agree to be in this study, you will be asked to watch a ten-minute educational video on task-management (preparation, prioritization and decision making) of airway obstruction in MAC anesthesia. You will be asked to complete paper surveys with pen or pencil; two prior to watching the video and two after watching the video. The surveys will include questions about your perceived confidence in task management for airway obstruction during MAC anesthesia. We will also collect some personal information about you such as gender, age, ethnicity, education level, number of years of experience in intensive care unit, and year in nurse anesthesia school. If there is a question you prefer not to answer, you may skip it. This educational video will take 10 minutes of your time. Each of the surveys will take approximately 3-5 minutes to complete.

Your participation is voluntary, which means you can choose not to participate. By attending the video session and submitting the surveys, we will assume you are agreeing to be in the research. There will be no negative consequences if you decide not to participate or change your mind later after you begin the study. You can withdraw your participation at any time prior to submitting your survey. If you change your mind later while answering the survey, you may stop answering the survey and exit the room. The surveys will then be disposed of in a way to maintain confidentiality. Once you submit your responses, we will be unable to remove your data later from the study because all data is anonymous and we will not know which data belongs to you. Your decision whether or not to be in the research will not affect any grade, evaluation, or status within DePaul University or the NorthShore University HealthSystem School of Nurse Anesthesia.

If you have questions, concerns, or complaints about this study or you want to get additional information or provide input about this research, please contact Pauline Tselonis at poleenkimbo@gmail.com or Laura Majewski at majewskilaura87@gmail.com.

If you have questions about your rights as a research subject you may contact Susan Loess-Perez, DePaul University's Director of Research Compliance, in the Office of Research Services at 312-362-7593 or by email at sloesspe@depaul.edu. You may also contact DePaul's Office of Research Services if:

- Your questions, concerns, or complaints are not being answered by the research team.
- You cannot reach the research team.
- You want to talk to someone besides the research team.
- You may keep (or print) this form for your records.

Appendix C.**Demographic Information Questionnaire**

<p>1. Prior to anesthesia school, how many years of critical care nursing experience did you have?</p>	<p><input type="checkbox"/> 1 <1 year</p> <p><input type="checkbox"/> 2 1-2 years</p> <p><input type="checkbox"/> 3 3-5 years</p> <p><input type="checkbox"/> 4 6-8 years</p> <p><input type="checkbox"/> 5 >8 years</p>
<p>2. Prior to anesthesia school, what was your highest level of educational?</p>	<p><input type="checkbox"/> 1 Associate degree</p> <p><input type="checkbox"/> 2 Bachelors degree</p> <p><input type="checkbox"/> 3 Masters degree</p> <p><input type="checkbox"/> 4 Doctorate – DNP/PhD</p>
<p>3. At what point of anesthesia training are you in at this time?</p>	<p><input type="checkbox"/> 1 First Year SRNA</p> <p><input type="checkbox"/> 2 Second Year SRNA</p> <p><input type="checkbox"/> 3 Third Year SRNA</p>

Appendix D.**PRE-INSTRUCTIONAL VIDEO CONFIDENCE SURVEY**

Please complete the following survey regarding the level of confidence in the areas of recognition and prioritization related to management of airway during MAC anesthesia. Your participation is voluntary and anonymous. This survey should take approximately 5 minutes.

The information from the survey will be used to evaluate confidence pertaining to task management related to airway management in MAC anesthesia.

