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Improving Student Nurse Clinical Reasoning, Critical Thinking, and Clinical Judgment Through Simulation Debriefing

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Walden University
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Abstract

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MSN, Methodist University, 2014

BSN, Midland University, 2012

Dissertation Submitted in Partial Fulfillment

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Abstract

Simulation is an educational strategy in nursing education that incorporates structured activities that depict real-life situations to develop and enhance the knowledge, skills, and attitudes of nursing students by allowing them to analyze and initiate interventions for realistic situations in a simulated environment. Debriefing is a reflective process and is a key component in the simulation education process, but there is a lack of evidence on debriefing methods that enhance learning outcomes in nursing education. This study, which was guided by the National League for Nursing Jeffries simulation theory, was to determine the effect simulation debriefing, as assessed using the National Council of State Boards of Nursing clinical judgment measurement model framework, had on the clinical reasoning, critical thinking, and clinical judgment of nursing students enrolled in a bachelor of science in nursing (BSN) program. A sample of 40 undergraduate BSN nursing students participated. Data were collected through a pretest and a posttest and were analyzed with a paired samples *t*-test. The analysis indicated a significant difference in participant scores in clinical reasoning, critical thinking, and clinical judgment between the pretest and posttest after debriefing using the clinical judgment measurement model framework ($p < 0.001$) with a large Cohen's d = 1.116. Recommendations for future research include studying nursing students in associate and master's degree programs and conducting a pretest–posttest control group design. The findings of this study could lead to positive social change by educating the next generation of nurses with effective simulation and debriefing techniques that lead to improved clinical reasoning, critical thinking, and clinical judgment and improve patient outcomes.

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Dedication

I would like to dedicate this dissertation to my wonderful family, who helped me through this process—not only in the past but ongoing throughout. Therefore, I dedicate this dissertation to my parents, Betty and Stanley, for being essential to my education as I grew up, and to my husband, Gary, who supported me along this journey. In addition, I am also dedicating this to my children, Derek, Breanne, and Jordyn, because you can do anything you set your mind to.

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I would like to acknowledge my dissertation chair, Dr. Leslie Hussey. Her support and guidance was an inspiration to me throughout my journey towards my PhD! She provided me with encouragement and the necessary appraisal and critique to complete the dissertation process from the beginning to the end. I would also like to acknowledge my committee member, Dr. M. Terese Verklan. Her thoughtful and explorative inquiry throughout the dissertation process provided additional academic guidance and support. I would also like to acknowledge all those at Walden University that are too numerous to mention and contributed to the successful completion of this dissertation. Additionally, I would like to acknowledge my colleagues and my family that supported me throughout this process. Finally, thank you Lord Jesus, for helping me, guiding me, and making this possible.

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Chapter 1: Introduction to the Study

Introduction

Simulation is an educational strategy that incorporates structured activities that depict real-life situations to develop and enhance the knowledge, skills, and attitudes of individuals by allowing them to analyze and initiate interventions for realistic situations in a simulated environment (International Nursing Association of Clinical and Simulation Learning [INACSL] Standards Committee, 2016c). The National Council of State Boards of Nursing (NCSBN) national simulation study found similar educational outcomes are achieved when up to half of traditional clinical hours are replaced with simulated learning experiences; therefore, high-quality simulation has become an integral part of nursing education (Hayden et al., 2014). Another important aspect of simulation is debriefing, which is a reflective process that follows the simulated experience and is led by a trained facilitator who uses a structured framework for the debriefing process (INACSL Standards Committee, 2016c).

Debriefing leads to an enhanced simulation process and is a key component in simulation education (INACSL Standards Committee, 2016). INACSL identified debriefing as a key component in the simulation education process, but there is a lack of evidence on a debriefing method that enhances learning outcomes in nursing education (Lee, et al., 2020). Therefore, the purpose of my study was to assess the effects of simulation debriefing on clinical reasoning, critical thinking, and clinical judgment in nursing students and to advance research in the area of debriefing methods that enhance

student learning in nursing education by applying the NCSBN clinical judgment measurement model as a conceptual framework in the debriefing process.

Educating the next generation of nurses is important in positive social change. Specifically, the findings of this study can lead to positive social change through improvement in social and human conditions within local communities and throughout the world by enhancing the pedagogy of nursing education. My study results also provided a better understanding of the effects the simulation debriefing process has on student nurses' transition to practice. Chapter 1 includes the background, problem statement, purpose, research question, hypotheses, theoretical foundation, nature of the study, definitions, assumptions, scope and delimitations, limitations, and the significance of the study.

Background

Traditional nursing education includes classroom instruction, along with clinical hours in which a student develops skills and critical thinking in a traditional clinical environment, such as a hospital setting, by interacting with and caring for patients under the supervision of a clinical instructor (Hayden et al., 2014). As nursing education evolves, and as traditional clinical hours in a hospital setting become more challenging to obtain due to limited clinical sites, decreasing numbers of students allowed on patient care units, faculty shortages, or restricted access to high-quality clinical experiences, there is an ongoing need to find additional innovative ways to prepare students (Hayden et al., 2014). Therefore, clinical hours are being replaced with simulated learning experiences, a technique that recreates real-life situations and allows for active

participation in guided simulated experiences (Gaba, 2004; INACSL Standards Committee, 2016d).

In nursing education, simulation is an educational strategy that facilitates students' learning and practice by allowing students to assess, plan, implement, and evaluate patient care while being immersed in a clinical environment that is safe and realistic (Arthur et al., 2013). Each simulated learning experience includes measurable objectives and outcomes, a structured format, and a realistic scenario. Further, the experience begins with prebriefing, and is followed by debriefing, and preparation materials to promote achievement of the objectives and outcomes of the simulated learning experience (INACSL Standards Committee, 2016a).

To develop the skills of a nurse, a complex interrelated process that progresses from basic psychomotor and problem-solving skills to higher-level clinical reasoning, critical thinking, and clinical judgment is necessary for decision making and safe and effective practice are developed (INACSL Standards Committee, 2016c). Psychomotor skills involve the ability to perform consistently and proficiently the skills required for professional nursing practice (INACSL Standards Committee, 2016c). Problem solving in professional nursing practice involves the process of focusing selectively on pertinent patient information to formulate a solution that manages the current patient situation (INACSL Standards Committee, 2016c).

In many instances clinical reasoning, critical thinking, and clinical judgment may be used interchangeably, but there are differences. Clinical reasoning and critical thinking lead to, and result in, the formation of clinical judgment (Alfaro-LeFevre, 2017). Critical

thinking is the process of problem solving, analyzing the available data, making decisions based on the evidence and scientific principles (Alfaro-LeFevre, 2017; INACSL Standards Committee, 2016c). Clinical reasoning is the process that goes one-step further and incorporates both thought formation and reflection in order to collect and comprehend patient information while employing previous knowledge, skills, and attitudes in order to analyze the current situation and draw a conclusion and potential alternative actions (INACSL Standards Committee, 2016c). Clinical judgment combines critical thinking and decision-making skills through the recognition of relevant changes in a patient's clinical condition and then appropriately interpreting, responding, and reflecting on the effectiveness of the interventions employed to establish alternative action as needed (Betts et al., 2019; INACSL Standards Committee, 2016c).

A structured conceptual framework is used to facilitate the debriefing process in the simulated learning experience (INACSL Standards Committee, 2016). While a common conceptual framework used for debriefing is the nursing process framework, other frameworks used include "GAS (gather, analyze, summarize), Debriefing with Good Judgment, Promoting Excellence and Reflective Learning in Simulation (PEARLS), Debriefing for Meaningful Learning (DML), Plus-Delta, 3D Model of Debriefing, OPT Model of Clinical Reasoning" (INACSL Standards Committee, 2016, p. S23), and Tanner's model of clinical judgment (Dreifuerst, 2009; Tanner, 2006). As noted by INACSL, frameworks appropriate for debriefing will continue to be created in the future (INACSL Standards Committee, 2016). One such framework recently developed to assess clinical judgment in NCSBN's newest National Council Licensure

Examination (NCLEX) for registered nurses (RNs) is the NCSBN clinical judgment measurement model framework.

Simulation debriefing is a self-reflection process that follows a conceptual framework and is led by a trained facilitator. The facilitator assists in the conscious reflection of actions and/or inactions, which combines with preexisting knowledge to promote a new understanding that supports the transfer of knowledge, skills, and attitudes for future situations and fosters professional role attainment and safe, quality patient care (INACSL Standards Committee, 2016, 2016d). Due to the lack of research on the debriefing process and what debriefing practices are deemed best practice, I assessed the effect of simulation debriefing on clinical reasoning, critical thinking, and clinical judgment in nursing students using the NCSBN clinical judgment measurement model framework for simulation debriefing in the simulated learning experience.

Problem Statement

Throughout the history of nursing education, 100% of the clinical hours have traditionally consisted of observational activities, interacting with and caring for patients, and/or interacting with the interdisciplinary team under the supervision of a clinical instructor. In 2014, the results of the NCSBN's national simulation study indicated no significant differences in the educational outcomes of students' knowledge, competency, and critical thinking when up to 50% of traditional clinical experiences in the undergraduate nursing program are replaced with simulated learning experiences (Hayden et al., 2014). The national simulation study's recommendations have also led to expanding the use of simulation in nursing education (Rutherford-Hemming et al., 2016).

Therefore, as nurses are educated and prepared with the latest teaching pedagogies, clinical reasoning, critical thinking, clinical judgment, problem solving, and psychomotor skills are enhanced by simulation debriefing (Shinnick et al., 2011). Furthermore, with the ongoing transition to assess and emphasize clinical judgment by the NCSBN's newest NCLEX for RNs, the simulation debriefing process needs to be an important piece in facilitating clinical judgment in nursing students (Bristol, 2019).

Simulation debriefing best practices include the qualities of reflection, emotion, reception, integration, assimilation, and accommodation that integrate through a conceptual framework in order to facilitate knowledge, skills, and attitudes; however, a conceptual framework is not always applied in the simulation debriefing process (Dreifuerst, 2009). As noted previously, there are several conceptual frameworks being used for the debriefing process, and the NCSBN clinical judgment measurement model has been brought to the forefront as a potential debriefing process and technique to further clinical judgment as nursing transitions to NCSBN's newest NCLEX for RNs (Hensel & Billings, 2020; NCSBN, 2019).

