High-fidelity Simulation in the Neonatal Resuscitation Program: A Randomized Control Trial

by

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"*I attribute my success to this, I never gave or took any excuse"- Florence Nightengale*

Abstract

Aim: The purpose of this project is to compare the use of low-fidelity simulation with high-fidelity simulation during the Neonatal Resuscitation Program and to examine if the use of different types of simulation will have an impact on nursing confidence and nursing competence during neonatal resuscitation scenarios. *Methodology:* The project design was a non-blinded randomized control trial with a control group that used low-fidelity simulation and an experimental group that used high-fidelity simulation during the NRP training course. Registered nurses that were in both the control group and the experimental group completed a demographic questionnaire about their experience in nursing, neonatal resuscitation, and simulation. Each of the registered nurses completed a self-report questionnaire on their confidence level using NRP resuscitation skills after using either the low-fidelity mannequin or high-fidelity simulator. Additionally, each of the nurses were observed during a mock code scenario to evaluate their competence in completing resuscitation skills on the low-fidelity mannequin or the high-fidelity simulator. *Results*: The results of this study demonstrated that the registered nurses who used the high-fidelity simulator self-reported a higher confidence rating ($p = 0.0156$) and scored higher on their competency evaluation ($p < 0.001$) during the mock codes. *Conclusion:* This study has shown that the confidence and competence of registered nurses can be positively impacted during the NRP training course. Therefore the use of high-fidelity simulation in the NRP training course would be an effective learning tool to promote nursing confidence and nursing competence, which will ultimately affect patient outcomes.

Keywords: Simulation, high-fidelity simulation, confidence, competence, neonatal resuscitation, NRP

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High-Fidelity Simulation in the Neonatal Resuscitation Program

Chapter I: Introduction

Every two years, healthcare professionals, including registered nurses, respiratory therapists, physicians, and residents, who attend deliveries for infants born in the United States, complete their training for newborn resuscitation. The Neonatal Resuscitation Program (NRP) was developed by the American Academy of Pediatrics (AAP) in conjunction with the American Heart Association (AHA) to train healthcare professionals on evidence-based resuscitation guidelines that should be used in the delivery room. Since the initiation of this program in the year 1987, the format and delivery of the educational materials have been updated to reflect current medical and educational trends.

One of the more recent educational trends that have been added to this program has been the implementation of simulation-based training. While the AAP has required the NRP course to use simulation-based training, there have not been any standards or guidelines to suggest how NRP instructors should conduct the simulation. The AAP states in their training textbook that in order for learners to receive their course completion card, they must successfully complete the NRP course and "participate in simulated resuscitation scenarios, *as determined by the course instructor(s)*" (American Academy of Pediatrics, 2016, pg. xii).

High-fidelity newborn simulators are available for use during resuscitation scenarios in NRP, but little research has been done to examine their effectiveness in this capacity. Although a plethora of research exists on the use of high-fidelity simulation in pre-nursing education and pre-medical education, the use of simulation to train and teach registered nurses is just beginning to emerge. Some studies have been conducted to evaluate the use of high-fidelity simulation in NRP on medical residents and physicians, but currently, there are no published studies that have

been completed to assess the use of high-fidelity simulation during NRP with registered nurses. Therefore, this project that will examine the use of high-fidelity simulation in comparison to low-fidelity simulation during NRP on registered nurses will add to the body of nursing research.

Background and Significance

There were 3.86 million babies born in the United States in 2017 (Martin, Hamilton, Osterman, Driscoll, & Drake, 2018). It is estimated that 10% of all newborns will require some form of assistance to breathe at birth (Kattwinkel et al., 2010). In addition to breathing, another 1% may need additional assistance which could be in the form of positive pressure ventilation (PPV), chest compressions, or the administration of resuscitation drugs. The Neonatal Resuscitation Program (NRP) was developed by the American Academy of Pediatrics (AAP) in conjunction with the American Heart Association (AHA) to train healthcare professionals that attend newborn deliveries to practice evidence-based resuscitation guidelines in the delivery room.

The NRP course has transitioned and changed over time as a result of research to indicate the need for improved guidelines, new equipment, new standards of care, and new teaching mechanisms. According to Jnah et al. (2016), the NRP program changed from a full day face to face didactic course to self-directed online learning modules with simulation based-training, which includes video recordings and debriefings of realistic scenarios. This change occurred in 2011, after the evaluation of studies that demonstrated that simulation-based training enhances performance in clinical situations as well as during simulated resuscitations (Kattwinkel et al., 2010). According to Zaichkin and Weiner (2011), the NRP provider course requires that simulation and debriefing be included to challenge learners in a safe environment. During this portion of the course, NRP instructors should develop realistic scenarios based on NRP learning

objectives. The scenarios should progress from simple to complex. Each situation should be lifelike enough that the learners will act and engage during the simulation, just like they would during a real-life emergency (Zaichkin & Weiner, 2011).

While there are no clear guidelines for how NRP instructors should conduct simulations from the AAP, Zaichkin, and Weiner (2011) explain that high-fidelity simulators can be used if the resources are available. But, simple and inexpensive materials can be useful for NRP simulation. Contrary to this, Cates (2011) suggest that high-fidelity newborn simulators, such as Newborn Hal from Gaumard, function so realistically with the ability to cry, grunt, change color, experience altered breathing, change its heart rate, and change its muscle tone, that the high-fidelity simulator will aide at creating an environment that will achieve suspension of disbelief.

When faced with a newborn in the delivery room that may require assistance to transition to extrauterine life, the team of healthcare professionals must respond appropriately to the situation. Infants who require resuscitation in the delivery room are at a higher risk for additional complications, which include complications from inappropriate intubation, pneumothorax for improper ventilation, worsening respiratory distress, intraventricular hemorrhage, and the potential of death (Bashir et al., 2017). Therefore, healthcare professionals that attend deliveries must be confident and competent in their NRP skills to provide appropriate and safe care to the infant.

Needs Assessment

The use of high-fidelity simulation during NRP training could increase the confidence and competence of registered nurses during neonatal resuscitation. To determine if the objective for this project could be impactful and successful, a SWOT analysis was conducted to examine the strengths, weaknesses, opportunities, and threats (See Appendix A). During the SWOT

analysis, it was determined that there were several internal strengths and weaknesses associated with this project. First, there is significant research to support the use of high-fidelity simulation in nursing students during general nursing education and training, as well as the use of high-fidelity simulation in medical residents for NRP training. The tertiary hospital has already purchased the Newborn Hal high-fidelity infant simulator, but it has not been used. Lastly, the tertiary hospital opened a state-of-the-art simulation center a few years ago that specializes in and supports hands-on, active learning through simulation. Several internal weaknesses were identified for this project. These include nursing staff that may be fearful of high-fidelity simulation, training for the Newborn Hal may be needed before the project can be implemented, and the Newborn Hal represents a full-term infant, and some NRP scenarios may require a simulator that represents a preterm infant which the tertiary hospital does not own.

When examining the external factors associated with this project, several opportunities and threats were identified. Opportunities identified with this project include that the AAP supports the use of simulation and debriefing to challenge learners and improve technical skills, practice effective teamwork, and improve communication. The use of simulation can improve neonatal outcomes if resuscitation is needed by ensuring that learners are competent in resuscitation skills. Finally, the organization has implemented a regional training center associated with the tertiary hospital that supports the use of high-fidelity simulation. External threats for this project include that there are several infant simulators available on the market with research to support their use, but the hospital only owns the Newborn Hal. Also, it will not be feasible to evaluate long-term outcomes during this project. In conclusion, after completion of the SWOT analysis, it is determined that the strengths and opportunities of this project outweigh the weaknesses and threats. With the support of the organization on simulation

training, the availability of the equipment, and the existing research to support high-fidelity simulation in NRP, this will ensure the success of the objective of this project.

Problem Statement

Simulation scenarios are now a requirement of the NRP provider course. They allow learners to practice and incorporate attained knowledge in a safe environment. With this change in teaching strategy, there have been limited guidelines or recommendations on how NRP instructors should complete the simulation portion of the course. The use of high-fidelity simulation is an option in the NRP course, but there is limited research as to whether this format of simulation makes a difference in a nurse's ability to practice confidently and competently during newborn resuscitation.

Purpose

As of the current date, only low-fidelity simulation is being used in the NRP training course at the tertiary hospital in which this project will occur. The purpose of this project is to compare the use of low-fidelity simulation with high-fidelity simulation during the NRP training course and to examine if the use of different types of simulation will have an impact on nursing confidence and nursing competence during neonatal resuscitation scenarios. Nursing confidence is associated with clinical competence (Arabani & Saleh, 2017). A lack of confidence may negatively impact a nurse's ability to provide safe care. Nurses must practice and improve the quality of their clinical performance. In turn, this will increase the nurse's confidence (Arabani & Saleh, 2017). Therefore, it is essential to evaluate both concepts. The aim of this project is to implement a high-fidelity simulation using the Newborn Hal simulator and compare if there is a difference in confidence and competence when using the high-fidelity simulator compared to the low-fidelity simulator.

There are two objectives of this project. The first objective is that the registered nurses using a high-fidelity infant simulator will report a minimum of 10% higher self-reported confidence level when compared to the self-reported confidence level of registered nurses using the low-fidelity infant simulator after completing a four-hour NRP training course. The second objective is that the registered nurses using a high-fidelity infant simulator will demonstrate a minimum of 10% higher competence in performing the NRP algorithm when compared to the registered nurses using the low-fidelity infant simulator after completing a four-hour NRP training course.

Clinical Question/PICOT

Considering these issues, the following PICOT questions have been formulated:

1. In registered nurses, how does high-fidelity simulation compared to low-fidelity simulation affect the nurse's confidence during the four-hour neonatal resuscitation program (NRP)?
2. In registered nurses, how does high-fidelity simulation compared to low-fidelity simulation affect the nurse's competence during the four-hour neonatal resuscitation program (NRP)?

Congruence with Organizational Strategic Plan

The tertiary hospital achieved ANCC Magnet recognition in 2010 and redesignation 2015. As part of the Magnet Recognition Program, the organization was evaluated on five key areas that are considered global issues in nursing and healthcare (St. John, 2018). Included in these five key areas are the pillars of competent, dedicated, and empowered nurses, as well as continued innovation with staff knowledge, clinical practice, and systemic improvements. As a continuing effort to improve these key areas, the organization opened a Regional Onboarding

Center (ROC) in 2016 that includes a state-of-the-art simulation center. The purpose of this simulation center is to integrate experiential learning and deliberate practice to develop more competent nurses. The goals of the ROC include adhering to adult education best practices while being standardized and efficient, measure and objective development progression that provides for patient safety, and being respectful of individual expertise. This project will implement a high-fidelity simulation into an existing training course offered at the ROC. Therefore, this project is in alignment and supported by the objectives of the ROC.

Synthesis of the Evidence

The CINHAL, OVID, and Google Scholar databases were utilized in the search for information related to this PICOT question. The CINHAL database was used for all the initial searches. The OVID database and Google Scholar were used to locate articles that were not available as full text in the CINHAL database. Additionally, Interlibrary loan through Bradley University's online library was used to obtain articles that were not available as full text on any of the previously mentioned databases.

Using the PICOT question an initial search was conducted using the keywords of simulation, neonatal, and fidelity. Since the methodology of the NRP provider course was changed to include simulation-based learning and debriefing in 2012 (Zaichkin & Weiner, 2011), but the study of the use of simulation for this course began before this change, the search timeframe was 2000 to 2019. This search resulted in 41 articles being found, with the oldest article published in 2004. These articles were further analyzed for the keywords of confidence or competence. After analysis of these articles, a total of 10 articles were identified for this PICOT question.

To evaluate research articles that focused on other types of resuscitation and not be limited to the neonatal population, an additional search was completed using the keywords of simulation, resuscitation, nursing, and fidelity from 2013 to 2019. A result returned a total of 20 articles. Those 20 articles were further evaluated for the keywords of confidence and competence. A total of four articles were selected to discuss general resuscitation.

Due to the limited number of articles found specific to neonatal nursing and resuscitation, the search was expanded to look at articles focused on nursing education. An additional search was completed using the keywords of simulation, nursing education, low-fidelity, and high-fidelity for the timeframe of 2013 to 2019. The result of this search produced 42 articles that were further reduced by adding the keywords of confidence or competence to the results. After the evaluation of the 20 articles containing these keywords, a total of six articles were selected.

Simulation in Nursing Education. Simulation is becoming a standard component of nursing education around the country. Many nursing programs are using different levels of simulation to assist nursing students in acquiring the knowledge, skills, and attitudes that they will need to possess as nurses once they graduate from school and obtain their licensure. This change in the structure of nursing education is related to a lack of clinical locations for nursing students to participate. Furthermore, the use of simulation also allows students to practice skills and interventions in a safe environment. The implementation of simulation in nursing education programs is supported by both the National Council of State Boards of Nursing (NCSBN) and the National League for Nursing (NLN) (Kiernan, 2018). As simulation continues to become an integral part of nursing education, it would make sense that simulation experiences should also be included in the continuing education and training of practicing registered nurses.

The International Nursing Association for Clinical Simulation and Learning (INACSL) explains that there are three types of fidelity to be considered when developing a simulation. These include physical fidelity, conceptual fidelity, and psychological fidelity (INACSL, 2016). When examining physical fidelity, the materials, environment, equipment, and props can be further defined as being low-fidelity to high-fidelity. Yaeger (2004) and Basak, Unver, Moss, Watts, and Gaioso (2015) state that simulations can be low-fidelity, which allows for the simple practice of skills, such as using a stationary arm to place an IV catheter. Additionally, Kiernan (2018) describes low-fidelity simulation as using simple mannequins or task trainers. High-fidelity simulation, on the other hand, is achieved when lifelike mannequins that breathe, talk and respond to nursing interventions are used to create a realistic learning environment (Ades & Lee, 2016; Kiernan, 2018; Yaeger et al., 2004). There is a considerable debate in the research as to if the use of high-fidelity versus low-fidelity simulation will improve learner outcomes, learner competence, and learner confidence.

