Fall 12-2016

# The Use of Simulation to Decrease Stress in First Year Student Registered Nurse Anesthetists

Jared Scott Seymour
*University of Southern Mississippi*

THE USE OF SIMULATION TO DECREASE STRESS IN FIRST YEAR STUDENT

REGISTERED NURSE ANESTHETISTS

by

Jared Scott Seymour

A Capstone Project
Submitted to the Graduate School
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:

_____
Dr. Cathy Hughes, Committee Chair
Assistant Clinical Professor, Collaborative Nursing Practice

_____
Dr. Michong Rayborn, Committee Member
Assistant Professor, Advanced Practice

_____
Dr. Marjorie Everson, Committee Member
Assistant Clinical Professor, Advanced Practice

_____
Dr. Karen S. Coats
Dean of the Graduate School

December 2016

***Published by the Graduate School***

ABSTRACT

THE USE OF SIMULATION TO DECREASE STRESS IN FIRST YEAR STUDENT REGISTERED NURSE ANESTHETISTS

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Each year, critical care nurses across the nation make the decision to become anesthesia providers. In order to become a certified anesthesia provider, nurses must meet the high standards required to be considered for entrance into anesthesia school. Once accepted, these students, known as Student Registered Nurse Anesthetists (SRNAs), must successfully complete a rigorous curriculum consisting of both didactic and clinical training. Due in part to the high degree of difficulty of anesthesia programs, SRNAs are at risk for experiencing high levels of stress. Chipas and McKenna (2011) shows SRNAs experience a self-reported average daily stress level of 7.2 on a 10 point scale compared to a self-reported average daily stress level of 4.7 among Certified Registered Nurse Anesthetists (CRNAs). The purpose of this study was to examine if the use simulation training can decrease self-reported stress levels among first year SRNAs. The inclusion criteria required all participants to be a first year SRNA enrolled in a three year, Bachelor of Science in Nursing (BSN) to Doctorate of Nursing Practice (DNP) anesthesia program at a public university in south Mississippi. A convenience sample of up to 21 SRNAs was randomly assigned into two separate groups. One of these groups was taught using simulation training while the second group was not. A pretest/posttest design was then used to evaluate whether simulation training is better at reducing self-report average daily stress levels than conventional means of teaching. Statistical

analysis consisted of a two-tailed t-test used to compare self-reported stress levels between the two groups. After collection of the posttest results, the control group was exposed to the same simulation as the test group. Posttest scores from the simulation group demonstrated a greater reduction in self-reported stress levels when compared to the non-simulation group. Three specific causes of stress were examined on the self-reported stress survey: (a) entering into clinical rotation, (b) anesthesia machine check-off, (c) mask-ventilation/airway maintenance. Posttest scores of the simulation group demonstrated a 27.2% ($t(17) = -3.49$, $p=0.002$), 8.9% ($n=10$) ($t(17) = -1.04$, $p=0.31$), and 6.7% ($n=10$) ($t(17) = -2.09$, $p=0.05$) reduction in self-reported stress levels, respectively.
Keywords: *student registered nurse anesthetist, simulation training, stress, air-way management, and anesthesia clinical improvements.*

ACKNOWLEDGMENTS

I would like to thank Dr. Cathy Hughes, my committee chair, and my other committee members, Dr. Michong Rayborn and Dr. Marjorie Everson, for guiding me through the capstone process.

# DEDICATION

I would like to thank my wife and two sons for their love, support, and the sacrifices they had to make while I earned my Doctorate of Nursing Practice degree.

Also, I would like to thank my parents, family, and friends who have helped me during this time. Without your love and support, this journey would not have been possible.

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LIST OF ABBREVIATIONS

| | |
|---|---|
| *AANA* | American Association of Nurse Anesthetists |
| *CRNA* | Certified Registered Nurse Anesthetist |
| *IRB* | Institutional Review Board |
| *NAP* | Nurse Anesthesia Program |
| *SRNAs* | Student Registered Nurse Anesthetists |
| *USM* | The University of Southern Mississippi |

# CHAPTER I - INTRODUCTION

Nurse anesthesia programs are designed to educate experienced intensive care nurses to become highly-skilled anesthesia providers. The transformation from intensive care nurse to nurse anesthetist is one that requires hard work, dedication, and years of training. During this time, Student Registered Nurse Anesthetists (SRNA) must further their understanding of subjects such as anatomy, physiology, and pharmacology. Also, SRNAs must develop a new set of clinical skills which include but are not limited to airway management, mask ventilation, and the use of ultrasound equipment. The ultimate goal of any anesthesia program is to produce safe and competent anesthesia providers. All of this training can cause SRNAs to experience high levels of stress. While some stress can be beneficial researchers and educators are constantly evaluating the current methods used to teach SRNAs new knowledge and skill sets in order to determine their effectiveness. One method used to teach SRNAs, known as simulation training, aims to recreate real world clinical situations in a controlled environment. Simulation training allows SRNAs to practice and develop new skills without putting an actual patient a risk.

## Background

Transitioning into the clinical aspect of anesthesia training can be a very stressful and overwhelming undertaking for the student registered nurse anesthetist (SRNA). The stress experienced by SRNAs has been shown to decrease their ability to recall information, learn new information, and perform basic motor functions (Chipas et al., 2012). This decrease in cognitive and physical ability has the potential to affect the

student registered nurse's ability to learn and process new information (Chipas et al., 2012).

## Significance and Needs Assessment

Currently there are 116 accredited nurse anesthesia schools in the United States (Council on Accreditation [COA], 2011). All of these schools are designed to train nurses how to deliver safe and effective anesthesia to patients. In an attempt to prevent the negative outcomes associated with SRNA experienced stress, SRNAs require a high level of training to be adequately prepared to meet the demands of clinical practice. Assessing areas in which SRNAs feel underprepared is one way to identify specific causes of stress related to transitioning into clinical practice. Chipas et al. (2011) identified that student registered nurse anesthetists have higher self-reported stress levels than certified nurse anesthetists. The work of Chipas et al. (2011) served as a needs assessment for this study. Better prepared SRNAs are likely to experience less stress when entering the clinical environment for the first time. Optimizing the time spent between the SRNA and CRNA through improved clinical readiness on the part of the student has the potential to decrease the level of stress experienced by the student. Developing a simulation workshop that addresses the areas identified by the student while incorporating those unknown to them has the potential to reduce the stress they experience in the beginning of their clinical rotation.

## Clinical Question

Can the use of simulation training decrease stress in first year student registered nurse anesthetists? Population (P) student registered nurse anesthetists, Intervention (I)

simulation training, Comparison (C) no simulation, Outcome (O) reduction in self-reported stress level, Time (T) prior to entering into clinical rotation.