Additionally, Waznonis (2015) indicated that the debriefing methods currently used in traditional baccalaureate nursing education might not be evidence based or understood throughout nursing education because a large proportion of these programs do not currently use any particular structured debriefing process. Furthermore, while the literature indicates debriefing is one of the most important parts of simulation and that debriefing is a critical component for learning, there is a lack of research on the debriefing phase and specific debriefing processes considered to be best practices (Alhaj

& Musallam, 2018; Hall & Tori, 2017; Hines & Wood, 2016; Palaganas et al., 2016; Rutherford-Hemming et al., 2016; Shinnick et al., 2011). Additionally, as noted by Dreifuerst (2009) and Dufrene and Young (2014), there is an ongoing need to research student learning and outcomes facilitated by different methods of debriefing. Therefore, I identified a need to research the NCSBN clinical judgment measurement model conceptual framework as a debriefing process and assess the framework's effect on the student learning outcomes of clinical reasoning, critical thinking, and clinical judgment in nursing education.

Purpose of the Study

The purpose of my study was to determine the effect simulation debriefing, as assessed by using the NCSBN clinical judgment measurement model framework, has on the clinical reasoning, critical thinking, and clinical judgment of nursing students. To address the literature gap, I conducted a one-group pretest posttest quasi-experimental study.

Research Question and Hypotheses

RQ: What effect does simulation debriefing, as assessed by using the NCSBN clinical judgment measurement model framework, have on clinical reasoning, critical thinking, and clinical judgment of bachelor of science in nursing (BSN) nursing students?

$H_0$1: There is no difference in the effect of simulation debriefing, as assessed by using the NCSBN clinical judgment measurement model framework, on clinical reasoning, critical thinking, and clinical judgment of BSN nursing students.

H_A1: There is a difference in the effect of simulation debriefing, as assessed by using the NCSBN clinical judgment measurement model framework, on clinical reasoning, critical thinking, and clinical judgment of BSN nursing students.

The student-learning outcomes of clinical reasoning, critical thinking, and clinical judgment in nursing students were assessed by a pretest and posttest using the clinical reasoning evaluation simulation tool (CREST), the critical thinking diagnostic (CTD), and the Lasater clinical judgment rubric (LCJR).

Theoretical Foundation

The theoretical basis for my study was the National League for Nursing (NLN) Jeffries simulation theory, which aligns with the purpose of determining if a simulation debriefing process that integrates the NCSBN clinical judgment measurement model framework has an effect on student-learning outcomes. The NLN Jeffries simulation theory provides the basis to inform practice in the study of the simulation phenomenon and to contribute to the science of nursing education (NLN, 2016). As a middle-range theory, the NLN Jeffries simulation theory supports the basis for studies related to best practices, outcomes, and systems change within the phenomenon of simulation (NLN, 2016). The NCSBN clinical judgment measurement model is defined as a framework that supports the development of a student's clinical reasoning, critical thinking, clinical judgment, and clinical decision making through the steps of recognizing cues, analyzing cues, prioritizing hypotheses, generating solutions, taking action, and evaluating outcomes (Hensel & Billings, 2020). Additionally, the NCSBN clinical judgment measurement model is used as a guide to lead students through the cognitive steps of

developing clinical judgment skills and can be used to guide discussions and teach clinical judgment through clinical scenarios, case studies, and simulations (Dickison et al., 2019; Hensel & Billings, 2020). The components that form the NLN Jeffries simulation theory include the context, the setting, or location of the simulation, as well as the background and design of the simulation. Next, the simulation experience is formed by the dynamic interaction of the facilitator, educational strategies, and the participant that is surrounded by an experiential, interactive, collaborative, learner centered, and trusting environment. These variables then lead to system, patient, and/or participant outcomes (NLN, 2016). Therefore, the NLN Jeffries simulation theory matched with my research project because the integration of the NCSBN clinical judgment measurement model framework for debriefing is an educational strategy that nurse educators can use to educate students and influence student learning outcomes. More details on the NLN Jeffries simulation theory are provided in Chapter 2.

Nature of the Study

I sought to determine the effect of the simulation debriefing intervention, the NCSBN clinical judgment measurement model framework, on BSN nursing student outcomes of clinical reasoning, critical thinking, and clinical judgment. The independent variable was the debriefing process using the NCSBN clinical judgment measurement model framework. The dependent variables or outcomes were clinical reasoning, critical thinking, and clinical judgment in BSN nursing students. One group of BSN nursing students, at the junior and senior level, were available for my study and data were collected before and after the debriefing intervention on the group. Based on my research

question, the study variables, and the availability of one group of BSN nursing students, a quasi-experimental, single-group, pretest–posttest design was the appropriate design for the study (see LoBiondo-Wood & Haber, 2014).

My research question and hypotheses included one independent variable and one dependent variable that combined clinical reasoning, critical thinking, and clinical judgment. Because there was one independent variable and one dependent outcome variable related to learning, I evaluated the data with a paired-samples t-test. A paired samples t-test allowed me to compare the mean scores on a single-group of BSN nursing students to determine if there was a statistically significant difference in the mean scores from pretest to posttest (see Pallant, 2016). I collected quantitative data on one group of BSN students before and after the simulation debriefing intervention by using the CTD, the LCJR, and the CREST.

The CTD was designed to assess critical thinking in the five categorical areas of (a) problem recognition, (b) clinical decision making, (c) prioritization, (e) clinical implementation, and (f) reflection on a six-point Likert scale, with 1 = *strongly disagree* to 6 = *strongly agree*. There is a maximum of 30 points for each category and 150 total points for the CTD (Berkow et al., 2011; Bittner et al., 2020; Turkel et al., 2016). The reliability of the CTD was demonstrated with a Cronbach's alpha of 0.976 for all categorical areas and with 0.910 for problem recognition, 0.0882 for clinical decision making, 0.932 for prioritization, 0.919 for clinical implementation, and 0.922 for reflection (Berkow et al., 2011).

The LCJR was designed to assess clinical judgment on 11 behaviors from beginning to exemplary with the *beginning* level earning 1 point, *developing* earning 2 points, *accomplished* earning 3 points, and *exemplary* earning 4 points on each behavior. Overall nursing clinical judgment is measured using a range of 0 to 44 points with clinical judgment at the beginning level scoring 0–11, developing 12–22, accomplished 23–33, and exemplary 34–44 (Miraglia & Asselin, 2015). The reliability of the tool was demonstrated with a Cronbach's alpha of 0.974 (Adamson & Kardong-Edgren, 2012).

The CREST was designed to assess clinical reasoning on 10 items of clinical reasoning on a five-point Likert scale. The minimum score is 10 and the maximum score is 50. The reliability of the tool was demonstrated with a Cronbach's alpha of 0.92; 95% confidence interval 0.86–0.95 (Liaw et al., 2018).

Definitions

Bachelor of science in nursing (BSN) students: Nursing students enrolled in a prelicensure RN program, primarily in a university setting that emphasizes liberal arts or advanced sciences. The nursing coursework typically requires 4 years of training and upon graduation allows the graduate to take the NCLEX for RNs (Institute of Medicine Committee on the Robert Wood Johnson Foundation on the Future of Nursing, 2011; Lipsky et al., 2019).

Clinical judgment: A cognitive process of interpreting and forming conclusions related to the needs, concerns, and health problems of patients while deciding whether or not to take a standard action or to use a new method based on the response of the patient (Tanner, 2006). Additionally, previous experiences help to develop one's clinical

judgment by using the process of critical thinking to facilitate a successful outcome related to a patient problem (INACSL Standards Committee, 2016c).

Clinical reasoning: A process of gathering and processing clinical cues and information in order to recognize a patient's condition to plan for and implement interventions, evaluate the results, and then move forward through thoughtful reflection to form new understandings and knowledge from the process. An effective clinical reasoning process will employ collecting the correct cues to take the right action at the right time for the right reason and on the right patient (Levett-Jones et al., 2010).

Critical thinking: Employing the combined personal practices and processes of thinking and reasoning to analyze problems, make judgments, come to conclusions, and take action (or an alternative action) in order to make the best clinical decision in solving a clinical problem and leading to the best patient outcome for the situation (Brunt, 2005; Facione, 1990; Lee et al., 2017; Shin et al., 2006).

Simulation debriefing: A process of reflection that follows a simulated learning experience and is led by a trained facilitator using a theoretical framework to facilitate the promotion of new understanding and the transfer of knowledge, skills, and attitudes in order to provide safe, quality patient care in future situations (INACSL Standards Committee, 2016, 2016d).

Assumptions

An assumption of my study was that BSN nursing students desire to have effective high-quality skills in clinical reasoning, critical thinking, and clinical judgment. Consequently, these learned skills will improve the quality of nursing practice by

improving a student's ability to act. An additional assumption was that BSN nursing students desire to graduate with all the necessary qualifications and skill sets to allow them to meet the diverse health care needs of the population and that will lead to the provision of safe and effective patient care (Sommers, 2018). These assumptions further implied that clinical reasoning, critical thinking, and clinical judgment improve the quality of nursing practice (Riddell, 2007).

Scope and Delimitations

The focus of my study was chosen due to the upcoming transition of the NCSBN's Next Generation NCLEX (NGN) examination that will assess graduate nurses' clinical judgment through questions that evaluate the knowledge, skills, and abilities needed to support critical thinking and clinical reasoning and therefore lead to successful outcomes while providing care (NCSBN, 2017). The inclusion criteria were nursing students in one BSN undergraduate nursing program who were junior and senior level students in medical–surgical nursing courses that included a high-fidelity simulation scenario. I excluded diploma and associate degree nursing students, accelerated BSN students, students who had a completed degree such as RN to BSN students, students not in the previously mentioned nursing courses, and students retaking a nursing course or a nursing course without high fidelity simulation scenario. The selection effects of the population may affect external validity and generalizability of the study's findings due to the population's exclusion criteria.