Nursing student satisfaction with the simulation experience is well documented and supported. Although Roh, Lee, Chung, and Park (2013) found no difference in satisfaction when comparing low-fidelity to high-fidelity simulation, numerous studies have reported the opposite. Studies have indicated that students are frequently more satisfied with high-fidelity simulation experiences when compared with moderate or low-fidelity simulations (Baptista, et al., 2016; Basak et al., 2015; Lubbers & Rossman, 2016; Zapko, Ferranto, Blasiman, & Shelestak, 2018). But, student satisfaction does not necessarily mean that the student learned something valuable that will translate to their nursing practice. The evaluation of self-confidence and competence are two crucial characteristics of nurses that must be considered during simulation training.

Confidence. According to the Merriam-Webster dictionary, self-confidence is defined as having confidence in oneself and in one's powers and abilities (Merriam-Webster, 2018). Many studies have hypothesized that using high-fidelity simulation will increase nursing student confidence (Basak et al., 2015; Lubbers & Rossman, 2016; Zapko, Ferranto, Blasiman, & Shelestak, 2018 Zhu & Wu, 2016). These studies did demonstrate that high-fidelity simulation increased nursing student confidence when compared with moderate or low-fidelity simulations by using a self-report confidence scale.

Simulation can be an essential learning modality for resuscitation training. According to Roh, Lee, Chung, and Park (2013), simulation-based resuscitation training can be invaluable to allow registered nurses to be immersed in emergency situations and be able to complete interventions, and review consequences in a safe environment without putting patent safety at risk. However, when comparing a computer-based simulation with a mannequin-based simulation during an Advance Life Support (ALS) training course for registered nurses, there was no significant difference in the self-report confidence level of the registered nurses (Roh, Lee, Chung, & Park, 2013). Contrary to this Tivener and Gloe (2016) how found that high-fidelity simulation in cardiopulmonary resuscitation (CPR) had a significant impact on student confidence.

Similar studies exist that examine the use of high-fidelity simulation when used in the NRP training course. Curran et al. (2013); Hossino et al. (2018); Nimbalkar et al. (2015) each report that using high-fidelity simulation during the NRP training course increased the learner's confidence. Additionally, Bender, Kennally, Shields, and Overly (2014) stated that confidence in resuscitation for NRP could be positively impacted by an NRP simulation booster intervention.

Regrettably, all these studies focus on medical residents. There were no studies that focused on nursing confidence when using any form of simulation during the NRP training course.

Competence. An additional characteristic that is frequently assessed during simulation experiences is competence. Patricia Benner (1982) defined competence in nursing to include the ability to see their actions in terms of long-range goals and plans for the patient. Being a competent nurse requires insight and inflection on how the nurse's actions will affect or impact the patient. Benner (1982) also states that most in services or organizational trainings are aimed at achieving competency.

Baptista et al., (2016) measured self-reported gains by nursing students that indicated that nursing students who participated in high-fidelity simulation versus moderate or low-fidelity simulation had a statistically significant increase in gains that included their ability to assess and anticipate patient outcomes, which lead to improved decision-making in-patient care. Kiernan (2018) studied a similar concept with nursing students using a clinical competency questionnaire after the implementation of high-fidelity simulation. The nursing students in this study also had improved clinical competency that led to improved patient outcomes.

According to Zaichkin (2018), the quality of resuscitation in the labor and delivery room can have long-term implications for the infant's health. The NRP training course provides evidenced-based practice guidelines and skills that can impact the performance of the neonatal delivery team, which will ultimately affect neonatal outcomes. High-fidelity simulations are shown to be an effective method of teaching the components of the NRP training course. Knowledge retention has been tested after the implementation of a high-fidelity simulation course and has been shown to be a powerful tool in helping medical students and medical professionals (Campbell, Barozzino, Farrugia, & Sgro, 2009; Lai, Ngim, & Fullerton,2012; Ross,

Rebella, Westergaard, Damewood, & Hess, 2016; Tivener & Gloe, 2015). Interestingly, Lai, Ngim, and Fullerton (2012) completed a follow-up assessment one year after their simulation and determined that half of the knowledge acquired during the simulation had been lost or forgotten. When examining competence during NRP, high-fidelity simulation has been shown to increase technical and behavior skills in medical residents (Sawyer, Leonard, Sterocka-Castandeda, & Thompson, 2014) as well as teamwork behaviors (Rakshasbhubankar & Patole, 2014). On the other hand, when comparing high-fidelity versus low-fidelity simulation when used in training medical residents during neonatal resuscitations, Nimbalkar et al. (2015) found there to be no difference in the student's skill acquisition when compared to the type of fidelity of the simulation. Therefore, these authors reported that while competence was improved, the advantage of the high-fidelity simulation was not impactful.

Although no studies were found that examined nursing competency during the NRP training course, several studies were found that evaluated nursing competence in general. Simulation has been shown to be a beneficial teaching method for registered nurses as part of continuing education or when learning new processes and skills. In a study conducted by Allan et al. (2010), simulation training was used to teach pediatric intensive care nurses to teach resuscitation skills and found that nurses were better prepared to participate in future resuscitation. Bultas, Hassler, Ercole, & Rea (2014), also found that using simulation-based training with pediatric nurses during routine staff education on how to care for deteriorating patients was effective in increasing knowledge. Conversely to Lai, Ngim, and Fullerton (2012), who found that knowledge was not retained long-term after simulation training, Bultas, Hassler, Ercole, & Rea (2014) found that knowledge retention for nurses was retained long-term after specific simulation scenarios.

Theoretical Framework

As identified previously, the major concepts of this project include nursing confidence and nursing competence. According to Merriam-Webster dictionary, self-confidence is defined as "having confidence in oneself and in one's powers and abilities," and competence is defined as "having sufficient knowledge, judgment, skill, or strength" (Merriam-Webster, 2018). These two concepts are dependent on each other for a registered nurse to provide effective and safe patient care. According to Arabani and Saleh (2017), a lack of confidence can hamper a nurse's ability to perform competent and safe patient care.

Patricia Benner (2001) developed the novice to expert nursing theory based on the Dreyfus model of skill acquisition. The Dreyfus model, using chess players and airline pilots, identified that through the attainment and development of skills, a student would pass through different levels of proficiency. The movement through these levels is based on three aspects of skill performance, which include movement from reliance on abstract principles to using concrete experiences, a change in the learner's perception, and finally transitioning from a detached observer to an involved performer (Benner, 2001). This model was the foundation for Benner to identify levels of nursing performance using knowledge acquisition, experiences, and skill development in relation to the five levels of proficiency. The Novice to Expert nursing theory identifies the five levels of proficiency in nursing, which include novice, advanced beginner, competent, proficient, and expert (Benner, 2001).

Benner further went on to define each of the levels of the novice to expert nursing theory to include characteristics of the nurse's performance and the teaching and learning needs of the nurses in each of the levels. Of importance to this study is Benner's discussion of the level of competence in nursing. Benner (1982) defines competence to include the ability of the nurse to

see their actions in terms of long-range goals and plans for the patient. With this insight, the registered nurse must then draw on knowledge as well as experiential practices to make clinical decisions for the patient. In the competent level, the nurse can recognize what is vital to the patient and what can be ignored (Benner, 2001).

Also, Benner (2001) defines competency to be unrelated to the competent stage. Competency, according to Benner (2001), refers to an "interpretively defined area of skilled performance identified and described by its intent, function, and meaning" (p. 292). Benner (2001) went on to describe 31 competencies, classified into seven different domains of practice situations. The domain of *effective management of rapidly changing situations* is relevant to registered nurses that would be using the NRP evidence-based guidelines and interventions to manage an infant in the delivery room. Registered nurses assigned to care for infants immediately after delivery are managing these infants independently. The registered nurse must be able to assess and recognize changes that would indicate an impending emergency or quickly identify an emergency and respond appropriately to provide safe care. Benner (2001) concludes that registered nurses are typically the ones that initiate resuscitation, which takes considerable knowledge and skill to provide rapid intervention. Registered nurses in practice situations, such as the delivery room, would require them to use their NRP knowledge and skills to initiate neonatal resuscitation.

This theory applies to this study since Benner (1982) states that most in-services or organizational trainings are aimed at achieving the level of competence. The NRP training course requires learners to complete online learning modules and online examinations. The purpose of this portion of the training course is to allow the learners to acquire the basic knowledge of NRP evidenced-based guidelines, appropriate interventions, and the rationales for

each of the interventions. Benner (1982) also states that nurses in the competent stage will benefit from simulation as this type of learning model will give them the ability to practice providing complex nursing interventions required by patients.

The instructor-led portion of the NRP training course currently offers low-fidelity simulation for registered nurses to practice NRP interventions and skills. Offering the NRP training course with the use of a high-fidelity simulation experience would create a more realistic experience that would assist nurses in passing through the proficiency levels based on the three aspects of skill performance discussed earlier. These three aspects consist of moving from reliance on abstract principles to using concrete experiences, a change in the learner's perception, and finally transitioning from a detached observer to an involved performer (Benner, 2001).

Finally, Benner (1982) stated that being competent requires some previous experience and exposure to clinical situations, and with increased exposure, the registered nurse's confidence will also improve. High-fidelity simulation can allow a realistic experience and exposure to a scenario that will enable the nurse to practice the competencies in the domain of effectively managing a rapidly changing situation is a safe environment. Patient care errors and inappropriate actions by the nurse can be reflected on to allow the nurse to correct their practice and become a more competent nurse.

Chapter II: Methodology

Project Design

This project design was a non-blinded experimental randomized control trial. The study compared two groups of participants that were randomly selected to be in either a control group or an experimental group. The control group participated in the four-hour NRP training course

and completed their skills and final mock code scenarios with a low-fidelity infant mannequin. The experimental group participated in the same four-hour NRP training course and completed their skills and final mock code scenarios with a high-fidelity infant simulator.

Setting

This study was conducted at an education center associated with a tertiary hospital in Tulsa, Ok. The tertiary hospital has a high-risk perinatal center that conducts 2,400 deliveries per year. The tertiary hospital has a level III neonatal intensive care unit (NICU) that cares for extremely premature and sick infants born at the hospital as well as infants transported from other community facilities that need advanced care. The healthcare providers at this tertiary hospital are required to take the NRP course every two years to maintain knowledge and competency on high risk maternal and infant care. The education center is a regional simulation center where all the educational programs for registered nurses and other interdisciplinary team members are held. In 2018, the educational center offered the NRP course 34 times, and 140 healthcare providers completed the training. There is currently a similar number of courses as well as healthcare providers that will be trained in the current year.

Population/Sample

The population for this study consisted of registered nurses that work at the tertiary hospital in the maternal-child departments and require NRP training as a part of their job description. The maternal-child departments include Labor and Delivery (L&D), Newborn Nursery, Postpartum, and NICU. The literature review revealed studies on nursing students and registered nurses regarding simulation in general. But, there was an absence of studies that evaluated registered nurses during the NRP training course. The population and sample for these studies with the NRP training course were using physicians and residents with various levels of

experience in neonatal resuscitation. Therefore, registered nurses were the focus population of this study.

The NRP training course is required to be taken every two years as part of the registered nurse's job description. Participants were recruited for this study through an email invitation that was provided to all of the nurse managers for the maternal-child departments (See Appendix B). Each of the nurse managers was asked to disseminate the invitation to their nursing staff. Since the NRP training course is required, every two-years, registered nurses that needed to take the course within the next six months were recruited. As an incentive for participating in the NRP training course that was affiliated with this study, participants were provided with a $5 gift card.

The sample size was determined by the number of registered nurses enrolled in the NRP training course. Enrollment for each NRP training course is limited to three to four learners for each NRP instructor based on the AAP's NRP instructor to student ratio (AAP, 2016). There were four NRP training courses for this project, and each course had two instructors, one of which will be the primary investigator for this study. Therefore, the target sample size was 24 registered nurses with approximately 12 registered nurses in the control group and 12 registered nurses in the experimental group, although the target was not achieved.

The inclusion criteria for the study consisted of any registered nurses who work in the maternal-child departments of the tertiary hospital and whose current NRP provider card will expire within six months of the date of the study. The exclusion criteria were other types of healthcare providers, such as respiratory therapists, residents, or physicians. An additional exclusion criterion was any registered nurses that work in areas outside of the maternal-child department, such as the emergency room.

After the study concluded, there were a total of 15 participants in the four courses that were associated with this project. Two of the original 15 participants were excluded from the study due to not meeting the inclusion criteria. One of the excluded participants was a registered nurse in the emergency room, and one of the participants was a pediatric resident. The total sample size for participants that meet the inclusion criteria was 13 registered nurses. Of the total sample, seven registered nurses were in the control group (n=7), and six registered nurses were in the experimental group (n=6). Randomizations determined these groups. Of the 13 registered nurses, all of them completed the informed consent (See Appendix C), participated in the full course, which included the observational competency tool, and completed each of the self-report instruments.

Random assignment to the control group or the experimental group was done by completing simple random sampling. There were four unmarked envelopes, one for each of the four NRP training courses. The NRP instructor randomly selected one of the unmarked envelopes at the start of the NRP training course. The contents of the envelope indicated if the NRP training course would use the low-fidelity infant mannequin or the high-fidelity infant simulator.

Participation in the study was voluntary. Registered nurses that did not wish to participate in the study were informed that they would still be allowed to complete the NRP training course that they signed up for, but they would not be required to complete any of the surveys or competency tools during or after the completion of their NRP training course. Participants were informed that choosing to not participate in the study would not affect the registered nurse's ability to obtain their NRP provider card at the end of the NRP training course. All participants that signed up for the course choose to participate in the study.

Instruments

Three paper tools were used to collect data and measure outcomes during this study. The first paper tool was a demographic questionnaire that was developed by the DNP student, which also included the directions for all of the tools (See Appendix D). This questionnaire consisted of demographic questions that were used to compare the control group and the experimental group of the study. Questions included the educational level of the participant, number of years of experience as a registered nurse, department currently employed in, number of years working on a maternal-child nursing unit, number of times completing NRP training, and if they have ever used NRP during a real resuscitation in the past. These questions were chosen to evaluate the current experience level of the registered nurse since lack of experience, or extensive experience could impact the registered nurse's confidence and competence. Additionally, there was a question that asked about prior simulation experience or simulation knowledge. This question was selected because registered nurses that have never experienced high-fidelity simulation may report their confidence or demonstrate competence differently than a registered nurse that has had previous exposure to high-fidelity simulation.