Rate your level of confidence in the following areas related to the management of airway during MAC anesthesia:					
	VERY UNCOMFORTABLE (1)	SOMEWHAT UNCOMFORTABLE (2)	NEUTRAL (3)	SOMEWHAT COMFORTABLE (4)	VERY COMFORTABLE (5)
1. How comfortable do you feel recognizing an airway obstruction?	1	2	3	4	5
2. How comfortable do you feel in identifying light vs. moderate vs. deep levels of sedation?	1	2	3	4	5
3. How comfortable do you feel in initiating an intervention for an obstructed airway?	1	2	3	4	5
4. How comfortable do you feel prioritizing your intervention?	1	2	3	4	5
5. How comfortable do you feel recognizing when to call for help?	1	2	3	4	5
6. How comfortable do you feel initiating an advanced airway?	1	2	3	4	5

POST-INSTRUCTIONAL VIDEO CONFIDENCE SURVEY

Please complete the following survey regarding the level of confidence in the areas of recognition and prioritization related to management of airway during MAC anesthesia. Your participation is voluntary and anonymous. This survey should take approximately 5 minutes.

The information from the survey will be used to evaluate confidence pertaining to task management related to airway management in MAC anesthesia.

Rate your level of confidence in the following areas related to the management of airway during MAC anesthesia:					
	VERY UNCOMFORTABLE (1)	SOMEWHAT UNCOMFORTABLE (2)	NEUTRAL (3)	SOMEWHAT COMFORTABLE (2)	VERY COMFORTABLE (1)
1. How comfortable do you feel recognizing an airway obstruction?	1	2	3	4	5
2. How comfortable do you feel in identifying light vs. moderate vs. deep levels of sedation?	1	2	3	4	5
3. How comfortable do you feel in initiating an intervention for an obstructed airway?	1	2	3	4	5
4. How comfortable do you feel prioritizing your intervention?	1	2	3	4	5
5. How comfortable do you feel recognizing when to call for help?	1	2	3	4	5
6. How comfortable do you feel initiating an advanced airway?	1	2	3	4	5

CRITICAL ACTION SURVEY

Please complete the following survey regarding the level of confidence in making decisions related to task management during airway management in MAC anesthesia following the video.

Your participation is voluntary and anonymous. This survey should take approximately 5 minutes. The information from the survey will be used to evaluate confidence pertaining to decision- making in airway management during MAC anesthesia following a video.

After receiving the task management video training, rate your level of confidence in making decisions regarding the following actions:					
	Not confident (1)	Somewhat not confident (2)	Neutral (3)	Somewhat confident (4)	Confident (5)
11. Identifying level of sedation.	1	2	3	4	5
12. Identifying airway obstruction.	1	2	3	4	5
13. Performing head tilt	1	2	3	4	5
14. Performing jaw thrust	1	2	3	4	5
15. Inserting oral airway	1	2	3	4	5
16. Inserting nasal airway	1	2	3	4	5
17. Using a bite block or mouth prop	1	2	3	4	5
18. Placing a facemask: vent mask, rebreather mask or non rebreather mask	1	2	3	4	5
19. Performing bag-valve mask in an event of emergency	1	2	3	4	5
20. Performing induction, intubation, and mechanical ventilation	1	2	3	4	5

Appendix E

**Task-Management Instructional Video Checklist
(Airway Obstruction during MAC Anesthesia)**

Derived from The Practice Guidelines for Sedation and Analgesia as reported by American Society of American Anesthesiologists (ASA) Task Force (2002)

VIDEO CONTENT AND SCRIPT	
Screen 1: Introduction	<p>Task-management Training for Recognition, Prioritization, and Decision Making for the SRNA.</p> <p>By: Pauline Tselonis Laura Majewski</p>
Screen 2:	<p>Teaching Objectives: At the completion of this video, the SRNA will be able to:</p> <ol style="list-style-type: none"> 1. Master the task-management element of non-technical skills: recognition, prioritization and decision-making 2. Distinguish whether the patient is in light, moderate or deep sedation 3. Improve decision-making based on early detection of changes in patient’s SpO₂ and ETCO₂. 4. Prioritize interventions necessary when airway obstruction develops during monitored anesthesia care (MAC) anesthesia.
Screen 3:	<p>NON-TECHNICAL SKILLS are defined as the cognitive, social, and personal resource skills that complement technical skills and contribute to safe and efficient task performance.</p> <p>The common non-technical skills that are important for safe operations in high-risk organizations such as anesthesia, include 1.) Situational-awareness, 2.) Decision-making, 3.) Teamwork and 4.) Task-management.</p> <p>This video-assisted simulation trainer intends to instruct the viewer on the skills of task management via examples of an obstructed airway during monitored anesthesia care.</p> <p>Video-assisted simulation training improves anesthesia trainees’ non-technical skills by demonstrating common anesthesia scenarios while applying relevant knowledge and crisis management skills. This enhances the trainees’ encoding, storage, and retrieval of learned information.</p>