## Problem Statement

Anesthesia programs are designed to teach nurses how to safely and effectively deliver anesthesia to patients. The demands placed upon SRNAs can cause high levels of stress. The purpose of this study was to examine whether or not the use of simulation can successfully reduce self-reported stress levels among first year SRNAs.

## Purpose and Theoretical Background

The purpose of this study was to examine whether or not the use of simulation can successfully reduce self-reported stress levels among first year SRNAs. The framework that was utilized in this study was Patricia Benner's "Novice to Expert" theory.

Benner suggests nurses acquire their skills over time through their educational backgrounds and through other experiences (Benner, 1982). Dr. Benner used the Dreyfus model of skill acquisition as the foundation of her work. Rather than focus on what a nurse is, Dr. Benner's theory focuses on how nurses obtain their knowledge (Benner, 1982).

Benner explained that clinical proficiency is based on science and actual experiences and is a long progressive process. Dr. Benner's theory highlights five stages of clinical competency which are novice, advanced beginner, competent, proficient, and expert. Each of these stages attempts to describe the nurse as they transition from relaying on abstract concepts to tangible experiences (Benner, 1982). The researcher has chosen Dr. Benner's theory because the purpose of this study was to examine if

simulation training can reduce self-reported stress levels among first year SRNAs by providing students the opportunity to practice clinical skills in a controlled environment.

## Doctorate of Nursing Practice Essentials

The inclusion of the eight DNP essentials is fundamental to a doctoral capstone project. These eight essentials are foundational outcome competencies that all candidates seeking to complete a DNP program are required to meet. This study was developed with these essentials in mind.

### *Essential One: Scientific Underpinnings for Practice*

This project attempted to reduce the stress experienced by student registered nurse anesthetists (SRNAs) as they enter into the clinical portion of their anesthesia training. The researcher examined whether or not the use of simulation training could be effective at lowering self-reported stress scores.

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

Essential two focuses on quality improvement through the use of systems thinking. This project examined the current curriculum of a nurse anesthesia program (NAP). The findings from this study could then be used when examining potential ways to improve the quality of the program.

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

The third essential requires the researcher to examine and apply current evidenced-based research to an identified clinical problem. A review of literature was conducted to assess the most current studies examining the use of simulation training.

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

In order to address essential four, the researcher must be able to use utilize current technology. Healthcare is transitioning into the digital age, which will require nurses to be comfortable accessing and recording information in an electronic format. One way in which the researcher utilized technology in this study was during the review of literature. All of the articles used in the review of literature were accessed through electronic data bases. Also, the information gathered during this study was analyzed using electronic statistical software.

*Essential Five: Health Care Policy for Advocacy in Health Care*

Healthcare policy is addressed in essential five. Healthcare policies can have a tremendous impact on the type of healthcare an individual receives. Although policy might not be directly influenced, this study could impact future anesthesia programs' curriculum.

*Essential Six: Interprofessional Collaboration for Improving Patient and Population Health Outcomes*

Essential six focuses on collaboration among professionals. Healthcare professionals need to be able to work as a team in order to provide quality comprehensive care. The simulation training session provided the student an opportunity to work as a part of a team with their fellow classmates.

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

Overall health of the population is addressed in essential seven. Stress has a negative impact on health. This project attempted to lower the levels of stress experienced by students currently enrolled in an anesthesia program.

*Essential Eight: Advanced Nursing Practice*

Essential eight acknowledges the competencies that are foundational for all DNP practices (AACN, 2006). This project aimed to reduce the self-reported stress levels of SRNAs, in order to diminish the negative effects associated with high stress levels.

Chapter I discussed the background and significance, theoretical framework, and the purpose of the project. Also, the way in which the doctorate of nursing practice essentials was addressed in this project was discussed. In the next chapter, the review of literature will be presented.

# CHAPTER II – REVIEW OF LITERATURE

A comprehensive literature review was conducted to find relevant articles related to student registered nurse anesthetist simulation training modalities and the effects these modalities have on SRNA self-reported stress levels. Multiple electronic databases were used in this search including EBSCO, Medline, and Google Scholar. The inclusion criteria for this search required each article to be peer-reviewed, full text, English language, and can be no greater than seven years old. The keywords used in this search included *student registered nurse anesthetist, simulation training, stress, air-way management, and anesthesia clinical improvements*. Of the 40 articles discovered in this search, only the articles that examined the use of simulation to reduce stress were included. Five studies have been included. Studies that did not fit the inclusion criteria were excluded.

## Stress

Stress in the individual can be viewed as physiologic and behavioral changes caused by a stimuli (McKay, Buen, Bohan, & Maye, 2010). Stress can vary in intensity. Also, how an individual perceives and manages stress varies from person to person. While moderate levels of stress can be beneficial to learning, high levels of stress can have a negative impact on students' ability to acquire new information and perform clinically (McKay et al., 2010).

In a study conducted by Chipas et al. (2012), the stressors of the typical student registered nurse anesthetist (SRNA) were examined by identifying trends in the perception, manifestation, and coping mechanisms of stress. Building on Savtchouk and Liu's (2011) work that suggested acute stress may affect information processing, Chipas

et al. (2012) examine the many ways stress can affect a student's health, motor skills, learning ability, and productivity.

Chipas et al. (2012) developed a questionnaire focusing on stress and its effects. The survey instrument was then sent out inviting all SRNAs of the American Association of Nurse Anesthetists to participate. Included in the sample, there were 1,374 SRNAs members of the AANA. According to the Council on Accreditation, the sample size represented 25.6 percent of all students enrolled in anesthesia school at the time this study was conducted. The survey instrument was a self-assessment tool requesting information regarding demographics and associated experiences of stress. The survey tool also asked for suggestions on how the AANA wellness initiative could help decrease stress and promote wellness. A Cronbach analysis revealed the survey tool retained internal consistency.

A 10-point Likert scale was used to self-report levels of stress by each of the participants. The mean level of stress was then determined for gender, age, race, marital status, and program type (front loaded vs. integrated). The mean level of stress reported among the students was 7.2 (Chipas et al., 2012). Analysis showed a higher level of reported stress among females when compared to males, with mean stress levels equaling 7.6 and 7.1 respectively (Chipas et al., 2012). When comparing students by race, minority students showed a statistically significant higher level of perceived stress than white students. Age did not demonstrate a statistically significant effect on stress.

