The University of Southern Mississippi
The Aquila Digital Community

Doctoral Projects

Winter 12-7-2018

Student Registered Nurse Anesthetists' Perception of Simulation as a Positive Reinforcement to Classroom Lecture in Handling a Difficult Airway

Kayla Forbis

Student Registered Nurse Anesthetists' Perception of Simulation as a Positive Reinforcement to Classroom Lecture in Handling a Difficult Airway

by

Kayla C. Forbis

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

Approved by:

Dr. Kathleen Masters, Committee Chair
Dr. Cathy Hughes
Dr. Mary Jane Collins

Dr. Kathleen Masters Committee Chair	Dr. Lachel Story Department Chair	Dr. Karen S. Coats Dean of the Graduate School

December 2018

Published by the Graduate School

THE UNIVERSITY OF
SOUTHERN
MISSISSIPPI

ABSTRACT

The management of a difficult airway by anesthesia providers is a core component of providing safe care. Simulation provides an opportunity for the student to manage uncommon clinical scenarios without harm to an actual patient. This project aimed to determine if the use of simulation may be useful in training Student Registered Nurse Anesthetist in the management skills of a difficult airway. The proposed intervention of this project was the addition of simulation experience to didactic lecture covering difficult airway management techniques. As supported in the Adult Learning Principles of Medical Learners, by allowing the SRNA to actively participate in the management of a difficult airway, instead of solely hearing about techniques through lecture, techniques may be better understood.

The target outcome of this project was to determine if simulation after classroom lecture increases the perceived self-efficacy of SRNAs in handling a difficult airway in the clinical setting. A two group, post-test design was utilized to evaluate the effectiveness of simulation to increase perceived self-efficacy for first-year Nurse Anesthesia students. The two groups participating in this project, the control group (n=10) and the intervention group (n=10), both received the same classroom lecture on difficult airways, as per usual for the program, prepared by the course director. After the pre-evaluations were completed, the students were randomly placed in either group. At the end of each exercise, the students then took the post-evaluation of perceived self-efficacy in the management of a difficult airway. Each group had an increase in mean, perceived self-efficacy in the management of a difficult airway following both interventions. Although the demonstration-group had a higher percent change in overall and categorical mean confidence levels, the intervention group also had an increase percent change in overall and individual categories following the simulation exercise. Simulation may be useful in the preparedness of future SRNAs in the management of a difficult airway.

Keywords: student registered nurse anesthetist, simulation training, difficult airway management

ACKNOWLEDGMENTS

I could not have completed this project without the help of my committee. To my committee members, Dr. Hughes and Dr. Collins, thank you for your time and dedication to making this project possible. To my chair, Dr. Masters, thank you for your diligence and commitment to my project; I sincerely could not have done this without you.

DEDICATION

This project, as a symbol of the completion of my Doctorate degree, is dedicated to my husband, Daniel Brock. I could not have done this without you. You have been my support system and the shining light at the end of this long journey. I will love you always.

TABLE OF CONTENTS

ABSTRACT ii

ACKNOWLEDGMENTS iv

DEDICATION v

LIST OF TABLES x

LIST OF ABBREVIATIONS xi

CHAPTER I - INTRODUCTION 1

Background 1

Significance and Needs Assessment 2

Clinical Question 3

Problem Statement 3

Purpose and Theoretical Background 3

Doctorate of Nursing Practice Essentials 5

Essential I: Scientific Underpinnings for Practice 5

Essential II: Organizational and Systems Leadership for Quality Improvement and Systems Thinking 5

Essential III: Clinical Scholarship and Analytical Methods for Evidence-Based Practice 5

Essential IV: Information Systems/Technology and Patient Care Technology for the Improvement and Transformation of Health Care 6

Essential V: Health Care Policy for Advocacy in Health Care ... 6

Essential VI: Interprofessional Collaboration for Improving Patient and Population Health Outcomes ... 7

Essential VII: Clinical Prevention and Population Health for Improving the Nation's Health ... 7

Essential VIII: Advanced Nursing Practice ... 7

Summary ... 8

CHAPTER II – REVIEW OF LITERATURE ... 9

History of Simulation ... 9

High Fidelity Simulation ... 9

Support for Use in Advanced Practice Nursing Curriculum ... 10

Self-Efficacy and Student Success ... 11

Prevalence of Difficult Airways ... 12

Difficult Airway Algorithm ... 13

Summary ... 15

CHAPTER III - METHODOLOGY ... 16

Target Outcomes ... 16

Setting ... 16

Population ... 16

Design ... 17

Tool 17

Collection of Data 18

Statistical Analysis 18

Barriers 19

Permission 20

Summary 20

CHAPTER IV – ANALYSIS OF DATA 21

Overview 21

Statistical Analysis 21

Pre-Demonstration Self-Efficacy Results 22

Pre-Simulation Self-Efficacy Results 22

Post-Demonstration Self-Efficacy Results 23

Post-Simulation Self-Efficacy Results 24

Summary 25

CHAPTER V – DICUSSION 26

Interpretation of Results 26

Implications for Future Practice 26

Limitations 27

Recommendations 28

Conclusion 28

APPENDIX A – Literature Matrix 30

APPENDIX B – Difficult Airway Algorithm.. 36

APPENDIX C –Self-Efficacy Scale 37

REFERENCES 39

LIST OF TABLES

Table 1. Pre-Intervention Self-Efficacy Results 23

Table 2. Post-Intervention Self-Efficacy Results.. 25

LIST OF ABBREVIATIONS

AACN	American Association of the Colleges of Nursing
APN	Advanced Practice Nurse
APRN	Advanced Practice Registered Nurse
CRNA	Certified Registered Nurse Anesthetist
DNP	Doctorate of Nursing Practice
IOM	Institute of Medicine
NAP	Nurse Anesthesia Program
SRNA	Student Registered Nurse Anesthetist
USM	The University of Southern Mississippi

CHAPTER I - INTRODUCTION

In 1999, the Institute of Medicine (IOM) released a report, *To Err is Human*, reporting a fatality rate upwards of 98,000 related to medical errors, surpassing the death toll of motor vehicle accidents for that year. The report called for modifications in the healthcare system, including changes in educational institutions to better prepare healthcare professionals to meet the demands of the nation's ever changing, complex healthcare system. In an effort to achieve the IOM's mandate for improved patient-centered care, the American Association of the Colleges of Nursing (AACN) released a statement promoting the use of doctoral prepared Advance Practice Registered Nurses (APRNs) (AACN, 2004). Although the scope of practice does not change, the additional assessment skills coupled with the use of evidence-based practice by all doctoral prepared APRNs was anticipated to meet these complex needs. By 2025, all Nurse Anesthesia Programs will have transitioned to solely producing doctoral prepared clinicians. According to Jones, Passos-Neto, and Brahiroli (2015), the first step in improving patient outcomes is evaluating the way in which healthcare providers are trained. The use of simulation in educational programs provides an opportunity for students to learn in a safe and controlled environment, with prepared scenarios, and focused skill reinforcement.