The second paper tool used, measured the outcome of learner confidence. The National League of Nursing (NLN), Student Satisfaction and Self-Confidence in Learning tool, which is a 13 item self-report survey was considered for this study. The tool measures both satisfaction and self-confidence, but only the portion of the survey that measures self-confidence would be needed. This tool exclusively focuses on confidence questions related to the simulation learning environment specific to medical-surgical nursing. Since this study focused on neonatal resuscitation, the NLN tool was used as a guide for creating a new tool that would measure nursing confidence in neonatal resuscitation and neonatal resuscitation skills.

The Neonatal Resuscitation Confidence Questionnaire (NRCQ) was developed by the DNP student using the NLN Student Satisfaction and Self-Confidence in Learning tool (See Appendix E). The general format and directions were modified to create this new tool. Additionally, the skills that learners in the NRP training course are required to achieve to complete the course and obtain their NRP provider card were used to write the questions for this new tool. These skills directly correlate to the skills in the NRP mock code scenarios. The final tool contained 14 items on a 5-point Likert scale. The NRCQ is a self-report tool asking the participant to rate their level of confidence in NRP skills used during the simulation. Since this is a new tool, there are not reliability or validity statistics.

The final tool used in this study was the Creighton Competency Evaluation Instrument (CCEI) (Copyright 2013 by Creighton University School of Nursing) (See Appendix F). This instrument measures competency during simulation in four categories, which include assessment, communication, clinical judgment, and patient safety. Within each of these categories are individual sub-items to support the category with a total of 23 possible criteria. Each sub-item is scored as competent, with a score of one (1) or not competent, with a score of zero (0). The instructor individualized the criteria based on the simulation used.

The CCEI allows the individual instructor to define specific measures for scoring a participant as competent, not competent, or not applicable for each of the criteria. Based on the NRP algorithm, only 13 of the 23 items were addressed. The NRP instructor determined the specific measurements for competence before the study started using the standards of care and steps that are listed in the NRP algorithm. These specific measurements are listed on the CCEI Discussion Worksheet for each of the four categories (See Appendix G). For example, the CCEI lists under the category of clinical judgment the sub-item of *provides evidenced-based*

interventions. The NRP instructor decided that providing positive pressure ventilation (PPV) within 30 seconds of finding the infant apneic as being competent (1) and not providing PPV within 30 seconds would be scored as not competent (0).

The scores for each of the 13 sub-items were added together for a total competence score for each participant. A participant who completed all criteria correctly would receive a score of 13/13 or would be considered 100% competent versus a participant that scored 11/13 would only be 85% competent. The reliability of the CCEI has been tested using Cronbach's alpha of 0.90 (Hayden, Keegan, Kardong-Edgren, & Smiley, 2014). The CCEI is available at the Creighton University website as a free download and does not require permission to use (Creighton University, 2019).

Project Plan

This project consisted of four phases, which included project preparation, pre-implementation, implementation, and project conclusion. The expected timeframe for the project pre-implementation is April to July, with implementation occurring in July and August. The final project conclusion phase will begin at the end of August. A timeline for the start and completion of each stage of this project, including the specific items and tasks for each phase can be seen in the Ghannt chart. (See Appendix H).

Implementation. The NRP training course is a four-hour training course that nurses, physicians, residents, and respiratory therapists take to learn the appropriate evidence-based guidelines for neonatal resuscitation in the delivery room. Participants for this course sign up through an online learning management system and complete textbook readings, several online examinations, and several online e-simulations. After completion of the online program, participants sign-up to take a four-hour instructor-led course. During the instructor-led course,

the participants have an opportunity to practice in the skills stations, which include providing oxygen, providing PPV, intubation, umbilical cannulation, and medication administration. After the conclusion of the skills stations the participants each complete mock code scenarios acting as the leader of an assigned delivery scenario. The mock code scenario allows the participant to put together everything they have learned in a simulated delivery room emergency. After the completion of the course, the participants receive an NRP provider card that is valid for two-years.

This study aims to identify the difference in registered nurse's levels of confidence and competence when taking the four-hour NRP training course with a low-fidelity infant mannequin or a high-fidelity infant simulator. Currently, the tertiary hospital is only utilizing low-fidelity simulation for mock code simulation scenarios during the NRP training course. The intervention that was evaluated during this study was the use of high-fidelity simulation during the mock code simulation scenarios during the NRP training course. The intervention was selected because of identified research that supports high-fidelity simulation as a potential superior form of education and training for registered nurses. Additionally, the tertiary hospital has already purchased the high-fidelity infant simulator but has not implemented the use of the infant simulator during any of the NRP training courses.

During the four-hour NRP training courses used in this study, the registered nurses were randomly assigned to the control group or the experimental group. Once all the registered nurses arrived for the training course, the NRP instructor chose one unmarked envelope whose contents will indicate the type of simulator the course will use. There were a total of four envelopes with two envelopes designated as low-fidelity and two envelopes designated as high-fidelity. The registered nurses in the control group completed the NRP training course in the same fashion that

the facility has been using for several years, which included the skills stations and mock code scenarios being done with a low-fidelity infant simulator. The registered nurses in the experimental group completed the same NRP training course. The only difference in the experimental group was that the high-fidelity infant simulator was used in place of the low-fidelity simulator during the skills stations and the mock code scenarios.

The mock code scenarios for both the control group and the experimental group were the same and required the same NRP interventions (See Appendix I). Since the enrollment was limited to no more than six participants, there were a total of six mock code scenarios for this project. In the instance that less than six registered nurses signed up for any of the training courses, the following method was used to determine which mock code scenarios were used. Scenarios one, three, and five were used for all groups, no matter how many participants enrolled. Scenarios two, four, and six are repeated scenarios that require the same interventions as scenarios one, three, and five. The only difference in these scenarios is the presenting information for the infant has been altered. Scenarios two, four, and six were placed in a bowl and randomly drawn by the NRP instructor. The NRP instructor selected as many scenarios as was needed to ensure that all participants had a scenario. For example, if a group had five participants, scenarios one, three, and five were used. The NRP instructor drew two additional scenarios from the bowl for a total of five random scenarios.

Outcome Measurements. The successful implementation of this project was determined by evaluating the objectives of this project. Data from the two groups, which consist of a control group of registered nurses that used the low-fidelity infant simulator and an experimental group of registered nurses that used the high-fidelity infant simulator, were compared to evaluate if there was a difference in the two variables of confidence and competence.

1. The registered nurses enrolled in the NRP training course will report 10% higher confidence when using the high-fidelity infant simulator after the completion of the four-hour training course when compared to the registered nurses using the low-fidelity infant simulator.
2. The registered nurses enrolled in the NRP training course will demonstrate a 10% higher competence of skills when performing the NRP algorithm with a high-fidelity infant simulator after the completion of the four-hour training course when compared to the registered nurses using the low-fidelity infant simulator.

Procedure for Data Collection. The timeline for data collection during this project occurred during each of the four-hour NRP training courses and immediately after the completion of each of the four-hour NRP training courses. Three tools were used for data collection. The CCEI tool was completed during each of the four-hour training courses, and the data for the demographic survey and the NRCQ was collected immediately after each of the four-hour NRP training courses. Potential barriers to data collection included participants not completing the tools in their entirety or not turning in the tools at all. The plan to address this barrier was that if a participant did not complete a question on the tool, that response to the question would be removed for that participant. If a participant did not complete multiple questions, or they do not turn in one of the tools at all, then the plan to address this barrier was data deletion, which would result in all the data for that participant being removed.

During the mock code simulation scenarios that occur during the four-hour NRP training course, the data collection for the variable of competence was collected. Every registered nurse in the four-hour training course was required to lead a mock code scenario. Each of the registered nurses that completed an informed consent was observed during their assigned mock

code scenario using the CCEI tool. The NRP instructor teaching the training course observed the simulation in real-time and scored each of the registered nurses based on the indicators in the tool. Participant identity was protected by using a participant number listed on each of the CCEI tools. This number correlated to the number on the surveys that were completed by the participant after the four-hour NRP training course. The same NRP instructor was used to observe all four training courses in the study to ensure the reliability of the observations. The NRP instructor responsible for observing the simulations and recording on the CCEI tool was trained on the use of the CCEI tool before the implementation of the study. Additionally, to ensure the NRP instructor possess confidence in using the CCEI tool, the NRP instructor also practiced using the tool during several NRP training courses that were not used for this study. The completed CCEI tools was placed in the same envelope that was also used to collect the participant's other surveys at the end of the four-hour NRP training course.

The data for the demographic survey and the NRCQ were collected immediately after the completion of the four-hour training course. The demographic survey, as well as the NRCQ, were included in the envelopes that were given to the registered nurses at the beginning of the NRP training course. The numbered tools for each participant to matched the numbers on the CCEI tool. Immediately after the NRP training course, the registered nurses had up to 30 minutes to complete the two surveys. The demographic tool also contained the directions for how to complete the tools and what to do with the tools when they have completed them (See Appendix D). An NRP instructor was available in an adjoining room to answer questions that participants may have had about the tools. All the registered nurses in the NRP training course placed their completed tools in one envelope provided by the NRP instructor. After collection of all the tools,

the envelope was sealed by the last registered nurse to place their materials in the envelope. The envelope was then given to the DNP student.

Evaluation. This project was evaluated by reviewing the outcomes stated in the project. The data was analyzed to determine if the registered nurses enrolled in the NRP training course reported 10% higher confidence when using the high-fidelity infant simulator after the completion of the four-hour training course when compared to the registered nurses using the low-fidelity infant simulator. Also, the data was analyzed to determine if the registered nurses enrolled in the NRP training course demonstrated 10% higher competence in skills when performing the NRP algorithm with a high-fidelity infant simulator after the completion of the four-hour training course when compared to the registered nurses using the low-fidelity infant simulator. Finally, the data collected for this project was also analyzed for any additional pertinent trends or tendencies that occurred when comparing the group of registered nurses that used high-fidelity with the group of registered nurses that used low-fidelity.

After data the completion of data collection and analysis, the outcomes were evaluated, and these results will be communicated to the nursing research council for the tertiary facility, the NRP instructors, and the administration for the nursing education department. The DNP student will meet formally with the NRP instructors and the administration team for the nursing education department to discuss the results of the study. If the outcomes of the study are positive, the team will review the potential implementation of high-fidelity simulation in future NRP courses. If the results of the study are not positive, the project plan will be evaluated to determine if there are alternative solutions to implement high-fidelity simulation in the NRP course or if there are modifications that can be made to impact the NPR courses in the future.

Sustainability Plan. If the outcomes in this study are achieved, plans will be made to implement the use of the high-fidelity infant simulator in the monthly NRP training courses that are taught at the tertiary facility. Implementation of high-fidelity simulation will involve training all the NRP instructors on how to use the high-fidelity infant simulator. The company for the high-fidelity infant simulator will be contacted to schedule training sessions for the actual product. The DNP student will modify NRP mock code scenarios based on the results of the study. For example, if there was a physiological change in the simulator that was supposed to trigger an action from the registered nurses, but none of the registered nurses responded appropriately then the scenario would need to be modified. The DNP student will train the NRP instructors on the scenarios throughout several months to allow the NRP instructors to become comfortable and competent to use the technology. Additionally, there will be a meeting with the company representative for the high-fidelity infant simulator to discuss the necessary software updates, hardware updates, and any maintenance that the high-fidelity infant simulator may need in the future. Knowing this information will allow the Administrator for the nursing education department to plan appropriately for any additional cost factors that may need to take place in the future.

Data Analysis

The data for this study was collected from the three separate tools that were completed by the study participants and the NRP instructor. The online enrollment system provided the number of registered nurses enrolled in the four NRP courses. This number was compared to the number of informed consents and the number of surveys to confirm that all the data had been collected for each of the participants in the course. The DNP student entered the data from the tools into an excel spreadsheet that was constructed with input from the statistician. To ensure

the accuracy of the data, the NRP instructor from the NRP training course will double-check that the translation of data from the tools into the excel spreadsheet did not contain errors. The translation of data into the excel spreadsheet occurred within seven days of the NRP training course. The excel spreadsheet was then be provided to a statistician to complete the statistical analysis of the data. Descriptive statistics were used to describe the characteristics of the control group and the experimental group using the data collected from the demographic study. Inferential statistics, such as the t-test, were used to compare the control and experimental groups regarding the variables of confidence and competence. The statistician provided a narrative of the results to the DNP student.

Institutional Review

This study received approval from the DNP student's education institutions Committee on the Use of Human Subjects in Research (CUSHR) (See Appendix J), the project site's nursing research council (See Appendix K), as well as the project site's IRB committee (See Appendix L) before implementation. Necessary IRB addendums based on requests from the educational institution IRB and the project site IRB reviews were provided to each of the IRB review teams before the implementation of the study. Participation in the study was voluntary. Participants were able to opt-out of the study at any point and time. Participants who did not wish to partake in the study were informed that they would still be allowed to complete the NRP training course and receive their NRP card. Informed consent was required for participation in the study (See Appendix C). The informed consent also included the purpose of the study as well as an explanation of the benefits and risks of the study. Confidentiality was maintained during the study by providing participants with a number to de-identify them during the study. All documents for data collection referred to the participant by their assigned number.

Chapter III: Organizational Assessment and Cost Effectiveness Analysis

Organizational Assessment

As mentioned earlier, the tertiary hospital that used for this project achieved ANCC Magnet recognition in 2010 and redesignation 2015. Additionally, a Regional Onboarding Center (ROC) was established in 2016 that includes a state-of-the-art simulation center, whose purpose is to integrate experiential learning and deliberate practice to develop more competent nurses. The goals of the ROC include adhering to adult education best practices while being standardized and efficient, objective development progression that provides for patient safety, and being respectful of the individual's expertise. This project implemented a high-fidelity infant simulation into the NRP training course that is offered at the ROC. The tertiary hospital previously purchased the high-fidelity infant simulator. Magnet recognition, the establishment of the ROC, the goals of simulation education, and the previous purchase of the high-fidelity infant simulator all indicate that the organization is ready for change.