Because the purpose of the research was to determine what affect the NCSBN clinical judgment measurement model framework has on clinical reasoning, critical

thinking, and clinical judgment when used in the simulation debriefing process, an experimental or quasi-experimental research design was appropriate. Due to the potential for a limited number of nursing students in the study's population group, I did not choose to conduct a randomized control trial or a true experimental design. Instead, I chose a quantitative quasi-experimental, single-group, pretest–posttest design due to the limited number of potential participants available in the population group. Because I did not use a control group or randomization, there is a threat to internal validity (see LoBiondo-Wood & Haber, 2014). Additionally, generalizability and external validity of the study may have been affected due to the Hawthorne effect, pretest sensitization, and posttest sensitization. With the Hawthorne effect, participants may perform at a higher level and lead to better outcomes because they know they are in a study and there is added attention. With a pretest, the study's population are alerted to the subject content of the study and therefore have a higher sensitization to the debriefing topics, which may then affect the posttest at a higher rate than it would have otherwise (see LoBiondo-Wood & Haber, 2014).

The theories and theoretical frameworks I reviewed for consideration were Benner's novice-to-expert theory, Tanner's clinical judgment model, Kolb's experiential learning theory, Lasater's clinical judgment model, and debriefing for meaningful learning. While each of these frameworks or theories addresses specific aspects of learning in nursing education, the NLN Jeffries simulation theory is focused more specifically on guiding research that will inform the practice into the study of simulation and contribute to the science of nursing education (NLN, 2016). Because my main focus

was to assess clinical reasoning, critical thinking, and clinical judgment after simulation debriefing using the NCSBN clinical judgment measurement model, the NLN Jeffries simulation theory was appropriate to use as a theoretical basis for my study.

Limitations

With a quasi-experimental, single-group pretest–posttest design, the data were collected on one group of subjects before and after the experimental treatment, which did not allow for a control group or randomization (see LoBiondo-Wood & Haber, 2014). Therefore, these internal validity limitations were considered when interpreting the findings of the study (see LoBiondo-Wood & Haber, 2014). Additionally, confounding variables had the potential to affect the findings of my study, but I could not randomly assign participants into a treatment or control group (Harris et al., 2006). Potential confounding variables include student participant demographics, such as age, sex, race, marital status, traditional or nontraditional student, full-time or part-time student, current employment (part time or full time), and previous college history, such as a previous degree in another field or current licensure as a licensed practical nurse (LPN). Therefore, these potential confounding variables may have affected the results, which could conceal a true cause-and-effect relationship.

Significance

NLN's (2016) education research priorities include "build[ing] the science of nursing education through the discovery and translation of innovative evidence-based strategies" (p. 2). Nurses must be educated and prepared with the latest teaching pedagogies that improve clinical reasoning, critical thinking, clinical judgment, problem

solving, and psychomotor skills to affect a positive transition to practice (Dreifuerst, 2009). Simulation debriefing that uses the NCSBN clinical judgment measurement model framework is one educational practice that has the potential to build the science of nursing education while improving the pedagogy of undergraduate nursing education, promoting student learning, and improving the transition to practice (Shinnick et al., 2011).

A best practice standard for simulation debriefing defined by the INACSL is for the simulation debriefing process to follow a structured framework (INACSL Standards Committee, 2016; Waznonis, 2015). Therefore, to address the gap in literature related to best practices for the debriefing processes, I sought to determine the effect that a simulation debriefing process using the NCSBN clinical judgment measurement model framework has on clinical reasoning, critical thinking, and clinical judgment among BSN nursing students.

The findings of my study contribute to positive social change because clinical reasoning, critical thinking, and clinical judgment strengthen student nurses' ability to make patient-centered decisions in a timely and effective manner (see Koharchik et al., 2015). Therefore, if the NCSBN clinical judgment measurement model framework for simulation debriefing strengthens these critical nursing skills, its use will lead to improved clinical reasoning and allow student and future nurses to recognize patient indicators, prioritize care, act promptly, and evaluate outcomes in order to recognize and act on a patient condition before the patient's condition deteriorates significantly (Bristol, 2019). Therefore, with the positive social change of improved patient outcomes, a

debriefing best practice for student nurses could be established that has the potential to influence patient care outcomes positively, now and in the future, as student nurses transition to practice as RNs.

Summary and Transition

With the NCSBN's transition that emphasizes clinical judgment in the Next Generation NCLEX, there is an ongoing need to assess and facilitate student learning in nursing education. Because evidence is lacking on simulation debriefing methods and their effect on clinical reasoning, critical thinking, and clinical judgment in nursing education, I sought to determine the effects a specific simulation debriefing method had on student learning. The simulation debriefing intervention is a conceptual framework based on the NCSBN clinical judgment measurement model. I assessed clinical reasoning, critical thinking, and clinical judgment before and after the debriefing intervention in one group of BSN nursing students. The quantitative data were attained through the CREST to assess clinical reasoning, the CTD to assess critical thinking, and the LCJR to assess clinical judgment in BSN nursing students. I also addressed the gap in literature related to best practice debriefing processes and the impact that a conceptual framework based off the NCSBN clinical judgment measurement model has on clinical reasoning, critical thinking, and clinical judgment. In Chapter 2, I will describe and summarize previous literature related to simulation and debriefing in nursing education and provide the theoretical foundation, key variables, and concepts used to perform my study.

Chapter 2: Literature Review

Introduction

Simulation in nursing education continues to advance since the landmark study by the NCSBN, which found no significant difference in educational outcomes of a students' knowledge, competency, and critical thinking when up to 50% of the student's traditional clinical experiences were replaced with simulation (Hayden et al., 2014; Rutherford-Hemming et al., 2016). The national simulation study's recommendations have also led to expanding the use of simulation in nursing education (Rutherford-Hemming et al., 2016). Additionally, the INACSL standards of best practice for simulation provide an evidence-based framework for guiding simulation's design, implementation, debriefing, evaluation, and research (INACSL Standards Committee, 2016b). These standards lay the groundwork for evidence-based practice in healthcare education, practice, and research (INACSL Standards Committee, 2016b).

Although the literature indicates debriefing after simulation is a critical component for learning to occur and that incorporating a debriefing session after a simulation scenario is best practice, there continues to be a lack of research on the debriefing phase and what debriefing processes are deemed as best practice (Alhaj & Musallam, 2018; Hall & Tori, 2017; Hines & Wood, 2016; Palaganas et al., 2016; Rutherford-Hemming et al., 2016; Shinnick et al., 2011). Furthermore, with the ongoing transition to assess and emphasize clinical judgment by the NCSBN's newest NCLEX for RNs, the simulation debriefing process is becoming an important piece in facilitating clinical judgment in nursing students (Bristol, 2019). Therefore, nurses must be educated

and prepared with the latest teaching pedagogies that improve clinical reasoning, critical thinking, clinical judgment, problem solving, and psychomotor skills, with simulation debriefing playing an important part of student nursing education.

It is important to understand a few details related to the debriefing process, such as the attributes of debriefing and a conceptual framework, because these make up and identify the debriefing process. Reflection, emotion, reception, integration, and assimilation define the attributes of the debriefing process, which is facilitated through guided reflection embedded in a conceptual framework. The most common framework in nursing is the nursing process framework (Dreifuerst, 2009). Other conceptual frameworks identified in nursing include Tanner's (2006) model of clinical judgment and the NCSBN (2019) clinical judgment measurement model.

The nursing process framework includes assessment, analysis, planning, implementing, and evaluation (Dreifuerst, 2009; Tanner, 2006). Tanner's (2006) model of clinical judgment includes the components of noticing, interpreting, responding, and reflection in action and reflection on action. The NCSBN (2019) clinical judgment measurement model includes recognition of cues, analyzing the cues, prioritizing a hypothesis, generating a solution(s), taking action, and evaluating the outcomes. These models/frameworks have in common that they develop clinical reasoning and facilitate clinical judgment (Dreifuerst, 2009; NCSBN, 2019; Tanner, 2006). As noted by Dreifuerst (2009), guided reflection, embedded in a conceptual framework, is frequently not done in the debriefing process.

Due to the lack of research on the debriefing process and debriefing best practices, my study was focused on the NCSBN clinical judgment measurement model as a conceptual framework for debriefing. The purpose of my study was to determine the effect simulation debriefing, as assessed by using the NCSBN clinical judgment measurement model framework, has on clinical reasoning, critical thinking, and clinical judgment of nursing students compared to the clinical reasoning, critical thinking, and clinical judgment of nursing students who do not receive simulation debriefing through the NCSBN clinical judgment measurement model framework. Chapter 2 includes the literature search strategy, a review of the theoretical foundation as well as the literature review of simulation debriefing and assessment tools used to assess clinical judgment and critical thinking.

Literature Search Strategy

I conducted a literature search using the following electronic nursing databases: CINAHL Plus with Full Text, MEDLINE with Full Text, ProQuest Nursing & Allied Health Source, and PubMed. The key search terms included *simulation, debriefing, simulation debriefing, nursing education, simulation in nursing education*, and *debriefing in nursing education*. Selected articles were related to simulation debriefing, the effect of debriefing on learning and clinical judgment, and tools that evaluate clinical performance. The scope of the literature review included peer-reviewed scholarly journals with research articles that were full text in the English language and published between 2010 and 2020. In addition, the book that references the theoretical framework was also included.

Theoretical Foundation

In 2003, the Laerdal Medical Corporation and the NLN funded a project to test models promoting student learning in nursing education using the pedagogical practice of simulation. Because simulation in nursing education was in its early stages of development at that time, no theoretical framework existed. Therefore, the Laerdal and NLN project director, Pamela Jeffries, along with the rest of the team, initiated the development of a simulation framework for nursing education (NLN, 2016).