Background

Simulation is defined as an exercise that reproduces a task in an environment with enough realism to serve a desired educational goal (Jha, Dunkan, & Bates, 2001). The use of simulation in health care is growing in popularity across many disciplines. Simulation provides an opportunity for the student to manage uncommon clinical scenarios without harm to an actual patient. Unfortunately, its use in Nurse Anesthesia Programs beyond practical skills is minimal due to factors such as cost and the number of staff needed (Covert, Roberson, Turcato, 2008).

Additional research is needed to demonstrate the importance in the use of high-fidelity simulation to reinforce difficult clinical situations. It is believed that simulation techniques improve quality of care and decrease medical errors (Institute of Medicine, 1999). If it is demonstrated that the use of simulation produces increased confidence in the understanding of lecture content in nurse anesthesia students, simulation reinforcement could provide information for faculty to consider in the planning of experiences within Nurse Anesthesia Program curricula that will facilitate the preparation of competent providers.

Significance and Needs Assessment

As of August 2016, there are currently 115 accredited Nurse Anesthesia Program across the country that graduate more than 2,400 students per year (Council on Accreditation, 2016). Each student completes approximately 2,100 clinical hours. Unfortunately, due in part to varying clinical experiences, not all students completing anesthesia programs feel confident in the basic skill of airway management. Closed-claim analyses have unveiled that of all Certified Registered Nurse Anesthetist (CRNA)-related claims, 39% were due to respiratory events and 68% of these events lead to death or serious brain damage (Crawforth, Jordan, Kremer, & Shott, 2001). Unfortunately, to the best of the authors knowledge, there is a gap in research related to a Student Registered Nurse Anesthetist’s (SRNA’s) ability to manage a difficult airway successfully. Due to the gap in research, it is believed to be due to the intervening of CRNA preceptors when a difficult airway is expected or encountered (White, Chandra, & Emmett, 2007).

Consequently, the lack of hands-on opportunity for students to manage a difficult airway provides an opportunity for further investigation into the SRNA's perceived self-efficacy in handling a difficult airway encountered during clinical rotations.

Clinical Question

Do first-year Student Registered Nurse Anesthetist have a greater increase in perceived self-confidence in their ability to handle a difficult airway after simulation reinforcement as compared to faculty demonstration? Identified components of the PICOT question include: Population (P) first-year student registered nurse anesthetists, Intervention (I) simulation reinforcement, Comparison (C) faculty demonstration, Outcome (O) increased self-confidence scores, and Time (T) prior to entering into a clinical rotation. The PICOT question served as a framework to the development and implementation of this project.

Problem Statement

Managing a difficult airway is a necessary skill for all nurse anesthesia students; thus, they should feel confident in their ability. The use of simulation training allows instructors to provide scenarios in a controlled situation that allows adequate time for a debriefing session without risk of harm to an actual patient. This project aims to determine if the use of simulation can improve a student's confidence in dealing with a difficult airway that he or she may encounter in an actual clinical situation as compared to traditional, faculty demonstration.

Purpose and Theoretical Background

The purpose of this project is to reduce medical errors by determining if simulation serves as a more positive reinforcement in handling a difficult airway as compared to faculty demonstration through a student self-rated confidence level tool. The framework for this project was based on the Adult Learning Principles of Medical Learners. The Adult Learning Principle, referred to as andragogy, can be further explained.

Adapted on the assumptions of andragogy, Bryan, Kreuter, and Brownson (2009) created five principles that describe the learning style of adult medical professionals: (1) Adults need to know why the information needs to be gained, (2) The motivation for adult learners lies in the need to solve issues, (3) Adult learners use previous experience to build upon his or her knowledge, (4) Teaching approaches should take into consideration the adult learner's diverse background, and (5) Adult learners need to be actively involved in the learning process. Therefore, educators should consider the role that experience and self-direction play in the necessity to learn through an active process.

Through the use of simulation as reinforcement to classroom lecture, each of these five principles can be incorporated into the intervention. During the lecture, the student will understand why this information is vital to his or her clinical practice in dealing with surgical patients. Simulation scenarios will provide the student with an opportunity to solve a clinical problem. The students will lean on previous clinical experience to help drive decision-making during the scenario. The simulation scenario provides an active learning approach to reinforce what was presented during lecture, while giving the future practitioner the opportunity to work through the clinical issue of airway management without the potential risk of harm to an actual patient.

Doctorate of Nursing Practice Essentials

The American Association of the Colleges of Nursing (AACN) outlined the Doctor of Nursing Practice (DNP) Essentials to serve as a foundation for Advanced Practice Nurses who choose to pursue the terminal degree (American Association of Colleges of Nursing, 2006). These eight fundamentals serve as a guideline for the doctoral scholar in the pursuit of evidence in order to shape a proposed practice change and are apparent throughout a proper project. Each of the eight essentials, outlined by the AACN, will be further explained as it pertains to this project.

Essential I: Scientific Underpinnings for Practice

Essential One describes how the practice doctorate prepares the APRN to address current practice issues through evidence. This project aimed to increase a SRNA's confidence in clinical skills in an effort to reduce medical errors. The investigator attempted to identify if simulation could serve as a more positive reinforcement to classroom lecture compared to faculty demonstration as evident by an increase in SRNA's perceived confidence in a handling a difficult airway.

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

Essential Two focuses on the DNP graduates' ability to address organizational practices and provide strategies for improvement. This project's goal was to determine if the use of simulation, over demonstration, can serve as a better reinforcement to classroom lecture. The results could lead to changes in educational programs in the way that students are prepared for clinical and future practice.

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

Essential Three describes the doctoral prepared APRN's role in the translation of evidence into practice. Prior to identifying simulation as a possible technique to increase student confidence in didactic material and, ultimately, decrease errors, a review of the literature was conducted. Due to the increasing number of studies that encourage its use in preparing medical professionals, specifically the growing popularity in the realm of anesthesia, simulation reinforcement following a classroom lecture on practice content was chosen for further evaluation.

Essential IV: Information Systems/Technology and Patient Care Technology for the Improvement and Transformation of Health Care

Essential Four addresses the DNP graduate's ability to use technology to improve patient care and healthcare systems. The simulation chosen for use in this project utilizes high-fidelity technology and mannequins to replicate clinical scenarios for the student. This technology use may increase the student's confidence in translating didactic material into clinical skills in an effort to improve patient outcomes and decrease the rate of morbidity and mortality due to medical error made by a clinician.

Essential V: Health Care Policy for Advocacy in Health Care

Essential Five focuses on changing all realms of health care policy, including institutional decision making for curriculums. The evaluation and creation of health care policy and curriculums is essential to enable the practitioner to address healthcare needs. The outcomes of this project could potentially alter a doctoral educational program's policies on the implementation of simulation following lecture content in the preparation of doctoral prepared SRNAs.

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

Essential Six aims to promote the DNP graduate's ability to engage in and support interprofessional communication. Simulation provides the student an opportunity to practice the basis of this essential when assuming the role of the clinician in difficult scenarios where collaboration with other members of the healthcare team may be the only way to alleviate the situation. Furthermore, the debrief process, occurring at the conclusion of the simulation scenario, allows instructors to engage in feedback on actions and possible alternative actions that the student may consider.

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

Essential Seven concentrates on evaluating care delivery models in an effort to address gaps in patient care. This project focused on the use of simulation and how it can possibly improve the care provided by SRNA students in both clinical and future practice The gap in practice, effective airway management skill attainment, may be remedied through simulation exercises in hopes of preventing adverse outcomes of surgical patients.