Facilitators for the implementation of this project include the Administration's focus and goal to use more simulation during educational offerings at the ROC. Other training courses that are taught in a traditional lecture format are being redeveloped to use more simulation. The NRP training course is currently being taught in a simulation format, but the implementation of high-fidelity will further meet the goals of the ROC. Barriers to the implementation of this project include the lack of desire for the current NRP instructors to use the high-fidelity infant simulators. The high-fidelity infant simulator was purchased several years ago and has not been used since the purchase. The current NRP instructors believe that the low-fidelity simulations meet the needs of the students in the training course, and there is not a strong enough indication to update the modality of the course.

Several risks or unintended consequences could impact this project. First, the training for the high-fidelity infant simulator has occurred through videos and paper modules provided by the manufacturer. The infant simulator has not been used by another educator in the education department. Therefore, there is a risk that implementing the use of this technology may present challenges in its application. Second, since the high-fidelity simulator has not been used, there is the possibility that additional parts, pieces, or software may be needed before implementation, which could take time or additional cost to resolve. Lastly, since this is a higher level of technology, the results of the study could be negative and not indicate that it should be used in the future. A negative result could be due to the participant's stress level that may be associated with a different type of infant simulator than what they are used to. Or that the use of the high-fidelity infant simulator takes longer to complete the scenarios, and the length of the four-hour training course may need to be increased.

Interprofessional collaboration will occur at multiple levels of this project. The NRP instructors range from registered nurses, advanced practice nurses, and physicians. All will need to receive training on the use of the high-fidelity infant simulator if it is implemented for future classes. The simulation technician will need to receive training on how to clean and care for the simulator. Additionally, the simulation technician will need to be aware of software updates or parts that need to be replaced or purchased for the equipment. The healthcare providers for the maternal-child department will also need to be made aware of the potential change in the format of the NRP training course. They will need to monitor infant resuscitations and infant outcomes to ensure that the new learning tool is effective at providing appropriate knowledge to the NRP providers who complete the training.

Cost Factors

The capital equipment necessary for this project was purchased by the education department for the tertiary hospital. This equipment includes a high-fidelity infant simulator, Newborn Hal, from Gamuard. This simulator was acquired several years ago by the facility. The cost of the infant simulator is $50,000. This simulator has been in storage since it was purchased and has not been utilized by the education department. Therefore, there is a cost avoidance associated with this equipment being bought but not used.

The NRP training course is a four-hour course that consists of various skills stations to practice skills. Then mock code scenarios are used at the end of the course to incorporate all the skills and NRP lessons into a comprehensive simulated emergency delivery situation. The AAP recommends that one NRP instructor is present for every three to four students enrolled in the course (AAP, 2016). The NRP training courses used for this project will require a total of two NRP instructors to oversee an estimated six participants in each course. The enrollment management system will have a limit of no more than six registered nurses that can enroll in any of the courses for this project. Two NRP instructors were used to teach the entire four-hour course. During the mock code scenarios, one NRP instructor was used to run the simulation and complete the CCEI for each registered nurse, and one NRP instructor was used to complete the debriefing after the simulated code scenarios. This project will require a total of four NRP training courses to be set up in this format for a total of 16 hours of paid instruction time.

Additional costs for this project included the use of paper supplies to print all materials that used for invitation flyers, consent forms, surveys, tools, as well as the envelopes that these printed materials will be placed in after the NRP training course. Also, there will be an incentive of a $5-dollar gift card for each participant that completes the NRP training course and surveys.

Lastly, a statistician was used to complete the data analysis for this project. The statistician is a college professor that completed the data analysis for a minimal cost or donation by the DNP student. The budget and cost factors for this project are available in Table 1 (See Appendix M).

Chapter IV: Results

Analysis of the Implementation Process.

This project began with the DNP student obtaining permission from the director of the education department to use the high-fidelity simulation equipment to complete mock codes during the tertiary hospital's NRP training course and use data collected from these courses as part of a research project. The director discussed the timelines, dates, and resources needed during the meeting. Once the director approved hosting the research study in the facility, the DNP student obtained approval from the nursing research council at the facility. Additionally, both the IRB for the school and the facility approved the study. After approval was confirmed for the study, the DNP student submitted the advertisement flyers to the managers of the maternal-child departments for the facility to recruit participants for the research study.

While waiting for the data collection portion of the study to begin, the DNP student taught four NRP courses. During these NRP courses, the high-fidelity simulator was used to practice the mock code scenarios that were used during the study. These practice courses allowed the NRP instructor to make modifications to scenarios based on issues presented during the practice scenarios. One example of an adjustment made was that one of the scenarios required reprogramming for a missing heart rate when the students auscultated for heart tones. After completing these practice courses, the instructor also gained confidence in running the scenarios for the students.

The education department schedules a total of three NRP courses each month. Since the study focused on just registered nurses, the director of the education department selected two NRP courses each month for the study, and the third course was not used for the study. By planning the courses in this manner, other healthcare professionals who needed to take the NRP course still had an opportunity to complete their training since healthcare professionals that were not nurses were not used in the data collection. There were a total of four NRP courses scheduled for this study. Two of the courses occurred in July, and two occurred in August. The enrollment for each of the courses in the study was set to a maximum of six participants, which would have given the study a total of 24 participants. As the courses approached, additional emails were sent to the maternal-child department managers to update them on the number of nurses enrolled and the number of seats still available. During the two courses taught in July, only four participants enrolled in each of the courses. The biggest challenge presented itself in August as the enrollment numbers were much lower than expected. The week the courses were scheduled to be taught, the director of the education department chose to cancel one of the courses due to only having one participant enrolled. This course had previously been advertised as part of the research study. The DNP student was able to get approval from the facility's IRB to move the date of the course to the third course that was being offered that month that was not originally scheduled to be part of the study. This allowed for the study to continue but did not allow for the DNP student to advertise the study. During the two courses in August, there were a total of seven participants, but because the date of the study was changed, two participants were excluded from data collection due to not meeting the inclusion criteria for the sample.

During each of the four courses for this study, all participants that met the inclusion criteria completed the consent as well as the data collection tools for the study. No participants

chose to opt-out of the study, although two individuals were excluded due to not meeting the inclusion criteria of the study. To randomize the courses into control groups and experimental groups, cards indicating low-fidelity or high-fidelity were pulled from an envelope before the start of the course. During the four courses, the intervention for using either the low-fidelity mannequin or the high-fidelity simulator for the mock code scenarios was uneventful. The DNP student ran the scenarios for each of the participants and completed all of the observational tools. A second NPR instructor was used to complete the debriefing with the participants after the completion of scenarios to allow the DNP student time to tabulate scores and set up for the next scenario.

All in all, the strategy for the implementation of the intervention was in alignment with the initial plan. The only significant deviation was the last-minute change in course dates and the lack of participants to sign up for the course. The DNP student having multiple attempts to practice using the high-fidelity simulator before the implementation of the study was a benefit and allowed for the successful implementation of the study. The most important lesson learned was the ability to be flexible since a course was moved to a different date unexpectedly. Thankfully there was a third option during the timeframe that allowed for this flexibility. In the future, if this study were to be replicated, it would be recommended not to set specific dates for data collection completion, but as an alternative, set the desired participant count over several months. This would allow the researcher to continue to teach courses every month until the preferred sample was obtained instead of being limited to a certain number of courses.

Analysis of the Project Outcome Data

There were three data collection tools used during this study to measure the selected outcomes. These tools included the demographic data on the participants, the self-report NRSQ,

and the CCEI. When analyzing the data, all data was present. No information was missing. The data was transferred from the individual data collection tools into an excel spreadsheet. The data collection tools and the excel spreadsheet were proofread on three separate dates to ensure that the data was transferred correctly and accurately. The data was then evaluated for statistical analysis.

Sample. There were 15 participants in the four courses that were associated with this project. The total sample size for participants that meet the inclusion criteria was 13 registered nurses. Of the total sample, seven registered nurses were in the control group (n=7), and six registered nurses were in the experimental group (n=6). Randomizations determined these groups. Two of the original 15 participants were excluded from the study due to not meeting the inclusion criteria. One of the excluded participants was a registered nurse in the emergency room, and one of the participants was a pediatric resident. Of the 13 registered nurses, all of them completed the informed consent, participated in the full course, which included the observational competency tool, and completed each of the self-report tools.

Demographic data. Each participant completed a demographic data tool to analyze further their confidence and competence in relation to their work experience, experience using NRP in the clinical setting, previous experience with high-fidelity simulation, and workplace location. The demographic tool asked the participants to select from three ranges of experience that correlated with Benner's Novice to Expert Theory. These ranges included 1-2 years (novice), 3-4 years (advanced beginner), and five or more years (competent). Of both the control groups and the experimental groups, the majority of the participants had worked in the maternal-child area for five years or more (see figure 1). Having the majority of the participants in both the control group and the experimental group, in the competent timeframe of experience is

essential to note when evaluating these same participants in their confidence and competence when completing the NRP training course.

Figure 1 Experience Level in the Maternal-Child Departments

Only one participant, who was in the control group, reported that they had never participated in a full resuscitation situation during a delivery. Of the 13 registered nurse participants, nine reported that they had previous experience with high-fidelity simulation, and four reported that they had never participated in a high-fidelity simulation scenario. The sample consisted of registered nurses that worked in L&D, NBN, and NICU. None of the participants worked in the Postpartum unit within the maternal-child department. The highest representation of workplace location was L&D (See figure 2).

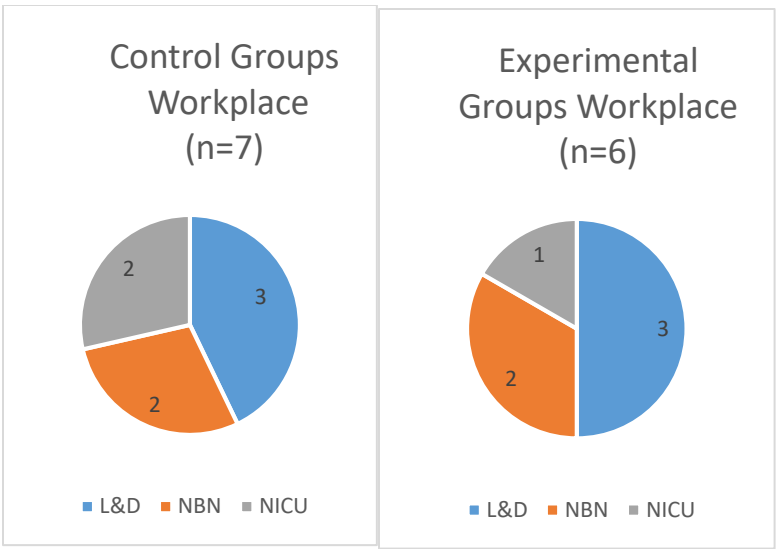

Figure 2 Maternal-Child Departments Represented

Confidence. A two-sample one-tailed t-test was used to test the hypothesis that the experimental, or high-fidelity group, would have a significantly higher "total confidence score" when compared to the control, or low-fidelity group. The experimental group was found to have a statistically significant greater total confidence sore than the control group ($p = 0.0156$). The mean confidence score of the high-fidelity group was 4.36, and the mean confidence score of the low-fidelity group was 4.86 (see Table 1).

Details of the individual questions within the NRCQ can be seen in Table 1. When comparing the individual questions on the confidence questionnaire, the lowest scoring item on the questionnaire was regarding the question, "I am confident in placing an umbilical venous catheter." The mean confidence score for this individual item on the confidence questionnaire was 3.57 for the control group (n=7) and 4.17 for the experimental group (n=6). While this was the lowest scoring question, it was not the question with the most significant difference in the groups. The two questions, "I am confident in drawing up epinephrine" and "I am confident in administering epinephrine," demonstrated the most significant difference in the control group and the experimental group. For each of these questions, the mean score for the control group

(n=7) was 3.71, while the mean score for the experimental group (n=6) was 4.67, with a difference of 0.86 between the two groups. The question regarding "I am confident in applying pulse oximetry" was equal for each of the groups, with both groups reporting a mean score of five.

Question	Control Group Mean Score (n =7)	Experimental Group Mean Score (n=6)
I am confident in completing the initial steps of NRP.	4.71	5
I am confident in applying pulse oximetry.	5	5
I am confident in applying oxygen therapy to an infant that is not in the target range for pulse oximetry.	4.86	5
I am confident in recognizing when an infant is apneic.	4.71	5
I am confident in providing PPV.	4.29	5
I am confident in using the neopuff device.	4.43	4.67
I am confident in assisting with intubation.	4.14	5
I am confident in recognizing when an infant requires chest compressions.	4.43	5
I am confident in providing chest compressions during neonatal resuscitation.	4.29	4.83
I am confident in placing an umbilical venous catheter.	3.57	4.17
I am confident in drawing up epinephrine.	3.71	4.67
I am confident in administering epinephrine.	3.71	4.67
I am confident in working together as a team during neonatal resuscitation.	4.57	5
I am confident that I can provide safe care to a neonate that requires resuscitation.	4.57	5
Total Confidence Score	**4.36**	**4.86**

Table 1 Results of Neonatal Resuscitation Confidence Questionnaire

Competence. A two-sample one-tailed t-test was used to test the hypothesis that the experimental, or high-fidelity group would have a significantly higher CCEI total score when compared to the control or the low-fidelity group. The experimental group was found to have a statistically significantly greater competency score than the control group ($p< 0.001$). The mean

total competency score for the high-fidelity group (n=6) was 99.29, while the mean overall competency score for the low-fidelity group (n=7) was 46.57 (see Table 2).