<p>Screen 4:</p>	<p><i>Script: In order to prepare for a MAC anesthetic, gather the essential equipment (read through the list provided below)</i></p> <p style="text-align: center;">Essential Equipment for MAC anesthesia <u>BASIC AIRWAY MANAGEMENT EQUIPMENT</u></p> <ul style="list-style-type: none"> • Source of oxygen • Nasal Cannula • Tongue blade • Oral and nasal airways • Suction • Standard monitors (including SpO2, EtCO2, EKG, RR and blood pressure) • Ambu bag <p style="text-align: center;">Advanced airway equipment and semi-closed circuit</p> <p style="text-align: center;"><i>An advanced airway set up should always be available during MAC anesthesia, in case of emergency.</i></p>																
<p>Screen 5:</p>	<p><i>Script: The definition provided serves as a reference that can be used as a guide and may be modified depending on the individual practice circumstances during MAC anesthesia.</i></p> <p style="text-align: center;">Definition of Levels of Sedation</p> <table border="1" data-bbox="407 940 1182 1268"> <thead> <tr> <th></th> <th>MINIMAL SEDATION (ANXIOLYSIS)</th> <th>MODERATE SEDATION/ANALGESIA (CONSCIOUS/SEDATION)</th> <th>DEEP SEDATION/ANALGESIA</th> </tr> </thead> <tbody> <tr> <td>Responsiveness</td> <td>Normal response to verbal stimuli</td> <td>PURPOSEFUL response to verbal and tactile stimulation</td> <td>PURPOSEFUL response after repeated or painful stimulation</td> </tr> <tr> <td>Airway</td> <td>Unaffected</td> <td>No intervention required</td> <td>Intervention may be required</td> </tr> <tr> <td>Spontaneous Ventilation Cardiovascular Function</td> <td>Unaffected Unaffected</td> <td>Adequate Usually maintained</td> <td>Maybe inadequate Usually maintained</td> </tr> </tbody> </table> <p><i>Script: (referring to the table above)</i></p> <ul style="list-style-type: none"> • <i>If a patient is minimally sedated, patient will show normal response to verbal stimuli such as spontaneously opening his/her eyes when calling his/her name. Airway, spontaneous ventilation and cardiac functions are unaffected.</i> • <i>If a patient is moderately sedated, purposeful response to verbal and tactile stimulations can be noted. This includes illicit response when tapped on the shoulder. Airway requires no intervention; spontaneous ventilation is adequate with stable cardiac function.</i> • <i>If a patient is in deep sedation, responsiveness is purposeful to repeated or painful stimuli, for example, sternal rub or peripheral stimulation. Intervention to support the airway may be required with the use of oral airway, nasal airway or mask. Spontaneous ventilation initiated by patient may be inadequate but cardiac function is usually maintained.</i> 		MINIMAL SEDATION (ANXIOLYSIS)	MODERATE SEDATION/ANALGESIA (CONSCIOUS/SEDATION)	DEEP SEDATION/ANALGESIA	Responsiveness	Normal response to verbal stimuli	PURPOSEFUL response to verbal and tactile stimulation	PURPOSEFUL response after repeated or painful stimulation	Airway	Unaffected	No intervention required	Intervention may be required	Spontaneous Ventilation Cardiovascular Function	Unaffected Unaffected	Adequate Usually maintained	Maybe inadequate Usually maintained
	MINIMAL SEDATION (ANXIOLYSIS)	MODERATE SEDATION/ANALGESIA (CONSCIOUS/SEDATION)	DEEP SEDATION/ANALGESIA														
Responsiveness	Normal response to verbal stimuli	PURPOSEFUL response to verbal and tactile stimulation	PURPOSEFUL response after repeated or painful stimulation														
Airway	Unaffected	No intervention required	Intervention may be required														
Spontaneous Ventilation Cardiovascular Function	Unaffected Unaffected	Adequate Usually maintained	Maybe inadequate Usually maintained														