Essential VIII: Advanced Nursing Practice

Essential Eight focuses on the foundational practice that DNP graduates are expected to demonstrate that includes assessment skills and the practice of acknowledging physical, psychological, behavioral, cultural, and economic influences in their area of specialization. Simulation provides the SRNA an opportunity to practice both assessment and physical skills in a controlled environment, without fear of harm to the patient. The SRNA may also evaluate the economic influence of utilizing simulation to not only attain these skills, but to decrease the cost of adverse outcomes to the surgical patient.

Summary

Chapter I outlined the background, significance, and needs assessment of SRNAs' personal confidence in his or her ability to manage a difficult airway. The clinical questions was outlined through the PICOT format. Also, the purpose of the project and applicable theoretical background, was described. The following chapter describes what literature currently exist in relation to this topic.

CHAPTER II – REVIEW OF LITERATURE

History of Simulation

Simulation is a technique intended to replicate real experiences. In the field of medicine, it can be traced back to clay models in Antiquity used to study human anatomy to its use in learning surgical techniques from the Middle Ages (Jones, Passos-Neto, & Braghiroli, 2015). The first modern medical simulation mannequin, Resusci-Anne, was produced in the 1960s to teach mouth-to-mouth ventilation (Cooper & Taqueti, 2008). In 1968, the American Heart Association created Harvey, a simulated patient that was used to learn about different cardiovascular diseases that included blood pressure readings, heart sounds, a pulse, and heart murmurs (Rosen, 2008). As technology improved over the next few decades, medical mannequins became derivatives of these early models.

High Fidelity Simulation

High-fidelity simulation creates an environment that immerses the student in situations that mimic real-life parameters and defy disbelief. These simulators include computer-enhanced mannequins that can be manipulated both physiologically and pharmacologically (Schoening, Sittner, & Todd, 2006). Reilly and Spratt (2007) even recommend that all the individuals should consider the mannequin as a live patient and refer to him or her as their assigned name. Past research compared high-fidelity simulation to the experience of an actor. The actor analogy places the student in a situation that may be encountered in the future while taking on the emotional and intellectual responses to meet the demands of the real-life situation.

Support for Use in Advanced Practice Nursing Curriculum

Recent research has supported the use of simulation in Advance Practice Nursing (APN) curriculum for several reasons. Simulation provides rare clinical experiences in a low risk situation; one that can be controlled, observed, and then debriefed with by faculty members. Each clinically replicated scenario allows the student to actively participate in correcting the presenting issue, instead of having to passively observe. Additionally, the knowledge obtained during an active learning approach tends to resonate more strongly with the students (Jones, Passos-Neto, & Braghiroli, 2015). The support for the use of simulation in the APN arena is strengthening, specifically in Nurse Anesthesia Programs (NAP).

As with the discipline of nursing as a whole, simulation provides an opportunity for the student APRN to engage in clinical issues without any risk to an actual patient. Experience through simulation is of paramount importance for the Advanced Practice Nurse due to the infeasibility of encountering a sufficient number of critical scenarios in clinical practice. NAP programs have attempted this by utilizing high-fidelity simulators to reconstruct critical events the student my encounter, such as unexpected airway issues (Lucisano & Talbot, 2012). This simulated event would differ from what the APRN student may have experienced during a clinical rotation.

In the event that the student APRN does encounter a critical situation, the student usually takes on the role of an observer. Unfortunately, albeit understandably, the preceptor will generally take over and the student will lose the opportunity to actively participate in alleviating the issue (Pittman, 2012). Simulation allows the student to engage in managing the medical problem first hand to reinforce patient-centered care, a skill that is difficult to teach without hands-on opportunities (Eggenberger & Regan, 2010). This hands-on, active approach could lead to better recall during a real-life encounter. According to Hovancsek (2007), because simulation utilizes an active learning approach, it could lead to the student retaining the information longer.

Self-Efficacy and Student Success

Self-efficacy is an individual's belief that he or she has the capability to complete a given task efficiently (Bandura, 1977). This personality trait has been linked throughout the literature to an individual's success in different types of endeavors. According to Lundberg (2008), self-efficacy or self-confidence provides a student with a number of positive attributes to persevere through clinical rotations and provides the (1) foundation for knowledge attainment, (2) basis for evidence application, (3) ability to view task with optimism, (4) endurance through adversity, and (5) positivity to accomplish goals. Self-confidence provides the drive to persevere through the difficult process of acquiring new skills.

Recent research has connected student confidence with the use of simulation. According to Thomas & Mackey (2012), baccalaureate nursing students who participated in high-fidelity simulation scenarios, as compared to their cohorts who had not, rated a higher self-confidence in completing basic clinical skills from assessment to the ability to effectively intervene. Khalila (2014) found a correlation in the use of simulation and an increase in student nurses' confidence during their first clinical practice as opposed to those who did not. Observing someone complete a task, as in a student watching a preceptor in the hospital setting, is less effective than if the student is able to work through it actively, as with simulation. Simulation provides the student an opportunity to receive confidence-building ideologies such as (1) instructor feedback, (2) peer modeling, and (3) the ability to practice new skills (Lundberg, 2008). Therefore, the use of simulation may be used as an effort to improve an SRNA's perceived self-efficacy in handling a difficult airway, a component of practice that is of constant concern due to potential risk involved with the safety of surgical patients receiving general anesthesia.

Prevalence of Difficult Airways

A difficult airway is defined as "the clinical situation in which a conventionally trained anesthetist experiences difficulty with mask ventilation, difficulty with supraglottic device ventilation, difficulty with tracheal intubation, or all three" (American Society of Anesthesiologist, 2013). The difficult airway is a combination of complex patient factors, the clinical setting, and the skill level of the anesthetic provider. Failed intubations occur 1:2230 in the general population and occur more frequently in obstetric population at a rate of 1:750-1:280. Difficult airway management can occur at any point in the anesthetic management, from induction to maintenance. According to the American Society of Anesthesiologist (ASA, 2013), there is a rise in the number of challenging airways experienced in the clinical setting due to an improvement in the treating of airway or facial pathology that later present for an unrelated surgery. In an effort to ensure patient safety, effective management of a difficult airway can be achieved with an emphasis placed on education and preparedness in handling these situations. (Popat, 2003). The ASA has attempted to provide a set of basic recommendations as a means for evaluating and managing patients categorized as having a difficult airway.

Difficult Airway Algorithm

The ASA's Task Force on Difficult Airway Management constructed a step-wise algorithm, illustrated in Appendix II, based on their practice guidelines for the anesthesia practitioner on proper techniques for managing a difficult airway. The task force considered both scientific and opinion-based evidence in the creation of these guidelines through a thorough evaluation of current literature and expert experience. The algorithm considers all stages of the perioperative procedure, leading to four priorities for the anesthesia provider to consider when faced with a patient expected of having a difficult airway: (1) preoperative assessment of airway, (2) basic preparation for managing a difficult airway, (3) alternative intubation techniques, and (4) consideration for extubation and postoperative care. These techniques provide the anesthetic provider with a set of guidelines from start to finish in the management of a difficult airway.

