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Using of Simulation Best Practices for Building Knowledge and Confidence for General Anesthesia Induction

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The primary purpose of graduate nurse anesthesia programs is to develop and achieve nurses' complete professional competence to deliver individualized, safe, and effective anesthesia care. In preparing and developing Student Registered Nurse Anesthetists (SRNAs) to become Certified Registered Nurse Anesthetists (CRNAs), simulation-based learning has become a fundamental component to nursing education, bridging didactic learning into real-life clinical experience. Simulation practice amplifies realistic experiences through guided understandings that imitate an actual clinical setting (Lateef, 2010). By completing simulation-based learnings, SRNAs may incorporate the skills and lessons learned from the simulation experience and integrate skill competencies into their clinical setting (Brown, 2017). For SRNAs to be deemed competent to perform a skill, anesthesia checklists must be completed that demonstrate a students' knowledge and ability to perform a task (Lateef, 2010).

A skillset measured in SRNAs includes completing general anesthesia (GA) through an induction technique often referred to as GA induction (Council on Accreditation of Nurse Anesthesia Educational Programs (COA), 2019). This competency can be achieved by combining medications that place the patient in a “sleep-like” state during which they are unarousable (Freeman & Berger, 2014; King, 2018). Pharmacologic agents in achieving GA induction can be done through intravenous or inhalation agents or combination (King, 2018). Patients who undergo GA often cannot maintain independent ventilation and require assistance in maintaining a patent airway through the placement of an endotracheal tube (Freeman & Berger, 2014). The goals for GA induction are to rapidly and efficiently produce safe conditions while maintaining hemodynamic stability and ventilation (King, 2018). When performing GA inductions, CRNAs must balance anesthesia conditions such as amnesia, hypnosis, analgesia, akinesia, and attenuation of autonomic nervous system response (Freeman & Berger, 2014; King, 2018).

As stated by the American Association of Nurse Anesthetists (2019), CRNAs administer more than 49 million anesthetic agents to patients yearly. As SRNAs are expected to build on foundational skills, the importance of GA induction becomes increasingly invaluable. They are expected to utilize learnings from this technique to manage difficult airways. In approximately 1 of 5,000 to 10,000 GA inductions, a rare and high-risk event may occur as a "cannot ventilate, cannot intubate" scenario and require emergent surgical airway management (Scott-Herring et al., 2020). As simulation-based experiences are purposefully designed to prepare SRNAs for principal competencies, it is crucial that SRNAs thoroughly understand the importance of a GA induction technique that will later prepare them for these acute high-risk settings.

Creating a focused simulation design promotes an essential structure needed to support SRNA confidence and performance success on GA inductions. Additionally, the successful completion of simulation designs is consistent with graduate nurse anesthesia institutional outcomes and program goals (International Nursing Association for Clinical Simulation Learning (INACSL) Standards Committee, 2016). At Marian University, the current state in which SRNAs are expected to complete GA induction competency does not fully meet or follow the necessary standards set forth by the INACSL board. Identifying this weakness on how GA induction competencies are conducted, the purpose of this project is to examine if providing SRNAs a standardized simulation training video with detailed instructions affects their knowledge and confidence of anesthesia induction technique, compared to current simulation practice.

Background

In the late 1920s, the first successful use of simulation began with aviation with the link trainer's development (Aebersold, 2016). This first flight simulator consisted of a small wooden airplane on a universal joint that simulated the motion of flying (Aebersold, 2016). In nursing, Martha Jenkins Chase built the first mannequin in 1911 to teach nurses how to dress, turn, and transfer patients (Aebersold, 2016). It was not until the 1960s when the Sierra Engineering Company developed its first high-fidelity simulator known as Sim One (Aebersold, 2016). Sim One was used to train anesthesia providers in completing endotracheal intubations and GA inductions (Lateef, 2010). In 1986, further modifications were made to develop the comprehensive anesthesia simulation environment by modifying a commercially available mannequin (Aebersold, 2016). Additional comprehensive anesthesia simulation environments were formed in the early 1990s to incorporate MedSim and Medical Education Technologies Inc. (Aebersold, 2016; Lateef, 2010). In 2000, Laerdal released a high-fidelity mannequin named SimMan that had many previous design features but at a lower purchase cost (Torsher, 2018). Today, simulation-based training has evolved to produce highly sophisticated mannequins that meet the objective learnings required by many national board and certification programs.

As many medical specialty board programs see the importance of moving away from content-based education, numerous competency-based teaching programs have been initiated, as seen through simulation learning (Torsher, 2018). Since 2002, simulated-based assessment has been a component of the Israeli Anesthesia board certification due to its ability to measure distinctive strengths and weaknesses in the simulation exercises that could not be assessed in the written or oral examinations (Torsher, 2018). For CRNA programs, the governing body of nurse anesthesia program authorization is known as COA. It is a nationally recognized accrediting agency for nurse anesthesia programs that award doctoral-level degrees in the United States. Its mission is to grant public recognition to nursing anesthesia programs that meet nationally established academic quality (COA, 2020). Curriculum standards set forth by the COA require simulated clinical experiences to be incorporated into the program (COA, 2019).

The importance of simulation-based education on SRNAs is to support them in preparing for completing the required clinical curriculum set by the COA. The clinical curriculum then provides SRNAs with real-life experiences that promote their development to become CRNAs. To successfully meet graduation requirements, the COA requires SRNAs to complete a minimum of 400 general anesthetics (COA, 2019). This requirement may not be satisfied by the use of simulated mannequins (COA, 2019). INACSL's standards demonstrate a commitment to improving patient care and best practices of healthcare education (INACSL, 2018). The importance of implementing INACSLs best practice for simulation helps SRNAs prepare to complete clinical curriculum requirements (INACSL Standards Committee, 2016). Therefore, incorporating INACSLs standards for best practice for simulation should be implemented to support SRNAs in completing GA induction competencies.

At Marian University, current simulation practice evaluates SRNA's skill aptitudes to complete a GA induction using simulated intravenous drugs with or without inhalation agents before endotracheal tube placement through skill checkoffs. The explanation for completing a GA induction is discussed during anesthesia didactic with additional student resources under the interrelated simulation course. Specific resources available to SRNAs include anesthesia textbooks, YouTube videos on GA induction, lectured course information, and controlled simulation time. SRNAs are expected to prepare for GA induction competency with provided resources before attending skill checkoffs. Current SRNA checkoffs for GA are measured through a skill checklist created by Marian University faculty. Overlooked best practices from this simulation include a simulation prebriefing, a GA induction checklist that encompasses alternative medications, and a detailed video instruction on GA induction (Roh et al., 2018; Wiggins et al., 2018).

Negative consequences for not having a more structured approach to simulation can lead to misrepresentation of information, further confusion on basic requirements, and inadvertent omission of information (INACSL, 2016). The inability to implement INACSL best practices may result in SRNA participants' failure to meet expected outcomes of simulation-based experiences that support COA clinical curriculum requirements (INACSL Standards Committee, 2016). Current simulation challenges include heightened anxiety from SRNA inexperience, uncoordinated simulation time, and unclear explanation of anesthesia-assisted tasks. Further potential consequences for not following INACSL standards may lead to further ambiguity, unintended outcomes, and skewed assessment and evaluation results (INACSL Standards Committee, 2016).

By implementing a structured simulation strategy, future challenges introduced into this refined environment may minimize simulation variability and improve simulation reliability (Yauger et al., 2020). The approach to generating a consistent simulation design for GA induction aims to achieve an objective and dependable experience for each SRNA to perform GA skill competence that supports clinical requirements. Furthermore, standardized simulation practices promote effective learning methodologies that improve cognitive knowledge outcomes, enhanced clinical performance, and student self-confidence (Eyikara & Baykara, 2017).

Problem Statement

The COA supports the importance of sufficiently preparing SRNAs to complete GA inductions as it influences the completion of clinical experiences required to become a CRNA (COA, 2019). The inability to intubate or mask ventilate is one of the most feared complications, anesthesia respiratory events account for 27% of closed claims reports due to difficult intubations (Steadman et al., 2017). In a 2007 to 2014 review of ambulatory surgery center claims, injuries most common to anesthesia include endotracheal intubations at 29% (Ranum et al., 2017). The Operating Room noted that 67% of difficult intubations occur during GA induction (Steadman et al., 2017). This percentage includes individuals assessed to have a normal airway, and for this reason, it is unrealistic to expect SRNAs to succeed in first attempt intubations (Steadman et al., 2017). It is important to note that persistent attempts to complete endotracheal intubations commonly result in airway losses with brain damage or even death (Steadman et al., 2017). A sufficient understanding of this technique is undoubtedly critical beyond an academic setting as it directly impacts patients' health during the perioperative period and high-risk scenarios. Optimization of simulation practices for GA induction is crucial for SRNA academic success and preventing complications and improving patient outcomes.

Organizational "Gap" Analysis of Project Site

The current state in which SRNAs are expected to complete GA induction competency does not fully encompass the use of INACSL's best practice for simulation. SRNAs are expected to prepare for simulation through self-guided readings and class resources provided by Marian faculty. Additionally, students can practice GA induction during open simulation laboratory times provided by Marian faculty. SRNAs are not prebriefed on GA induction checkoffs before completing this competency. SRNAs are evaluated on the succession of GA induction through direct observation by Marian faculty either through the adjacent observation room or in the simulation laboratory. Successful completion of simulation experience is dependent on the successful demonstration of GA induction competency and understanding of its clinical application.