Simulation Model

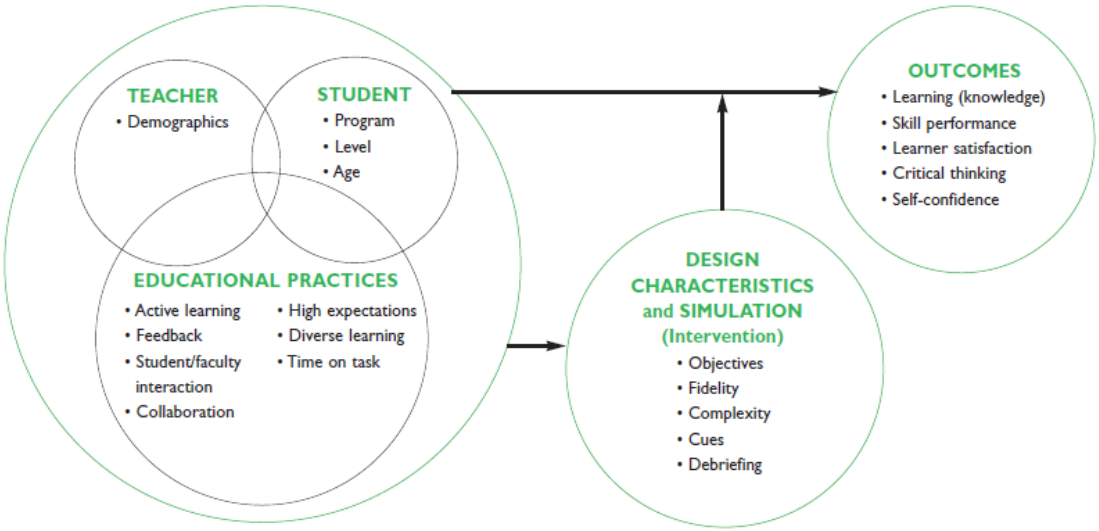
The original theoretical framework, the *simulation model* of the NLN Jeffries simulation framework, was guided by a literature review. The framework was used to guide the design, implementation, and evaluation of simulations in nursing education (Jeffries, 2005; NLN, 2016). Furthermore, a framework is needed to guide in the simulation design and implementation and to assess outcomes in nursing education; it also is needed to specify pertinent variables and how they relate to each other to conduct research in an organized and methodical manner (Jeffries, 2005).

In 2005, Jeffries provided a detailed description of the modified original prototype of the simulation model, as shown in Figure 1. The modified simulation model included five main concepts with associated variables for each concept. Of course, while the modified simulation model framework identified main concepts and variables associated with each concept, not all are relevant to every study (Jeffries, 2005). The main concepts in the modified simulation model include the teacher, the student, educational practices, outcomes, and design characteristics with the simulation intervention. Additionally, the

model displays that the learning outcomes are influenced by the simulation design characteristics and interventions when the teacher, student, and educational practices work in coordination with each other. Subsequently, these main concepts, along with the variables associated with the concepts, will be described in further detail (Jeffries, 2005).

Figure 1

Second Iteration of the Simulation Model of the NLN Jeffries Simulation Framework



Source: Adapted from "A Framework for Designing, Implementing, and Evaluating Simulations Used as Teaching Strategies in Nursing", by P. R. Jeffries, 2005, Nurse Education Perspectives, 26(2), p. 97. Reprinted with permission (see Appendix A).

Teacher Concept

The teacher's role in simulation is central to the simulation learning experience. Depending on the purpose of the simulation, the teacher's function will change. During a simulation experience, a teacher mainly functions as a facilitator of student learning, but

when the purpose of the simulation is to evaluate student learning, teachers function as observers (Jeffries, 2005).

Student Concept

Within the simulation experience, a student is expected to be autonomous and independently motivated for their own learning. The simulation may involve the student playing a role, such as patient, nurse, or observer. Role playing will allow the student to learn from the different perspectives that each role entails (Jeffries, 2005).

Educational Practices

The simulation model's educational practices are based on Chickering and Gamson's seven principles. These principles include "active learning, prompt feedback, student/faculty interaction, collaborative learning, high expectations, allowing diverse styles for learning, and time on task" (Jeffries, 2005, p. 98).

Design Characteristics and Simulation

Essential to the simulation design is a teaching activity that is suitable to support the goals, skills, and outcomes in the course. As noted in Figure 1, the simulation design includes objectives, fidelity, complexity, cues, and debriefing. The simulation objectives will guide the student learning experience and the attainment of the student outcomes. Effective fidelity will reflect realism of the clinical environment and patient scenario. The simulation scenario can range from very simple to highly complex, with relevant and irrelevant information and/or low or high levels of uncertainty. Cues are implemented during the simulation by faculty or others in order to help the student progress through the simulation. Finally, effective debriefing allows for reflective learning, critical

thinking, and appropriate interventions when faced with complex simulated real life scenarios (Jeffries, 2005).

Outcomes

Learner and course outcomes assessed in nursing education with the simulation model framework are knowledge or learning, performance of skills, learner satisfaction, critical thinking, and self-confidence. Knowledge or learning is measured by retention of knowledge and if the learning outcomes are met. Skill performance allows for procedural skill acquisition and assessment through skill competency check. Learner satisfaction is identified quantitatively or qualitatively through student satisfaction of the simulated learning experience. Critical thinking has been associated with simulated learning experiences, but a student's self-confidence in their critical thinking and problem solving is increased through their improved clinical judgment skills obtained in the simulated learning environment (Jeffries, 2005).

Nursing Education Simulation Framework

In 2007, the third adaptation to the model was presented in Jeffries' book *Simulation in Nursing Education: From Conceptualization to Evaluation*. The third adaptation altered and clarified one of the five main concepts. The concept of *design characteristics and simulation intervention* was edited to *simulation design characteristics*. By refining the simulation design characteristic concept, the variables were then changed to include objectives, fidelity, problem solving, student support, and debriefing. The third adaptation include these minor changes and the name was changed to the NLN Jeffries simulation framework. Then, in 2012, in Jeffries' second edition of

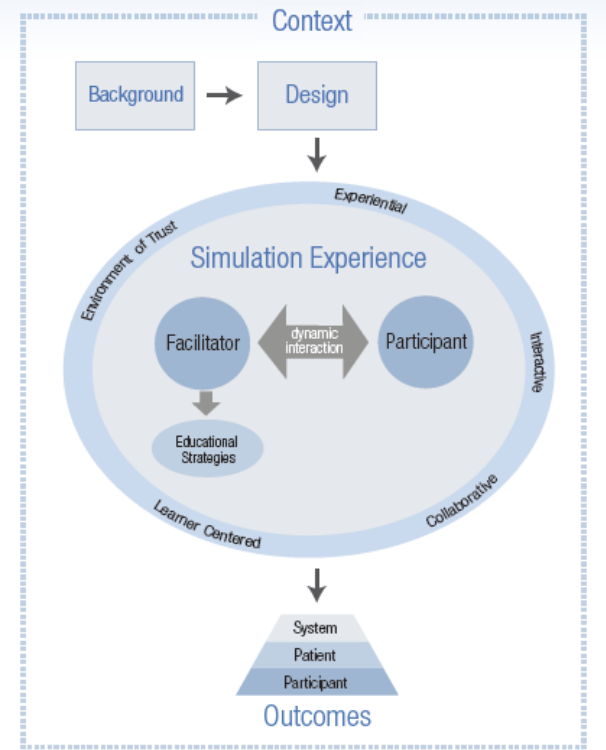
Simulation in Nursing Education: From Conceptualization to Evaluation, additional changes were made to the framework. The main concepts in the framework were again enhanced and the concept of *teacher* became *facilitator* and *student* became *participant* in the fourth adaptation to the simulation framework (NLN, 2016).

NLN Jeffries Simulation Theory

In 2015, and after the state of the science review, the framework was finally known as the NLN Jeffries simulation theory (Figure 2). The NLN Jeffries simulation theory is used to guide research in the study of the phenomenon of simulation and to contribute to the science of nursing education. As a middle-range theory, the NLN Jeffries simulation theory supports the basis for studies related to best practices, outcomes, and systems change within the phenomenon of simulation (NLN, 2016a). Therefore, I used the NLN Jeffries simulation theory as the organizing structure that supported my study related to simulation debriefing's outcome measure of participant learning.

Figure 2

NLN Jeffries Simulation Theory



Source: Adapted from *The NLN Jeffries Simulation Theory* by P. R. Jeffries, 2016, Wolters Kluwer. Copyright 2016 National League for Nursing. Reprinted with permission. (see Appendix B)

The concepts within the NLN Jeffries simulation theory include the context, background, design, simulation experience, facilitator and educational strategies, the participant, and outcomes. Within the simulation's design, the debriefing strategies are established. Debriefing strategies include the various methods of debriefing such as reflection; oral; video; structured or unstructured debriefing; and/or high, intermediate, or low-level facilitator debriefing involvement. The simulation experience includes interaction between the participant and the facilitator while using educational strategies.

Included in the facilitator and education strategies are appropriate feedback, cues, and debriefing near the end of the simulation experience. Finally, the outcomes of the simulation experience or the evaluation piece is separated into three areas: patient, participant, and system outcomes. The participant outcomes included in the evaluation phase of the theory are "reaction (satisfaction, self-confidence), learning (changes in knowledge, skills, attitudes), and behavior (how learning transfers to the clinical environment)" (NLN, 2016a).

While the research on simulation is still in the early stages of development, the NLN Jeffries simulation theory supports the informative practice related to knowledge, outcomes, simulation, and simulated educational practices. Additionally, the NLN Jeffries simulation theory includes the concepts of context, background, simulation design, simulation experience, facilitator and educational strategies, the participant, and outcomes (NLN, 2016a). Therefore, this theory has the potential to guide a variety of studies in the area of simulation. Jarvill et al. (2018) used the NLN Jeffries simulation theory to guide research on a simulated intervention for medication administration competence. Farra and Smith (2019) used the theory to guide the participant experiences related to anxiety and stress in a live disaster exercise, because anxiety affects the simulation learning experience of the participants. Graham et al. (2018) used the framework supporting the study to determine if participant attributes and demographics such as the race of students and manikins influence the outcome and experiences of simulation.