The CCEI has four main categories, which include assessment, communication, clinical judgment, and patient safety. Details of the experimental group and the control group scores for each of the CCEI categories can be viewed in Table 2. When comparing the control group scores with the experimental group scores, the CCEI category of communication demonstrated the most significant difference between the two groups, with the experimental group having a mean score of 100 and the control group having a score of 0. The next difference in scores was noted in the CCEI category of assessment with the experimental group mean score of 100, and the control group mean score of 61.28. This was followed by the CCEI category of clinical judgment, with the experimental group having a mean score of 97.16 and the control group having a mean score being 39.28. Lastly, the CCEI category of patient safety was the category with the closest scores between the two groups. The experimental group had a mean score of 100, and the control group had a mean score of 85.71.

CCEI Category	Control Group Mean Score (n =7)	Experimental Group Mean Score (n=6)
Assessment	0	100
Communication	61.28	100
Clinical Judgement	39.28	97.16
Patient Safety	85.71	100
Total Competency Score	**46.57**	**99.29**

Table 2 Results of the Creighton Competency Evaluation Instrument

Chapter V: Discussion

Findings Linked to Objectives

There were two objectives for this project. The variables of both confidence and competence were measured independently during the use of the low-fidelity and high-fidelity

simulation in the NRP training course. The NRCQ and the CCEI were used to gather and analyze data to determine the achievement of these objectives.

Objective one. The first objective was that the registered nurses using a high-fidelity infant simulator would report a minimum of 10% higher self-reported confidence level when compared to the self-reported confidence level of registered nurses using the low-fidelity infant simulator after completing a four-hour NRP training course. Each participant completed a self-report confidence questionnaire that measured their confidence in performing NRP skills during the training course. This questionnaire used a five-point Likert scale. When converting the Likert scores into a percent, the control group who used low-fidelity simulation had a total confidence percentage score of 87.2% or 4.36 out of an overall possible score of five. The experimental group, who used the high-fidelity simulation, had a total confidence percentage score of 97.2% or 4.86 out of an overall possible score of five. Therefore, this outcome was achieved with the high-fidelity group reporting their confidence level at precisely 10% higher than the low-fidelity group.

The NRCQ was developed using the skills and objectives that are used in the NRP training course that have been established by the AAP. Findings from the individual questions in the NRCQ would indicate that "placing an umbilical line" was a skill that both groups reported low on. When further evaluating this question, it is essential to note that this skill is not in the scope of practice of registered nurses. While this is a skill that the NRP course teaches, it would make sense that the nurses would report low confidence in the skill since it is not something that they would apply to their practices, no matter how many years of experience they had. Additionally, the skills of drawing up and administering epinephrine were also low confidence skills for both groups. Even though this is a skill that the registered nurses would perform during

a real-life resuscitation, additional consideration of this skill indicates that the type of simulation would not impact the nurse's confidence. This skill is a technical skill using a syringe and needle and is typically done away from the bedside where the low-fidelity mannequin or the high-fidelity simulator were located. Finally, the most impactful result of the NRCQ was the question regarding safe patient care. Patient safety should always be considered to ensure that patients receive optimal care without adverse incidents. The high-fidelity group indicated that they had a higher confidence rating than the low-fidelity group when providing safe patient care.

Objective two. The second objective was that the registered nurses using a high-fidelity infant simulator would demonstrate a minimum of 10% higher competence in performing the NRP algorithm when compared to the registered nurses using the low-fidelity infant simulator after completing a four-hour NRP training course. The CCEI was the observational tool used to evaluate the demonstration of competence in the nurses during their mock code check-offs at the end of the NRP training course. The control group, who used low-fidelity simulation, had a total observed competence score of 46.57% compared to the experimental group, who used high-fidelity, which had a total observed competence score of 99.29%. This is a significant difference of 52.72% between the low-fidelity and the high-fidelity groups. Thus, this outcome was achieved and well exceeded the expected 10% difference.

It is important to note that while the difference between the two groups in terms of competence was so significant most of the difference was due to timing. The group that used the low-fidelity mannequin had to ask multiple questions to the NRP instructor to gain the information necessary to take action during the scenario. While the group using the high-fidelity simulator was able to take action and perform interventions without having any discussion with the NRP instructor. For example, one of the categories of the CCEI that was being evaluated

was that the learner would identify that the infant was apneic and begin PPV within 30 seconds. In the low-fidelity group, generally, more than 30 seconds would go by before the participant had asked enough questions and come to the realization that the stationary mannequin was apneic. They would then begin PPV, but their actions were delayed. In the high-fidelity group, the simulator would stop moving, turn blue, and stop breathing. This group intervened immediately upon recognition of the change and began PPV, sometimes only a few seconds after the simulator stopped breathing. This difference between the groups further demonstrates that the high-fidelity simulator immerses the learner in a more realistic environment and situation that allows them to perform as they would on a live infant.

Successes and difficulties. There were both successes and challenges during the implementation of this project. One of the most significant successes of this project included that the high-fidelity simulator was implemented for the education of nurses during their NRP training. The high-fidelity simulator used in this project had been stored in a box unused for several years. With the implementation of this project, the education team, including the DNP student, received training on how to use the simulator. Also, the learners for all the training courses in which the high-fidelity simulator was used when completing this project were exposed to a new type of technology that enhanced their learning. Hopefully, those nurses are better equipped to provide the evidence-based guidelines of NRP during resuscitation in the delivery room. The main difficulty with this project was recruiting participants into the study. While this was challenging and lead to a significant limitation of the study, the project was completed and demonstrated positive results.

Effectiveness of intervention. The use of high-fidelity simulation has previously been shown to be a valuable learning tool in nursing schools, medical schools, and for the training of

currently practicing nurses and physicians. There are multiple benefits of high-fidelity simulation to students, which include both increased confidence and increased competence. This study has shown that the confidence and competence of registered nurses can be positively impacted during the NRP training course. Therefore, the use of high-fidelity simulation in the NRP training course would be an effective learning tool to promote nursing confidence and nursing competence, which will ultimately affect patient outcomes.

Limitations

One of the most significant limitations of this study is the sample size. There was an expected sample size of 24 participants, with six registered nurses enrolling in each of the four NRP training courses. The courses were advertised, but the maximum enrollment numbers were not achieved for any of the courses. An incentive of a gift card was also offered to attempt to increase enrollment and increase the desire of possible participants to join a research study. The small sample size and lack of enrollment into the training course could be partially related to the time of the year. The courses with the lowest enrollment for this study occurred during August, and this could be linked to area schools returning from summer break, and therefore, nurses were not available on their days off to take a training course. These courses are offered every month, so the opportunity to take the training course at a later and more convenient time exists.

While the results of the study showed statistically significant results for both the variables of confidence and competence, results with a larger sample size may return different results. To increase the sample size in further studies, it is recommended to continue to teach NRP training courses every month until the desired number of participants is achieved. Restricting the data collection to only a certain amount of courses proved to be too limiting to generalize the results to all NRP training courses.

Additional limitations for this study include that the study was conducted at one facility, with only nurses from that facility participating in the training course. The population for this study was restricted to just registered nurses due to a lack of research found on registered nurses in the NRP training course. While this limitation was intentional, the NRP component of interdisciplinary collaboration was not able to be evaluated. Additionally, several of the skills identified in the NRP learning objectives that were used to develop the NRCQ were determined, after completion of the study, to be out of the scope of practice for the nurses and therefore this may have impacted the self-reported confidence level for those skills by the nurses involved in the study. Further evaluation of the NRCQ should be considered to determine the reliability and validity of this new tool.

There were not any significant deviations from the project plan. The only minor variation was the cancellation of the NRP training course in August that had to be moved to another date. Since there was an additional NRP training course, which was not part of the study, moving the study to this new date was reasonably effortless. The only concern with moving this date was that it was not able to be adequately advertised and recruit any additional participants. Other than this minor change, the project plan was implemented during the scheduled timeline, as previously planned.

Implications

Practice. Previous studies have reported that using high-fidelity simulation during the NRP training course increased the physician's and medical resident's confidence (Curran et al., 2013; Hossino et al., 2018; Nimbalkar et al., 2015) and competence of technical and behavior skills (Sawyer, Leonard, Sterocka-Castandeda, & Thompson, 2014). The results from this project indicate that high-fidelity simulation can also be a useful learning tool in the NRP

training program with nurses to increase confidence and competence. Therefore, it is recommended that the use of high-fidelity simulation continues as a learning tool in the NRP training program. Recommendations for the sustainability of this project include providing training to other NRP instructors on how to use the high-fidelity simulator, constructing a binder with scenario templates, and a step by step guide on how to initiate the scenarios. Modifications to the project plan can include the use of a mix methodology approach to simulation. An example of this would consist of utilization of the low-fidelity mannequin for certain skill practices, such as PPV, but using the high-fidelity simulator for the full mock code scenarios. This would allow participants to be exposed to various types of learning tools and account for different learning styles.

When considering the transferability of the intervention, multiple challenges would need to be addressed. The first challenge would be the purchase of a high-fidelity simulator. At $50,000, this could be an extraordinary expense that some facilities may not be able to afford. A facility could consider writing for a grant to assist with the purchase price of the equipment that is needed. Secondly, facilities would need to program the high-fidelity simulator for the necessary NRP scenarios. Programming for the specific NRP algorithm is time-consuming. Detailed instructions could be provided to assist other facilities in programming the scenarios into the high-fidelity simulator. Lastly, the NRP course instructors would need training on how to use the high-fidelity simulator, how to initiate the scenarios, and how to troubleshoot any technological problems.

Future research. This study focused on the population of registered nurses due to the lack of current research investigating the use of high-fidelity simulation in the NRP training courses with this population. While the data from this research supports using high-fidelity

simulation in the NRP training courses to aide with the achievement of confidence and competence when conducting NRP skills during resuscitation, more research needs to be done with larger sample sizes. Additionally, the use of high-fidelity simulation should be researched with other maternal-child programs such as Perinatal Continuing Education Program (PCEP) and S.T.A.B.L.E. to investigate the value of high-fidelity simulation with learning to care for neonates in these training courses. Lastly, since several research studies reviewed during this project implied that, while simulation had an impact at the time of learning, simulation did not affect the longevity of acquired skills and knowledge. Therefore, an additional study to evaluate the long-term effects of simulation during the NRP training program would be beneficial.

Promoting interdisciplinary collaboration between healthcare professionals that participate in the NRP training course is vital to prepare healthcare professionals to be able to communicate and work together during high-stress emergency situations during a delivery. Physicians, respiratory therapists, and nurses must be able to collaborate to achieve the best patient outcomes. Further research should be considered to evaluate if high-fidelity simulation during the NRP training program can influence the ability of the interdisciplinary team to communicate and collaborate more efficiently.

This dissemination process for this project will include sharing the information from this research study to various entities within the facility where the research was conducted. A PowerPoint presentation will be constructed to review the project and project findings for a live presentation. This presentation will be given to both the Nursing Research Council that approved this project for implementation at the tertiary hospital and the Education Department, where the project occurred. Sharing the knowledge obtained from this project will allow the educators in the department to work toward making changes and improvements in the

simulations, and teaching modalities in the courses taught in the department, including the NRP training course. Finally, this project will be presented at the facility's State of Science Evidence-Based Practice Fair in the spring of 2020 with a poster presentation.

Nursing. Registered nurses are typically the first healthcare professionals present during a patient emergency, such as a resuscitation. Initiating a resuscitation takes a considerable amount of knowledge and skill to provide a rapid intervention that is safe and will positively impact patient outcomes (Benner, 2001). Simulation has been recognized as a learning tool that allows nurses to practice providing complex nursing interventions (Benner, 1982). The results of this study corroborate that simulation is an appropriate educational platform that can aide in developing the skills of practicing nurses as they move through the experiential phases of their practice. As the fundamental skills of nurses become more and more advanced, and the patients become more and more complex, nurses must be correctly training to handle critical situations such as resuscitation.

High-fidelity simulation can allow a realistic experience and exposure to a scenario that will enable the nurse to practice the competencies in the domain of effectively managing a rapidly changing situation is a safe environment. The application of high-fidelity simulation could result in nurses that demonstrate higher confidence and higher competence and are therefore better prepared to care for their patients. Implementation of high-fidelity simulation should be considered in the NRP training courses as well as other training courses and continuing education courses that nurses take as part of their job role.

Health policy. There are two Healthy People 2020 objectives that are related to infant mortality. These objectives include reducing the rate of fetal deaths from 6.2 to 5.6 per 1,000 live births for infants born at 20 or more weeks gestation and reducing the rate of fetal deaths

from 6.6 to 5.9 per 1,000 live births for infants between 28 weeks gestation to less than seven days after birth (Office of Disease Prevention and Health Promotion, 2019). Since many facilities use nurses as the attendants for the infants in deliveries, nurses should be better prepared to use resuscitation skills to prevent deaths. Nurses with increased confidence and competence will perform better, and therefore, this will assist with improving patient outcomes and reducing fetal deaths.

The World Health Organization (WHO) has recommended that consistent policies should be made regarding resuscitation of infants in the delivery room. Also, the WHO has recommended constructing and maintaining competencies of healthcare professionals that attend births to perform infant resuscitation (WHO, 2012). Finally, from a health policy perspective, it is recommended that healthcare professionals who are responsible for infant resuscitation are frequently assessed to ensure that they are providing quality care (WHO, 2012). These vague educational policies do not provide recommendations for a consistent type of education or training that healthcare professionals should be exposed to learn to carry out the essential interventions of infant resuscitation. As WHO represents multiple countries, the resources for both the education of healthcare professionals and the actual implementation of resuscitation in the delivery are not standard, and many countries are without critical items to carry out simple tasks such as PPV. Therefore simpler training devices such as a low-fidelity mannequin should still be considered when limited resources impair the ability of a facility to utilize state of the art equipment that would be costly to an organization.

To impact infant mortality at the institutional level, several unit policy recommendations should be considered. The institution has already implemented the use of the NRP training course to healthcare professionals that attend deliveries in their facility to meet the requirement

of the education and training requirement of the WHO and the AAP. The AAP (2019) has stated that completion of the NRP training course does not mean the provider is competent and it is up to the institution to determine the level of competence. Therefore, it is recommended that the institution write a policy that outlines what the performance expectations of competency would entail for newborn resuscitation. Also, the institution's educational department should write a policy that guides an NRP instructor in not only how to use the high-fidelity simulator, but also the best implementation of the simulator in the NRP training course. Lastly, the institution should write a policy to reassess their healthcare providers consistently, potentially with high-fidelity simulation. As recommended by the WHO (2012), frequent assessments will ensure that healthcare providers are giving the best quality care. Currently, healthcare providers are required to take the NRP training course every two years which could result in the regression of knowledge and skills.