Gaps identified in the current simulation design include systematic simulation standardization, prebriefing practices, and purposeful preparatory GA induction activities. As a result, this has led to suboptimal utilization of simulation resources and ineffective assessment of participants to achieve outlined objectives. Furthermore, due to the lack of a structured simulation design, SRNAs are disadvantaged from having an optimized simulation-based experience that supports their confidence and knowledge for completing GA induction simulation. A revised simulation design was created at Marian University using INACSL standards of best practice for simulation utilizing the National League for Nursing (NLN) Jeffries framework as the theoretical outline.

Review of the Literature

Search Methodology

Databases to conduct this literature search included MEDLINE, CINAHL Plus, and ERIC. Additional scholarly articles were explored using Google Scholar. Several Boolean searches were completed using the following phrases: simulation AND CRNA; reliability AND healthcare simulation; reliability AND simulation best practice; competency confidence AND nursing simulation; simulation AND prebriefing. From this search, 161 records were identified for potential relevancy and applicability to this project. Specific exclusion criteria applied to these records included the lack of an abstract, irrelevancy to the research question, and inconclusive data to its research findings. As a result, 103 articles were excluded from the initial screening. The remaining 58 articles were closely reviewed for relevancy to the research question.

Inclusion criteria consisted of articles in the English language, peer-reviewed, content related to the research question, and articles published within the last five years (2015-2020). Although the literature search yielded significant results about anesthesia and simulation, no such articles specifically discussed GA induction with simulation practices for SRNAs. Encouraged by the currently available literature on simulation benefits, a holistic search strategy was completed in finding articles to support INACSL's best practices. Selected articles were reviewed based on relevancy in prebriefing practices within a nursing simulation, improved self-confidence and nursing simulation competency, and reliability in standardized simulations. The level of evidence ranged from level I to VII, with no discriminatory selection to the required level of evidence. Based on inclusion criteria, 18 articles were selected for a full review, and upon closer review, 13 articles were retained within Literature Review (Appendix A).

Prebriefing Practices within Nursing Simulation

According to the standards of best practices by INACSL, prebriefing is described as an informational or orientation period conducted before the start of a simulation experience (INACSL Standards Committee, 2016). Minimally, prebriefing should include the following practices: Providing students background information regarding the simulation; specify detailed instructions and expectations about the simulation-based experience; allotting sufficient time for participants to prepare for simulation; and giving an orientation to the simulation environment (INACSL Standards Committee, 2016). Prebriefing practices should consider the participant's level of knowledge, specific learning needs, and previous experiences (Page-Cutrara, 2015).

The intent of integrating prebriefing into practice is to provide a safe learning environment and support participants in completing simulation goal competencies (Kim et al., 2017; INACSL Standards Committee, 2016). Simulations structured around prebriefing offer critical support in nursing performances and allows students the opportunity to find deeper meaning in their simulation experiences (Page-Cutrara, 2015). Prebriefing activities that incorporate the described elements could encourage reflection-before-action that further support the post-simulation process (Page-Cutrara, 2015; McDermott, 2017).

For new learners who do not have the experience or skills to perform a required competency, imbedding prebriefing into simulation experience supports the participant's metacognition (Page-Cutrara, 2015; Page-Cutrara & Turk, 2017; Chamberlin, 2017). Kim et al. (2017) reports that nursing students who receive prebriefing interventions demonstrate high practice flow and participant satisfaction scores. In another study that examined 76 baccalaureate nursing students, structured prebriefing effects on a student's decision-making, skill performance, and overall awareness demonstrated statistical significance ($p < 0.001$) in all categories (Page-Cutrara & Turk, 2017).

In reviewing a modified electronic Delphi method study design, a board of 59 Certified Simulation Educators reached an understanding (100%) that prebriefing was a crucial component for competency realization (McDermott, 2017). Similar findings were identified in a study of 281 undergraduate nursing students, yielding a higher team psychological safety and skill performance when provided prebriefing preparatory material (Roh et al., 2018). It is imperative that simulation-based learning encompass prebriefing practices to support learners in obtaining successful competency outcomes. Providing prior knowledge and familiarity before a simulation experience decreases nursing student’s anxiety and allows for full simulation participation (Sharoff, 2015).

Improved Confidence and Competency with Prebriefing

The DNP student completed a comprehensive review to identify commonalities among confidence, skill competency, and prebriefing practices. The DNP student did this to evaluate the simulation participant's perceptions and confidence to perform measured skills. According to Sharoff (2015), prebriefing practice enhanced 81 undergraduate nursing students' clinical judgment and overall confidence. Major themes from this mix-methods study included improvements in the participants' critical thinking ability and aptitude to complete simulated problem-solving (Sharoff, 2015).

It is necessary to provide simulation participants with the supplies, space, and time to prepare for simulation-based experiences. In a quasi-experimental study, 207 junior and senior undergraduate nursing students exposed to prebriefing activities demonstrated an increased self-confidence and clinical competency (Kim et al., 2017). Comparably, a study that included prebriefing practices reviewed 63 undergraduate nursing student’s ability to recognize and respond to deteriorating patients exhibited meaningful improvement in clinical confidence and competency (Goldsworthy et al., 2019).

In efforts to promote simulation standardization, Wiggins et al. (2018) describe the use of pre-course didactic content used to assess 49 CRNAs knowledge, skill, and attitude in regional anesthesia administration. Outcomes from this simulation demonstrated substantial increases in CRNA knowledge and confidence (Wiggins et al., 2018). Additionally, a quasi-experimental design study compared outcomes among 119 undergraduate nursing students and identified higher perceptions of overall knowledge, self-confidence, and simulation efficacy with the use of prebriefing (Chamberlin, 2017). From these articles, it can be assumed that prebriefing activities will improve participants' education and simulation experience (Chamberlin, 2017; Kim et al., 2017; Sharoff, 2015; Wiggins et al., 2018).

Reliability and Simulation Efficiencies through Standardization

Reliability is the ability to consistently replicate a simulation in which participants are exposed to the same environmental conditions (Yauger et al., 2020). In a systematic review of both quantitative and qualitative studies, Yauger et al. (2020) reviewed 50 articles and evaluated the impact of creating a simulation with a consistent simulation design. Article findings suggest that having a consistent simulation design will eliminate setting errors that will negatively impact a learner’s competency and improve efficiency in the participant learnings through simulation standardization (Yauger et al., 2018). Implementing prebriefing in a standardized manner supports simulation outcomes that will enhance learner satisfaction, participation, and effectiveness of the simulation experience (Chamberlin, 2015).

Due to its adaptability and organized approach to developing learning objectives, Staun et al. (2020) utilized the Objective Structured Clinical Experience as a tool to develop three simulation stations for 23 SRNAs in the preparation of their cardiac rotation. Due to the consistent simulation design, SRNAs were able to cycle through each workstation multiple times that supported productive learning, skill competency, and overall self-confidence (Staun et al., 2020). According to Aebersold et al. (2018), 50 reviewers agreed that simulation standardization was of particular importance in prebriefing in meeting simulation objectives and measurable outcomes. The use of thoughtful simulation design from these articles demonstrates the ability to promote skill acquisition that is reliable and efficacious to new learning.

Theoretical Framework

The theoretical framework used to support this DNP project is the NLN Jeffries framework (Appendix B). This framework was developed to define simulation education variables and is used as an organizational guide to include six core elements– context, background, design, educational practices, simulation experience, and outcomes (Cowperthwait, 2020). The dissemination of this model was first done in 2005 and has undergone several iterations between 2005-2012 (Cowperthwait, 2020). The NLN Jeffries framework provides the necessary structure for developing a simulation design (Bottone-Post, 2016; Cowperthwait, 2020). The NLN Jeffries framework acknowledges interactions between the participants and facilitators of the simulation by establishing a trusting relationship (Cowperthwait, 2020). It supports simulation activities such as prebriefing, authenticating the simulation experience, simulation progression, and engagement (Cowperthwait, 2020; Jeffries et al., 2015). Concepts of particular interest to the research are elements that make up the simulation design include approaches to prebriefing/debriefing, conceptual fidelity, student role assignments, learning objectives, and simulation flow (Cowperthwait, 2020; Jeffries et al., 2015).

This framework's utilization allowed the DNP student to use the core elements of this framework as a guide to develop and evaluate a sophisticated simulation design (Jeffries et al., 2015). Specifically, the NLN Jeffries framework assisted in designing a simulation that incorporates INACSL's best practices to evaluate SRNA competency in GA induction (Cowperthwait, 2020). This framework is appropriate because it encompasses student preparation practices and facilitator simulation preplanning to define learning objectives that support SRNA knowledge and self-confidence (Cowperthwait, 2020; INACSL Standards Committee, 2016). Additionally, this framework allowed the DNP student to become more aware of participant variables that could negatively impact current or future simulations. The

DNP student had the opportunity to identify simulation themes, understand learning gaps, and measure participant outcomes highlighted in the NLN Jeffries framework (Cowperthwait, 2020).