As noted by NLN (2016a), “the challenge is now to test and use this theory to guide research in studying the simulation phenomena and contribute to the science of nursing education” (p. 52). While all the concepts within the NLN Jeffries simulation theory served as the basis for my study, the simulation design, educational strategies, and the simulation outcomes are the key concepts that are guided by the NLN Jeffries simulation theory. Therefore, the NLN Jeffries simulation theory was appropriate to serve as the theoretical underpinning for my study, which was assessing a simulation debriefing interventions’ effect on undergraduate student learning outcomes.

Literature Review Related to Key Variables and/or Concepts

Simulation

Simulation is an educational strategy used to represent real life situations in order promote and improve an individual’s knowledge, skills, and performance through activities that are guided in a simulated and safe environment in order to improve one’s cognitive, motor, and critical thinking skills (INACSL Standards Committee, 2016c; Hayden et al., 2014). These simulation activities reproduce clinical practice scenarios using virtual reality, patient actors, or manikins that simulate real life skills, interactivity, and critical thinking (Hayden et al., 2014).

Debriefing

The origins of debriefing are rooted in the military, aviation, education, and psychology (Gardner, 2013). Initially, debriefing was used in the military as a method to gather the historical description of battles during World War II. Later, military debriefing was used for stress management after individuals were exposed to traumatic events

because debriefing was found to reduce anxiety and increased self-efficacy in individuals exposed to trauma in the military (Shalev, 1993). In the 1980's critical incident stress debriefing (CISD) or psychological debriefing was used to address physical and psychological symptoms associated with traumatic events such as deception, trauma, disaster, or stress related to combat (Gardner, 2013). In the aviation industry, debriefing was first used in pilot flight simulations and later for training the entire crew to reduce errors and prevent accidents. In education and psychology, debriefing was used to facilitate participation and guided discussions to analyze, synthesize, and apply learning (Gardner, 2013).

Debriefing Concept

Gardner (2013) defined debriefing as "a post-experience analytic process… [in which] there is discussion and analysis of an experience, evaluating and integrating lessons learned into one's cognition and consciousness" (p. 166). Johnson-Russell and Bailey (2010) and NLN-SIRC (2013) (as cited by Meakim et al., 2013) defined debriefing as:

> an activity that follows a simulation experience and is led by a facilitator. Participants' reflective thinking is encouraged, and feedback is provided regarding the participants' performance while various aspects of the completed simulation are discussed. Participants are encouraged to explore emotions and question, reflect, and provide feedback to one another. The purpose of debriefing is to move toward assimilation and accommodation [in order] to transfer learning to future situations. (p. S5)

For my study, debriefing included a discussion process that followed the simulated learning experience and a facilitator that was a faculty member led the discussion. This structured reflection facilitated the student nurses learning process and allowed the nursing students to learn from the simulation experience.

Gururaja et al. (2008) described the attributes associated with the effective practice of debriefing as engagement, focus, reflection and critique, and application. Engagement is facilitated using open-ended questions in order to engage the individual immediately and the whole team to reflect on their individual and team performance during the simulation scenario. The facilitator promotes the focus of the debriefing discussion through the creation of an open, comfortable environment that allows and encourages the participants to self-assess, self-correct, and disclose. Reflection and critique within debriefing allow the participant to reflect on the simulation experience, discuss the experience with others, learn from the experience, and then adjust one's actions in the future. Finally, through application, the facilitator encourages the participants to find the skills and behaviors that will lead to improvements and changes in one's behaviors and skills in their future practice (Gururaja et al., 2008).

Dreifuerst (2009) identified the attributes that facilitated meaningful learning in simulation debriefing as reflection, emotion, reception, and integration and assimilation. Reflection allows the simulation experience to be reviewed. Through this experiential review, it allows one to think about what occurred from start to finish and to contemplate the thought processes that occurred throughout the simulation experience. Through the emotional involvement in the learning experience, one can enhance or inhibit learning.

The release of emotions and the expression of emotions set the frame for embedding the learning experience into memory. Reception is the openness to feedback. Through a positive learning experience, during the simulation debriefing, the participants are coached in a way that allows them to be open to feedback, in order for their strengths and weaknesses to be brought forward in a positive and nonthreatening way. Through integration and assimilation, the participant can assimilate the knowledge, skills, and attitudes to practice and finally to transfer the knowledge learned in one situation to another. All of these defining attributes of debriefing lead to an improved learning experience that can advance clinical reasoning, critical thinking, and clinical judgment (Dreifuerst, 2009).

Debriefing Process

In simulation-based experiences, debriefing is the process of reflection and review of the simulated scenario. During debriefing, the scenario is discussed, analyzed, and evaluated through faculty facilitation with the student, which leads to the development of clinical reasoning and clinical judgment skills (Dreifuerst, 2009; Gardner, 2013). Educators credit debriefing as being the critical element, essential component, or lynchpin to the learning process (Gardner, 2013; Mayville, 2011; Ryoo & Ha, 2015; Shinnick et al., 2011). In addition, the INACSL standards of best practice advise that debriefing meet five criteria:

- The debrief is facilitated by a person(s) competent in the process of debriefing.

- The debrief is conducted in an environment that is conducive to learning and supports confidentiality, trust, open communication, self-analysis, feedback, and reflection.
- The debrief is facilitated by a person(s) who can devote enough concentrated attention during the simulation to effectively debrief the simulation-based experience.
- The debrief is based on a theoretical framework for debriefing that is structured in a purposeful way.
- The debrief is congruent with the objectives and outcomes of the simulation-based experience. (INACSL Standards Committee, 2016, pp. S21–22)

Methods/Frameworks of Debriefing

While debriefing has been deemed essential to learning in the simulation process, the customary practices vary with each model, technique, or framework utilized (Dreifuerst, 2009; Shinnick et al., 2011). In 2009, Dreifuerst noted that the debriefing practices vary and many questions remain on how to debrief. Neill et al. (2011) noted that debriefing practices vary with each institution and minimal research has been done on debriefing best practices. Waznonis (2014) indicated that the debriefing practices were "not evidence based or widely known" (p. 459) and Hall and Tori (2017) noted inconsistencies on what is considered to be debriefing best practices. Furthermore, Lavoie et al. (2019) identified that there is minimal information describing how alternate approaches employed for simulation debriefing affect learning outcomes and clinical judgment and Lee et al. (2020) once again emphasized there is a wide variety of

debriefing methods utilized for simulation, as well as inadequate determination of the most effective debriefing method.

In 2016, the INACSL Standards Committee indicated the debriefing frameworks currently utilized were models such as Debriefing with Good Judgment, GAS (gather, analyze, summarize), PEARLS, DML, Plus-Delta, 3D Model of Debriefing, and the OPT Model of Clinical Reasoning (INACSL Standards Committee, 2016). In 2017, Hall and Tori conducted an integrative review of debriefing and identified best practice guidelines and models of debriefing. The debriefing frameworks noted in the Hall and Tori (2017) study were the NLN Simulation Innovation Resource Center's Beginning/Introduction, Middle, Closing/Summary Model, Mayo Clinic Model for Debriefing, Plus-Delta, Advocacy-Inquiry, GREAT (guidelines, recommendations, events, analysis, and transfer), DML, 3D Model of Debriefing, and SHARP (set learning goals, how did it go, address concerns, review learning points, and plan ahead future practice).

Lee et al. (2020) conducted a systematic review and meta-analysis focusing on debriefing methods and learning outcomes found in studies published from January 1995 to December 2016. The systematic review identified seven debriefing methods in the 18 selected studies. The debriefing methods were video debriefing, DML, peer-led video debriefing, senior debriefing, debriefing with good judgment, verbal debriefing with journaling or blogging, and instructor-led discussion debriefing. Five of the 18 studies utilized a structured debriefing method, with three out of the five employing DML, one using debriefing with good judgment, and one employing debriefing using the LCJR. In the five studies that utilized structured debriefing methods, an assessment of learning was

conducted in four out of the five studies with the utilization of the Health Sciences Reasoning Test (HSRT) or the LCJR. Significant improvement of the HSRT score was shown in two of the studies using DML as the structured debriefing method. The third study using DML, showed no significant improvement in learning, as assessed by the LCJR. The fourth study that used debriefing with the LCJR showed a significant improvement in learning, as assessed by the LCJR.

NCSBN Clinical Judgment Measurement Model Debriefing Framework

The steps associated with NCSBN's clinical judgment measurement model debriefing framework are the recognition of cues, analysis of those cues, prioritizing hypotheses, generating solutions, taking action, and evaluating outcomes. Through the recognition of cues, nursing students identify the pertinent patient data from a variety of available sources. Then through the analysis of those cues, the nursing students begin to associate the cues with what is emerging clinically. After that, the nursing students prioritize the potential issues according to risk of occurrence, urgency, or seriousness. Next, the nursing students identify interventions to potentiate a favorable outcome and then implement the most appropriate interventions for what was deemed highest priority. Finally, the outcome is evaluated against what was the expected outcome. These steps enhance nursing knowledge through the development of clinical judgment associated with critical thinking and decision-making (NCSBN, 2019).

Summary and Conclusions

Best practice indicates that debriefing should be based on a structured framework (Hall & Tori, 2017). Lee et al. (2020) noted that evidence is lacking on a structured

debriefing method that improves learning outcomes. While Dufrene and Young (2014) indicated that teacher facilitated debriefing is not the only effective method of debriefing, Levett-Jones and Lapkin (2014) found that debriefing practices have a positive impact on learning no matter what debriefing method is used. Therefore, there is inadequate evidence on a most effective debriefing process, as well as a process that is most effective for all simulated learning experiences (Hall & Tori, 2017; Kim & Kim, 2017; Lee, et al., 2020; Neill & Wotton, 2011; Waznonis, 2014). Additionally, there continues to be a lack of research on the simulation debriefing phase and what debriefing processes are considered to be best practice in nursing education (Alhaj & Musallam, 2018; Hall & Tori, 2017; Hines & Wood, 2016; Palaganas et al., 2016; Rutherford-Hemming et al., 2016; Shinnick et al., 2011).