The Task Force's assessment of literature and expert opinion, lead to a heavy emphasis on the importance of conducting an extensive preoperative assessment that considers the patient's history, physical exam, and diagnostic results. The ASA recommends, if possible, that the airway assessment be conducted by the cases' assigned anesthetic provider only. The intent of the assessment should focus on evaluation of the patient's history, comorbidities, and any previous surgeries to evaluate the likelihood of a difficult airway. If available, the anesthetic provider should evaluate previous anesthetic records that could yield vital information to prior airway management. The airway physical exam will assess for the presence of characteristics that increase the likelihood of a difficult airway, outlined in Table 1. Diagnostic test, such as radiology reports, may also reveal pertinent information for the anesthetic provider to consider. The preoperative assessment, physical exam, and evaluation of diagnostic reports encompasses the first part of the ASA's recommendation for management of a difficult airway (ASA, 2013).

The ASA recommends the anesthetic provider has a sense of basic preparedness for the potential encounter of a difficult airway. The anesthetic provider may consider having available equipment ready for management of the difficult airway, specifically in the form of a portable airway cart. The patient should be informed of the risk of a difficult airway, especially for those who are suspected or confirmed difficult intubations. The anesthetic provider should consider delegation roles and how the ancillary personnel in the room will be assigned task if a difficult airway situation arises. The anesthetist should place an emphasis on adequate pre-oxygenation prior to induction and throughout the management of the difficult airway. All of these strategies provide the anesthetic provider with a basic preparedness for the management of a difficult airway (ASA, 2013).

The ASA (2013), recommends the anesthetist to have a plan for alternative, non-invasive techniques of intubation when bag-mask ventilation or traditional direct laryngoscopy cannot be obtained: (1) awake intubation, (2) video-assisted laryngoscopy, (3) bougie or stylet, (4) supraglottic airway, (5) rigid laryngoscopy, (6) fiberoptic intubation, and (7) lighted wands or stylets. If these non-invasive techniques do not result in airway obtainment with adequate oxygenation, after both masking and direct laryngoscopy has been attempted, the anesthetic provider may progress to invasive airway access. Once the airway is obtained, the anesthetic provider should consider how this patient will be cared for post-operatively.

Follow up care for the patient includes the anesthetist's documentation of the event, informing of the patient or appropriate caregivers of the occurrence, and follow-up for potential complications. The documentation will remain in the patient's chart for future provider's use in the patient's preoperative assessment. This information should be detailed, including which techniques were incorporated, successfully or unsuccessfully, with apparent reasons for each. The patient should be well advised of this occurrence and its implication for future care. The anesthetist may consider following up with the patient post-operatively for evaluation of any complications that may have occurred during efforts to obtain the airway. This notification system, both to the patient and detailed in the medical record, is beneficial to guiding future care of the patient.

Summary

Chapter 2 summarized the history, as well as the support, of simulation and its use in the preparation of APRNs. The prevalence of difficult airways encountered by the anesthetist was described. Lastly, the current recommendations from the ASA on difficult airway management, depicted as a step-wise progression known as the Difficult Airway Algorithm, was explained. Chapter 3 will describe the methodology of this doctoral project.

CHAPTER III - METHODOLOGY

Target Outcomes

The target outcome of this project was to determine if simulation after classroom lecture increases the perceived self-efficacy of SRNAs in handling a difficult airway in the clinical setting. Research has shown the benefits of using simulation for teaching students across multiple medical disciplines (Eggenberger & Regan, 2010, Lucisano & Talbot, 2012; Thomas & Mackey, 2012;). The outcome was determined by comparing the difference between SRNAs perceived self-confidence in handling a difficult airway after classroom lecture and then following a simulation exercise for reinforcement.

Setting

The setting for this project took place at The University of Southern Mississippi's Doctorate of Nursing Practice Nurse Anesthesia Program in Hattiesburg, Mississippi. An academic setting, such that this one afforded, provided the opportunity to determine if simulation could be utilized more extensively in the preparation of future nurse anesthesia practitioners. For convenience, this setting was the investigator's program of study.

Population

The population for this project included 20, volunteer, first-year students enrolled a the DNP program for Nurse Anesthesia who had not yet started clinical rotations. The convenience sample included the cohort of students admitted during the same year as the project. There were numerous inclusion criteria for the 20 students: (1) Bachelor of Science in Nursing, (2) varying ages, (3) different backgrounds, and (4) various previous experience levels. No student was excluded due to having or not having previous experience with simulation or any other demographic data. The students were divided into the perspective groups based on a random draw. To further prevent bias, the project was conducted in the simulation lab at the institution under the supervision of the Nurse Anesthesia Program faculty.

Design

A two group, post-test design was utilized to determine the effectiveness of simulation to increase perceived self-efficacy for Nurse Anesthesia students. There were two groups who participated in this project: (1) the control group and (2) the intervention group. Each group received the same classroom lecture on difficult airways, as per usual for the program, prepared by the course director. Afterwards, each student rated his or her perceived self-confidence in handling a difficult airway using the tool in Appendix II. The control group watched a demonstration by the course director on handling a difficult airway and then completed the same self-confidence evaluation tool. The intervention group instead completed a simulation exercise with a difficult airway case then followed up with a debriefing. After the simulation, the intervention group completed the post-demonstration self-confidence tool. Following the conclusion of the project, the control group was given the same opportunity to participate in the simulation exercise.

Tool

The Self-Efficacy in the Identification and Management of a Difficult Airway During the Induction of General Anesthesia instrument is the sole instrument used to measure perceived self-efficacy. The tool, as depicted in Appendix III, was created by the author based on Bandura’s description of how to tailor a self-efficacy scale to fit a particular context (Bandura, 1977). The author designed the questions based on the steps outlined by the ASA's Practice Guidelines for the Management of the Difficult Airway Algorithm (American Society of Anesthesiologist, 2013). This protocol outlined the importance of conducting a thorough preoperative airway assessment, the preparation through adequate help and equipment, the escalating steps of dealing with the situation, and the postoperative documentation. These variables were considered in the creation of the tool. The responses consisted of a four point Likert scale to eliminate the neutral response that occurs with a five-point scale. For scoring purposes, each response ranged from 1 to 4: (1) Not at all true, (2) Hardly true, (3) Moderately true, and (4) Exactly true. Therefore, the sum of scores ranged between 17 and 68, with a higher score indicating a greater sense of self-efficacy in the management of a difficult airway.

Collection of Data

Each participant was randomly assigned to either the control group or the intervention group. The data collected during the project was transferred to a Microsoft Excel spreadsheet before being transferred to SPSS (Statistical Package for Social Sciences) for statistical analysis. Student confidentiality was maintained throughout the process of data collection.

Statistical Analysis

This project focused on whether simulation increased SRNA's perceived self-confidence in handling a difficult airway more than an instructor's demonstration by comparing post-test self-confidence scores between the two groups of students. The hypothesis was that the simulation group would have higher perceived self-efficacy scores than the demonstration group. Through the SPSS software, the control group and the intervention group was compared by evaluating the mean self-efficacy scores obtained by students in each group collectively.