Two different types of programs were included in this study. The first type is known as front loaded, in which the majority of the didactic portion of the program is presented before the clinical portion begins. The second type is known as an integrated

program, in which students receive the classroom and clinical training concurrently. A comparison of the mean level of stress reported for these two separate groups was conducted. The results of the study demonstrated a statistically significant difference in self-reported stress between students in an integrated program when compared to students in a front loaded program, with mean stress scores totaling 7.9 and 7.1 respectively (Chipas et al., 2012).

Of the students participating in this study, 47.3 percent reported being depressed at some time while in school. Also, 56.6 percent had sought assistance and 22.5 percent were currently receiving medical treatment for stress and depression (Chipas et al., 2012). Furthermore, 21.2 percent of students reported having suicidal ideations at some point during their program. When the means of males and females were compared, there was not a statistically significant difference in those with suicidal ideation. Additionally, 6.3 percent reported personally knowing someone who committed suicide while in nurse anesthesia school (Chipas et al., 2012).

Lastly, students were asked for suggestions for the AANA wellness initiative that they thought would be beneficial in promoting health and wellness. Among the student suggestions was a request for peer support, an exercise program, stress management tips, and affordable insurance. This study showed that there are proactive measures students can take in order to better cope with the increased levels of stress associated with nurse anesthesia school. For example, students who exercised had lower self-report levels of stress than those who did not exercise frequently (Chipas et al., 2012).

The articles in this section are included to demonstrate that stress has a negative impact on both the learner and the learning process. Also, Chipas et al. (2012)

established that self-reported stress among student registered nurse anesthetists is higher than certified nurse anesthetists.

## Simulation

Traditionally, health care professionals have been educated using an apprenticeship model which allows students to work with actual patients in a clinical setting (Zigmont, Kappus, & Sudikoff, 2011). While this style of training does offer a supervised environment for students, the potential to inadvertently have a negative impact on the patient exists. One method that still provides hands on experience but removes the potential to harm an actual patient is simulation.

Within the context of nursing education, simulation can be defined as the use of techniques to represent nursing processes and actions (Schiavenato, 2009). Simulation can range from inexpensive low-fidelity techniques, such as using actors to role-play scenarios, to high-fidelity techniques which can include expensive computerized mannequins. Both types of simulation attempt to achieve the same goal of recreating actual clinical events in a controlled environment without putting patients at risk.

## Stress Reduction

Simulation has the potential to reduce stress levels experienced by SRNAs during their training. High stress levels have the potential to negatively impact an individual's ability to perform the clinical skills necessary to deliver safe anesthesia to patients. McKay et al. (2010) conducted a study to investigate the relationship between stress levels and performance level. During periods of increased stress, sympathetic stimulation causes the salivary glands in the human body to release a specific enzyme known as α-amylase (McKay et al., 2010). McKay et al. (2010) examined the level of a-amylase in

the saliva of participants during simulation training (McKay et al., 2010). The study included 18 students enrolled in the 2009 nurse anesthesia program at the Uniformed Services University. The 18 participants consisted of 15 men and 3 women. The study began by obtaining consent, demographic data, and baseline physiologic data from the participants. The physiologic data consisted of heart rate, blood pressure, and salivary α-amylase levels. Also, a pulse oximeter was placed on each participant's finger. Furthermore, the presence of sweat was recorded by directly observing the participant's forehead (McKay et al., 2010).

The investigation examined the participants as they performed a standard induction and intubation on a high-fidelity human patient simulator. The participants' performance was videotaped. After completion of the simulation, the each participant was taken to a room adjacent to the simulation lab. In this room, the same physiologic data was examined again. Then, the participants were given 20 minutes to relax and their physiologic data was collected for a third time (McKay et al., 2010).

Three certified registered nurse anesthetists with greater than seven years of experience then watched the videotapes and rated each performance using an objective checklist (McKay et al., 2010). The performances were then separated into three groups of six based on their performances (McKay et al., 2010). The top six scores comprised the high performer group, the middle six contained the moderate performer group, and the lowest six scores included the low performer group (McKay et al., 2010).

The results of the study showed that α-amylase levels, heart rate, and anxiety levels increased from base-line in all participants. Also, stress response varied among all levels of performance. While the results of the study showed an inverse relationship

between stress levels and performance as a possibility, a direct correlation could not be made (McKay et al., 2010).

## Preparation for High Risk Situations

Simulation can be can be used to better prepare health care providers for high risk situations they may face in the clinical setting. One of the major responsibilities of anesthesia providers is the management of their patient's airway. Effective airway management, especially during the induction phase, is necessary to prevent negative patient outcomes such as hypoxic injury or even death. Furthermore, comorbidities are likely to make the process of airway management even more difficult. Obesity, which affects about 30 percent of adults in the United States, is one example of a disease process that increases a patient's risk for hypoxic injury because it increases the chance of a difficult airway, decreases functional residual capacity, and increases metabolic demand (Lucisano & Talbot, 2012). These factors decrease the amount of time a person can tolerate hypoxia.

The need for anesthesia providers to be able to quickly secure even the most difficult airway requires clinicians to be highly trained and capable of handling any scenario. As previously stated, new practitioners have traditionally been trained using actual patients while under the direct supervision of a licensed anesthesia provider. Unfortunately, this apprentice style of training has the potential to put the patient at risk by receiving inferior care (Lucisano & Talbot, 2012). In an effort to provide the constant training needed to develop and maintain the skills needed to rapidly resolve a difficult airway, a simulating training protocol may offer a safe and effective alternative (Lucisano & Talbot, 2012).

## Use of Simulation in Advanced Airway Training

A systematic review conducted by Lucisano and Talbot (2012) attempted to evaluate current research regarding the use of simulation in advanced airway training. The researchers utilized four electronic databases: Cumulative Index to Nursing & Allied Health Literature, MEDLINE, PsycINFO, and Web of Science. The researchers developed inclusion criteria needed for an article to be utilized in the review. First, the study had to be an experimental or quasi-experimental design. Secondly, the study had to employ a simulated advanced airway management training process. Finally, the study had to include clearly stated study objectives with measured outcomes. Of the 87 articles found, 15 of them meet all three inclusion requirements.

The purpose of the review conducted by Lucisano and Talbot (2012) was defined in multiple ways. One area of interest was to analyze the different types of simulation. Also, the effectiveness of simulation on single and multiple airway task completion was evaluated. Likewise, the efficacy of simulation training over time was assessed. The researchers also examined the effects of human and non-human based simulation training. Finally, the methods used to evaluate performance deficiencies were investigated.

Multiple types of airway management were included in the studies utilized for this review. Specifically, the categories of airway management consisted of pre-hospital airway management, fiber optic intubations, assessment skills, and the management of difficult airways. The studies also reviewed the use of simulation in airway management in trauma patients as well as the use of a specific intubation laryngoscope.