Goals, Objectives, and Expected Outcomes

This project had two specific aims: 1.) Improve SRNA knowledge on GA induction and 2.) Improve SRNA self-confidence when completing GA induction competency. This project aimed to assist SRNAs who are exposed to prebriefing practices to have more knowledge and self-confidence on GA inductions for anesthesia practices. Expected outcomes for this project assumed that SRNAs who are provided prebriefing material will have enhanced knowledge and self-confidence when performing GA inductions with minimal to no errors. An effective simulation design used the NLN Jeffries framework and INACSL best practices to facilitate consistent outcomes that improved overall SRNA understandings and certainty when completing GA induction.

According to the INACSL Standards Committee (2016), simulation-based experiences should begin with prebriefing. Under the NLN Jeffries framework's guidance, the desired state for simulation-based experiences includes creating an environment of integrity, trust, and respect (INACSL Standards Committee, 2016). The integration of these concepts supports INACSL standards of practice and creates a learning environment that is psychologically safe and conducive to SRNA learning (INACSL Standards Committee, 2016; Cowperthwait, 2020). The core elements outlined in the NLN Jeffries framework were appropriate in creating a new simulation-based experience at Marian University. It includes strategies for prebriefing and preparatory material that highlights essential concepts seen through INACSL standards of best practice (Cowperthwait, 2020).

Project Setting

Marian University is located in the metropolitan area of Indianapolis, Indiana. During the time this project was executed, Marian University had three concurrent classes enrolled in the nurse anesthesia program. Upon admission, SRNAs are expected to progress as a unit with class sizes ranging from 22 to 24 students. The simulation laboratory is available to all students who wish to practice anesthesia skills during specific open hours. Open simulation times are currently managed by Marian faculty. There is not a set requirement for SRNAs to attend simulation laboratory except for completing skill checkoffs. Attending the simulation laboratory is highly encouraged during open hours. The number of simulations completed in Marian's anesthesia program is variable and dependent on each course instructor. Specific anesthesia simulations are created based on skills required to be completed in the real-life clinical setting.

The simulation room itself uses a Computer-Aided Engineering (CAE) Human Patient Simulator (HPS) to complete GA induction checkoffs. The simulation facilitator can control the HPS through a computer station adjacent to the central simulation laboratory (simulation observation room). This HPS is specifically designed to support anesthesia practices and interface with the patient monitors, ventilator, and students in the simulation laboratory (Computer-Aided Engineering (CAE) Human Patient Simulator (HPS), 2018). Additional equipment found in this laboratory includes the anesthesia machine (Drager Apollo) and simulated inhalation agents used for GA induction. Specific anesthesia equipment unique to GA induction includes the use of an endotracheal tube, laryngoscope, simulated induction syringes, monitoring equipment, face mask, medical tape, and intravenous fluids. Students are given all the necessary supplies to complete GA induction competency, except that SRNAs are expected to bring their stethoscopes.

Project Sample

A total of 24 SRNAs in their third semester were included in this project. This convenience sample group's inclusion criteria required current enrollment in the first Anesthesia Principles didactic with the associated simulation course. Exclusion criteria included participants who did not meet this requirement. Students who failed to comply with the verbal agreement for completing necessary prebriefing simulation activities were not included in this project but still completed the simulation per course expectations.

Project Design

A new simulation design was developed using INACSL's prebriefing practices and NLN Jefferies framework with preparatory material developed by the DNP student. This project used a quality improvement with a quantitative evaluation approach to assess and evaluate SRNA knowledge barriers and self-confidence for GA induction. Preexisting quantitative tools were modified and used as part of data collection procedures.

Methods

This project was facilitated by the DNP student with oversight from one CRNA faculty member. This project was evaluated by randomizing SRNAs into two groups: The experimental group (n=12) and the control group (n=12). The experimental group was expected to review a detailed competency checklist and complete an instructional video on GA induction before attending the simulation. This group was given a brief orientation to the simulation environment with the DNP student outlining the competency objectives, knowledge expectations, and simulation limitations. The DNP student confirmed that the experimental group completed all preparatory activities before starting the simulation. The control group was given the current simulation design that may have encompassed aspects described in the experimental group.

Before starting the simulation, a verbal attestation that the experimental group has completed all prebriefing activities was required. SRNAs who had not fulfilled this activity were asked to complete missed prebriefing material before starting the simulation. SRNAs who failed or declined to follow these instructions were excluded from this project but still completed the simulation per course expectations. The intent of confirming that the experimental group had completed the assigned prebriefing material strengthened the validity and actions represented by the participants who completed the preparatory material.

SRNAs who were a part of the control group were provided the same preparatory material as the experimental group after data collection was completed. Student participation and results for this quality improvement project were not affected by the pass or failure of this anesthesia course. The simulation experience for each SRNA was completed with one participant completing the GA induction competency at a time. 24 SRNAs signed up for 30-minute time slots to complete GA induction checkoffs. No student was permitted to observe another when completing the simulation to prevent bias. As part of the verbal attestation for student academic honesty, students were reminded to not share information with others about the simulation-based experience.

Measurement Instruments

Modified Student Satisfaction and Self-Confidence in Learning Survey

The SSSL survey is a 13-item instrument designed by the NLN that measures student satisfaction and self-confidence in instructions with simulation (Zapko et al., 2018). Within the instrument itself, it contains two subscales that measure satisfaction with the current learning (5 items) and self-confidence in learning (8-items) (Unver et al., 2017). Responses are rated using a five-point Likert scale that ranges from 1 (strongly disagree) to 5 (strongly agree) (Unver et al., 2017). Supported by Cronbach's alpha measurement of reliability, this tool received a value of 0.94 for satisfaction and 0.87 for self-confidence (Bottone-Post, 2016; National League of Nursing, 2005; Unver et al., 2017). Higher results scored from this survey indicate higher satisfaction and self-confidence (Unver et al., 2017). For this project, the SSSL survey was modified to measure student self-confidence variables specific to SRNA and GA induction competency. Quantitative data was obtained through the pretest/posttest NLN survey (Appendix C).

Simulation Posttest Knowledge Assessment

SRNA learning is an essential outcome as it assesses changes in student knowledge, skills, and attitudes of a simulation (Jeffries et al., 2015). To measure SRNA knowledge on GA induction, a posttest questionnaire was used to assess knowledge of this competency. This knowledge assessment tool consists of five questions that focus solely on the GA induction technique and interventional concepts. This five-question knowledge assessment tool was generated by the DNP student using the GA induction checklist as a framework to develop this assessment tool. The questionnaire was designed to measure SRNA knowledge of how to perform GA induction safely in a clinical setting. The generated test questions underwent face and content validity assessment through the feedback and recommendations of two GA induction experts. Quantitative data was gathered through posttest knowledge assessment results (Appendix D).

GA Induction Checklist and Duration

The GA induction checklist (Appendix E), provided by Marian University faculty, was used for this project as a rubric to test SRNA's succession of this competency. Additionally, this checklist captured the number of errors or omissions by SRNAs during the simulated experience. The DNP student also compared durations among the experimental and control groups to complete the GA induction checklist. The duration in which the DNP student evaluated the time for the SRNA to complete the GA induction competency was recorded when Marian faculty confirmed the SRNA's readiness to begin and end their evaluation. Quantitative data was monitored by the DNP student through observed errors and omissions from the GA induction checklist. Additionally, the duration for each SRNA to complete skill competency was recorded.

Data Collection Procedures

Simulation Experience and Facilitation

Before starting the simulation, both the experimental and control groups were asked to complete the same pretest SSSL survey. The pretest survey was provided to SRNAs by the DNP student through email using Qualtrics and reviewed for completion. Once completed, the DNP student continued with the GA induction simulation. During the simulation experience, SRNAs were evaluated by the DNP student and Marian faculty using the same rubric for GA induction for both the experimental and control groups. Specifically, the DNP student and Marian faculty assessed the number of errors or omissions using the GA induction checklist. Any deviations from this competency checklist were tallied and compared against these two groups. For the experimental group, the DNP student and Marian faculty did not intervene or correct any departures from the GA induction checklist until the simulation was over. For the control group, Marian faculty was able to complete GA induction competency checkoffs as part of routine evaluation.

The overall time to complete GA induction competency was recorded and compared against these two groups using an apple iPhone stopwatch. Marian faculty verbally announced the start and stop time through the participant's readiness to complete this simulation. After the SRNA completed the GA induction simulation, the same posttest SSSL survey and posttest knowledge assessment were provided to each SRNA via email link through Qualtrics. The DNP student reviewed the posttest SSSL survey and posttest knowledge assessment responses through Qualtrics. From there, the DNP student confirmed all surveys and posttest knowledge assessments were completed by each SRNA before leaving the simulation.

Ethical Considerations/Protection of Human Subjects

The Marian Internal Review Board (IRB) deemed this project as exempt before initiating the DNP project. The IRB approval process ensures that participants are provided with sufficient information and complete comprehension of this project before participating. SRNA participation was entirely voluntary and without any foreseeable risks. There were no financial gains or incentives for participating in this simulation experience. Participants were able to withdrawal from this DNP project at any point participants deemed necessary. As part of this DNP project, the privacy of student educational records was guided through the Family Educational Rights and Privacy Act (FERPA) by the DNP student (Gilliard, 2020). Additionally, the DNP student utilized the principles founded in the *Standards of Care* when conducting this project at Marian University (HG.org Legal Resources, n.d.).