Barriers

A number of potential barriers could have been encountered during the implementation of this project. Barriers that particularly involved the participants are the unwillingness to participate, disinterest in simulation, and fear of the simulation process. According to Hamstra, Morgan, Naik, & Salvoldelli (2005), residents and physicians were hesitant to participate in simulation exercises due to the nature of how the experiences were conducted. The hesitation to participate was due to the individuals anticipating a stressful environment, concern of a peer's judgment, fear of appearing inadequate, and the financial burden of missing work to participate. Overcoming these issues was considered when attempting to implement the project.

The initial step in addressing these barriers was to first prioritize each individually (Dudley-Brown, Terhaar, & White, 2016). The financial burden was alleviated for students due to the simulation occurring during scheduled class time. Changing a participant's perception proved more difficult than the issue of timing. There is a lack of literature on how to address personal viewpoints (Dudley-Brown, Terhaar, & White, 2016). Kulier, Gee, & Khan, (2008), suggested the use of acceptance and persuasion. Acceptance and persuasion can be achieved through influential leaders and multiple sources of evidence. This project attempted to overcome these barriers through the discussed strategies.

Permission

Permission was obtained from the Institutional Review Board (IRB) of the University of Southern Mississippi prior to the implementation of the projects. Prior to IRB approval, the project was accepted by the members of this project's committee, all faculty members of the university. Permission was also obtained individually by each participant.

Summary

Chapter 3 described the methodology in which the investigator conducted this project. The target outcome as well as setting and population was described. The design of the project, including tool and data collection was outlined. The potential barriers the investigator believed could have been encountered was also described. Chapter 4 analyzed the data that was collected.

CHAPTER IV – ANALYSIS OF DATA

Overview

This project aimed to determine if the use of simulation increased SRNAs' perceived self-efficacy in the management of a difficult airway versus instructor demonstration. The hypothesis of this research project, formed by reviewing current literature, stated that SRNAs whom receive simulation training versus those that receive instructor demonstration will have a greater perceived self-efficacy in the management of a difficult airway following classroom lecture. The null hypothesis stated that simulation training in the reinforcement of difficult airway management skills does not change the perceived self-efficacy of SRNAs compared to instructor demonstration. The change in means of each group's pre and post test self-efficacy scores were compared.

A brief presentation was provided to the first-year Nurse Anesthesia doctoral students at a university in Mississippi. The presentation began at the start of a scheduled class meeting in the students' assigned classroom prior to the start of lecture. The students were informed that participation was voluntary, there were no foreseen risk of participation, and no incentives would be provided for participation. All 20 of the SRNA students of the first-year class agreed to participate in the project. The project participants were administered the Self-Efficacy questionnaire prior to each group's randomly-selected intervention and again after each intervention.

Statistical Analysis

Quantitative statistics were utilized to interpret the data collected from the Perceived Self-Efficacy questionnaires. All 20 (100%) of the first-year students completed the pre and post Perceived Self-Efficacy evaluation tool. The students were asked to rate their perceived self-efficacy in the management of a difficult airway on a descriptive scale ranging from not at all true to exactly true. A numerical value was assigned by the investigator to ease in statistical analysis: not at all true (1), hardly true (2), moderately true (3), and exactly true (4). The sections of the questionnaire were divided into four categories based on the Difficult Airway Algorithm from which it was created: the first four questions reflected preoperative actions, the next four questions focused on the skill of mask ventilation, the following seven questions assessed confidence in airway establishment techniques, and the last two questions evaluated the student's self-efficacy in postoperative tasks.

Pre-Demonstration Self-Efficacy Results

The control group, the students who received demonstration reinforcement, had an overall, mean perceived self-efficacy of 2.19, a qualitative equivalent to hardly true in the student's perceived self-efficacy in difficult airway management skills. Of the four questions reflecting confidence in preoperative skills, the students rated a combined mean of 2.13. The students rated their confidence in bag mask ventilation at a mean of 2.73, approaching the level of exactly true. The control group's mean confidence in airway establishment skills of the difficult airway was computed to 2.04. Lastly, the students rated their confidence in postoperative actions of a 1.8 or hardly true.

Pre-Simulation Self-Efficacy Results

The intervention group, the students receiving simulation, had a combined mean self-efficacy of 2.29 prior to completing the simulation exercise, 0.1 higher than the demonstration group, but at the same qualitative level of hardly true in their perceived self-confidence in the overall management of a difficult airway. Categorically, the students rated their ability in preoperative actions for the patient with a difficult airway at a mean of 2.2. The pre-simulation students rated a mean of 2.9 in their ability to bag-mask ventilate the patient with a difficult airway, even closer than the demonstration group to being exactly true in their confidence in this skill. The intervention group's mean confidence in airway establishment of the patient with a difficult airway was a 2.09. For postoperative actions, the pre-simulation students rated their confidence at a 1.95. Overall and categorically, the intervention group had a higher perceived self-confidence in difficult airway management skills than the control group.

Table 1

Pre-Intervention Self-Efficacy Results

	Control Group (Demonstration Group)	Intervention Group (Simulation Group)
Overall Mean Perceived Self-Efficacy	2.19	2.29
Preoperative Skills Perceived Self-Efficacy	2.13	2.2
Mask Ventilation Perceived Self-Efficacy	2.73	2.9
Airway Establishment Perceived Self-Efficacy	2.04	2.09
Postoperative Skills Perceived Self-Efficacy	1.8	1.95

Post-Demonstration Self-Efficacy Results

The control group, the students whom received the demonstration reinforcement, had an overall, mean post-demonstration self-efficacy score of 2.89 in the management of a difficult airway. The change in means from pre and post demonstration yielded an overall increase of 0.7 or a 32% increase from the students' pre-demonstration, overall mean self-efficacy score. The student's post-demonstration self efficacy score for pre-operative skills was a mean of 3.03, a percent increase of 42% from the pre-demonstration mean. The control group had a mean, post-demonstration self-efficacy score of 3.03 for mask ventilation, a percent increase of 11% pre-demonstration mean score. The student's post-demonstration score was 2.81 for airway establishment following the demonstration exercise, a percent increase of 38% pre-demonstration. Lastly, the students had a mean, post-demonstration score of 2.65 for post-operative actions. This yielded a 47% increase from the mean pre-demonstration scores.

Post-Simulation Self-Efficacy Results

The intervention group, the students whom participated in the simulation exercise, had an overall, post-simulation self-efficacy mean score of 2.76. Compared to the pre-simulation self-efficacy mean score, the students had a 21% overall increase in perceived confidence in the management of a difficult airway. The students had a mean, post-simulation score of a 2.93 in pre-operative skills, a percent increase of 33%. The intervention group had a mean score of 3.13 perceived self-efficacy in mask ventilation, an 8% increase from pre-simulation score. The simulation students reported a mean, post-simulation score of 2.57, a 23% increase from pre-simulation scores. As for the category of post-operative actions, the intervention group had a mean, post-simulation score of 2.4, a 23% increase from pre-simulation scores.

Table 2.

Post-Intervention Self-Efficacy Results

	Control Group (Demonstration Group)	% Change	Intervention Group (Simulation Group)	% Change
Overall Mean Perceived Self-Efficacy	2.89	32%	2.76	21%
Preoperative Skills Perceived Self-Efficacy	3.03	42%	2.93	33%
Mask Ventilation Perceived Self-Efficacy	3.03	11%	3.13	8%
Airway Establishment Perceived Self-Efficacy	2.81	38%	2.57	23%
Postoperative Skills Perceived Self-Efficacy	2.65	47%	2.4	23%

Summary

Chapter 4 analyzed the data that was collected from both the control and intervention groups. The data was further analyzed as it related to overall mean perceived self-efficacy in difficult airway management from preoperative to postoperative intervention. The following chapter, Chapter 5, attempted to discuss the significance of the information analyzed.