<p>Screen 6:</p>	<p style="text-align: center;"><u>RECOGNIZING AIRWAY OBSTRUCTION</u></p> <p>➤ <i>The features suggestive of airway obstruction includes:</i></p> <ol style="list-style-type: none"> 1. Partial Obstruction- added sound of labored breathing where air entry is diminished. Assess for use of accessory muscle during respiration such as tracheal tugging, paradoxical chest movement, abdominal “see-sawing” movement. <hr/> <ol style="list-style-type: none"> 2. Complete Obstruction – is indicative of complete absence of airway sounds. Flat ETCO₂ waveform. And declining SpO₂ level. <ul style="list-style-type: none"> ➤ Low SpO₂ – reflects inadequate oxygenation. ➤ Tachypnea/ tachycardia – reflects respiratory distress. <p><i>Script: In anticipation of airway obstruction, observe and ask the patient his/her best-breathing position. Be aware that patient may have to position herself/himself for optimal airflow</i></p>
<p>Screen 7:</p>	<p><i>Script: The following patient scenario will be used to help familiarize you with the task management strategies involved in the proper management of airway obstruction during MAC anesthesia. These include:</i></p> <ol style="list-style-type: none"> <i>1) Recognizing the manifestations of airway obstruction</i> <i>2) Prioritizing your interventions and</i> <i>3) Making appropriate clinical decisions.</i> <p>Mr. Mac Sleepie is a healthy 35-year-old male patient weighing 70 kg who is undergoing bilateral inguinal hernia repair under monitored care anesthesia or MAC anesthesia. The patient is in the operating room, positioned supine on the table, and has received 2mg of Versed and 50mcg of Fentanyl.</p>
<p>Screen 8:</p> <p><i>Will be a split screen projection showing the monitoring device and reenactment of the patient scenario</i></p>	<p><u>Scenario 1: MINIMAL SEDATION</u></p> <p><i>Mr. Mac Sleepie appears drowsy and comfortable but is still responsive to verbal stimuli. His airway is unaffected and his vital signs are stable. The surgeon proceeds to inject local anesthetic and the patient grimaces and moves his right leg.</i></p> <hr/> <p><u>Recognition:</u> Patient responds to verbal and painful stimuli, airway is unaffected, he is spontaneously ventilating, and cardiovascular is also unaffected.</p> <p style="text-align: center;"><u>MONITOR SCREEN:</u></p> <p style="text-align: center;">BP- 120/65 HR- 68 RR- 16 SpO₂- 99% ETCO₂- 35,</p> <hr/> <p><u>Prioritization:</u> Balance of patient comfort/stability with surgical requirements.</p>