Chapter VI: Conclusion

Value of the project

The implementation and utilization of high-fidelity simulation in the NRP training course were valuable to the facility as well as to the participants of the NRP training course. It is estimated that 10% of all newborns will require some form of assistance to breathe at birth (Kattwinkel et al., 2010). In addition to breathing, another 1% may need additional aid which could be in the form of positive pressure ventilation (PPV), chest compressions, or the administration of resuscitation drugs. The NRP training course was developed to teach these essential skills that can impact the health outcomes of infants in the delivery room. Considering the percentage of infants that require additional assistance and the knowledge that there are 2,400 deliveries a year at the facility, it can be concluded that approximately 264 infants per year could

require some form of resuscitation at the facility. The results of this study demonstrated that high-fidelity simulations could have a positive impact on nursing confidence and nursing competence during resuscitation in the delivery room. This equates to improved health outcomes for infants born at the facility.

DNP Essentials

The Essentials of Doctoral Education for Advanced Nursing Practice, established by the American Association of Colleges of Nursing, provides a framework for core competencies for all advanced nursing practice roles (AACN, 2006). There are a total of eight essentials that are identified and defined. All of the eight essentials were considered and used as a guideline while designing, implementing, and evaluating this project.

Essential I. The first essential in the DNP essentials addresses the scientific underpinnings for practice. This project allowed for the implementation of high-fidelity simulation in the NRP training course. This was a new approach using a different learning tool to enhance the learning outcomes of the participants. This project directly aligns with the competency of "developing new practice approaches based on nursing theories and theories from other disciplines" that are included in Essential I (AACN, 2006, pg 9).

Essential II. The second essential in the DNP essentials discusses organizational and systems leadership and quality improvement systems thinking to improve healthcare outcomes and promote patient safety and excellence in nursing practice (AACN, 2006). During this project, the DNP student developed multiple mock code scenarios using the NRP algorithm. With each of these scenarios, the learners had to implement their NRP skills to safely care for the infant in the scenario. The development of these scenarios and the implementation of them into the NRP training course were in direct alignment with this essential.

Essential III. The third essential in the DNP essentials addresses clinical scholarship and analytical methods for evidence-based practice. Included in the outcomes for this essential is the ability to appraise existing literature, use technology to identify gaps in the evidence, and apply findings to improve practice (AACN, 2006). During the literature review for this project, it was found that there was a gap in the evidence on how high-fidelity simulation in the NRP training course could impact nursing confidence and nursing competence. With the lack of knowledge in this area, a project was developed that would contribute to the body of nursing knowledge and determine if this was, in fact, best practice. The results from this project demonstrated that high-fidelity simulation is a useful learning tool in the NRP training course and should be considered for implementation in other NRP training courses. Therefore, DNP Essential III was met through each stage of this project.

Essential IV. Information systems/technology and patient care technology for the improvement and transformation of healthcare is the focus of the fourth DNP essential. Since the emphasis of this project was the use of high-fidelity simulation in the NRP training course, this essential, geared toward technology, was one of the most significant contributors to the project. DNP graduates should be able to use technology to design and evaluate programs to monitor outcomes of care (AACN, 2006). During this project, training occurred regarding how to use the high-fidelity simulator. Also, this project required the DNP student to design mock code scenarios using the NRP guidelines and program the simulator to transition through the scenarios. When using this technology, the participants were able to demonstrate increased confidence and competence in performing NRP skills.

Essential V. The focus of the fifth essential is on health care policy for advocacy in health care. While this essential was not strongly represented in the early stages of this project, it

will be addressed as the project continues. Health care policy, according to AACN (2006), can include policy development at the institutional level as well as the local, state, regional, and federal levels. Currently, there is not a policy associated with high-fidelity simulation or the instructional modalities of the NRP training course. A continuing portion of this project will be to design a policy that guides other educators at the facility on when to use high-fidelity simulation, how to use the simulator, and the evaluation methods needed during simulation that occurs in various instructional courses, including the NRP training course.

Essential VI. Interprofessional collaboration for improving patient and population health outcomes is the emphasis of essential six. In this essential, the DNP student should "employ effective communication and collaborative skills in the development and implementation of…scholarly projects" (AACN, 2006, pg. 15). Typically the NRP training programs are comprised of multiple professionals, including physicians, residents, respiratory therapists, and of course, nurses. This course limited participation to just nurses since there was a lack of research on this particular profession with simulation in the NRP training program. However, with the high level of technology associated with this project, the DNP student spent many hours collaborating with IT professionals and the simulation coordinator for the facility. The implementation of the high-fidelity simulation in this course required software updates, installation of modems, routers, and special monitors to display simulated patient data. Through the collaborative effort of the DNP student, the IT professionals, and the simulation coordinator, this technology was implemented and will aide in the improvement of patient outcomes through the education of the nurses who care for them.

Essential VII. The focus of the seventh essential by the AACN for DNP graduates is clinical prevention and population health for improving the Nation's health. This essential

includes health promotion and risk reduction strategies to impact population health for individual aggregates. Infants, particularly neonates, are the primary aggregate influenced through the implementation of this project. Early neonatal deaths are defined as a neonatal death that occurs before the age of seven days of life. When comparing the neonatal death rate from 2014, 2015, and 2016, the rate has remained unchanged during the three-year time period, with the rate showing 3.13 deaths per 1,000 live births (Gregory, Drake, & Martin, 2018). Putting high-fidelity simulation into practice with nurses taking the NRP training will have a direct influence on this aggregate's health outcomes and potentially reduce the neonatal death rate.

Essential VIII. The final essential addressed by the DNP essentials centers on advanced nursing practice. Several of these competencies are identified in this project. These competencies include sustaining partnerships with professionals to facilitate optimal patient care, demonstrate advanced levels of clinical judgment when delivering and evaluating an evidence-based project, and mentoring and supporting other nurses to achieve excellence in nursing practice (AACN, 2006). During the implementation of the project relationships were established to promote the NRP training course with high-fidelity simulation, clinical judgment was used to develop and implement the project, and working with the nurses that signed up for the NRP training course allowed the DNP student to directly guide and mentor nurses through the NRP guidelines so that they can provide confident and competent care to the newborns in the delivery room and improve patient outcomes.

Plan for Dissemination

The dissemination process for this project will start with sharing the information from this research study to various entities within the facility where the research was conducted. A PowerPoint presentation will be constructed to review the project and project findings for a live

presentation. This presentation will be given to both the Nursing Research Council that approved this project for implementation at the tertiary hospital and the Education Department, where the project occurred. Sharing the knowledge obtained from this project will allow the educators in the department to work toward making changes and improvements in the simulations, and teaching modalities in the courses taught in the department, including the NRP training course. Finally, this project will be presented at the facilities State of Science Evidence-Based Practice Fair in the Spring of 2020 with a poster presentation.

Additionally, this project will be disseminated at the state, national, and international levels. Applications to present the findings from this project as a poster or podium presentation will be submitted to various conferences. State conferences include but are not limited to the Oklahoma chapter for the Association of Women's Health Obstetric and Neonatal Nurses (AWHONN) and the Oklahoma Nurses Association. National conferences include but are not limited to the AWHONN National Convention, the Advanced Practice Neonatal Nurses Conference, and the NLN Nursing Education Research Conference. Lastly, an application to present the project as a poster or podium presentation at Sigma Theta Tau International Nursing Society would allow for the project to be disseminated at the International level.

The project will also be upload into the Doctors of Nursing Practice Doctoral Repository and the Virginia Henderson Global Repository. Additional opportunities to disseminate the project will be to submit the project for publication to professional journals that focus on neonatal care, maternal-child issues, and educational topics and trends. By disseminating the information gleaned from this project to various platforms, a large number of healthcare individuals can be reached, allowing the knowledge to be shared and utilized by other professionals.

Attainment of Personal and Professional Goals

The work done on this project was challenging and rewarding on multiple levels that provided the DNP student to attain several personal and professional goals. During the implementation of this project, the DNP student was able to learn how to use the high-fidelity simulator and how to best implement the simulator in the NRP training course. The knowledge and experience obtained from using the simulator was invaluable, and the knowledge gained will continue to be utilized with other courses the DNP student teaches. Also, the DNP student was recognized with a Nursing Research Award by both the Oklahoma Nurses Association Region 2 and the State level of the Oklahoma Nurses Association. This was an unexpected award and honor that validated the hard work done on this project. This award also allowed for the project to be introduced to the nursing community. The ability to be recognized on the State level will hopefully open additional opportunities for research by the DNP student. Recognition for this project was also received by the facility in which the project occurred through a Nursing Research award that was presented by the Board of Directors of the facility. The DNP student was able to meet the Board of Directors for the Health System and the Hospital and be presented with this additional award. Between the meeting with the Board of Directors and the public announcements of recognition through newsletters and social media posts, the research project has received further accolades, and the DNP has received public acknowledgment of this professional accomplishment.

Finally, the most significant accomplishment associated with this project was that the project satisfied the requirements for completion of the Doctor of Nursing Practice degree. The goal of obtaining a terminal degree in nursing has been a long-standing personal and professional goal of the DNP student. With a passion for life-long learning and a determination for nursing

excellence, working on this project and completing the DNP degree have enhanced the knowledge of this DNP student to continue to improve nursing practice and collaborate with professionals to improve patient outcomes. The leadership skills that have been developed and refined throughout this project are immeasurable and will continue to be utilized by the DNP student while mentoring and educating future nursing as they enter the profession of nursing.

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Appendix A

SWOT Analysis

<table>
<tr><td colspan="2">Objective:</td></tr>
<tr><td colspan="2">Increase the confidence and competence of nurses during neonatal resuscitation with the implementation of high fidelity simulation scenarios during NRP training.</td></tr>
<tr><td colspan="2">Internal Factors</td></tr>
<tr><td>Strengths (+)</td><td>Weaknesses (-)</td></tr>
<tr><td>• The Baby Hal-High fidelity simulator baby has already been purchased
• Evidence to support practice improvement in medical residents and nursing students
• Facility opened an onboarding center, 2 years ago, that specializes in and supports hands-on, active learning through simulation with a state of the art technological setting.</td><td>• Nursing staff may fear high fidelity simulation
• Training needed for the Baby Hal
• Will need to purchase additional equipment for the scenarios-ECG monitor, pulse ox
• Baby Hal represents a term infant. A simulator for preterm infants is not owned by the facility.</td></tr>
<tr><td colspan="2">External Factors</td></tr>
<tr><td>Opportunities (+)</td><td>Threats (-)</td></tr>
<tr><td>• Regional training center, affiliated with facility, supports high fidelity simulation
• Improved infant outcomes when resuscitation is needed
• NRP program supports the used of simulation and debriefing to improve leadership, communication, and teamwork skills</td><td>• Funding for additional equipment may be needed
• Other infant simulators, such as SimBaby, may be superior to baby Hal according to NRP.
• Inability to evaluate long term outcomes</td></tr>
<tr><td colspan="2">Evaluation of Objective:</td></tr>
<tr><td colspan="2">There is strong evidence to support that high-fidelity simulation is an effective tool in teaching NRP with other professionals besides nursing. The organization and the regional training center both value and support simulation training and have already purchased the equipment. The strengths and opportunities outweigh the weaknesses and threats which will ensure the success of the objective.</td></tr>
</table>

Appendix B

Is it time to renew your NRP?

What: You are invited to participate in the NRP course using a new type of technology. Tamara Hryshchuk, MS, RNC-NIC is completing a study as part of her doctoral education to compare different types of infant simulators that can be used during the NRP provider course. Your participation could help advance nursing research in simulation use.

Who: Any registered nurse currently working in a maternal-child department at SJMC which includes L&D, PP, NBN, NICU AND who is due to renew their NRP card in the next six months.

When: July TBD, 2019 from 8:00-12:00
July TBD, 2019 from 1:00-5:00
August TBD, 2019 from 8:00-12:00
August TBD, 2019 from 1:00-5:00

How: Sign up through HealthStream for one of the above dates and timeframes. Complete your online learning modules and online examination for the Neonatal Resuscitation Program. Attend the four-hour instructor-led portion of the program on the selected date and time. Complete a survey.

Incentive: As an incentive for participating in this study, each participant that completes the course and survey will receive a $5 gift card from Starbucks.

Questions: Any questions regarding this study can be addressed to Tamara at 918-289-9585.

Appendix C

Consent for Participation

My name is Tamara Hryshchuk; I am a graduate student at Bradley University in Peoria, IL. I am pursuing a Doctor of Nursing Practice (DNP) with a focus on leadership. My DNP project is to investigate the use of high-fidelity and low-fidelity simulation in the Neonatal Resuscitation Program (NRP). Participation in this study is voluntary.

I would appreciate your help with my project by completing the surveys provided after your NRP course today. Also, an NRP instructor will be used during this course to evaluate the mock code scenarios. Survey results and mock code scenario results will be strictly confidential, and results will only be accessible to me as the primary investigator. The results of the surveys are anonymous and will not affect your completion of this course or your ability to obtain your NRP card in any way. To ensure your anonymity, your name will not be placed on any of the surveys or scoring tools.

The surveys should only take approximately 10 minutes to complete but, you will be given up to 30 minutes if needed. Submission of the surveys will be considered as consent to participate. All results will be reviewed and analyzed by the primary investigator as well as a third-party statistician. All surveys and scoring tools will be destroyed within six months of the completion of this DNP project.

I appreciate your help with this project. The information obtained will be significant for the nursing profession and NRP educational standards.

Thanks again,
Tamara Hryshchuk, MS, RNC-NIC

☐ I have reviewed and understand the above consent, and by checking this box, I consent to participate in this study.