The outcome measures of the review were multifaceted. One outcome measure compared airway management performance to a predetermined checklist. Another outcome measure examined the number of attempts and completion time of a specific task, while another outcome measured performance based on generally excepted guidelines. A qualitative study was also included that measured self-perceived value of the simulation experience.

The findings from this systematic review lead by Lucisano and Talbot (2012) suggest that simulation training may be an effective tool to teach airway management skills. Also, simulation can help anesthesia providers develop and improve techniques to handle difficult airway situations. The researchers highlight that the task being taught, the availability of the trainers, and time flexibility appear to be important factors in developing effective simulation training.

## Summary

All of the studies included in the review of literature attempt to demonstrate the effectiveness of simulation training on both improvement of clinical skills and a reduction in SRNA perceived anxiety. The following sections describe the methodology used in this study, as well as the sample and design. Also, the data collection and analyses techniques are explained.

# CHAPTER III - METHODOLOGY

## Population

The population of this study included all Student Registered Nurse Anesthetists currently enrolled in a doctoral level nurse anesthesia program in the United States. The sample of this study consisted of one class of first year SRNAs enrolled in a doctoral-level nurse anesthesia program (NAP) at a public university located in the southeast United States. The individuals in this study were a convenience sample and participation was completely voluntary. The NAP that was used for this study is an integrated program, in which the first year of the program consists of didactic education only. None of the participants had entered into their clinical rotation during the time of the study. Inclusion criteria for this study required the student to be enrolled in the NAP, and be a first year student not having entered into clinical rotation. Exclusion criteria were students enrolled in the NAP who were in their second or third year of the program and who had already entered into their clinical rotation.

## Methods

After receiving approval by The University of Southern Mississippi Institutional Review Board (IRB), the researcher examined if the use of simulation training could reduce self-reported stress levels among first year SRNAs. The researcher then explained the project and obtained written consent from all participants of the study. Also, the researcher explained there would be no compensation for participants of the study. Additionally, the researcher explained that students not participating in the study would not be penalized in any way. Once the study was explained, the researcher reviewed the consent forms, assured confidentiality, and answered any questions. Participants in the

study were instructed to leave their names off of any forms in order to maintain anonymity. Instead, participants were asked to create a five digit code that was used to match the pretest to the corresponding posttest.

In the first phase, a survey instrument was administered. The survey instrument was an exploratory tool used to ascertain and describe, demographic and personal information specific to each of the student registered nurse anesthetists that participated in the study. The survey instrument also consisted of 13 Likert-style questions, developed by Chipas (2012). Permission to use the survey tool was obtained from Chipas. Chipas' survey tool was used to assess the subjects' base-line self-reported stress level.

Once all participants were surveyed, the second phase of the study began by randomly assigning the participants into two separate groups. Randomization was achieved by entering the five digit code created by each participant into a random number generator. The first group, known as the simulation group, received a lecture and a power point hand out covering topics such as basic anesthesia machine check-off, mask ventilation technique, and airway maintenance. In addition, the students assigned to the simulation group received a simulation workshop. The simulation workshop consisted of an hour long training session that covered the same topics covered in the lecture and power point handouts. A two hour debriefing followed immediately after the simulation workshop. All of the information in the lecture, power points, and simulation workshop was supplemental teaching and separate from any teaching-learning opportunities that the students received from the faculty of the nurse anesthesia program.

The simulation workshop provided the students in the simulation group with the opportunity to not only listen to a lecture but to also work hands on with the equipment they will be using once the clinical aspect of the NAP begins. After all topics were covered, the students in the simulation group were allowed to ask any additional questions they had.

The students assigned to the second group, known as the non-simulation group, received the same lecture and a power point handout presented to the students in the simulation group. However, the difference between the two groups was that the students in the non-simulation group did not receive the hour long simulation workshop. The students assigned to the non-simulation group were not allowed to simulate any of the topics discussed and had to rely solely in the verbal lecture and power point handout.

Finally, both groups were given the posttest. The posttest was identical to the pretest, consisting of 13 Likert-style questions used to assess self-reported stress levels. The following day, once the posttest was completed by all participants, members of the non-simulation group received the same hour long simulation training and two hour long debriefing received by members of the simulation group.

Workshop effectiveness was evaluated using the pretest-posttest design. Posttest scores of the simulation group and the non-simulation group were compared to pretest levels of their respective groups. An independent t-test was used to determine if the changes in the self-report stress levels were statistically significant.

In Chapter III the population and methodology of the project was discussed. Also the pretest/posttest design used in this study was described. In the next chapter, the data from this study is analyzed and explained.

# CHAPTER IV ANALYSIS OF DATA

## Overview

The purpose of this project was to examine the effects of simulation training on self-reported stress levels among first year student registered nurse anesthetists. Of the 21 potential participants who meet the inclusion criteria for this study, 19 were included in the final data analysis. Two participants were excluded from the study because these participants did not complete both the pretest and the posttest.

The demographic information analyzed from the survey instrument consisted of three categories. These categories investigated the gender, age, and race of the participants. The survey was provided in English only since all participants were English-speaking. Also, the survey was not given in electronic form. Rather, the survey was given to the participants directly on paper.

The sample included 10 participants (simulation group) who received the simulation workshop and 9 participants (non-simulation) who served as the control group and did not receive the simulation workshop. Eleven of the participants (57.9%) were female and eight or 42.1% were male. Three participants (15.8%) were age less than 25, 12 (63.2%) were 25-29, 1 (5.3%) was 30-34, and 3 (15.8%) were 35-39. Fifteen participants (78.9%) classified their race as white (non-Hispanic), 2 (10.5%) classified themselves as Asian, 1 (5.3%) classified themselves as black or African-American, and 1 (5.3%) chose not to answer. (See Table 1).