Data Analysis

The purpose of this quality improvement project was to determine if prebriefing practices improved SRNA self-confidence and knowledge for GA induction competency. All surveys were completed electronically using Qualtrics and inputted into the International Business Machines

(IBM) Statistical Package for the Social Sciences (SPSS) software (Version 28). For all categorical and numerical data, the DNP student placed this data into tables for all SSSL survey responses and reported posttest knowledge assessment results for both groups. For data that was a continuous level of measurement, additional descriptive statistics were calculated included measures of frequency, measures of central tendency, and measures of variability.

In evaluating student self-confidence in completing GA induction, individual responses were summed and evaluated for both the pretest and posttest surveys. Frequencies and percentages were reported for these 13-question surveys as they are considered categorical variables. The statistical test used to compare two related samples and assess if population ranks differed was completed using the Wilcoxon Signed Rank test (Heavy, 2015). In determining the statistical difference in the SSSL survey responses for the control and experimental group, an independent t-test was used.

For the posttest knowledge assessment, the final score of this 5-item questionnaire yielded continuous variables as it was converted to a percentage before completing the independent t-test. The purpose of this test is to determine if there was a statistical difference between the two groups (Heavy, 2015). Additionally, the time to complete GA induction competency followed the same statistical procedures and was completed using the independent t-test to assess this continuous variable. In evaluating the number of omissions or errors, the Chi-square test was be used to compare differences for the experimental and control groups.

Results

Prior Student Knowledge on General Anesthesia Induction

SRNAs who participated in this DNP project did not have prior experience in the clinical setting and were limited to only the simulation laboratory. All SRNAs did have prior exposure to the simulation room and were familiar with interacting with the CAE HPS. All simulation participants had less than one year of nurse anesthesia didactic completed during the execution of this project. None of the SRNA participants reported having completed a GA induction on an actual patient.

Student Demographics

Of the 24 participants, there were a total of 16 females (67.00%) and 8 males (33.00%) who completed the GA induction competency. The primary age range of this group was reported to be approximately 26-30 years of age (58.33%). Additionally, the average years of nursing experience were reported to be between 3-6 years (45.83%) for simulation participants.

Student Participation in the Simulation

In this DNP project, 24 (100%) participated in this quality improvement project including the completion of the SSSL pretest survey, post-knowledge test, and SSSL posttest survey. In asking the experimental group for the completion of all prebriefing activities 11 (92%) students stated completion of all prebriefing activities. One student stated they did not watch the instructional video provided by the DNP student but watched previous videos on how to complete GA induction provided by the course instructor. For this reason, this student was not excluded as part of this project. All SRNA participants completed the GA induction checkoffs under the specific requirements outlined in Appendix E and were evaluated by only the course instructor and not the DNP student.

Student Self-Confidence

Pretest to Posttest Results within the Groups

In reviewing the pretest SSSL frequencies within the control group, pretest results showed higher selections for *undecided* and *agree* for the pretest (selection frequency 75.00%) and higher scores for *agree* and *strongly agree* in the posttest test (selection frequency 94.87%). The overall difference in this selection increased by 59 responses for *agree* and *strongly agree* in improvement for student self-confidence within the control group. In performing the Wilcoxon Signed Rank test for this group, it was determined to be not statistically significant ($p > 0.05$).

Pretest responses for the experimental group demonstrated higher scores in *disagree* and *agree* (selection frequency 67.31%) and higher scores in *agree* and *strongly agree* (selection frequency 78.85%) for the posttest. The difference in this group's selection for *agree* and *strongly agree* increased by 39 responses for improvement in student self-confidence for prebriefing practices in the experimental group. Performing the Wilcoxon Signed Rank test, this also was not statistically significant ($p > 0.05$).

Comparing Pretest Results between the Two Groups

In evaluating the pretest results between the two groups, the control group had higher scores for *undecided* and *agree* (selection frequency 75.00%) in comparison to the experimental group that had higher scores in *disagree* and *agree* (selection frequency 67.13%). The response rate for *agree* and *strongly agree* between these two groups resulted in a difference of five responses, which favored the simulation experience within the control group where prebriefing was not used. Performing the Wilcoxon Signed Rank test, this finding was determined to be not statistically significant ($p > 0.05$).

Comparing Posttest Results between the Two Groups

For the posttest survey results, the control group demonstrated significantly higher results in *agree* and *strongly agree* (selection frequency 94.87%) for a total response value of 148 responses. The experimental group also showed higher scores in *agree* and *strongly agree* (selection frequency 78.85%) for a total response value of 123. The difference between these two groups resulted in a value of 25 which favored the simulation experience within the control group. Similar findings, using the Wilcoxon signed-rank test, resulted in a value of $p > 0.05$ that was not statistically significant.

Analysis of each Question and Subtheme

The range of mean scores for satisfaction items ranged from 3.17 to 3.67 for the pretest SSSL survey and 4.42 to 4.58 for the posttest SSSL survey of the control group. All satisfaction item mean scores were higher in the posttest group. The satisfaction item means scores were summed, with 25 being the highest possible mean summed score. The control group for the posttest showed higher satisfaction results at 22.66 compared to the pretest value of 16.92. Scores indicated that the control group was more satisfied in the posttest result in comparison to the pretest result of the same group. The participants were more satisfied after completing their simulation on GA induction competency. This proved to be statistically significant ($p = 0.043$) in the summation of satisfaction scores. See Table 1.1 for satisfaction results.

Table 1.1

SSSL satisfaction with current learning pretest vs. posttest for the control group

Item	Control group pretest mean (SD)	Control group posttest mean (SD)	Mean difference	p-Value
Satisfaction 1	3.25 (0.87)	4.42 (0.67)	+1.17	0.001*
Satisfaction 2	3.17 (0.83)	4.50 (0.67)	+1.33	0.004*
Satisfaction 3	3.33 (0.65)	4.58 (0.51)	+1.25	0.002*
Satisfaction 4	3.50 (0.67)	4.58 (0.90)	+1.08	0.005*
Satisfaction 5	3.67 (1.15)	4.58 (0.90)	+0.91	0.031*
Summed satisfaction	16.92 (0.20)	22.66 (0.07)	+5.74	0.043*

**Note.* Using the Wilcoxon Signed Rank test, a statistically significant change at $p <0.05$.

The range of mean scores for the 8-item self-confidence questions ranged from 3.25 to 4.42 for the pretest and 4.33 to 4.67 for the posttest of the control group. All of the posttest results scored higher in comparison to the pretest results. The highest possible summed score for this 8-item self-confidence survey was 40. Posttest summative scores indicated higher scores of self-confidence in learning after the simulation (35.75) than before the simulation (29.50). This finding was statistically significant with p = 0.011. See Table 1.2 for the self-confidence results of the control group.

Table 1.2

SSSL self-confidence in learning pretest vs. posttest for the control group

Item	Control group pretest mean (SD)	Control group posttest mean (SD)	Mean difference	p-Value
Confidence 1	3.25 (0.87)	4.42 (0.67)	+1.17	0.001*
Confidence 2	3.42 (0.90)	4.42 (0.67)	+1.00	0.008*
Confidence 3	3.33 (0.79)	4.50 (0.52)	+1.17	0.003*
Confidence 4	3.33 (0.89)	4.33 (0.65)	+1.00	0.008*
Confidence 5	4.42 (0.51)	4.58 (0.51)	+0.16	0.157
Confidence 6	4.17 (0.83)	4.67 (0.49)	+0.50	0.034*
Confidence 7	3.83 (0.83)	4.33 (0.65)	+0.50	0.063
Confidence 8	3.75 (0.87)	4.50 (0.52)	+0.75	0.033*
Summed confidence	29.50 (0.43)	35.75 (0.19)	+6.25	0.011*

**Note.* Using the Wilcoxon Signed Rank test, a statistically significant change at p <0.05.

The mean score range for the pretest in the experimental group ranged from 2.92 to 3.42. By comparison, the posttest in this same group ranged from 3.67 to 3.92. All satisfaction scores yielded higher scores in the posttest group with two statistically significant items. Findings were similar to that of the control in which summative scores in the posttest (19.09) were higher than pretest (15.50) for the experimental group. Participants had higher scores of satisfaction in the current learning after the simulation was completed than before starting the simulation. This finding was statistically significant (p = 0.043). See Table 2.1 for SSSL satisfaction results for the experimental group.