CHAPTER V – DISCUSSION

Interpretation of Results

Post-intervention self-efficacy mean scores were compared for the control group, those who participated in demonstration, and the intervention group, those who took part in a simulation exercise. Overall, as seen in Table 3, each group had an increase in mean, perceived self-efficacy in the management of a difficult airway following both interventions. While the demonstration-group had a higher percent change in overall and categorical mean confidence levels, the intervention group also had an increase percent change in each category post-simulation. Therefore, the null hypothesis is accepted; the use of simulation versus the use of demonstration did not change the perceived self-efficacy of Student Registered Nurse Anesthetist in the management of a difficult airway when compared to instructor demonstration for this sample. The null hypothesis may have been accepted due to the small sample size and the difference in experience of the student and faculty member who lead simulation and demonstration, respectively.

Implications for Future Practice

Although simulation was not shown to increase the SRNAs' perceived self-efficacy more than the use of instructor demonstration, the simulation group had an increase in mean self-efficacy scores overall and within each category. Simulation reinforcement could aid in the development of skills needed for the SRNA to feel confident in the management of a difficult airway encountered in the operating room. Simulation may also benefit in the continuing education and skill reinforcement for the CRNA and the OR staff assisting with patients who present with a difficult airway.

Future implications for workforce training could be further analyzed with a cost benefit analysis for the installment of such program.

Limitations

The limitations for this project were based on the number of participants, how the two demonstration exercises were executed, and the changes that occurred in the program prior to study implementation. The small sample size impacted the way statistical analysis could be computed, limiting the computation to solely comparing means. Additionally, the small sample size could influence the ability to replicate these results. Another factor, that may have impacted the post-intervention self-efficacy scores, is that each demonstration group was led by a different individual with a vast difference in level of experience. The demonstration exercise was led by a faculty member well versed in academic delivery of information as well as decades of anesthesia experience, while the simulation group was led by the researcher, a junior SRNA. The hope of the researcher, the junior SRNA, was that her presence in leading the simulation exercise would be to decrease the likelihood of the students feeling inadequate or unwilling to participate if lead by an authority figure, a barrier previously discussed. In doing so, this may have limited the amount gained by those in the simulation group vs those in the demonstration group. Lastly, the students in this cohort participated in many simulation exercises prior to this airway exercise. The previous exposure to airway management skills through simulation may explain why the students' baseline confidence scores reflected so highly and, therefore, led to less of an increase following the post simulation exercise. Each of these limitations may have impacted the results of this project.

Recommendations

Future investigations into techniques that lead to the increased perceived self-efficacy of SRNAs in not only the management of the difficult airway, but other crucial skills, is imperative for the development of competent, safe providers. In the future, each intervention should be completed by the same individual or individuals with similar levels of education and experience. Also, if possible, a larger sample size would increase the likelihood of replicability as well as increase the available statistical tests that may be used to interpret the data. Lastly, demographic data may be useful in identifying connections between the level of perceived self-efficacy and the student's age, sex, previous nursing experience, etc. Future implications for projects may also focus on the use of simulation not only in the preparedness of future CRNAs, but also in the continued education of practicing CRNAs and OR staff to increase patient safety. Each of these recommendations may be useful in furthering similar projects or to aid in future studies interested in determining effective methods in the preparation of the Student Registered Nurse Anesthetist, CRNAs, and other members of the OR staff.

Conclusion

The implementation of evidence-based practice is a major part of the foundation of the Doctor of Nursing Practice degree and may therefore be utilized in the development of its curriculum. This project aimed to determine if simulation could aid in the preparation of SRNAs in increasing their perceived self-efficacy in the management of a difficult airway as compared to demonstration. In this project, the simulation group did not experience a greater increase in self-confidence than those who participated in the demonstration. However, the simulation students reported an increase in mean overall self-confidence and in the individual skills involved in each phase of the management of a difficult airway. Future research may be necessary to determine the effectiveness of simulation in the management of difficult airways. These projects may include a larger sample size, an increase in control to aid in measuring the effectiveness of simulation, or the use of other members of the anesthesia team.

APPENDIX A – Literature Matrix

Author/Year/ Title	Level	Sample/ Data Collection	Findings	Recommendations
American Society of Anesthesiologist. (2013). Practice guidelines for managment of the difficult airway. *Anesthesiology, 118*(2), 1-20.	I & VII	Data was obtained from scientific evidence and expert-opinion.	Practice guidelines for the management of a difficult airway.	Further scientific research in the management of a difficult airway.
Bandura, A. (1977). Self-efficacy: Toward a unifying theory of behavioral change.	VII	Findings are from a microanalyses of enactive, vicarious, and emotive modes of treatment that support the hypothesized relationship between perceived self-efficacy and behavioral changes.	Self-efficacy is a predictor of performance.	Future studies should focus on extending the use of self-efficacy in other types of treatment.
Cooper, J.B. and Taqueti, V.R. (2008). A brief history of the development of mannequin simulators for clinical education and training.	I	PubMed was searched using keywords "simulation" and "simulator" for the years 1965 to 2004.	Review of the literature in both mannequin and procedural simulation show little overlap of source material references between the major domains. Simulation in healthcare education	Suggest that those in the field of simulation become broadly familiar with the technologies, pedagogies, and research methods in each domain to better inform strategies and tactics for application and diffusion of simulation into healthcare education, training, and research.

			training seems to be gaining acceptance.	
Eggenberger, S. K., & Regan, M. (2010). Expanding simulation to teach family nursing.	VI	50 undergraduate nursing students participating in simulation to reinforce family caring	In the preparation and participation in the simulation experience, faculty realized the value in utilizing simulation to teach family nursing skills.	Simulation should be further evaluated for its use in teaching relational care instead of solely focusing on its use in teaching psychomotor skills.
Hovancsek, M. T. (2007). Using simulation in nursing education.	VI	25 students enrolled in a nursing program rated confidence in four areas pre and post a simulation exercise.	After the simulation exercise, the students rated a higher self confidence in all four areas of assessment, physical exam, nursing care, and the use of health promotion advice.	Future studies could focus on on different nursing topic to assess the different effectiveness in the use of simulation.
Jones, F., Passos-Neto, C. E., and Braghiroli, O. F. M. (2015). Simulation in medical education: Brief history and methodology	I	Reviewed the history, adult learning process, and methodology for simulation in medical education.	Simulation provides controlled scenarios for students to work through that produce no risk to an actual patient. It provides an opportunity to reinforce	Simulation should be used in educational institutions to better prepare future clinicians to meet the demands of the ever complex healthcare system.

			skills. It enables the learner to learn from mistakes.	
Khalaila, R. (2014). Simulation in nursing education: An evaluation of students' outcomes at their first clinical practice combined with simulations	VI	61 second-year baccalaureate nursing students from Zefat Academic College	Rise in self confidence after the students' first clinical practice with simulations	Future research should examine the anxiety level, caring ability, self-confidence, and caring efficacy over time during all the years of clinical practice among student nurses.
Lucisano, K.E. and Talbot, L. A. (2012). Simulation Training for Advanced Airway Management for Anesthesia and Other Healthcare Providers: A Systemic Review	I	15 studies were reviewed in this study, all were randomized controlled trials. Four databases CINAHL (1995-September 2007), MEDLINE (1990-September 2009), PsycINFO (1990-September 2009), and Web of Science (1990-September 2009) were searched for the RCTs.	Confirmed that simulation may be an effective tool to teach airway management skills and provide support for techniques that may be used.	Additional research to further evaluate the use of simulation as a tool to teach advanced airway management in anesthesia students and current practioners.