Appendix D

Simulation in Neonatal Resuscitation

Instructions:
Thank you for your participation in the NRP Provider course. There are **two** forms that you are asked to complete now as part of the Simulation in Neonatal Resuscitation study. Do not place your name on any of these forms. The form below is for demographic data. Please answer all questions to the best of your knowledge. Attached to the demographic data form is the self-confidence tool. Please follow the instructions listed on that form. You have up to 30 minutes to complete all the tools. Please place both of your completed forms in the envelope provided by the instructor.

Demographic Data

Please check one:

1. Highest level of nursing education:

_____Associates _____Bachelors _____Masters _____Doctorate

2. Years of experience as an RN:

_____less than 5 _____6-10 _____11-20 _____21 years or more

3. Which maternal-child department do you currently work in:

_____L&D _____Postpartum _____NBN _____NICU

4. Years of experience in a maternal child department (NBN, NICU, Postpartum, or L&D):

_____less than 1 year _____1-2 years _____3-4 year _____5 year or more

5. How many times have you have completed an NRP training course?

_____

6. Have you ever used your NRP training during a full resuscitation situation in the delivery room (PPV, CPR, delivery of medications)?

_____Yes _____No

7. Do you have previous experience with high-fidelity simulation (mannequin that breathes, moves, makes noise, responds to treatments)

_____Yes _____No

Appendix E

Neonatal Resuscitation Confidence Questionnaire

Introduction: This questionnaire is a series of statements about your confidence with neonatal resuscitation after your NRP provider course and mock code scenarios. Each item represents a statement about your confidence in using the skills that you have practiced today. There are no right or wrong answers. Please indicate your personal feelings about each statement below by marking the numbers that best describe your attitude or beliefs. Please be truthful and describe your confidence as it really is, not what you would like it to be. This questionnaire is anonymous.

Mark one answer only:

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

Rate your confidence	SD	D	UN	A	SA
1. I am confident in completing the initial steps of NRP.	○ 1	○ 2	○ 3	○ 4	○ 5
2. I am confident in applying pulse oximetry.	○ 1	○ 2	○ 3	○ 4	○ 5
3. I am confident in applying oxygen therapy to an infant that is not in the target range for pulse oximetry.	○ 1	○ 2	○ 3	○ 4	○ 5
4. I am confident in recognizing when an infant is apneic.	○ 1	○ 2	○ 3	○ 4	○ 5
5. I am confident in providing PPV.	○ 1	○ 2	○ 3	○ 4	○ 5
6. I am confident in using the neopuff device.	○ 1	○ 2	○ 3	○ 4	○ 5
7. I am confident in assisting with intubation.	○ 1	○ 2	○ 3	○ 4	○ 5
8. I am confident in recognizing when an infant requires chest compressions.	○ 1	○ 2	○ 3	○ 4	○ 5
9. I am confident in providing chest compressions during neonatal resuscitation.	○ 1	○ 2	○ 3	○ 4	○ 5
10. I am confident in placing an umbilical venous catheter.	○ 1	○ 2	○ 3	○ 4	○ 5
11. I am confident in drawing up epinephrine.	○ 1	○ 2	○ 3	○ 4	○ 5
12. I am confident in administering epinephrine.	○ 1	○ 2	○ 3	○ 4	○ 5
13. I am confident in working together as a team during neonatal resuscitation.	○ 1	○ 2	○ 3	○ 4	○ 5
14. I am confident that I can provide safe care to a neonate that requires resuscitation.	○ 1	○ 2	○ 3	○ 4	○ 5

Appendix F

Creighton Competency Evaluation Instrument (CCEI)

Student Name: _____
Staff Nurse Instructor Name: _____

0= Does not demonstrate competency
1= Demonstrates competency
NA= Not applicable

Date: ____/____/____
MM / DD / YYYY

	Circle Appropriate Score for all Applicable Criteria - If not applicable, circle NA		
ASSESSMENT			
1. Obtains Pertinent Data	0	1	NA
2. Performs Follow-Up Assessments as Needed	0	1	NA
3. Assesses the Environment in an Orderly Manner	0	1	NA
COMMUNICATION			
4. Communicates Effectively with Intra/Interprofessional Team (TeamSTEPPS, SBAR, Written Read Back Order)	0	1	NA
5. Communicates Effectively with Patient and Significant Other (verbal, nonverbal, teaching)	0	1	NA
6. Documents Clearly, Concisely, & Accurately	0	1	NA
7. Responds to Abnormal Findings Appropriately	0	1	NA
8. Promotes Professionalism	0	1	NA
CLINICAL JUDGMENT			
9. Interprets Vital Signs (T, P, R, BP, Pain)	0	1	NA
10. Interprets Lab Results	0	1	NA
11. Interprets Subjective/Objective Data (recognizes relevant from irrelevant data)	0	1	NA
12. Prioritizes Appropriately	0	1	NA
13. Performs Evidence Based Interventions	0	1	NA
14. Provides Evidence Based Rationale for Interventions	0	1	NA
15. Evaluates Evidence Based Interventions and Outcomes	0	1	NA
16. Reflects on Clinical Experience	0	1	NA
17. Delegates Appropriately	0	1	NA
PATIENT SAFETY			
18. Uses Patient Identifiers	0	1	NA
19. Utilizes Standardized Practices and Precautions Including Hand Washing	0	1	NA
20. Administers Medications Safely	0	1	NA
21. Manages Technology and Equipment	0	1	NA
22. Performs Procedures Correctly	0	1	NA
23. Reflects on Potential Hazards and Errors	0	1	NA

COMMENTS:

COMMENTS

Total: _____
Total Applicable Items: _____
Earned Score _____

Revised for DEU use 8/20/2013

Appendix G

CCEI Discussion Worksheet

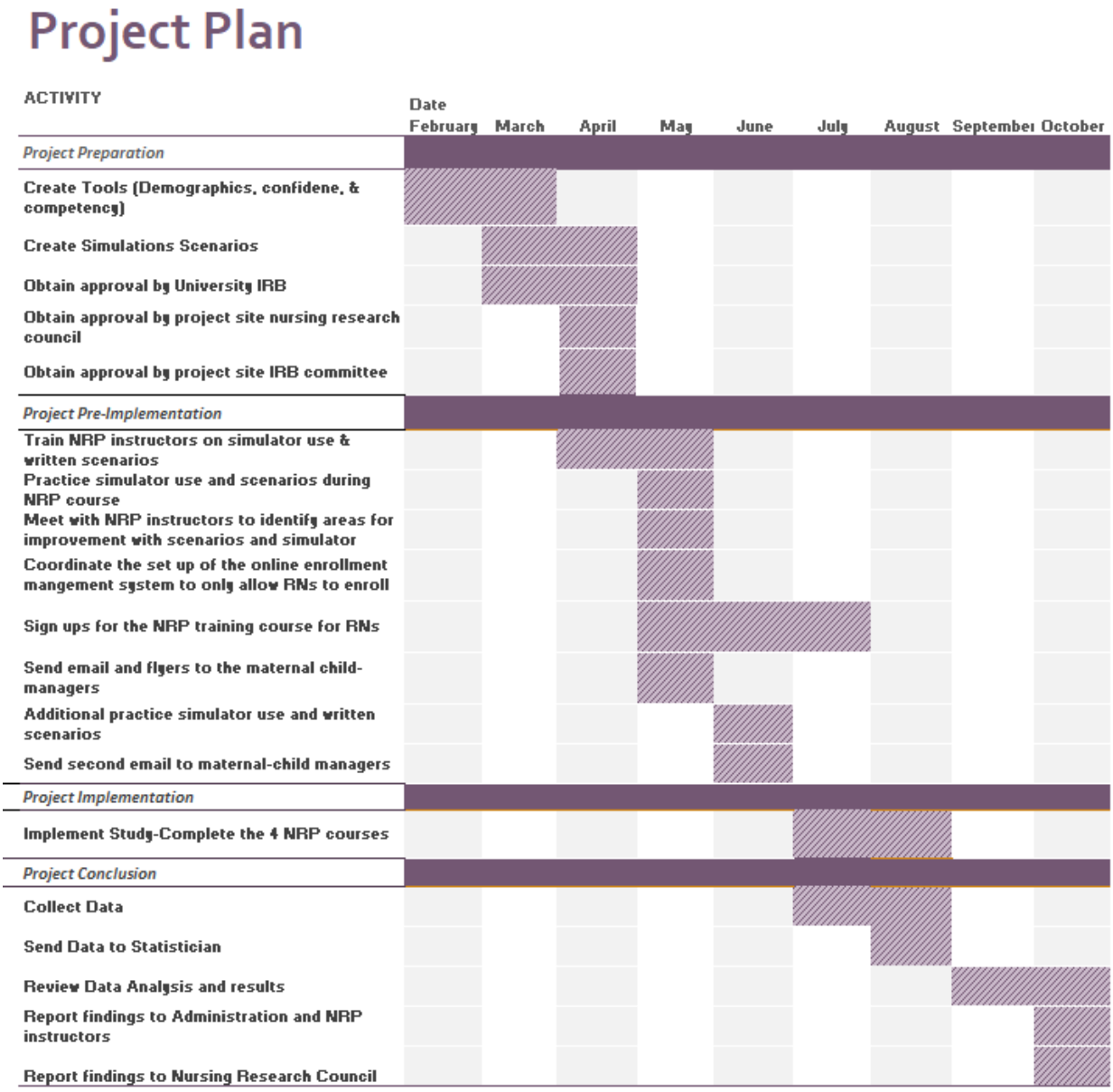
ASSESSMENT Discussion Worksheet
Obtains Pertinent Data • **Ask the four question before infant delivery** • **Completes the initial steps of warm, dry, stimulate, and position** • **Central cyanosis-applies pulse ox** • **Pulse ox not in target range- provide O2** • **Infant apneic-begins PPV** • **HR < 100 BPM begins PPV** • **HR < 60 BPM begins CPR**
Performs Follow-Up Assessments as Needed • **Follow up assessment every 30 seconds**
Assesses the Environment in an Orderly Manner • **Sets up room which includes turning on the bed, turning on O2, suction, blankets**

COMMUNICATION Discussion Worksheet
Communicates Effectively with Intra/Interprofessional Team (TeamSTEPPS, SBAR, Written Read Back Order) • **N/A**
Communicates Effectively with Patient and Significant Other (verbal, nonverbal, teaching) • **N/A**
Documents Clearly, Concisely, & Accurately • **N/A**
Responds to Abnormal Findings Appropriately • **Central cyanosis-applies pulse ox** • **Pulse ox not in target range- provide O2** • **Infant apneic-begins PPV** • **HR < 100 BPM begins PPV** • **HR < 60 BPM begins CPR**
Promotes Professionalism • **N/A**

CRITICAL JUDGMENT Discussion Worksheet
Interprets Vital Signs (T, P, R, BP, Pain) • **Central Cyanosis- interprets to need for pulse oximetry** • **Apneic – Interprets need to PPV** • **HR < 100 BPM- Interprets need for PPV** • **HR< 60 BPM- interprets the need for CPR**
Interprets Lab Results • **Pulse oximetry is out of target range – interprets the need for Oxygen**
Interprets Subjective/Objective Data (recognizes relevant from irrelevant data) • **N/A**
Prioritizes Appropriately • **Uses ABC to Prioritize care** • **Airway – opens the airway and suctions as needed** • **Breathing- provides PPV if indicated** • **HR- provides chest compressions after initiation of PPV**
Performs Evidence-Based Interventions • **Central cyanosis-applies pulse ox** • **Pulse ox not in target range- provide O2** • **Infant apneic-begins PPV** • **HR < 100 BPM begins PPV** • **HR < 60 BPM begins CPR**
Performs Evidence-Based Rationale for Interventions • **N/A**
Evaluates Evidence-Based Interventions and Outcomes • **Titrates Oxygen therapy as indicated using pulse oximetry**
Reflects on Clinical Experience • **N/A**
Delegates Appropriately • **Delegates PPV as scenario difficulty increases** • **Delegates chest compressions as scenario difficulty increases** • **Delegates UVC as scenarios difficulty increases** • **Delegate Medication administration as scenario difficulty increases**

PATIENT SAFETY Discussion Worksheet
Uses Patient Identifiers • **N/A**
Utilizes Standard Practices and Precautions Including Hand Washing • **N/A**
Administers Medications Safely • **Epinephrine dose is correct based on patient weight** • **NS bolus is correct based on patient weight**
Manages Technology and Equipment • **Uses Ambu bag correctly** • **Uses NeoPuff correctly** • **Uses Umbilical line correctly**
Performs Procedures Correctly • **Correct placement of pulse oximetry** • **Correct method for flow by oxygen delivery** • **Correct ratio for PPV with chest rise and fall** • **Correct ratio and technique for CPR**
Reflects on Potential Hazards and Errors • **N/A**

Appendix H


Project Plan
ACTIVITY
Date
February
March
April
May
June
July
August
September
October
Project Preparation
Create Tools (Demographics, confidene, & competency)
Create Simulations Scenarios
Obtain approval by University IRB
Obtain approval by project site nursing research council
Obtain approval by project site IRB committee
Project Pre-Implementation
Train NRP instructors on simulator use & written scenarios
Practice simulator use and scenarios during NRP course
Meet with NRP instructors to identify areas for improvement with scenarios and simulator
Coordinate the set up of the online enrollment mangement system to only allow RNs to enroll
Sign ups for the NRP training course for RNs
Send email and flyers to the maternal child-managers
Additional practice simulator use and written scenarios
Send second email to maternal-child managers
Project Implementation
Implement Study-Complete the 4 NRP courses
Project Conclusion
Collect Data
Send Data to Statistician
Review Data Analysis and results
Report findings to Administration and NRP instructors
Report findings to Nursing Research Council

Appendix I

NRP Scenarios for Simulation

NRP Scenario #1

Objectives: Initial Steps, Central Cyanosis, PPV
Pre-Delivery Questions:

Gestational Age?	Amniotic fluid clear?	How many babies?	Other risk factors?	C-section or vaginal?
39 weeks	Yes	1	Vacuum extraction	Vaginal Birth