Table 2.1

SSSL satisfaction with current learning pretest vs. posttest for the experimental group

Item	Experimental group pretest mean (SD)	Experimental group posttest mean (SD)	Mean difference	p-Value
Satisfaction 1	3.00 (1.13)	3.92 (0.90)	+0.92	0.048*
Satisfaction 2	2.92 (1.08)	3.75 (0.97)	+0.83	0.033*
Satisfaction 3	3.08 (1.24)	3.92 (0.67)	+0.84	0.090
Satisfaction 4	3.42 (0.90)	3.83 (1.03)	+0.41	0.160
Satisfaction 5	3.08 (1.08)	3.67 (1.15)	+0.59	0.150
Summed satisfaction	15.50 (0.19)	19.09 (0.11)	+3.59	0.043*

**Note.* Using the Wilcoxon Signed Rank test, a statistically significant change at p <0.05.

The range of mean scores for the 8-item self-confidence items were 3.17 to 4.08 for the pretest and 3.67 to 4.08 for the posttest in the experimental group. All of the scores in the posttest yielded higher values or a net value of zero in comparison to the pretest scores. One item resulted in a statistically significant individual p-value. Additionally, the summative self-confidence scored higher in the posttest results (31.25) than the pretest (28.25). Participants in the experimental group showed higher self-confidence in learning after completing the simulation than before starting the simulation. This finding was statistically significant for a p-value of 0.018. See Table 2.2 for self-confidence results in the experimental group.

Table 2.2

SSSL self-confidence in learning pretest vs. posttest for the experimental group

Item	Experimental group pretest mean (SD)	Experimental group posttest mean (SD)	Mean difference	p-Value
Confidence 1	3.17 (1.03)	3.83 (0.58)	+0.66	0.046*
Confidence 2	3.75 (0.97)	3.92 (0.90)	+0.17	0.914

Confidence 3	3.42 (0.90)	3.92 (0.51)	+0.50	0.063
Confidence 4	3.33 (0.98)	3.75 (0.97)	+0.42	0.357
Confidence 5	3.42 (1.44)	3.67 (1.23)	+0.25	0.396
Confidence 6	4.08 (0.67)	4.08 (0.51)	0.00	1.00
Confidence 7	3.50 (1.00)	4.08 (0.29)	+0.58	0.059
Confidence 8	3.58 (1.00)	4.00 (0.60)	+0.42	0.393
Summed confidence	28.25 (0.28)	31.25 (0.15)	+3.00	0.018*

**Note.* Using the Wilcoxon Signed Rank test, a statistically significant change at p <0.05.

The satisfaction range of mean scores for pretest in the control group ranged from 3.17 to 3.67. The satisfaction range of mean scores for the experimental group resulted in lower values by comparison for a range of 2.92 to 3.42. The highest possible summative satisfaction score was 25 in which the control group resulted in larger quantities (16.92) in comparison to the experimental group (15.50). Participants involved in the control group had higher scores of satisfaction in the current learning than participants in the experimental group who were provided prebriefing material. Using an independent t-test, this finding was statistically significant (p = 0.049). See Table 3.1 for results on pretest satisfaction for the control and experimental group.

Table 3.1

Pretest SSSL satisfaction with current learning control group vs. experimental group

Item	Control group pretest mean (SD)	Experimental group pretest mean (SD)	Mean difference	p-Value
Satisfaction 1	3.26 (0.87)	3.00 (1.13)	-0.26	0.549
Satisfaction 2	3.17 (0.83)	2.92 (1.08)	-0.25	0.533
Satisfaction 3	3.33 (0.65)	3.08 (1.24)	-0.25	0.543
Satisfaction 4	3.50 (0.67)	3.42 (0.90)	-0.08	0.800
Satisfaction 5	3.67 (1.15)	3.08 (1.08)	-0.59	0.215
Summed satisfaction	16.92 (0.20)	15.50 (0.19)	-1.42	0.049*

**Note.* Using the Independent T-test, a statistically significant change at p <0.05.

The self-confidence range of mean scores for the pretest in the control group was 3.25 to 4.42. The self-confidence range of mean scores for the experimental group was 3.17 to 4.08. The summative scores resulted in higher scores in the control group (29.50) than in the experimental group (28.25). Participants involved in the control group had higher scores of self-confidence in learning with one item showing statistical significance. However, there was not a statistically significant difference in the summed self-confidence between these two groups. See Table 3.2 for results on pretest self-confidence for the control and experimental group.

Table 3.2

Pretest SSSL self-confidence in learning control group vs. experimental group

Item	Control group pretest mean (SD)	Experimental group pretest mean (SD)	Mean difference	p-Value
Confidence 1	3.25 (0.87)	3.17 (1.03)	-0.08	0.832
Confidence 2	3.42 (0.90)	3.75 (0.97)	+0.33	0.391
Confidence 3	3.33 (0.79)	3.42 (0.90)	+0.09	0.811
Confidence 4	3.33 (0.89)	3.33 (0.98)	0.00	1.00
Confidence 5	4.42 (0.51)	3.42 (1.44)	-1.00	0.034*
Confidence 6	4.17 (0.83)	4.08 (0.67)	-0.09	0.790
Confidence 7	3.83 (0.83)	3.50 (1.00)	-0.33	0.385
Confidence 8	3.75 (0.87)	3.58 (1.00)	-0.17	0.666
Summed confidence	29.50 (0.43)	28.25 (0.28)	-1.25	0.406

**Note.* Using the Independent T-test, a statistically significant change at $p < 0.05$.

Mean scores for the control group ranged from 4.42 to 4.58 in the control group and from 3.67 to 3.92 in the experimental group. All individual mean scores were higher in the control group with three items showing statistical significance. The summed satisfaction scores for the control group resulted in a total of 22.66 and 19.09 for the experimental group. Results demonstrated higher scores of satisfaction in the control group than in the experimental group. This was a statistically significant difference ($p < 0.001$) in that the control group had higher levels of satisfaction in learning than the experimental group. See Table 4.1 for satisfaction results.

Table 4.1

Posttest SSSL satisfaction with current learning control group vs. experimental group

Item	Control group posttest mean (SD)	Experimental group posttest mean (SD)	Mean difference	p-Value
Satisfaction 1	4.42 (0.67)	3.92 (0.90)	-0.50	0.137
Satisfaction 2	4.50 (0.67)	3.75 (0.97)	-0.75	0.038*
Satisfaction 3	4.58 (0.51)	3.92 (0.67)	-0.66	0.012*
Satisfaction 4	4.58 (0.90)	3.83 (1.03)	-0.75	0.071
Satisfaction 5	4.58 (0.90)	3.67 (1.15)	-0.91	0.042*
Summed satisfaction	22.66 (0.07)	19.09 (0.11)	-3.57	<0.001*

**Note.* Using the Independent T-test, a statistically significant change at p <0.05.

The range of mean scores for the 8-item self-confidence survey was 4.33 to 4.67 in the control group and 3.67 to 4.08 in the experimental group. All individual mean item scores were higher in the control group, with four items showing a statistically significant difference. Also, the total summed scores were higher in the control group (35.75) than in the experimental group (31.25). Participants in the control group showed higher scores of self-confidence in the GA induction simulation learning than in the experimental group. This was a statistically significant difference ($p < 0.001$) in that the control group had higher levels of self-confidence after completing their simulation on GA induction than the experimental group.

Table 4.2

Posttest SSSL self-confidence in learning control group vs. experimental group

Item	Control group posttest mean (SD)	Experimental group posttest mean (SD)	Mean difference	p-Value
Confidence 1	4.42 (0.67)	3.83 (0.58)	-0.59	0.032*
Confidence 2	4.42 (0.67)	3.92 (0.90)	-0.50	0.137
Confidence 3	4.50 (0.52)	3.92 (0.51)	-0.58	0.012*

Confidence 4	4.33 (0.65)	3.75 (0.97)	-0.58	0.097
Confidence 5	4.58 (0.51)	3.67 (1.23)	-0.91	0.026*
Confidence 6	4.67 (0.49)	4.08 (0.51)	-0.59	0.010
Confidence 7	4.33 (0.65)	4.08 (0.29)	-0.25	0.237
Confidence 8	4.50 (0.52)	4.00 (0.60)	-0.50	0.041*
Summed confidence	35.75 (0.19)	31.25 (0.15)	-4.50	<0.001*

**Note*. Using Independent T-test, a statistically significant change at $p < 0.05$.

Student Knowledge

Students were given a post-knowledge test and scores were compared between the control and experimental group. The control group's post-knowledge assessment scores ranged from 40-100% with a mean of 76.67% (SD 16.70). The experimental group's post-knowledge assessment scores ranged from 60-100% with a mean of 83.33% (SD 11.55). While the experimental group demonstrated a mean difference of +6.66%, the result was not statistically significant ($t = -1.14$, $p = 0.27$). The most missed questions for the control group included knowing to check for the loss of an eyelid reflex after administering propofol (question 3) and appropriate endotracheal tube depth for an average adult (question 5). The experimental group's commonly missed posttest knowledge questions included knowing the duration in which a paralytic agent takes maximum effect (question 2) and knowing the best indicator for correct endotracheal tube placement (question 4).

Recorded Omission, Errors, and Time Elapsed

During the simulation, the DNP student observed each SRNA complete their simulation and monitored for any deviations (i.e., omission and/or errors) from the GA induction checklist. The time elapsed was also recorded and compared against these two groups. The control group's total number of deviations from the GA induction checklist was 22 and seven for the experimental group for a total of 29 deviations between the two groups. The two most frequently missed items from the GA induction checklist in the control group were to check the eyelid reflex and to turn on the vaporizer. For the experimental group, the two most frequently missed items included verification of ventilation after checking the eyelid reflex and assessing neuromuscular function (no twitches). Despite the experimental group having 15 deviations less than the control group, a Chi-square test determined that this finding was not statistically significant ($p = 0.484$).