As noted by Dreifuerst (2009), the debriefing process should be embedded in a conceptual framework, such as the nursing process framework, Tanner's model of clinical judgment, or the NCSBN clinical judgment measurement model. However, the use of a conceptual framework is frequently not used in the debriefing process. Additionally, all these models/frameworks facilitate development of clinical reasoning and clinical judgment (Dreifuerst, 2009; NCSBN, 2019; Tanner, 2006) but they have not been used in conjunction with the simulation debriefing process. In 2013, Mariani et al. identified the need for quantifiable research to assess the effectiveness of structured debriefing on student learning outcomes. While using several structured debriefing models/frameworks, a follow-up study found that all the models of structured debriefing "can be used to assess students' thinking and understanding of clinical nursing concepts"

(Mariani et al., 2014, p. 330). In 2016, Hines and Woods noted that a standardized debriefing script such as Tanner's model resulted in improved student clinical judgment. Therefore, there is a gap in the literature and an ongoing need to determine the effect on clinical reasoning, critical thinking, and clinical judgment that a structured debriefing process, such as the NCSBN clinical judgment measurement model framework, had on these areas of student learning.

The literature indicates inadequate evidence on a most effective debriefing method, and although there are several frameworks utilized for debriefing, none had been deemed as most effective for all simulated learning experiences (Hall & Tori, 2017; Kim & Kim, 2017; Lee, et al., 2020; Neill & Wotton, 2011; Waznonis, 2014). In addition, there is lack of evidence on a structured debriefing method that improves learning outcomes (Lee, et al., 2020). Because there is lack of evidence on structured debriefing methods that improve learning outcomes, there was an ongoing need to develop and research additional debriefing frameworks and their effects on learning outcomes and there was a need to research the NCSBN clinical judgment measurement model framework as a debriefing process for simulation.

Furthermore, debriefing has been shown to be the most important component critical to the learning process in the simulated learning experience (Forneris, et al., 2015; Gardner, 2013; Levett-Jones & Lapkin, 2014; Mayville, 2011; Ryoo & Ha, 2015; Sawyer et al., 2016; Shinnick et al., 2011; Waznonis, 2014). Through reflection, emotion, reception, integration, and assimilation; debriefing leads to an improved learning experience and the ability to advance a student's clinical reasoning, critical thinking, and

clinical judgment (Dreifuerst, 2009). Additionally, as noted by Dreifuerst (2009), debriefing through guided reflection that is facilitated and embedded in a conceptual framework, is frequently not done. Therefore, research was needed on the conceptual debriefing framework, the NCSBN clinical judgment measurement model for debriefing, and the need to assess the effect the model of debriefing had on clinical reasoning, critical thinking, and clinical judgment of nursing students.

For my study, simulation debriefing followed a structured method, facilitated by a faculty member trained in the NCSBN clinical judgment measurement model. This facilitative debriefing process included the recognition of cues (relevant data such as laboratory results, vital signs, medications, other signs or symptoms, etc.), analyzing the cues, prioritizing a hypothesis, generating a solution(s), taking action (nursing interventions), and evaluating the outcomes (NCSBN, 2019; Sportsman, 2018). Additionally, learning was assessed post simulation to determine the effectiveness of the NCSBN clinical judgment measurement model for debriefing.

Chapter 3: Research Method

Introduction

The purpose of my study was to determine the effect that the NCSBN clinical judgment measurement model framework for simulation debriefing has on clinical reasoning, critical thinking, and clinical judgment in nursing students. In the following chapter, I present the research design and rationale, the population, sampling, and sampling procedures. I describe the procedure for recruitment, participation, and data collection and explain the instruments and intervention for my research study, data analysis plan, discussion of threats to validity, and ethical procedures.

Research Design and Rationale

Quasi-experimental studies are commonly used for nonrandomized intervention studies, and frequently researchers do not randomize due to ethical issues, complexity of the randomization of subjects, complexity in randomization at sites, or due to the availability of only a small sample size. The four quasi-experimental study designs include (a) a quasi-experimental design without control groups, (b) a quasi-experimental design with control groups and no pretest, (c) a quasi-experiment design with control groups and pretest, and (d) the interrupted time-series design (Harris, et al., 2006). I used a quasi-experimental single-group pretest–posttest design to study what effect the independent variable, the NCSBN clinical judgment measurement model framework for simulation debriefing, had on the dependent variables of clinical reasoning, critical thinking, and clinical judgment in BSN nursing students. This design allows a researcher to test a cause-and-effect relationship when random assignment or a control group are not

possible due to the availability of subjects (LoBiondo-Wood & Haber, 2014; Warner, 2013). Additionally, the quasi-experimental, single-group, pretest–posttest design was consistent for a study that conducts an intervention (simulation debriefing using the NCSBN clinical measurement model framework) on an existing group (class of BSN nursing students) that cannot be randomly assigned into groups to determine a cause and effect relationship on clinical reasoning, critical thinking, and clinical judgment and therefore was used in this study.

A quasi-experimental design is a reliable research design used to advance the knowledge that assesses a variety of debriefing techniques effect on learning outcomes. This is corroborated by Lee et al.'s (2020) systematic review, which identified 18 studies that analyzed learning outcomes of undergraduate nursing students with an array of debriefing methods. Of these 18 studies, 14 used a quasi-experimental design and the other four used a randomized control trial (RCT). All the studies were analyzing the effect different debriefing methods had on qualitative and quantitative learning outcomes, such as clinical reasoning, clinical judgment, and debriefing experiences, in simulation nursing education. Therefore, the quasi-experimental approach was the appropriate choice as a research design that advanced knowledge in simulation nursing education.

Methodology

Population

The target population for my research study consisted of nursing students enrolled in a prelicensure RN baccalaureate undergraduate nursing program at a university in the central United States. The nursing students were junior and senior level students enrolled

in medical–surgical nursing courses that included a high-fidelity simulation scenario in their clinical course. The power analysis determined that the correct sample size was 34. The potential target population size of students enrolled in a nursing course at a university in central United States was 70 to 75 nursing students.

Sampling and Sampling Procedures

The sampling strategy I chose was a nonprobability convenience sampling method. While a nonprobability sampling method produces findings that are less generalizable, this sampling technique is easier to obtain and still allows for confidence in the findings due to the representativeness of the sample and external validity. Representativeness and external validity are accomplished through a sampling that reflects the target population with the strict use of inclusion criteria, exclusion criteria, and adequate sample size. Convenience sampling poses a risk for bias, but the extent or degree that bias is or is not present can be assessed by comparing the sample to population percentages that would occur in a random sampling (LoBiondo-Wood & Haber, 2014).

The inclusion criteria for participants included nursing students in one BSN undergraduate nursing program who were at the sophomore, junior, or senior level in fundamentals of nursing, medical–surgical nursing, pediatric nursing, mental health nursing, or obstetrical mother baby nursing courses that include high fidelity simulation scenarios. The exclusion criteria were diploma and associate degree nursing students, accelerated BSN students, students who had a completed degree such as RN to BSN students, students not in the previously mentioned nursing courses, and students retaking

the specific nursing course in which the research study is conducted in or those nursing courses without high-fidelity simulation scenarios.

To compute the sample size for the research problem, I used the G*Power statistical power analyses program, Version 3.1.9.4 by Buchner et al. (1992–2019). With the calculator, I selected the t test as the test family, the statistical test selected was the means: difference between two dependent means (matched pairs), and the type of power analysis was a priori. The level of statistical significance or the alpha level (α) was set at 0.05, which signifies a small risk for a Type I error or the probability of rejecting the null hypothesis when the null hypothesis is actually correct. The power level ($1 - \beta$) was set at 0.8, with a beta of 0.2. Because the power level chosen is close to 1, the hypothesis test is good at detecting a false null hypothesis; therefore, there would be a small chance of making a Type II error by failing to reject the null hypothesis. A medium effect size of 0.5 was selected. I used a medium effect size so that I could detect how large the difference is between two groups or how strong the association is between the matched pair groups (see Warner, 2013). The power analysis determined that the correct sample size was 34.

Procedures for Recruitment, Participation, and Data Collection

I recruited prospective participants from an undergraduate nursing program. Potential participants were recruited in person with a presentation about the study in the last few minutes of a class session. The information provided included simulation training on the simulation scenario format, the study's background, purpose, and the

risks, benefits, and rights of the participant. I obtained consent from all participants prior to the initiation of the study in their nursing course.

Screening questions for enrollment in my study included whether they were a student in an undergraduate BSN nursing program; whether they were 18 years or older; and whether they were currently enrolled in a sophomore, junior, or senior level nursing course as a first time student of fundamentals of nursing, medical–surgical nursing, pediatric nursing, mental health nursing, or obstetrical mother baby nursing. Individuals who answered yes to all screening questions qualified for the study. If an individual answered no to any of the questions, they were thanked for their interest. Participants were also informed they could remove themselves from the study at any time for any reason. After enrollment, each participant completed a sociodemographic questionnaire with the following demographic information collected: (a) gender, (b) age, (c) marital status, (d) ethnic origin, (e) prior education preparation, and (f) job experience (i.e., healthcare work experience, nursing assistant). The sociodemographic questionnaire can be found in Appendix C.

To measure the dependent variables of clinical judgment, clinical reasoning, and critical thinking, participants completed the LCJR, CREST, and CTD. The LCJR measures clinical judgment across 11 behaviors on a scale of 1 to 4, from beginning to exemplary, and it was converted to a four-point ordinal scale (Adamson & Kardong-Edgren, 2012; Manetti, 2018). I received permission to use the LCJR from Elsevier and the Elsevier and Copyright Clearance Center (Appendix D). The CREST measures clinical reasoning with 10 items on a five-point Likert scale, and the CTD measures

critical thinking in five areas on a six-point Likert scale from 1 = *strongly disagree* to 6 = *strongly agree* (Berkow et al., 2011; Liaw et al., 2018). I received permission from Elsevier and the Elsevier and Copyright Clearance Center to use the CREST (Appendix E), and I received permission from Wolters Kluwer Health Inc. and the Copyright Clearance Center to use the CTD (Appendix F).