Lundberg, K. M. (2008). Promoting self-confidence in clinical nursing students.	I	CINAHL, PubMed, ERIC, and Psy-coINFO databases were accessed for student confidence and clinical teaching strategies	Simulation and skill review exercises are effective confidence-building tools that can be useful to provide motivation for nursing students to progress through a program.	Future research in understanding theories of clinical confidence acquisition and teaching techniques.
Pittman, O. A. (2012). The use of simulation with advanced practice nursing students. American Academy of Nurse Practioners, 516-520.	VI	FNP students in their second of a four-quarter course series on diagnosing & managing health problems	Students verbalize that they find simulation to be a positive learning experience that increased their understanding of classroom content.	Future studies will use a similar sample to examine for an changing in the students' perceived confidence level pre- and post-simulation.
Reilly, A., & Spratt, C. (2007). The perceptions of undergraduate student nurses of high- fidelity simulation-based learning: a case study report from the University of Tasmania. *Nurse Education Today, 27*, 252-550.	I	Perception of three-year BSN nursing students in their experience of high-fidelity simulation and clinical preparedness	The students verbalized their appreciation for simulation in a safe environment and the application of active learning approach.	Further studies in the use of high-fidelity simulation in nursing education

Rosen, K. R. (2008). The history of medical simulation.	VI	Review of the history of simulation in medical technology.	Modern simulation has changed of the last fifty years. Fidelity and validity are the two main reasons for the delay in its use. The debate over the use is heated. There is a future push for its use in licensure and certification of medical professionals.	Further research in the future of simulation use in the medical field in training and certifying medical professionals.
Schoening, A. M., Sittner, B. J., & Todd, M. J. (2006). Simulated clinical experience: nursing students' perceptions and the educators' role. *Nurse Educator, 31*(6), 253-258.	I	The study examined nursing students' perceptions of a preterm labor simulated clinical experience as a method of instruction.	The students reported satisfaction with the use of simulation and the entire experience.	Further research in different types of nursing students and scenarios.
Thomas, C., & Mackey, E. (2012). Influence of a clinical simulation elective on baccalaureate nursing student clinical confidence.	I	24 baccalaureate nursing students participated in high-fidelity simulation course were evaluated for a change in level of confidence as compared to traditional	Significant increase in confidence as compared to the control group who did not receive the simulation training in recognizing symptoms, assessment,	Which aspects of simulation are the most beneficial.

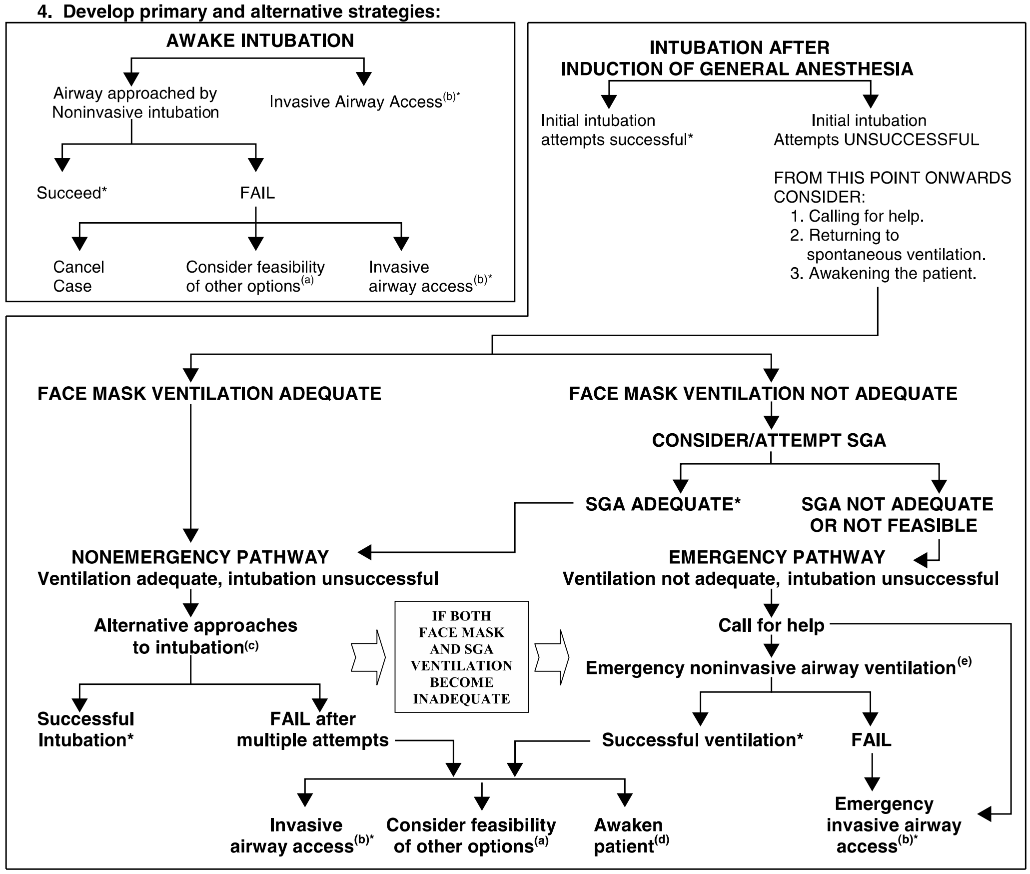
		clinical experience	intervention, and evaluation.	

APPENDIX B – Difficult Airway Algorithm

American Society of Anesthesiologists

DIFFICULT AIRWAY ALGORITHM

1. **Assess the likelihood and clinical impact of basic management problems:**
   - **Difficulty with patient cooperation or consent**
   - **Difficult mask ventilation**
   - **Difficult supraglottic airway placement**
   - **Difficult laryngoscopy**
   - **Difficult intubation**
   - **Difficult surgical airway access**
2. **Actively pursue opportunities to deliver supplemental oxygen throughout the process of difficult airway management.**
3. **Consider the relative merits and feasibility of basic management choices:**
   - **Awake intubation *vs.* intubation after induction of general anesthesia**
   - **Non-invasive technique *vs.* invasive techniques for the initial approach to intubation**
   - **Video-assisted laryngoscopy as an initial approach to intubation**
   - **Preservation *vs.* ablation of spontaneous ventilation**
4. **Develop primary and alternative strategies:**



***Confirm ventilation, tracheal intubation, or SGA placement with exhaled CO_2.**

a. Other options include (but are not limited to): surgery utilizing face mask or supraglottic airway (SGA) anesthesia (e.g., LMA, ILMA, laryngeal tube), local anesthesia infiltration or regional nerve blockade. Pursuit of these options usually implies that mask ventilation will not be problematic. Therefore, these options may be of limited value if this step in the algorithm has been reached via the Emergency Pathway.

b. Invasive airway access includes surgical or percutaneous airway, jet ventilation, and retrograde intubation.

c. Alternative difficult intubation approaches include (but are not limited to): video-assisted laryngoscopy, alternative laryngoscope blades, SGA (e.g., LMA or ILMA) as an intubation conduit (with or without fiberoptic guidance), fiberoptic intubation, intubating stylet or tube changer, light wand, and blind oral or nasal intubation.

d. Consider re-preparation of the patient for awake intubation or canceling surgery.

e. Emergency non-invasive airway ventilation consists of a SGA.