The time elapsed to complete the GA induction competency for the control group had a mean score of 11 minutes and 53 seconds (SD 3.68). The experimental group resulted in a mean score of 11 minutes and 12 seconds (SD 2.93). Participants in the experimental group completed the GA induction sooner than those in the control group. This finding was determined to not be statistically significant ($p = 0.77$).

Discussion

In this quality improvement project, INACSL best practices and guidelines were used in creating a new simulation design on GA induction. All participants reported their self-confidence and demonstrated their knowledge to perform GA induction based on the provided preparatory material specific to each group. For the experimental group, additional prebriefing material on GA induction included an outline of the simulation objectives, a review of the simulation expectations, stated simulation limitations, and a detailed GA induction instructional video. All participants were evaluated using a posttest knowledge assessment, pretest/posttest SSSL surveys, observed deviations, and recorded time to complete this skill competency.

Results demonstrated that participants in the control group had higher scores of satisfaction and self-confidence in comparison to the experimental group for posttest survey responses ($p < 0.001$). Focusing on the control group, summative mean differences improved in both satisfaction (+5.74) and self-confidence (+6.25) which proved to be statistically significant ($p < 0.05$). Prior research has shown student's perceptions of overall simulation effectiveness, learning, and self-confidence are significantly higher when using prebriefing practices (Chamberlain, 2017). Prebriefing is an essential component for learners' success as it aims to achieve simulation competency outcomes (Kim et al., 2017). In this DNP project, this finding did not correlate with other completed studies on this use of prebriefing practice for simulation-based learning.

Evaluating the pretest to posttest results for the experimental group, there was a statistical significance for improved satisfaction and self-confidence. Summative mean scores resulted in a +3.59 improvement for satisfaction and +3.00 improvement for self-confidence. While this summative mean score was not as great as the control group's results, this finding does correlate with other research in stating that completion of simulation competency has improved scores in self-confidence and knowledge in those exposed to prebriefing practices (Kim et al., 2017). Future studies are needed to provide additional insight into the full benefits of prebriefing practices for simulation-based learning.

Although scores were higher in satisfaction and self-confidence in the control group, posttest knowledge assessment scores did show a +6.66% improvement in the experimental group. Despite this finding not being statistically significant, other literature states that those who are exposed to prebriefing practice demonstrated higher scores in overall performance in simulation-based education (Roh et al., 2018). Research has found significant increases in knowledge, skills performance, and self-confidence when integrating prebriefing practices into a simulation design (Goldsworthy et al., 2019).

The time elapsed to complete the simulation competency improved by a mean difference score of +0.41 in the experimental group. The observed deviations from the rubric checklist also improved in the experimental group by 51.72%. Despite these two improvements within the experimental group, these findings were determined to be not statistically significant. Findings from this process improvement project are suggestive that participants involved with prebriefing practices may have been influenced by this intervention and final results. Literature indicates significant improvements in learning engagement and competency completion in students who participated in prebriefing activities (Chamberlin, 2017). Literature findings align with project results in that the use of prebriefing practices increases perceptions of self-confidence and learning outcomes (Chamberlin, 2017; Goldsworthy et al., 2019).

The use of prebriefing practices may affect SRNA confidence and knowledge when completing GA induction competency. Receiving information about an upcoming simulation along with the execution of an improved simulation process may contribute to the concept of psychological safety in that participants may have improved self-confidence and knowledge. Therefore, implementing INACSL's best practices for prebriefing can be a useful adjunct in improving areas of self-confidence and anesthesia knowledge in the simulation environment. Further study is required on the different types and exposure of prebriefing strategies on learning outcomes of knowledge and self-confidence for simulation-based learning. A repeated study with an increased number of participants should be considered.

Strengths and Limitations

Strengths of this project included the creation of a well-structured simulation for GA induction, generation of GA induction resources for future SRNAs, the introduction of

INACSL's best practices for prebriefing in the simulation environment, and positive feedback from students on the GA induction instructional video. A limitation of this project included having a small sample size, unmonitored open simulation lab time, uncontrolled communication between students on the GA induction competency, control group utilization of outside resources to prepare for checkoffs, and SRNA distraction of upcoming exam that may have affected full student engagement. Additionally, six other DNP students completed their DNP project on simulation improvements that may have led to participant fatigue and affected project results. In this instance, it is difficult to demonstrate that this quality improvement intervention may have influenced student confidence and knowledge for GA induction.

Future Project Recommendations

In this project, students reported overall higher scores in the control group that did not involve the use of prebriefing practices. During the execution of this DNP project, participants were simultaneously preparing for an upcoming exam that may have affected results. To prevent outside influences on future simulation improvement projects, it is recommended that future studies involving prebriefing material be condensed. In doing this, it would hopefully alleviate future participant stress and allow for full engagement in future quality improvement interventions. If future DNP projects should be completed on simulation improvements involving a single SRNA cohort, it is recommended that multiple DNP projects be limited to prevent participant fatigue.

Conclusion

Prebriefing is required to support learners by supplementing additional resources to support limited knowledge and experiences before a simulation. The current simulation design does not include a standardized method for simulation execution, use of prebriefing practices, or use of purposeful preparatory GA induction activities. As a result, this may negatively impact the knowledge and self-confidence of SRNAs completing GA induction competency. This project's results revealed that SRNAs in the experimental group revealed improved scores in their posttest knowledge test and overall performance in GA induction competency though these results were not statistically significant.

In reviewing the results generated by the SSSL survey, the control group had a higher individual self-confidence rating in both the pretest and posttest when compared to the experimental group. There was a statistical significance between the control and experimental group for posttest results for self-confidence but not for pretest results for self-confidence. As a result, the DNP student determined this project results to be inconclusive in determining if the use of a standardized simulation training video with detailed instructions affects their knowledge and confidence of anesthesia induction technique, compared to current simulation practice. It is important that simulation-based learning design and the implementation of learning orientation use prebriefing activities to foster and improve knowledge and self-confidence for SRNAs. Further exploration in the use of prebriefing in simulation-based learning is needed to ensure SRNAs are given effective simulation experiences that promote self-confidence and knowledge that can be transferred to a clinical setting and their practice.

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Zapko, K. A., Ferranto, M. L. G., Blasiman, R., & Shelestak, D. (2018). Evaluating best educational practices, student satisfaction, and self-confidence in simulation: A descriptive study. *Nurse Education Today, 60*, 28–34. https://doi.org/10.1016/j.nedt.2017.09.006