	<p>Decision-Making: Patient is comfortable but surgical conditions require deeper sedation.</p> <p><i>Script: Surgeon states that he needs the patient to be still as he will start making his incision.</i></p>
Screen 9:	<p>Scenario 2: MODERATE SEDATION <i>An additional 50mcg of Fentanyl has been given and a propofol drip is infusing at 75mcg/kg/min. The surgeon makes incision without much response from the patient. He is occasionally lightly snoring with dampening of the ETCO2 waveform.</i></p> <p>Recognition: Patient's responsiveness is purposeful to verbal and tactile stimulation, lightly snoring but no required airway intervention is needed at this time. He is adequately ventilating and maintaining cardiovascular function</p> <p>MONITOR SCREEN: BP- 140/75 HR- 86 RR- 12 SpO2- 99% ETCO2- fluctuating between 0-18</p> <p>Prioritization: Sedation level is providing optimal surgical conditions. Anticipate any needed airway intervention.</p> <p>Decision-Making: Ask patient to take a deep breath and/or perform head tilt, chin lift</p>
Screen 10:	<p>Scenario 3: DEEP SEDATION (Part 1): <i>The surgeon is reaching the most stimulating part of the procedure. In anticipation, additional medications are administered. Mr. Mac Sleepie has now received 150mcg of Fentanyl, 3 mg of Versed, and the Propofol infusion is running at 150mcg/kg/min. The patient does not respond to verbal or painful stimuli, he is snoring heavily with episodes of apnea, and his breathing appears labored.</i></p> <p>Recognition: Patient does not respond to verbal stimuli, PURPOSEFULLY responds to repeated painful stimuli, airway requires intervention, spontaneous ventilation appears inadequate, and cardiovascular function is still maintained.</p> <p>MONITOR SCREEN: BP- 105/55 HR- 118 RR- 12 SpO2- 93% ETCO2-0</p> <p>Prioritization: Patient is possibly over-sedated and airway requires escalating level of intervention.</p> <p>Decision-Making: Perform jaw thrust and consider possible oral/nasal</p>

	airway.
Screen 11:	<p>Scenario 4: DEEP SEDATION (Part 2):</p> <p><i>The EtCO₂ waveform is now completely flat and Mr. Sleepie’s SpO₂ is beginning to drop below 92%. You assess that the patient appears to be mouth breathing. An oral airway is carefully placed and you switch to a venti-mask. Due to continued airway compromise, you provide bag-valve mask ventilation in order to assist Mr. Mac Sleepie’s ventilation. The propofol infusion is reduced significantly.</i></p> <p>Recognition: Patient purposefully responds to repeated painful stimuli, airway requires intervention, spontaneous ventilation is inadequate, and cardiovascular function is now being affected.</p> <p><u>MONITOR SCREEN:</u> BP- 92/45 HR- 100 RR- 5 SpO₂- 87% ETCO₂-0</p> <p>Prioritization: Airway interventions and reduction in sedation</p> <p>Decision-making: Approach to relieve airway obstruction and improve ventilation: from nasal cannula, oral /nasal airway, facemask to bag mask ventilaton.</p>
Screen 12:	<p>RECAP:</p> <p>MINIMAL SEDATION:</p> <p><u>Recognition:</u></p> <ul style="list-style-type: none"> • Drowsiness • Comfortable • Responsive to verbal and painful stimuli <p><u>Action:</u></p> <ul style="list-style-type: none"> • Balance patient’s comfort based on surgical requirements. <p>MODERATE SEDATION:</p> <p><u>Recognition:</u></p> <ul style="list-style-type: none"> • Purposeful response to verbal and/or light response painful stimuli • Light snoring • Dampening ETCO₂ (based on head/chin position) <p><u>Action:</u></p> <ul style="list-style-type: none"> • Ask patient to take deep breath • Perform head tilt and chin lift <p>DEEP SEDATION</p> <p><u>Recognition:</u></p> <ul style="list-style-type: none"> • No response to verbal and/or painful stimuli • Snoring with episodes of apnea

	<ul style="list-style-type: none">• <i>Labored breathing / mouth breathing</i>• <i>Low SpO2</i> <p><u>Action:</u></p> <ul style="list-style-type: none">• <i>Jaw thrust</i>• <i>Possible oral/nasal airway</i>• <i>Consider venti-mask and/or</i>• <i>Bag-mask to assist ventilation (if needed)</i>
	If this does not immediately improve the patient's oxygenation and ventilation or you notice hemodynamic changes, call for help.