Intervention

As noted in the INACSL standards of best practice, each simulation experience includes a debriefing session at the end, which is an essential component to the learning process (INACSL Standards Committee, 2016). My study focused on the fourth criteria, in which the debriefing process is based on a theoretical framework. I used the NCSBN clinical judgment measurement model as a new debriefing framework as the intervention to facilitate the debriefing process.

The debriefing intervention using the NCSBN clinical judgment measurement model framework included a process that facilitates clinical judgment through prompts for debriefing the simulated experience. The design of the debriefing intervention was formulated to represent the NCSBN clinical judgment measurement model framework. This framework includes recognition of cues, analyzing the cues, prioritizing a hypothesis, generating solutions, taking action or implementing the solution, and then evaluating the outcomes (NCSBN, 2019).

At the conclusion of the simulated experience and after taking the pretest, all participants received the debriefing intervention through formulated prompts designed to mirror the components of the framework. Appendix G provides the template with the

script and prompts for the six components that made up the NCSBN clinical judgment measurement model framework for the debriefing intervention of the simulation scenario. These prompts mirror the NCSBN clinical measurement model framework and were an intricate part of the debriefing intervention. This template assured that each participant received the same debriefing structure script and prompts, while minimizing any bias that could occur if the defined structure was not used when assessing the model/framework's effect on a nursing student's clinical reasoning, critical thinking, and clinical judgment. Immediately after the debriefing intervention, the participant completed the CTD, LCJR, and CREST as a posttest. To match the pretest to the posttest, I assigned each participant a code so I could match their pretest and posttest. For example, Participant 1 was coded as 1A for the pretest and 1B for the posttest.

Instrumentation and Operationalization of Constructs

The LCJR was developed by Lasater and was published in the *Journal of Nursing Education* in November 2007. This rubric was developed to evaluate clinical judgment in a single episode in the simulation lab and is based on Tanner's clinical judgment model's phases of noticing, interpreting, responding, and reflecting. The instrument defines noticing, interpreting, responding, and reflecting with 11 behaviors, and each of these elements are scored based on the four developmental levels of exemplary, accomplished, developing, or beginning (Lasater, 2007, 2011). I received permission to use the LCJR from Elsevier and the Elsevier and Copyright Clearance Center (Appendix D).

Each student's simulation scenario was assessed with the LCJR on the 11 behaviors of clinical judgment, which are rated from beginning to exemplary. The

beginning level behavior earned 1 point, *developing* level earned 2 points, *accomplished* level earned 3 points, and *exemplary* level earned 4 points for each of the 11 behaviors. A student's final score and the determination of nursing clinical judgment ranged from 0 to 44 points. Clinical judgment at the beginning level ranged from 0–11 points, developing level at 12–22, accomplished level at 23–33, and the exemplary level at 34–44 (Miraglia & Asselin, 2015).

The LCJR has been used for research and educational purposes to assess students and new graduates to identify clinical performance abilities in the simulation setting (Adamson et al., 2012). The validity of the LCJR for assessing clinical judgment during simulation scenarios was established by accurately identifying student performance levels in the Adamson (2011) study. Additionally, Sideras (2007) found that the LCJR's construct validity was supported by its capability to correctly distinguish student ability (as cited in Adamson et al., 2012) and through its ability to improve clinical judgment, which was demonstrated in Gubrud-Howe's (2008) study (as cited in Adamson et al., 2012). Furthermore, Adamson and Kardong-Edgren (2012) assessed the reliability and validity of the LCJR in measuring student performance in simulated learning activities. The reliability and validity of the LCJR is shown with an interrater reliability of 0.889, the test-retest reliability intraclass correlation (3, 1) of 0.908, the Pearson (*r*) of 0.908, Spearman (ρ) of 0.910, and internal consistency by Cronbach's α of 0.974. These data provide evidence that supports the reliability and validity of the LCJR for assessing clinical judgment in simulation (Adamson & Kardong-Edgren, 2012).

In 2018, Liaw et al. developed the CREST to measure clinical reasoning skills of student nurses by assessing their ability to recognize and respond to a simulated declining clinical condition. Nurse Education Today published this tool in March 2018. Each student's clinical reasoning skills were assessed using the CREST across ten items of clinical reasoning on a five-point Likert scale with a minimum score of 10 and a maximum score of 50 (Liaw, et al., 2018). Permission to use the CREST for my study was received from Elsevier and the Elsevier and Copyright Clearance Center (Appendix E).

The validity and reliability of the CREST was established as a valid and reliable tool to measure clinical reasoning skills of student nurses through an assessment of their ability to recognize and respond to a declining simulated clinical experience by content, construct, concurrent, and predictive validity and through internal consistency and inter-rater reliability. Content validity of the 10-item CREST was established by an expert panel of clinicians, researchers, and educators that generated an item-level content validity index (I-CVI) of a minimum 0.75 for each item and 0.93 for the overall scale. Construct validity was demonstrated through significantly higher ($p < 0.001$) clinical reasoning scores of third year students over second year students. Concurrent validity was demonstrated by significant positive correlation ($p < 0.01$) between global rating scores and seven out of the eight subscale scores. The predictive validity of the CREST was demonstrated by a moderately strong correlation ($r = 0.71$, $p < 0.01$) when the total scores of the CREST was evaluated with the RAPIDS-tool (Rescuing A Patient In Deteriorating Situation) total scores. The reliability and high internal consistency of the

CREST was demonstrated by a Cronbach's alpha of 0.92 (95% confidence interval 0.86–0.95). Additionally, the CREST demonstrated high inter-rater reliability with an intraclass coefficient (ICC) between two raters using the CREST of 0.88 (95% confidence interval 0.74–0.94; Liaw et al., 2018).

The CTD was developed by the Nursing Executive Center in 2009 and it was published in The Journal of Nursing Administration in April 2011. The CTD measures critical thinking in five areas and 25 core competencies on a six-point Likert scale from one-strongly disagree to six-strongly agree (Berkow et al., 2011). Permission to use the CTD was received from Wolters Kluwer Health, Inc. and the Copyright Clearance Center (Appendix F).

Reliability and validity of the CTD was demonstrated with an overall Cronbach α of 0.976 for all 25 core critical thinking competencies and more specifically, for the five skill categories, with a Cronbach α of 0.910 for problem recognition, 0.882 for clinical decision making, 0.932 for prioritization, 0.919 for clinical implementation, and 0.922 for reflection. A 0.961 Guttman split-half and a 0.930 correlation between halves demonstrated the entire instrument's reliability (Berkow et al., 2011).

Intervention Studies or Those Involving Manipulation of an Independent Variable

The intervention for my study was a simulation debriefing process that followed the NCSBN clinical judgment measurement model framework for debriefing. Following the simulated learning experience, the NCSBN clinical judgment measurement model framework was used to lead the reflective process of simulation debriefing. The reflective process followed a script that included the six components of the NCSBN clinical

judgment measurement model framework: cue recognition, analyze cues, prioritize hypotheses, generate solutions, take action, and evaluate outcomes (Appendix G: NCSBN Clinical Judgment Measurement model script). After the simulated learning experience, clinical reasoning, critical thinking, and clinical judgment were assessed to determine what effect the simulation debriefing process utilizing the NCSBN clinical judgment measurement model debriefing framework had on each of them.

Critical thinking is a process of thinking and reasoning in order to analyze problems, make judgments, determine conclusions, and then to initiate actions in order to make a clinical decision in solving a problem that leads to the best patient outcome for the situation (Brunt, 2005; Facione, 1990; Lee et al., 2017; Shin et al., 2006). I measured critical thinking with the CTD in the five categorical areas of problem recognition, clinical decision-making, prioritization, clinical implementation, and reflection on a six-point Likert scale, with 1 = *strongly disagree* to 6 = *strongly agree*. There is a maximum of 30 points for each category and 150 total points for the CTD (Berkow et al., 2011; Bittner et al., 2020; Turkel et al., 2016) (see Appendix H).

Clinical judgment is a thought process in which an individual interprets and forms conclusions based on the needs, concerns, and health problems of patients and then makes the decision to use either a standard intervention or a new and innovative technique based on the patient's response (Tanner, 2006). I measured clinical judgment using the LCJR based on 11 behaviors from which are scored as beginning to exemplary. The beginning level behavior earned the participant 1 point, developing level earned 2 points, accomplished earned 3 points, and exemplary level earned 4 points. Overall

nursing clinical judgment ranged from 0 to 44 points with clinical judgment at the beginning level scoring 0-11, developing 12-22, accomplished 23-33, and exemplary 34-44 (Miraglia & Asselin, 2015) (Appendix I).

Clinical reasoning is processing and gathering clinical cues and information to determine a patient's condition so that interventions can be planned, results evaluated, and thoughtful reflection can be performed, to form new understandings and knowledge from the process. The clinical reasoning process employs collecting the correct cues so the right action can be implemented at the right time, for the right reason, on the right patient (Levett-Jones, et al., 2010). I measured clinical reasoning using the CREST which assessed ten items of clinical reasoning on a five-point Likert scale with a minimum score of 10 and a maximum score of 50 (Liaw et al., 2018) (Appendix J).

Data Analysis Plan

I used SPSS Statistics version 28.0 to analyze my data. Prior to data analysis via the SPSS program, I screened the data for errors, inconsistencies, outliers, and missing values. The data screening process included proofreading and comparing the SPSS file data with the originally obtained data for correct coding, data entry, and any missing values. Statistical techniques such as a histogram, boxplot, or a scatterplot were used to identify outliers or skewed data. I examined the data for outliers to determine if the score was outside of +3 and -3 standard deviations of the sample mean. I assessed the data for outliers so I could determine what effect had the outcome and which provided a more accurate explanation of the analysis (Warner, 2013).

The research question being addressed in this study was: What effect does simulation debriefing, assessed by using the NCSBN clinical judgment measurement model framework; have on clinical reasoning, critical thinking, and clinical judgment of BSN nursing students. The following statement is the null hypothesis that is being tested to answer the research question: There will be no difference in the effect of simulation debriefing, as assessed by using the NCSBN clinical judgment measurement model framework, has on clinical reasoning, critical thinking, and clinical judgment of BSN nursing students. The following statement is the alternative hypothesis: There will be a difference in the effect of simulation debriefing, as assessed by using the NCSBN clinical judgment measurement model framework, has on clinical reasoning, critical thinking, and clinical judgment of BSN nursing students.