Appendix A

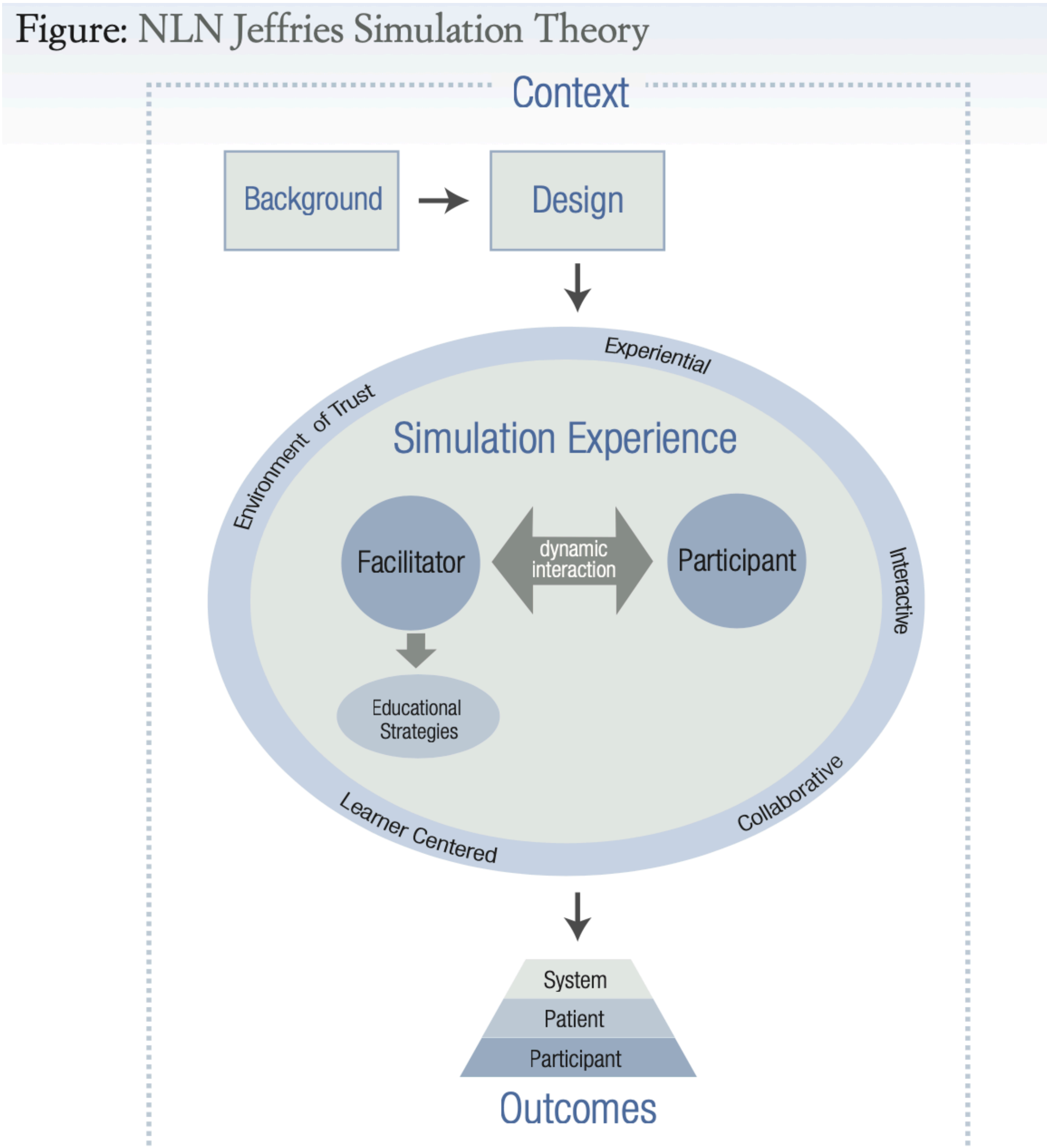
Literature Review Matrix					
Reference in APA format	**Level of Evidence**	**Variables**	**Sample**	**Instruments**	**Results**
Aebersold, M., Mariani, B., & Cherara, L. (2018). Do experts and novices agree? A qualitative review of the 2016 INACSL standards of best practice: SimulationSM reviewer feedback. *Clinical Simulation in Nursing* , *25* , 1–5. https://doi.org/10.1016/j.ecns.2018.09.007	Level V evidence	Consistency, theory/objectives, reliability/validity, clearly defining expectations, and excellence	Expert reviewers (n=25) and novice reviewers (n=25)	Electronic feedback and questionnaire (four open-ended questions)	Novices and experts had similar themes but differences in details. Both types of feedback are important to obtain because users of the standards are both experts and novices. Both types of feedback are important to obtain because users of the standards are both experts and novices.
Chamberlain, J. (2015). Prebriefing in nursing simulation: A concept analysis using Rodger's methodology. *Clinical Simulation in Nursing* , *11* (7), 318–322. https://doi.org/10.1016/j.ecns.2015.05.003	Level V evidence	Identification of prebriefing, surrogate terms, attributes, model case, antecedent and consequences, related concepts	Studies (n=23); population of interest nursing prebriefing methodology	No instruments were used	To support the rigors of simulation research and development, prebriefing needs to be conducted in a consistent manner. Performing a concept analysis is the first step in ensuring clear under- standing and application of the prebriefing components. It is essential that nursing programs provide high-quality simula- tion with faculty who are educated in the pedagogy including the prebriefing phase.
Chamberlain, J. (2017). The impact of simulation prebriefing on perceptions of overall effectiveness, learning, and self-confidence in nursing students. *Nursing Education Perspectives (Wolters Kluwer Health)* , *38* (3), 119–125. https://doi.org/10.1097/01.NEP.0000000000000135	Level III evidence	No prebrief, Learning/Orientation activities, Orientation only, Learning only, overall confidence score, overall learning score, overall simulation effectiveness score	Undergraduate nursing students (n=119)	Simulation Effectiveness Tool (SET). SET includes 13 items with a 3-point Likhert-scale	Perceptions of overall simulation effectiveness, learning, and self-confidence was significantly higher with prebriefing ($p=0.000$) compared to no prebriefing. No significant distinction ($p>0.05$) was found among the prebriefing activities. Findings from this study support the use of learning engagement and orientation activities during prebriefing in order to enhance overall simulation effectiveness.
Goldsworthy, S., Patterson, J. D., Dobbs, M., Afzal, A., & Deboer, S. (2019). How does simulation impact building competency and confidence in recognition and response to the adult and paediatric deteriorating patient among undergraduate nursing students? *Clinical Simulation in Nursing* , *28* , 25–32. https://doi.org/10.1016/j.ecns.2018.12.001	Level III evidence	Knowledge assessement related to each of the six deteriorating patient simulation cases and reliability of the clinical self-efficacy (CSE) scale	BSN nursing students in their final year (n=63)	Pulse/delta methodology for debriefing, high-fidelity simulator, and CSE tool	A high internal consistency (0.91) in all items on the Clinical self-efficacy tool was seen in the treatment group after the intervention. No significant improvement in any of the Clinical self-efficacy items in the control group (p value > 0.05). Further multistate research is needed to further explore the significance of the simulation intervention.

Kim, Y.-J., Noh, G.-O., & Im, Y.-S. (2017). Effect of step-based prebriefing activities on flow and clinical competency of nursing students in simulation-based education. *Clinical Simulation in Nursing* , *13* (11), 544–551. https://doi.org/10.1016/j.ecns.2017.06.005	Level III evidence	Age, school year, GPA, overall GPA in the prior semester, flow in practice, clinical competency: learner's evaluation, clinical competency: instructor's evaluation, satisfaction, self-confidence	Undergraduate nursing students (junior/senior) (n=207)	10-item flow short scale, clinical competency self-reported tool and evaluation tool, instructor checklist, two numeric rating scales measuring satisfaction and self-confidence	The age, year, clinical training GPA, and overall GPA in the previous semester among the study groups showed no significant differences, thereby supporting homogeneity among the groups (p-value unspecified). Flow in experimental group 2 was the highest and significantly higher than the other two groups (F=8.14, p=0.001). Learner's self-evaluated clinical competency score of experimental group 2 was signficantly higher (F=5.19, p=0.006). Satisfaction higher in the experimental group 2 (F=4.25, p=0.016), self-confidence was significantly higher in experimental group 2 (F=7.65, p=0.016).
McDermott, D. S. (2016). The prebriefing concept: A delphi study of CHSE experts. *Clinical Simulation in Nursing* , *12* (6), 219–227. https://doi.org/10.1016/j.ecns.2016.02.001	Level VII evidence	Gender, age, residence, length of time using SBL in education, highest academic degree, types of simulation used, members of professional organizations, organizational setting where SBL used, incorporate INACSL standards of practice	Certified as a Healthcare Simulation Educator (CHSE) (n=59)	Electronic Qualtrics survey and five-point Likert scale	Certified Healthcare Simulation Educators (expert panel) reached consensus (>70%) on 83 statements about prebriefing. Findings from this review suggest prebriefing is an important three-phase process of simulated-based learning (SBL). Findings of this study may be used to develop guidelines to for successful SBL experience.
Page-Cutrara, K. (2015). Prebriefing in nursing simulation: A concept analysis. *Clinical Simulation in Nursing* , *11* (7), 335–340. https://doi.org/10.1016/j.ecns.2015.05.001	Level II evidence	Use of the concept, model case, contrary case, related case, antecedents and consequences, empirical referents	Studies (n= 31); population of interest included relevance to nursing student education	No instruments were used	This concept analysis suggests that research specifically focusing on prebriefing could strengthen prebriefing's contribution to the simulation experience, provide a clearer, evidence-based understanding of the activity, and address questions about optimal delivery of simulation for learning
Page-Cutrara, K., & Turk, M. (2017). Impact of prebriefing on competency performance, clinical judgment and experience in simulation: An experimental study. *Nurse Education Today* , *48* , 78–83. https://doi.org/10.1016/j.nedt.2016.09.012	Level I evidence	Competency performance; clinical judgment; perceptions of prebriefing experience; competency performance, clinical judgment, and prebriefing experience	Undergraduate nursing student (n=76)	Creighton Competency Evaluation Instrument (CCEI), Clinical Judgement subscale (CCEI-CJ), and Prebriefing Experience Scale (PES)	A statistically significant difference was demonstrated between group for competency performance (p<0.001), clinical judgment (p<0.001) and prebriefing experience (p<0.001). No relationship was found between perception of prebriefing experience and students' simulation performance.