APPENDIX C –Self-Efficacy Scale

SELF-EFFICACY IN THE IDENTIFICATION AND MANAGEMENT OF

A DIFFICULT AIRWAY DURING THE INDUCTION OF GENERAL ANESTHESIA

<u>I am confident in my ability to:</u>	Not at all true	Hardly true	Moderately true	Exactly true
1. Complete a thorough preoperative airway assessment	☐	☐	☐	☐
2. Identify patients who are a suspected difficult airway	☐	☐	☐	☐
3. Prepare the necessary equipment needed to handle a difficult airway	☐	☐	☐	☐
4. Delegate assistance from others in the room when experiencing a difficult airway	☐	☐	☐	☐
5. Adequately pre-oxygenate by facemask prior to induction of anesthesia	☐	☐	☐	☐
6. Bag-mask ventilate	☐	☐	☐	☐
7. Place an appropriate sized oral airway when necessary	☐	☐	☐	☐
8. Place an appropriate sized nasal airway when necessary	☐	☐	☐	☐
9. Choose the appropriate size LMA based on patient characteristics	☐	☐	☐	☐
10. Choose the correct blade based on patient characteristics	☐	☐	☐	☐
11. Choose the correct endotracheal tube size based on patient characteristics	☐	☐	☐	☐
12. Intubate a patient through direct laryngoscopy	☐	☐	☐	☐

13. Utilize a bougie with a patient who has an anterior airway	☐	☐	☐	☐
14. Place an endotracheal tube with a Glidescope	☐	☐	☐	☐
15. Confirm tracheal intubation with capnography or end-tidal carbon dioxide monitoring	☐	☐	☐	☐
16. Document a difficult airway and its management	☐	☐	☐	☐
17. Provide post-extubation care and counseling	☐	☐	☐	☐

REFERENCES

American Association of Colleges of Nursing. (2006). *The essentials of doctoral education for advanced nursing practice.* Retrieved from http://www.aacn.nche.edu/dnp/Essentials.pdf

American Association of Colleges of Nursing. (2004). *AACN position statement on the practice doctorate in nursing.* Retrieved from http://www.aacn.nche.edu/publications/position/DNPpositionstatement.pdf

American Society of Anesthesiologist. (2013). Practice guidelines for managment of the difficult airway. *Anesthesiology, 118*(2), 1-20.

Bandura, A. (1977). Self-efficacy: Toward a unifying theory of behavioral change. *Psychological Review, 84*(2), 191-215.

Bryan, R., Kreuter, M., & Brownson, R. (2009). Integrating adult learning principles into training for public health practice. *Health Promotion Practice*.

Cooper, J. B., & Taqueti, V. R. (2008). A brief history of the development of mannequin simulators for clinical education and training. *Postgrad Medical Journal, 84*(997), 563-570.

Council on Accreditation of Nurse Anesthesia Educational Programs. (2016). *CRNA School Search.* Retrieved from Accredited Programs: http://home.coa.us.com/accredited-programs/Pages/CRNA-School-Search.aspx

Covert, K., Roberson, C., & Turcato, N. (2008). Simulation-based education: What's in it for nurse anesthesia educators? *AANA Journal, 76*(5), 257-262.

Crawforth, K., Jordan, L. M., Kremer, M., & Shott, S. (2001). Data-driven practice improvement: The AANA foundation closed malpractice claims study. *AANA Journal*, *69*, 301-311.

Dudley-Brown, S., Terhaar, M. F., & White, K. M. (2016). *Translation of evidence into nursing and health care* (Vol. 2). New York: Springer Publishing Company.

Eggenberger, S. K., & Regan, M. (2010). Expanding simulation to teach family nursing. *Journal of Nursing Education*, *49*(10), 550-558.

Hamstra, S. J., Morgan, P. J., Naik, V. N., & Salvoldelli, G. L. (2005). Barriers to the use of simulation-based education. *Cananda Journal of Anesthesia*, *52*(9), 944-950.

Hovancsek, M. T. (2007). Using simulation in nursing education. In P. R. Jeffries (Ed), *Simulation in nursing education: From conceptualization to evaluation*, 1-9. New York, NY: National League of Nursing

Institute of Medicine. (n.d.). *To err is human: Building a safer health system.* Retrieved from National Academies of Enginering, Science, and Medicine: http://www.nap.edu/books/0309068371/html

Jha, A. K., Dunkan, B. W., & Bates, D. W. (2001). Simulator-based training and patient safety. *Making Health Care Safer: A Critical Analysis of Patient Safery Practices*, *45* (2), 511-518.

Jones, F., Passos-Neto, C., & Braghiroli, O. (2015). Simulation in medical education: Brief history and methodology, *Principles and Practice of Clincial Research,* *2*(1), 56-63.

Kulier, R., Gee, H., & Khan, K. S. (2008). Five steps from evidence to effect: Exercising clinical freedom to implement research findings. *British Journal of Obstretics & Gynecology, 115*(10), 1197-1202.

Lucisano, K. E., & Talbot, L. A. (2012). Simulation training for advanced airway management for anesthesia and other healthcare providers: A systematic review. *AANA Journal*, 80 (1), 25-31.

Lundberg, K. M. (2008). Promoting self-confidence in clinical nursing students. *Nurse Education*, *33*(2), 86-89.

Pittman, O. A. (2012). The use of simuation with advanced practice nursing students. *American Academy of Nurse Practioners*, *24*(9), 516-520.

Popat, M. (2003). The airway. *Anaestheisa*, *58*(12), 1166-1171.

Reilly, A., & Spratt, C. (2007). The perceptions of undergraduate student nurses of high-fidelity simulation-based learning: a case study report from the University of Tasmania. *Nurse Education Today, 27(6)*, 252-550.

Rosen, K. R. (2008). The history of medical simulation. *Journal of Critical Care, 23*(2), 157-166.

Schoening, A. M., Sittner, B. J., & Todd, M. J. (2006). Simulated clinical experience: nursing students' perceptions and the educators' role. *Nurse Educator, 31*(6), 253-258.

Thomas, C., & Mackey, E. (2012). Influence of a clinical simulation elective on baccalaureate nursing student clinical confidence. *Journal of Nursing Education, 51*(4), 236-239.

White, W., Chandra, A., & Emmett, D. (2007). The impact of provider and environemental factors ont he outcomes of urgent intubation at a large teaching hospital. *Healthcare and Public Policy, 85(3), 29-35*.