Table 1

*Demographic Characteristics*

| Characteristics | Non-Simulation | | Simulation | |
|---|---|---|---|---|
| | n | % | n | % |
| Participants | 10 | 52.63 | 9 | 47.37 |
| Gender | | | | |
| Male | 3 | 15.79 | 5 | 26.31 |
| Female | 7 | 36.84 | 4 | 21.05 |
| I'd rather not answer | 0 | 0 | 0 | 0 |
| Age | | | | |
| <25 | 3 | 15.79 | 0 | 0 |
| 25-29 | 5 | 26.32 | 7 | 36.84 |
| 30-34 | 0 | 0 | 1 | 5.26 |
| 35-39 | 2 | 10.53 | 1 | 5.26 |
| Ethnicity | | | | |
| Asian | 2 | 10.53 | 0 | 0 |
| Black/African American | 0 | 0 | 1 | 5.26 |
| White | 8 | 42.11 | 7 | 36.84 |
| I'd rather not answer | 0 | 0 | 1 | 5.26 |

n=number

## Statistical Analysis

Participants were asked to rate their current daily stress level on a scale of 1 to 10. The scale started with 1 being low stress, 5 being average stress, and 10 being extreme stress. Participants were asked to rank, from 0 to 100, the percentage of their stress they attributed to school. Next, participants were asked to use the same 1 to 10 scale to rank their current stress level associated with three categories that relate to starting their clinical rotation. These categories consisted of the stress associated with starting their clinical rotation, performing an anesthesia machine check-off, and mask ventilating/maintain the airway of their patient. Lastly, participants were given five topics and asked to pick the one they perceived as being the most stressful aspect of starting their clinical training. The five categories included: (a) formulating an anesthetic

plan; (b) performing an anesthesia machine check-off; (c) mask ventilation; (d) intubating a patient; and (e) maintenance of anesthesia during a case.

The participants in the study had a self-reported mean value of 52.1 % daily stress. Furthermore, the participants reported that 74.21% of their total stress level was attributed to school. When asked about their current stress level associated with entering into the clinical aspect of their training, participants in the simulation group (n=9) stated a self-reported stress level with a mean value of 8.33±1.32 on the pretest compared to the non-simulation (n=10) group that stated a mean self-reported stress level of 8.8±1.69. Posttest scores demonstrate a self-reported stress level with a mean value of 5.6±2.1 among the simulation group (n=9) and 8.7±1.77 among the non-simulation group (n=10) ($t(17) = -3.49$, $p=0.002$), which represents a 27.2% and a 1% reduction of self-report stress respectively (See Figure 1).

When asked about their stress level associated with having to perform a machine check-off, the participants in the simulation group (n=9) stated a self-reported stress level with a mean value of 7.33±1.8 on the pretest while the non-simulation group (n=10) had a mean value of 7.1±3.93. Posttest scores reveal a self-reported stress level with a mean value of 6.44±1.51 among the simulation group (n=9) and a self-reported stress level with a mean value of 7.4±2.37 among the non-simulation group (n=10) ($t(17) = -1.04$, $p=0.31$), which represents an 8.9% reduction among the simulation group but a 3% increase within the non-simulation group (See Figure 2).

With regard to mask ventilation and airway maintenance, pretest scores among participants in the simulation group (n=9) stated a self-reported stress level with a mean value of 6.78±2.28 compared to 7.7±2.16 amid the non-simulation group (n=10).

Posttest scores demonstrate a self-reported stress level with a mean value of 6.11±1.62 among the simulation group (n=9) and a self-reported stress level with a mean value of 7.8±1.87 in the non-simulation group (n=10) ($t(17) = -2.09$, $p=0.05$). The posttest scores represent a 6.7% reduction in the mean self-reported stress levels within the simulation group compared to a 1% increase in self-reported stress levels among the non-simulation group (See Figure 3).

Lastly, participants in the study were given five topics and asked to select the one they felt would be the most stress aspect of starting their clinical training. Pretest scores show 7 participants (36.8%) selected formulating an anesthetic plan, 2 participants (10.5%) selected performing and anesthesia machine check-off, 1 participant (5.3%) selected mask-ventilation, 4 participants (21.1%) selected intubating a patient, and 5 participants (26.3%) selected maintenance of anesthesia during a case as the most stressful aspect of starting their clinical training. Comparatively, posttest scores show 5 participants (26.3%) selected formulating an anesthetic plan, 3 participants (15.8%) selected performing and anesthesia machine check-off, 2 participants (10.5%) selected mask-ventilation, 4 participants (21.1%) selected intubating a patient, and 5 participants (26.3%) selected maintenance of anesthesia during a case as the most stressful aspect of starting their clinical training.

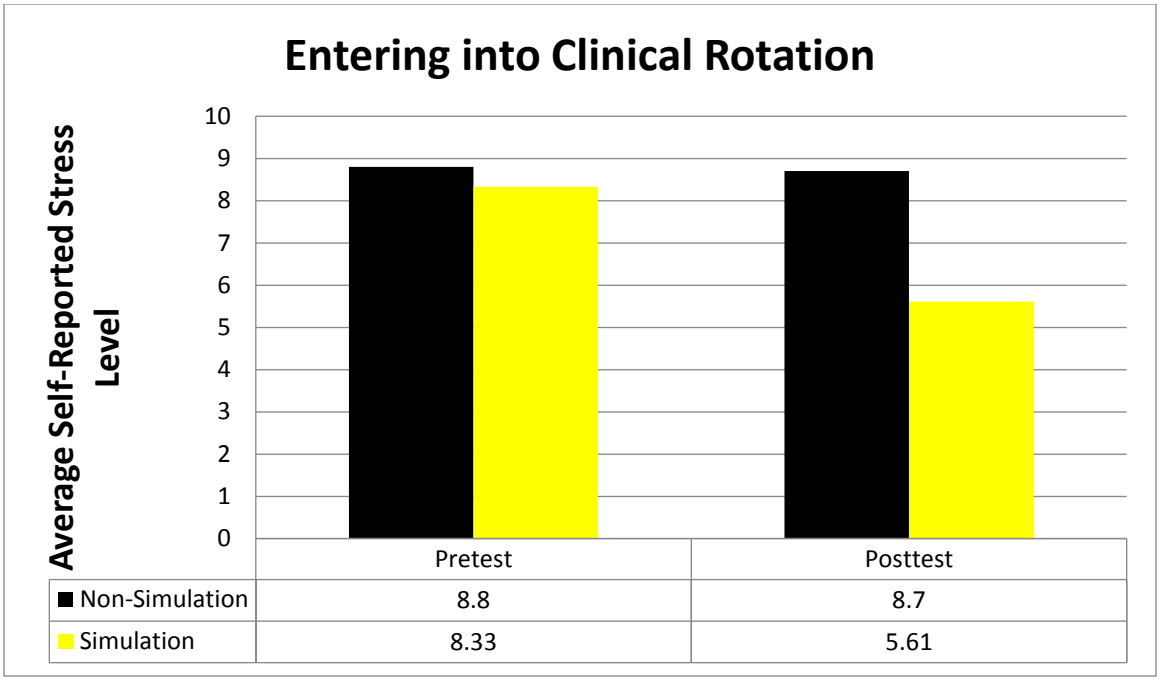


*Figure 1.* Self-report stress levels associated with entering in clinical rotation.

This figure illustrates the comparison of pretest/posttest self-reported stress levels between the two groups, non-simulation and simulation, participating in this study.