Appendix F

Letter Seeking Permission to Use Survey/Questionnaire Tool

09/17/2016

Jennifer Yee*Summa Health System Akron City Hospital, Akron, OH 44304, USA**Northeast Ohio Medical University, Rootstown, OH 44272, USA**Western Reserve Hospital, Cuyahoga Falls, OH 44223, USA*

Dear Dr. Jennifer Yee,

My name is Pauline B. Tselonis, a Registered Nurse Anesthetist Doctoral student from NorthShore University HealthSystem and DePaul University writing my dissertation entitled “Task-management Training for Recognition, Prioritization and Decision Making for the SRNA in Airway Obstruction during MAC Anesthesia” under the direction of my dissertation committee chaired by Dr. Julia Feczko who can be reached at 847-570-1959 or juliafez@gmail.com. The NorthShore University HealthSystem IRB Committee Chair- Karen McKinney can be contacted at 847.570.1632.

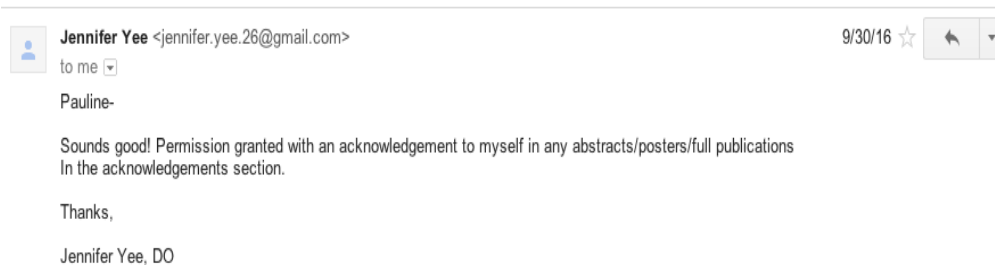
I would like your permission to adapt the “Mechanical Ventilation Boot Camp: A Simulation-Based Pilot Study” Confidence Survey and Critical Actions Checklist for Mucus Plugging Case questionnaires as an instrument in my research study. I would like to use and print your survey under the following conditions:

- I will use the surveys only for my research study and will not sell or use it with any compensated or curriculum development activities.
- I will include the copyright statement on all copies of the instrument.
- I will send a copy of my completed research study to your attention upon completion of the study.

If these are acceptable terms and conditions, please indicate so by signing the attached document or by replying to me through e-mail: poleenkimbo@gmail.com. Thank you in advance and I hope to hear from you soon.

Sincerely,

Pauline Tselonis, BSN-RN, DNP-C



Appendix G.