Scenario

Actions	Interventions
1. Infant is unresponsive on the radiant warmer	Initial Steps are completed which include: Warm, Dry, Suction, Position
2. Breathing and color are assessed infant has central cyanosis but is breathing	Pulse ox is applied to the right hand
3. Pulse ox is below target limit	O2 is applied at greater than 21% O2
4. Pulse ox remains below target limit	O2 is titrated higher than current setting
5. Infant becomes apneic	*PPV is started with good chest rise and fall *PPV is started without good chest rise and fall, learner uses MRSOPA to correct
6. Pulse ox is within target limit	No change continues to monitor
7. Infant has spontaneous breathing	PPV is removed, but free flow oxygen is maintained
8. Stop Scenario	

NRP Scenario #2

Objectives: Initial Steps, Central Cyanosis, PPV
Pre-Delivery Questions:

Gestational Age?	Amniotic fluid clear?	How many babies?	Other risk factors?	C-section or vaginal?
35 weeks	Unknown	1	Maternal Hypertension	C-Section

Scenario

Actions	Interventions
1. Infant is unresponsive on the radiant warmer	Initial Steps are completed which include: Warm, Dry, Suction, Position
2. Breathing and color are assessed infant has central cyanosis but is breathing	Pulse ox is applied to the right hand
3. Pulse ox is below target limit	O2 is applied at greater than 21% O2
4. Pulse ox remains below target limit	O2 is titrated higher than the current setting
5. Infant becomes apneic	*PPV is started with good chest rise and fall *PPV is started without good chest rise and fall, learner uses MRSOPA to correct
6. Pulse ox is within target limit	No change continues to monitor
7. Infant has spontaneous breathing	PPV is removed, but free flow oxygen is maintained
8. Stop Scenario	

NRP Scenario #3

Objectives: Initial Steps, PPV, Intubation
Pre-Delivery Questions:

Gestational Age?	Amniotic fluid clear?	How many babies?	Other risk factors?	C-section or vaginal?
41 weeks	Yes	1	Shoulder Dystocia	Vaginal Birth

Scenario

Actions	Interventions
1. Infant is unresponsive on the radiant warmer	Initial Steps are completed which include: Warm, Dry, Suction, Position
2. Breathing and color are assessed infant has central cyanosis and is NOT breathing	*PPV is started with good chest rise and fall *PPV is started without good chest rise and fall, learner uses MRSOPA to correct
3. Central cyanosis remains	Pulse ox is applied
4. Pulse ox remains below target limit	O2 is titrated higher than current setting
5. Reassess, and infant is still NOT breathing spontaneously	PPV is resumed Intubation is considered or attempted Correct size ETT and Blade Confirms placement with CO2 detector, evaluating chest rise and fall, bilateral lung sounds
6. Pulse ox is within target limit	No change to O2, continue to monitor
7. Reassess, and infant is still NOT breathing spontaneously	PPV is resumed Intubation is attempted Correct size ETT and Blade Confirms placement with CO2 detector, evaluating chest rise and fall, bilateral lung sounds
8. Stop Scenario	

NRP Scenario #4

Objectives: Initial Steps, PPV, Intubation
Pre-Delivery Questions:

Gestational Age?	Amniotic fluid clear?	How many babies?	Other risk factors?	C-section or vaginal?
30 weeks	Yes	1	Premature, IUGR, Maternal Preeclampsia and on high dose of Magnesium	C-Section

Scenario

Actions	Interventions
1. Infant is unresponsive on the radiant warmer	Initial Steps are completed which include: Warm, Dry, Suction, Position
2. Breathing and color are assessed infant has central cyanosis and is NOT breathing	*PPV is started with good chest rise and fall *PPV is started without good chest rise and fall, learner uses MRSOPA to correct
3. Central cyanosis remains	Pulse ox is applied
4. Pulse ox remains below target limit	O2 is titrated higher than the current setting
5. Reassess, and infant is still NOT breathing spontaneously	PPV is resumed Intubation is considered or attempted Correct size ETT and Blade Confirms placement with CO2 detector, evaluating chest rise and fall, bilateral lung sounds Leader Delegates PPV
6. Pulse ox is within target limit	No change to O2, continue to monitor
7. Reassess, and infant is still NOT breathing spontaneously	PPV is resumed Intubation is attempted Correct size ETT and Blade Confirms placement with CO2 detector, evaluating chest rise and fall, bilateral lung sounds Leader Delegates PPV
8. Stop Scenario	

NRP Scenario #5

Objectives: Initial Steps, PPV or Intubation, Chest compressions
Pre-Delivery Questions:

Gestational Age?	Amniotic fluid clear?	How many babies?	Other risk factors?	C-section or vaginal?
32 weeks	Unknown	1	Fetal bradycardia for the past 5 minutes	Emergency C-section with general anesthesia

Scenario

Actions	Interventions
1. Infant is unresponsive on the radiant warmer	Initial Steps are completed which include: Warm, Dry, Suction, Position
2. Breathing and color are assessed infant has central cyanosis and is NOT breathing AND Heart rate is <60 BPM	*PPV is started with good chest rise and fall *PPV is started without good chest rise and fall, learner uses MRSOPA to correct *Start Chest Compressions
3. Central cyanosis remains	Pulse ox is applied & O2 increased to 100%
4. Reassess, and infant is still NOT breathing spontaneously AND Heart rate is < 60 BPM	PPV is resumed Intubation is considered or attempted Correct size ETT and Blade Confirms placement with CO2 detector, evaluating chest rise and fall, bilateral lung sounds Chest compression continue Leader Delegates UVC placement Leader Delegates EPI-infant weighs 1800g
5. Pulse ox is within target limit	No change to O2, continue to monitor
6. Reassess, and infant is still NOT breathing spontaneously AND Heart rate is <60 BPM	PPV is resumed Intubation is attempted Correct size ETT and Blade Confirms placement with CO2 detector, evaluating chest rise and fall, bilateral lung sounds Chest compression continue UVC is placed Medications are given
7. Reassess, and infant is still NOT breathing spontaneously AND Heart rate is <60 BPM	PPV via Intubation continues Chest compression continues Leader delegates additional EPI-weighs 1800g Leader considers fluid bolus-weighs 1800g
8. Stop Scenario	

NRP Scenario #6

Objectives: Initial Steps, PPV or Intubation, Chest compressions
Pre-Delivery Questions:

Gestational Age?	Amniotic fluid clear?	How many babies?	Other risk factors?	C-section or vaginal?
29 weeks	Unknown	1	Premature Motor vehicle crash Placental Abruption	Emergency C-section with general anesthesia

Scenario

Actions	Interventions
1. Infant is unresponsive on the radiant warmer	Initial Steps are completed which include: Warm, Dry, Suction, Position
2. Breathing and color are assessed infant has central cyanosis and is NOT breathing AND Heart rate is <60 BPM	*PPV is started with good chest rise and fall *PPV is started without good chest rise and fall, learner uses MRSOPA to correct *Start Chest compressions
3. Central cyanosis remains	Pulse ox is applied & O2 increased to 100%
4. Reassess, and infant is still NOT breathing spontaneously AND Heart rate is < 60 BPM	PPV is resumed Intubation is considered or attempted Correct size ETT and Blade Confirms placement with CO2 detector, evaluating chest rise and fall, bilateral lung sounds Chest compression continue Leader Delegates UVC placement Leader Delegates EPI-infant weighs 1200g
5. Pulse ox is within target limit	No change to O2, continue to monitor
6. Reassess, and infant is still NOT breathing spontaneously AND Heart rate is <60 BPM	PPV is resumed Intubation is attempted Correct size ETT and Blade Confirms placement with CO2 detector, evaluating chest rise and fall, bilateral lung sounds Chest compression continue UVC is placed Medications are given
7. Reassess, and infant is still NOT breathing spontaneously AND Heart rate is <60 BPM	PPV via Intubation continues Chest compression continues Leader delegates additional EPI-weighs 1200g Leader considers fluid bolus-weighs 1200g
8. Stop Scenario	

Appendix J

BRADLEY University

DATE: 2 July 2019

TO: Tamara Hryshchuk, Sarah Silvest-Guerrero
FROM: Bradley University Committee on the Use of Human Subjects in Research

STUDY TITLE: High-fidelity simulation in the Neonatal resuscitation program
CUHSR #: 44-19
SUBMISSION TYPE: Initial Review

ACTION: Approved
APPROVAL DATE: 2 July 2019
REVIEW TYPE: Exempt

Thank you for the opportunity to review the above referenced proposal. The Bradley University Committee on the Use of Human Subject in Research has determined the proposal to be EXEMPT from IRB FULL REVIEW according to federal regulations and concurs with the St. John Health System IRB (Tulsa OK, June 19, 2019) that this study is exempt.

The study has been found to be exempt pursuant to 45 CFR 46.104(d) 1 [Normal Educational Practices and Settings: Research, conducted in established or commonly accepted educational settings, that specifically involves normal educational practices that are not likely to adversely impact students' opportunity to learn required educational content or the assessment of educators who provide instruction. This includes most research on regular and special education instructional strategies, and research on the effectiveness of or the comparison among instructional techniques, curricula, or classroom management methods].

Please submit a final status report when the study is completed. A form can be found on our website at https://www.bradley.edu/academic/cio/osp/studies/cuhsr/forms/. Please retain research records for three years from the conclusion of your study. Be aware that some professional standards may require the retention of records for longer than three years. If this study is regulated by the HIPAA privacy rule, retain the research records for at least 6 years.

Be aware that any future changes to the protocol must first be approved by the Committee on the Use of Human Subjects in Research (CUHSR) prior to implementation and that substantial changes may result in the need for further review. These changes include the addition of study personnel. Please submit a Request for Minor Modification of a Current Protocol form found at the CUHSR website at https://www.bradley.edu/academic/cio/osp/studies/cuhsr/forms/ should a need for a change arise. A list of the types of modifications can be found on this form.

While no untoward effects are anticipated, should they arise, please report any untoward effects to CUHSR immediately.

This email will serve as your written notice that the study is approved unless a more formal letter is needed. You can request a formal letter from the CUHSR secretary in the Office of Sponsored Programs.

———

Committee on the Use of Human Subjects in Research – 100 Kauffman
1501 W Bradley Ave.
Peoria, IL 61625

Appendix K

St. John Health System | ASCENSION

Tamara Hryshchuk, MS, RNC-NIC
RN – Clinical Education Department St. John Regional Oboarding Center
DNP Student – Bradley University
(918) 289-9585
tamara.hryshchuk@langston.edu; Tamara.Hryshchuk@ascension.org

June 10, 2019

Dear Ms. Hryshchuk,

St. John Medical Center's Nursing Research and Evidence Based Practice Council has approved your study proposal titled *High-Fidelity Simulation in the Neonatal Resuscitation Program.* At this time, you may submit your proposal and other required documents to the St. John Health System Institutional Review Board.

Once you have completed your project, please contact Nursing Research & EBP Council to schedule a time to present your results.

Please contact me if you have any questions that Nursing Research & EBP Council may be able to assist you with.

Best regards,

Lindsey N. Green, DNP, APRN-CNS, RNC-NIC, CCNS-N
Chair, Nursing Research & EBP Council
St. John Medical Center
Office: (918) 744.3144
Email: Lindsey.Green@sjmc.org

Medical Excellence • Compassionate Care

Appendix L

St. John Health System

Medical Excellence · Compassionate Care
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DATE:	June 19, 2019
TO:	Tamara Hryshchuk, MS, RNC-NIC
FROM:	St. John Health System Institutional Review Board (SJHS IRB)
PROJECT TITLE:	[1423853-1] High-fidelity Simulation in the Neonatal Resuscitation Program
SUBMISSION TYPE:	New Project
ACTION:	APPROVED
APPROVAL DATE:	June 19, 2019
REVIEW TYPE:	Exempt Review
EXEMPT CATEGORY:	1 - Research, conducted in established or commonly accepted educational settings, that specifically involves normal educational practices that are not likely to adversely impact students' opportunity to learn required educational content or the assessment of educators who provide instruction. This includes most research on regular and special education instructional strategies, and research on the effectiveness of or the comparison among instructional techniques, curricula, or classroom management methods.

Thank you for your submission of the following materials for this study:

- Advertisement - Email Flyer updated 5.12 (UPDATED: 05/13/2019)
- Application Form - Initial Human Subject Research Application IRB SJMC updated 5.12 (UPDATED: 05/13/2019)
- Conflict of Interest - Other - IRB COI-Hryshchuk (UPDATED: 06/13/2019)
- Consent Form - Consent for Participation (UPDATED: 05/13/2019)
- Cover Sheet - IRB Cover Ltr.docx (UPDATED: 06/13/2019)
- HIPAA Waiver - SJMC IRB Waiver of Authorization Request Form (UPDATED: 05/13/2019)
- Letter - Permission to Teach Letter (UPDATED: 06/11/2019)
- Letter - HryshchukTamara_NRC_ApprovalLetter_June2019.pdf (UPDATED: 06/11/2019)
- Other - Bill of Rights (UPDATED: 05/13/2019)
- Other - IRB Fee Waiver Form (UPDATED: 04/8/2019)
- Proposal - Hryshchuk Proposal SJMC 4.3.19 (UPDATED: 05/13/2019)
- Questionnaire/Survey - Demographics Tool (UPDATED: 05/13/2019)
- Questionnaire/Survey - CCEI Tool (UPDATED: 05/13/2019)
- Questionnaire/Survey - Neonatal Resuscitation Confidence Questionnaire (UPDATED: 05/13/2019)

The SJHS IRB has reviewed the above materials and determined that your study meets the criteria for exemption classification. Research classified as exempt is not subject to the continuing review

Appendix M

Project Budget

Expenses		Revenue	
Simulators			
Newborn Hal Infant High-fidelity simulator (already purchased)	$50,000		
Salaries		**Billing**	$0
Salary for 2 NRP instructors to teach the 4-hour NRP course for 4 courses 4 hrs. x 4 courses = 16 hours @ $25/hr x 2 instructors	$800.00		
Supplies:		**Institutional budget support**	$0
Paper for Survey/Tools	$10.00		
Envelopes	$10.00		
Other:		**Grants**	$0
Gift Card Incentives 24 @ $5	$120.00		
Statistician	$100.00		
Total Expenses:	$1040.00	**Total Revenue:**	$0
Net Balance			$1040.00