Roh, Y. S., Ahn, J.-W., Kim, E., & Kim, J. (2018). Effects of prebriefing on psychological safety and learning outcomes. *Clinical Simulation in Nursing, 25* , 12–19. https://doi.org/10.1016/j.ecns.2018.10.001	Level III evidence	Study variables between experimental and control groups: team psychological safety, academic safety (i.e., academic safety/comfort and anxiety), satisfaction with debriefing, and team performances.	Undergraduate nursing students in their fourth year of simulation (n=281)	Korean version of the Edmondson (1999)'s Team Psychological Safety scale. Academic safety was assessed using the academic safety tool. Satisfaction with debriefing was assessed using the Korean version of Debriefing Assessment for Simulation in Healthcare-Student Version (DASH-SV). Video-recorded group performance was rated using the Korean version of Advanced Cardiovascular Life Support Skills Checklist.	Nursing students in the experimental group showed higher team psychological safety (t=2.754, p=0.008) and cardiopulmonary resuscitation performance (t=7.488, p<0.001). However, there were no differences in overall academic safety (t=1.67, p=0.103)or satisfaction with debriefing scores (t=1.202, p=0.238). Prebriefing strategies that incorporate the fiction contract and concept mapping could help nursing students to improve team psychological safety and performance.
Sharoff, L. (2015). Simulation: Pre-briefing preparation, clinical judgement, and reflection. What is the connection?. *Journal of Contemporary Medicine, 5* (2), 88-101. https://doi.org/10.16899/ctd.49922	Level IV evidence *(mix-method studies)*	Confidence, skill competency, anxiety levels, preceived critical thinking skills and problem-solving.	Undergraduate junior/senior nursing students (n=81) and instructors (n=9)	Surveys, PMS-SS, PMS-IS, LCJR/Scoring Sheet, Guide for Simulation Reflection (qualitative survey)	Pre-briefing preparatory material for both students and instructors provided essential and adequate information for an effective and enhanced simulation learning experience. Students felt their ability to grasp the experience; understand the simulation situation; provide effective nursing actions; and reflect upon their experience was enhanced with the utilization of the pre-briefing preparatory material. Instructors felt more confident and prepared after reading the preparatory material.
Staun, J. (2020). Anesthesia simulation in cardiac surgery (ASICS). *AANA Journal* , *88* (3), 183–189.	Level I evidence	male-to-female ratio, current age, race, years of employment as a RN, time in the critical care, type of ICU	SRNA participants (n=23)	Objective Structured Clinical Examination (OSCE), National League of Nursing surveys, 5-point Likert scale, "agreement" and "importance" Likert scale, student satisfaction and self-confidence in learning survey, educational practices questionnaire	Using simulation activities scored high in agreement and importance which validated the ASICS implementation into the SRNA's curriculum. SRNAs agreed that skills they learned from ASICS could transfer over into their cardiac rotations. Through the ASICS, SRNAs gained a greater sense of self-efficacy and clinical competence.

Wiggins, L. L., Morrison, S., Lutz, C., & O'Donnell, J. (2018, April). Using evidence-based best practices of simulation, checklists, deliberate practice, and debriefing to develop and improve a regional anesthesia training course. *AANA Journal, 86* (2), 119-126. https://www.aana.com/docs/default-source/aana-journal-web-documents-1/using-evidence-based-best-practices-of-simulation-checklists-deliberate-practice-and-debriefing-to-develop-and-improve-a-regional-anesthesia-training-course-april-2018.pdf?sfvrsn=c2505fb1_8	Level V evidence	Average length of time as a CRNA (years), no preexisting regional skills, experience with placement of epidural or spinal block, Had place 1-5 "spinals" and "epidurals" as a CRNA, performed 1-5 sterile procedures a month, performed 6-10 sterile procedures a month, right-hand dominant, last time any participant had placed a spinal or epidural block (months)	CRNAs enrolled in the NARAT course (n=49)	Best practices and guidelines for simulation course deployment, development and improvement were used. These included use of the Delphi method/Angoff method for checklists, deliberate practice, realistic simulation, and debriefing and structured feedback. Additionally, NARAT precourse survey and precourse attitude surveys were administered, the skills assessment/checklists were completed during the hands-on component, and a NARAT postcourse survey.	Postcourse scores for comfort and confidence level for both spinal (4.14) and epidural (4) blocks were improved compared with precourse results. An important incidental observation was that age seems to be a factor in the anesthesia provider's comfort level of performing spinal or epidural. Essential elements are important during development of a blended course help CRNAs improve knowledge, attitude, and skills needed for competent regional anesthesia practice.
Yauger, S. J., Konopasky, A., & Battista, A. (2020). Reliability in healthcare simulation setting: A definitional review. *Cureus, 12* (5), e8111. https://doi.org/10.7759/cureus.8111	Level IV evidence (*mix-method studies*)	Demographic summary of setting attributes, articles published by year, word frequency search for terms related to reliability, Ontology of simulation setting reliability, constructs influencing simulation setting reliability, reliability terms used by authors, training simulated patients for performance standardization using a standardized training approach	Studies (n=50); population of interest is mixed	QSR International's NVivo data analysis software was used to support search processes, data collection efforts, and data management. The Standards for Reporting Qualitative Research serves as the reporting guidelines.	Experience of the simulation is influenced by the social characters of simulations. Reliability in healthcare simulation is dependent on an simulated participant's consistency to achieve specific performance tasks. Reliable simulations should provide the same stimuli to participants to ahcieve their goal-orientated activities. Inconsistencies and setting errors resulted in stimulated participants performance that exposed them to unequal conditions that influenced competency achievement.

Appendix B



Note. From "NLN Jeffries Simulation Theory: Brief Narrative Description," by P. R. Jeffries, B. Rodgers, and K. Adamson, 2015, *Nursing Education Perspectives, 36*(5), 292–293. Copyright 2015 by the National League for Nursing.

Appendix C

Student Satisfaction and Self-Confidence in Learning GA Induction

Instructions: This questionnaire is a series of statements about your personal attitudes about the instruction you receive during your general anesthesia (GA) induction simulation. Each item represents a statement about your attitude toward your satisfaction with learning and self-confidence in obtaining the instruction you need. There are no right or wrong answers. You will probably agree with some of the statements and disagree with others. Please indicate your own personal feelings about each statement below by marking the numbers that best describe your attitude or beliefs. Please be truthful and describe your attitude as it really is, not what you would like for it to be. This is anonymous with the results being compiled as a group, not individually.

Mark:
1 = STRONGLY DISAGREE with the statement
2 = DISAGREE with the statement
3 = UNDECIDED - you neither agree or disagree with the statement
4 = AGREE with the statement
5 = STRONGLY AGREE with the statement

Satisfaction with Current Learning	**SD**	**D**	**UN**	**A**	**SA**
1. The teaching methods used in this simulation were helpful and effective	1	2	3	4	5
2. The simulation provided me with a variety of learning materials and activities to promote my learnings for GA induction competency check-offs	1	2	3	4	5
3. I enjoyed how my simulation facilitator(s) conducted the simulation	1	2	3	4	5
4. The teaching materials used in this simulation were motivating and helped me to learn	1	2	3	4	5
5. The way my simulation facilitator(s) conducted the simulation was suitable to the way I learn	1	2	3	4	5
Self-Confidence in Learning	**SD**	**D**	**UN**	**A**	**SA**
6. I am confident that I am mastering the content of the simulation activity that my simulation facilitator(s) presented to me	1	2	3	4	5
7. I am confident that this simulation covered critical content necessary for the mastery of GA induction competency	1	2	3	4	5
8. I am confident that I am developing the skills and obtaining the required knowledge from this simulation to perform necessary tasks in a clinical setting	1	2	3	4	5
9. My simulation facilitator(s) used helpful resources to teach the GA induction competency	1	2	3	4	5
10. It is my responsibility as the student to learn what I need to know from this simulation activity	1	2	3	4	5
11.I know how to get help when I do not understand the concepts covered in the simulation	1	2	3	4	5
12.I know how to use simulation activities to learn critical aspects for this GA induction competency check-off	1	2	3	4	5
13.Completion of the required preparatory material improved my self-confidence for mastery of GA induction	1	2	3	4	5

Note. From "Description of Available Instruments," by National League for Nursing, 2005 (http://www.nln.org/professional-development-programs/research/tools-and-instruments/descriptions-of-available-instruments). In the public domain.

Appendix D

GA Induction Posttest Knowledge Assessment

1. All of the following are components to the mnemonic MSMAIDS except:
    a. Monitors
    b. Intubation equipment
    c. Machine
    d. Suction

2. The student nurse anesthetist knows that after the administration of rocuronium should wait at least ________ seconds before performing direct laryngoscopy.
    a. 30 seconds
    b. 60 seconds
    c. 90 seconds
    d. 120 seconds

3. During GA induction, the student nurse anesthetist knows that the next step after giving propofol is to ________?
    a. Attempt to ventilate the patient
    b. Tape the patient's eye
    c. Check for the loss of an eyelid reflex
    d. Immediately administer rocuronium

4. The student nurse anesthetist knows that the BEST indicator for endotracheal tube placement after direct laryngoscopy is:
    a. EtCO2 tracing on the ventilator
    b. Auscultation for bilateral breath sounds
    c. Observed patient chest rise
    d. Tidal volume tracing on the ventilator

5. After performing direct laryngoscopy, the student nurse anesthetist knows that an appropriate endotracheal tube depth for an average adult is approximately ________.
    a. 16-18 cm at the lip
    b. 22-24 cm at the lip
    c. 19- 21 cm at the lip
    d. 17-20 cm at the lip

Appendix E

General Anesthetic Induction Checklist Rubric

Name: ____

MSMAID	**Successful**	**Unsuccessful**
Machine		
Suction		
Monitors		
Airway equipment		
IV works		
Drugs ready		
Induction	**Successful**	**Unsuccessful**
Apply 100% oxygen by mask		
Apply monitors		
Obtain first set of vital signs		
Administer narcotic		
Administer lidocaine		
Administer induction agent		
Check eyelid reflex		
Verify that you can ventilate		
Administer paralytic		
Tape eyes closed		
Assess neuromuscular function (no twitches)		
Perform laryngoscopy and insert endotracheal tube		
Inflate pilot balloon		
Connect ETT to breathing circuit and give one breath		
Verify ETT placement with EtCO2 and Bilateral breath sounds		
Tape ETT in place		
Turn on vaporizer		
Turn on ventilator		
Recheck vital signs		

____ ______________________________

Instructor Signature Date