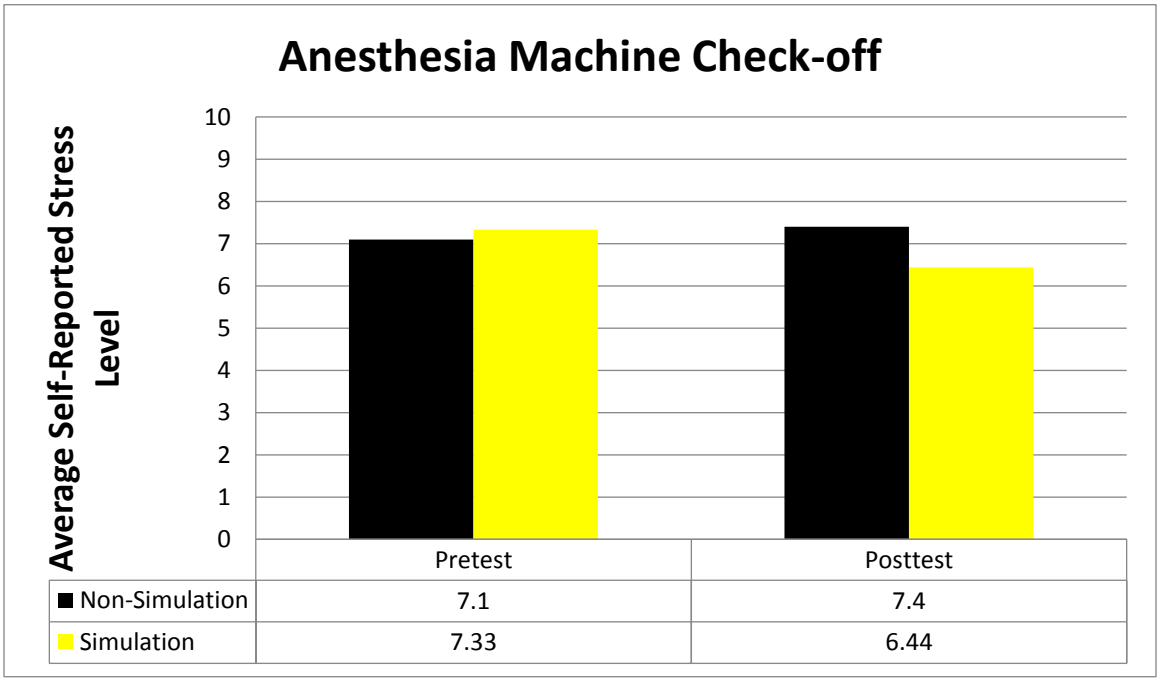


*Figure 2.* Self- reported stress levels associated with performing an anesthesia machine check-off.

This figure illustrates the comparison of pretest/posttest self-reported stress levels between the two groups, non-simulation and simulation, participating in this study.

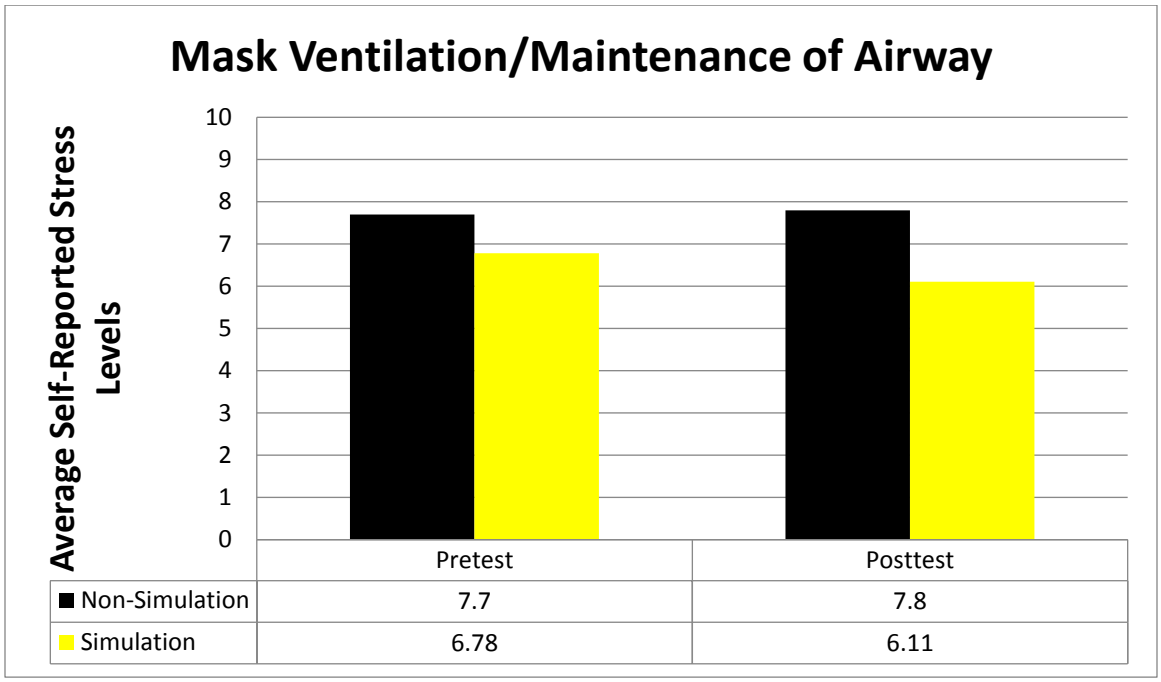


*Figure 3.* Self-reported stress scores associated with mask-ventilation/maintenance of airway.

This figure illustrates the comparison of pretest/posttest self-reported stress levels between the two groups, non-simulation and simulation, participating in this study.

Table 2

*Independent t-test for Equality of Posttest Means*

| | Simulation | Non-simulation | t-test | p-value |
|---|---|---|---|---|
| Participants (n) | 9 | 10 | | |
| Entering into clinical rotation | 5.6±2.1 | 8.7±1.77 | -3.49 | 0.002 |
| Anesthesia Machine Check-Off | 6.44±1.51 | 7.4±2.37 | -1.04 | 0.31 |
| Mask Ventilation/Airway Maintenance | 6.11±1.62 | 7.8±1.87 | -2.09 | 0.05 |

## Discussion

When posttest score were compared between the simulation and non-simulation groups a difference was noted. Posttest scores associated with self-reported stress levels of entering into clinical rotation, machine check-off, and mask ventilation/maintenance of airway decreased by a greater percentage all three categories among the simulation group (n=9) compared to the non-simulation group (n=10). An independent t-test was conducted for all three questions and showed the difference of posttest scores between the two groups to be statistically significant.