R² Correlation Between Comfort And Confidence

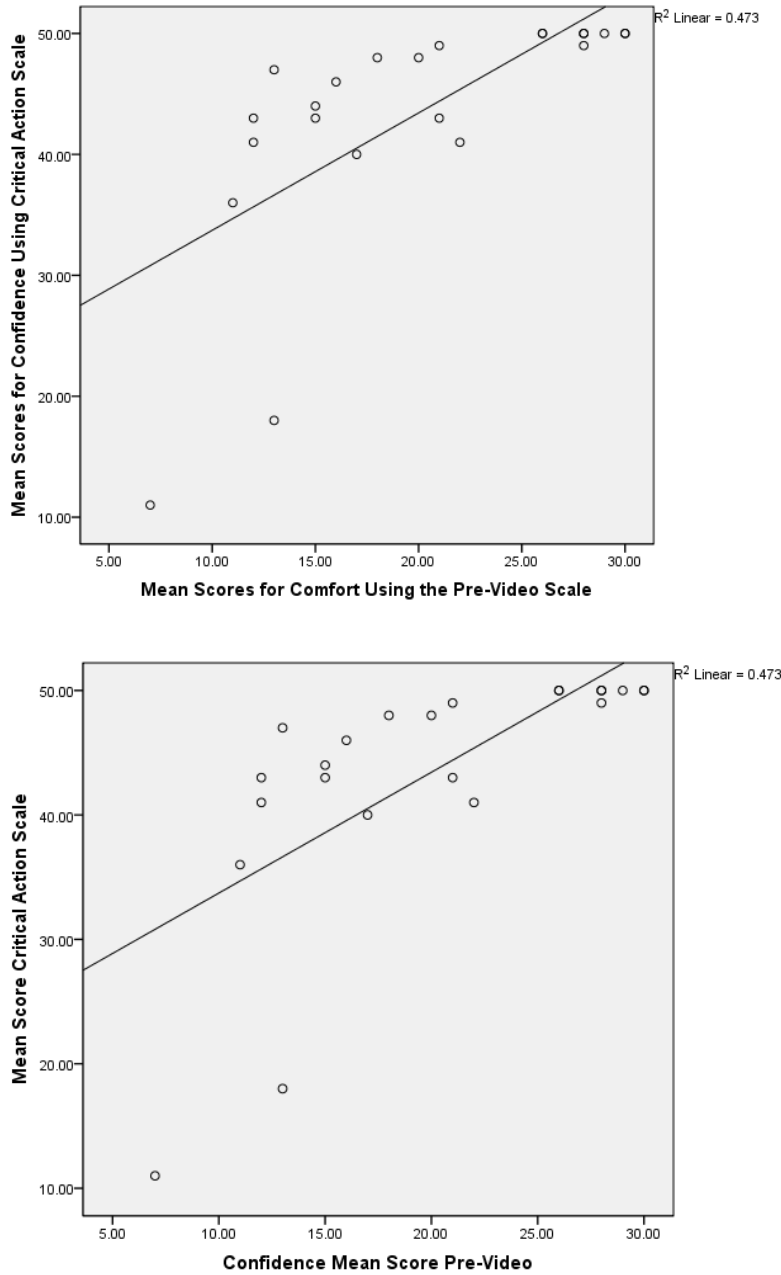


Figure 1a. Significant positive correlations between the mean scores for comfort (Pre-video Scale) and mean scores for confidence (Critical Action Survey Scale) using Spearman's rho (*r*).

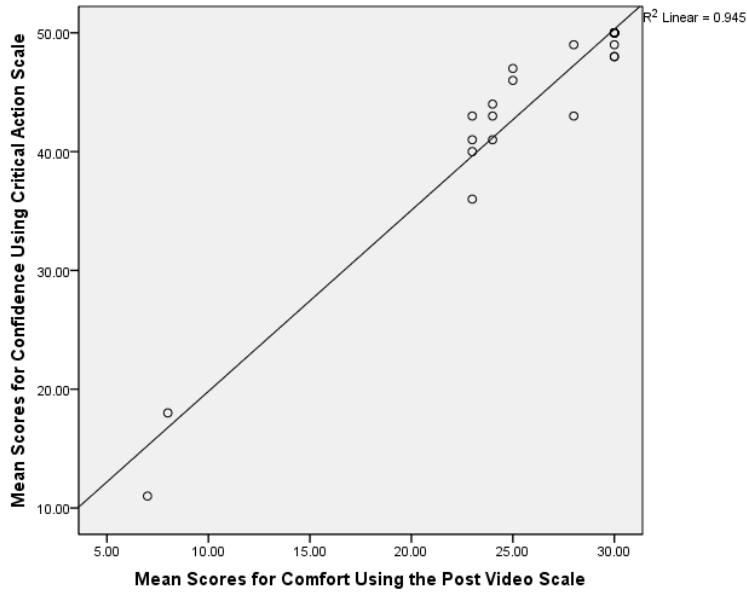


Figure 1b. Significant positive correlations between the mean scores for comfort (Post-video Scale) and mean scores for confidence (Critical Action Survey Scale) using Spearman's rho (r).

Note: The R^2 , which is the shared variance between comfort and confidence, has improved from .473 to .945 indicating a stronger relationship between the variables. Thus, the video education accounts for the increased strength of relationship between comfort and confidence levels among the study participants

Appendix H.

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