While overall posttest self-reported stress scores decreased in both the simulation group (n=9) and the non-simulation group (n=10), some individual scores increased. During the debriefing session, some students did comment that the simulation training made them realize how much was to be expected from them during their clinical rotation, which in turn increased their stress level. Also, some participants from both groups changed their answers as to what they perceived to be the most stress causing aspect of starting their clinical rotation. Since all test scores were kept confidential, individual scores cannot be matched to a specific participant.

In this sample, simulation lower overall self-reported stress levels on the posttest when compared to a lecture and power-point alone. Feedback from the participants was overall positive. The results of this study does support the hypothesis that simulation can reduce self-reported stress levels in the first year student registered nurse anesthetists.

## Barriers and Limitations

One limitation of this study is the small sample size of SRNAs. Also, the students in this sample only represented one anesthesia school. Results of this convenient sample

may not be generalizable to a larger population. The cost of the equipment could be a barrier for the implementation of simulation training. Also, the faculty of any institution planning to implement simulation training would need to have their staff adequately trained in the use of simulation. Another limitation of this study was the time available to complete the project. Participants only received one simulation session. Future research could utilize multiple simulation sessions spread out over a longer amount of time. Finally, paper surveys were used in this study rather than electronic surveys. Subsequent research could utilize electronic surveys in an effort to reach a larger sample size.

## Recommendations

Further studies should be conducted with larger sample sizes to see if the results can be replicated. While this study examined the use of simulation to reduce stress, future studies could examine the effects simulation has on other aspects of SRNA training. For example, future research could examine the use of simulation to improve clinical performance for SRNAs who have already started their clinical training. Also, future studies could examine the use of simulation to prepare for infrequent high risk cases. The researcher suggests new studies implement a pilot study first.

## Implications for Future Practice

The results of this study showed that simulation did reduce self-reported stress levels more than lecture and handouts alone in this small sample. However, the researcher do not suggest simulation training be viewed as a replacement for traditional methods of teaching. Rather, simulation training should be used to enhance traditional forms of teaching, such as lectures and handouts. Integrating simulation training into current anesthesia curriculums could aid SRNAs in developing the knowledge and skill

set needed to become a safe healthcare provider. Also, simulation could be used for competency evaluations for newly hired employees. Furthermore, future studies could examine the use of simulation to practice infrequent and high risk cases with all members of the operating room team. Finally, a cost analysis and return on investment study could be conducted on the use of simulation.

## Conclusion

The purpose of this study was to assess if simulation reduced self-reported stress levels among first year student registered nurse anesthetists. Chipas et al. (2012) demonstrated student nurse anesthetists have higher self-reported stress levels than certified registered nurse anesthetists. The outcome of this study was defined as a reduction in self-reported stress levels using the pretest/posttest design. In this convenient sample, simulation was more effective at reducing self-reported stress when compared to non-simulation training.

APPENDIX A – Literature Matrix

| AUTHOR | YEAR | DESIGN | SAMPLE | FINDINGS | NOTES |
|---|---|---|---|---|---|
| Chipas, A., McKenna, D. | 2011 | Quantitative Design | 7,537 SRNAs members of the AANA | This study examined the current stress levels and its physical manifestations in CRNAs and SRNAs. Coping mechanisms for dealing with stress were also explored in this study. | This study examined the CRNA and SRNA perceived stress. |
| Chipas, A., Cordrey, D., Floyd, D., Grubbs, L., Miller, S., & Tyre, B. | 2012 | Quantitative Design | 1,374 SRNAs members of the AANA | This study showed that there are proactive measures students can take in order to better cope with the increased levels of stress associated with nurse anesthesia school. For example, students who exercised had lower self-report levels of stress than those who did not exercise frequently | This study examined the amount of stress experienced by SRNAs and explored ways to improve student wellness. |

| | | | | | |
|---|---|---|---|---|---|
| Lucisano, K. E., & Talbot, L. A. | 2012 | Systematic Review | 15 articles that meet the inclusion criteria were included. | Simulation training may be an effective tool to teach airway management skills. Also, simulation can help anesthesia providers develop and improve techniques to handle difficult airway situations. The researchers highlight that the task being taught, the availability of the trainers, and time flexibility appear to be important factors in developing effective simulation training. | Thorough article that highlights the value in simulation training and the need for further research. |
| McKay, K. A., Buen, J. E., Bohan, K. J., & Maye, J. P. | 2010 | Quantitative Design | 18 SRNAs | During an induction and intubation sequence in a patient simulator, this study compared baseline, acute, and recovery measurements of stress with performance scores of | This study examined physiologic responses to stress. |

| | | | | | |
|---|---|---|---|---|---|
| | | | | students. This study found remarkable findings with regard to the relationship between stress and student performance | |
| Schiavenato, M. | 2009 | Literature Review | N/A | A definition and the broader concepts associated with simulation are examined in this paper. | The use of simulation in nursing. |
| Zigmont, J. J., Kappus, L. J., & Sudikoff, S. N. | 2011 | Literature Review | N/A | Examines the different ways in which simulation can be used to enhance learning in nursing. This paper also describes the different levels of fidelity in simulation. | The use of simulation to enhance learning |

APPENDIX B - Stress Survey Tool

SRNA STRESS SURVEY 2016

**1. Gender:**

- Male
- Female
- I'd rather not answer

**2. What is your age group?**

- < 25
- 25 - 29
- 30 - 34
- 35 - 39
- 40 - 44
- 45 - 49
- 50 - 54
- 55 - 59
- 60 - 64
- 65+
- I'd rather not answer

**3. Marital status:**

- Married/Partnership
- Married/Partnership (children or others at home)
- Divorced
- Divorced (children or others at home)
- Single
- Single (children or others at home)
- I'd rather not answer

**4. Race/Ethnicity**

- American Indian or Alaska Native
- Asian
- Black or African American
- Hispanic
- Native Hawaiian or other Pacific Islander
- White (Non-Hispanic)
- I'd rather not answer

**5. During the last year, have you had any of the following occur? Please mark all that apply.**

□ Salary/Benefits decreased
□ Bankruptcy/Financial crisis
□ Birth of a child
□ Caring for debilitated/chronically ill loved one
□ Change jobs
□ Death of a spouse/partner/child
□ Death of a family member/close friend
□ Demotion
□ Divorce
□ Marital/Partner reconciliation
□ Marital/Partner separation
□ Marriage/Legal union
□ Medical malpractice lawsuit
□ Military deployment – self
□ Military deployment – significant other/friend
□ Moved
□ Personal illness or injury
□ Pregnancy
□ Promotion
□ Quit a job
□ Regulatory audit (COA/JCAHO)
□ Retirement
□ Started school

**6. How would you rate your stress level on an average day?**

1 – Low stress
2
3
4
5 – Average stress
6
7
8
9
10 – Extreme stress

**7. How much of your stress is from school?**

100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0

**8. Stress can be manifested in many ways. Some are more obvious than others. Please mark the frequency that each condition or feeling occurred to you during the last year.**

Weekly . . . . . Occurs at least once every week

Monthly . . . . . Occurs at least once per month but not every week

Intermittent . . Occurs 3 or more times per year

N/A . . . . . Not at all

| | Weekly | Monthly | Intermittent | N/A |
|---|---|---|---|---|
| Agitation/Anxious/Irritable | | | | |
| Annoyed by trivial things | | | | |
| Avoid interactions with others | | | | |
| Cardiac irregularities/Arrhythmias/Chest pain/Palpitations | | | | |
| Confusion | | | | |
| Cravings/Compulsions | | | | |
| Decreased ability to concentrate | | | | |
| Decreased work accomplishments even though working hard | | | | |
| Digestion problems (include heart burn/ GERD) | | | | |
| Dizziness | | | | |
| Eating disorders/Over or under eating | | | | |
| Finger tapping/ Nail biting | | | | |
| Forget deadlines and appointments | | | | |
| Frequent back or neck spasms/pain | | | | |
| Frequent sick days | | | | |
| Frequently tardy | | | | |
| Headaches | | | | |
| Hives | | | | |
| Hypertension | | | | |
| Impatient with others | | | | |
| Impotence | | | | |
| Increased boredom at work | | | | |
| Infertility | | | | |
| Jaw pain | | | | |

| | | | | |
|---|---|---|---|---|
| Job performance sub-par | | | | |
| Loss of appetite | | | | |
| Low libido | | | | |
| Mood swings | | | | |
| Menstrual irregularities/ Amenorrhea | | | | |
| Mistakes at work | | | | |
| Nervousness/ Tremors | | | | |
| Nightmares/ Night sweats | | | | |
| Overuse of alcohol | | | | |
| Rapid breathing/ Shortness of breath | | | | |
| Sad, discouraged | | | | |
| Sleep disturbances/ Insomnia/ Over-sleeping | | | | |
| Smoke excessively | | | | |
| Teams I am involved with don't work well | | | | |
| Teeth grinding | | | | |
| Thoughts of death or suicide | | | | |
| Too busy for things I used to do | | | | |
| Use of illegal substances | | | | |
| Use of prescription drugs not prescribed for me | | | | |
| Other | | | | |
| If Other, please list: | | | | |

**9. These items deal with ways you've been coping with stresses in your life. Each item says something about a particular way of coping. We want to know to what extent you have been doing what the item says. How much or how frequently, not whether it seems to be working.**

**I've been:**

| | Very Frequently | Frequently | Occasionally | Rarely | Very Rarely | Never |
|---|---|---|---|---|---|---|
| Turning to work | | | | | | |
| Doing household projects | | | | | | |
| Doing things to make the situation better | | | | | | |
| Getting emotional support from others | | | | | | |
| Using alcohol or other drugs to make myself feel better | | | | | | |
| Giving up trying to deal with it | | | | | | |
| Refusing to believe these things happen | | | | | | |
| Saying things (gossip) to let my unpleasant feeling escape | | | | | | |
| Getting help or advice from healthcare | | | | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| professionals | | | | | | |
| Trying to see things in a more positive light | | | | | | |
| Criticizing myself | | | | | | |
| Giving up on coping | | | | | | |
| Making jokes about things | | | | | | |
| Doing things to think less, movies/TV | | | | | | |
| Going out with family/friends | | | | | | |
| Expressing my negative feelings | | | | | | |
| Trying to find comfort in my religion or spiritual beliefs | | | | | | |
| Meditating | | | | | | |
| Exercising | | | | | | |
| Listening to music | | | | | | |
| Playing with my favorite pet | | | | | | |
| Reading | | | | | | |
| Having sex | | | | | | |
| Sleeping | | | | | | |
| Other | | | | | | |
| If Other, please specify: | | | | | | |

**10. Next year you will start the clinical portion of your training as a student registered nurse anesthetist. How much stress does the anticipation of entering into the clinical phase of your training cause you?**

1 – Low stress
2
3
4
5 – Average stress
6
7
8
9
10 – Extreme stress

**11. Rate your current stress level associated with having to performing an anesthesia machine check-off in the clinical setting.**

1 – Low stress
2
3
4
5 – Average stress
6
7
8
9
10 – Extreme stress

**12. Rate your current stress level associated with having to mask ventilate and maintain the airway of a patient in the clinical setting.**

1 – Low stress
2
3
4
5 – Average stress
6
7
8
9
10 – Extreme stress

**13. Currently, what do you think will be the most stressful aspect of starting your clinical rotation? Please circle only one answer.**

- Formulation of your anesthetic plan of care
- Performing an anesthesia machine check-off
- Mask-ventilation
- Intubating the patient
- Maintenance of anesthesia during the case

APPENDIX C - Letter of Support

THE UNIVERSITY OF
SOUTHERN MISSISSIPPI

COLLEGE OF NURSING

118 College Drive #5095 | Hattiesburg, MS 39406-0001
Phone: 601.266.5445 | Fax: 601.266.5927 | nursing@usm.edu | www.usm.edu/nursing

July 10, 2016

Dear Dr. Hughes:

I have reviewed Jared Seymour's research plan for his DNP Capstone. I understand that he plans to survey nurse anesthesia students regarding their stress in relation to a simulation experience, and that she is requesting to conduct this study with the assistance of Dr. Michong Rayborn, a faculty in the Nurse Anesthesia Program. We are willing and capable of providing Mr. Seymour's the opportunity to conduct these simulation activities and data collection.

The College of Nursing supports Mr. Seymour's project. This project is sound and has merit. Please let me know if you need anything further as you move forward. Thank you for serving as her capstone chair. I look forward to learning of her results.

Sincerely,

Lachel Story

Lachel Story, PhD, RN
Interim Chair, Department of Advanced Practice
Assistant Dean for Research and Evaluation
PhD Program Director
Associate Professor
The University of Southern Mississippi
College of Nursing

## APPENDIX D - Simulation Outline

### Simulation Topics

I. Machine Check-Off

   a. Simulated and discussed proper daily check of anesthesia machine prior to use

II. Mask Ventilation Technique

   a. Simulated and discussed the proper technique to mask ventilate a patient

III. Airway Maintenance

   a. Simulated and discussed how to maintain a patient's airway during the perioperative period.

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