I analyzed the data using the paired sample t-test, which allowed me to compare the means of the one groups' clinical reasoning, critical thinking, and clinical judgment, before and after simulation debriefing using the NCSBN clinical judgment measurement model framework. In order to match the pretest to the posttest, each participant was assigned a code to mark his or her pretest and posttest. For example, Participant 1 was coded as 1A for the pretest and 1B for the posttest. These codes were written on each participant's pre and posttests. The pretest and posttest groups were comprised of the same BSN nursing students and were assessed before and after the intervention. I also conducted a Cronbach's alpha on the CREST, CTD, and LCJR participant responses to assess the internal consistency and reliability of the scales for measuring clinical reasoning, critical thinking, and clinical judgment.

Threats to Validity

External Validity

Selection bias was a threat to external validity due to quasi-experimental research design and the inability to randomly assign participants into different groups which prevents generalizing the results to a wider population (Lund Research Ltd., 2022a). To minimize this threat, my research was conducted by pretest and posttest on the same group of participants.

The Hawthorne effect, pretest sensitization, and posttest sensitization, or otherwise known as testing effects, was also a threat to external validity as participants may perform at a higher level because they know their performance is being assessed in a study. Additionally, because the participants were assessed before and after the intervention, they may have gained some understanding of the research matter and therefore may be sensitized to the debriefing topics, which may affect the posttest scores than it would have otherwise (LoBiondo-Wood & Haber, 2014). While these testing effects cannot be totally prevented, I acknowledge that they are potential contributors to the study results, rather than only due to the independent variable.

Experimenter effects that cause experimenter bias can also be a threat to external validity. These experimenter effects could be verbal or nonverbal cues that influence the participant responses in the study. Additionally, the experimenter may have a formed a directional assumption about the outcome of the study and this could also lead to personal biases that affects the experimenter's actions during the study (Lund Research Ltd.,

2022a). To minimize these threats, I followed the NCSBN clinical judgment measurement model script.

Internal Validity

Potential threats to internal validity for my study included history effects, maturation effects, testing effects, instrumentation effects, selection bias, and experimental mortality.

History effects could include a participant not getting a good night's sleep prior to the pretest, posttest, or both. This has the potential to affect the participant's alertness, could impact thought process effectiveness, and therefore could affect their clinical reasoning, critical thinking, and/or clinical judgment. Another history effect that had the potential to affect the dependent variables of clinical reasoning, critical thinking, and/or clinical judgment are events that may occur during the study or between the pretest and posttest. The history effect of providing additional subject matter between the pretest and posttest can be minimized or prevented from being a threat to internal validity by minimizing the time between the pretest and the posttest (Lund Research Ltd, 2022). I minimized or prevented this by setting up the pretest and posttest evaluations to be conducted on the same day.

Maturation effects are additional threats to internal validity. These effects may include that the participant could change over time or from pretest to posttest in my study. This threat was minimal because the time between the pretest and posttest took place within an hour of each other (Lund Research Ltd, 2022).

In quasi-experimental research designs that include a pretest and posttest, testing effects may also be a threat to internal validity. With testing effect, the participant is being tested more than once and the participant may have gained a familiarization with the subject matter, the purpose, or the testing environment. Due to this exposure, there was the potential to influence posttest scores in a positive way that may not only be due to the independent variable (Lund Research Ltd, 2022). Therefore, this potential threat to internal validity will be noted in my study.

Instrumentation effects can be a threat to internal validity due to instrument or researcher bias. Instrumental bias occurs when the instrument used to measure the effect on the dependent variables changes over the course of the experiment. While researcher bias can occur when the researcher generated scores given on the measurement instrument, change due to experience, increased proficiency, or if a different researcher is used for the pretest and posttest (Lund Research Ltd, 2022). To prevent instrument bias from a changing instrument over time, only the CREST was used to measure clinical reasoning, only the CTD was used to measure critical thinking, and only the LCJR was used to measure clinical judgment. Therefore, the instrument to assess and measure clinical reasoning, critical thinking, and clinical judgment was the same throughout my research. In order to prevent and minimize researcher bias when generating clinical reasoning, critical thinking, and clinical judgment scores, the participants performed self-evaluations.

Selection bias can also be a threat to internal validity when using a quasi-experimental research design because design participants are not randomly assigned into

different groups (Lund Research Ltd, 2022). In my research, selection bias was mitigated through a one group or single group, pretest posttest design.

Experimental mortality was another potential threat to internal validity which includes participant death, a participant no longer available due to a student leaving school or moving away, or no longer willing to participate in the study (Lund Research Ltd, 2022). This was not a limitation in my study because I did not have any participants dropout and my study was a one group or single group, pretest posttest design.

Construct Validity

Construct validity is the degree that an instrument measures the basic assumption or general principles that it claims to measure (Surucu & Maslakci, 2020). The instruments that were used to measure clinical judgment, clinical reasoning, and critical thinking, after using the NCSBN clinical judgment measurement model framework for simulation debriefing, were the LCJR to measure clinical judgment, the CREST to measure clinical reasoning, and the CTD to measure critical thinking. These instruments did not pose a threat to construct validity and will support the conclusions of this study because they measure the assumptions and principles of clinical judgment, clinical reasoning, and critical thinking as identified below. The LCJR's construct validity was supported in the Sideras (2007) study with the conclusion of its capability to correctly distinguish student ability (as cited in Adamson et al., 2012) and its ability to improve clinical judgment in the Gubrud-Howe (2008) study (as cited in Adamson et al., 2012). The CREST's construct validity was supported through significantly higher ($p < 0.001$) clinical reasoning scores of third year students over second year students (Liaw et al.,

2018). The CTD's reliability as a consistent measurement of 25 core competencies of critical thinking was supported with an overall Cronbach alpha of 0.976 CTD, and in the five skill categories, with a Cronbach alpha of 0.910 for problem recognition, 0.882 for clinical decision-making, 0.932 for prioritization, 0.919 for clinical implementation, and 0.922 for reflection (Berkow et al., 2011).

Ethical Procedures

Prior to initiating data collection for my study, I obtained Institutional Review Board (IRB) approval through Walden University and the university where the study was conducted (Walden University's approval 10-24-22-0588635). The IRB committees on these campuses reviewed the research plan in order to protect the rights of the participants. The application to the IRB included a description of the study and its purpose, risks and benefits of the study, process for informed consent, how privacy and confidentiality was protected, the scientific merit and/or potential use of the results, participation in the study was voluntary, right of the participant to withdraw at any time, and my name and contact information, as the researcher was provided to all participants so they could contact me if there were any questions (Creswell & Creswell, 2018).

I recruited participant by scheduling an informational presentation to all potential participants the last few minutes of their class. The informational presentation and recruitment flyer, that was provided, included providing the participants with (a) an explanation of the purpose of the study, (b) roles of the researcher, (c) description of what will be done, (d) description of anticipated benefits to participants or others, (e) description of foreseeable risk or discomforts, (f) expected duration of participant

participation, (g) statement that participation is voluntary, (h) statement that participant may withdraw at any time without penalty, (i) description on how confidentiality will be maintained, and (j) whom to contact with any question about the research or participant rights. Informed consent was obtained from all participants prior to any data collection via an email they sent to me in which they replied, "I consent."

Several ethical concerns and procedures were considered and were addressed when conducting this research. The first ethical consideration was related to recruitment and the process to ensure voluntary participation in the research by participants. I addressed the ethical concern of recruitment by providing an informational presentation to all potential participants with the general purpose of the study, risks and benefits of the study, their participation was voluntary, they could have withdrawn at any time, how I protected their privacy and confidentiality, and provided my name and contact information, so they were able to contact me if any questions arose (Creswell & Creswell, 2018).

The second ethical consideration was maintaining confidentiality (Creswell & Creswell, 2018). The study data were numbered and/or coded so it could not be linked to the participant's name. The participant's identity was also numbered and/or coded to maintain confidentiality. I am the only one who knows the codes. All study data were collected, stored in a secure place, and will not be shared without permission. Additionally, the participant's name and/or other identifiers was stored separately from the research data, the participant's name and other identifiers were replaced with a unique code and this code will only be used to refer to that participant's data, and the unique

code key was stored separately from the participant identifiers. The study data is accessible to the dissertation committee and myself upon request. Furthermore, the study data and participant identifiers are safely stored and will be maintained until 5 years from the date of degree completion and then all the study data and participant identifiers will be destroyed.

Finally, power relationships are another ethical consideration for my study because there may be a perceived power imbalance between the data collector, because I am a college nursing instructor and the participants are nursing students (Creswell & Creswell, 2018). I addressed this by conducting the study with participants who were not in my courses.

Summary

In Chapter 3, I presented the research design and rationale, methodology, data analysis plan, and threats to validity. The target population for this research study consisted of sophomore, junior, or senior level nursing students enrolled in a prelicensure-RN, baccalaureate undergraduate nursing program at a university in the central United States. I used a quasi-experimental single-group pretest–posttest design to study what effect the independent variable, the NCSBN clinical judgment measurement model framework for simulation debriefing, had on the dependent variables of clinical reasoning, critical thinking, and clinical judgment in BSN nursing students. I chose a nonprobability convenience sampling method for this study and conducted a G*Power Statistical Power Analyses to calculate the sample size. The validity and reliability of the instruments used to measure clinical reasoning, critical thinking, and clinical judgment

were described in this chapter along with a detailed description of each instrument. In Chapter 4, I will provide the study results in detail.

Chapter 4: Results

Introduction

The purpose of my single group, pretest–posttest study was to determine what effect a simulation debriefing model, based on the NCSBN clinical measurement model framework, would have on clinical reasoning, critical thinking, and clinical judgment of BSN nursing students. I used a quantitative quasi-experimental methodological approach to address the research question: What effect does simulation debriefing, as assessed by using the NCSBN clinical measurement model framework, have on clinical reasoning, critical thinking, and clinical judgment of BSN nursing students? My null hypotheses stated that there would be no difference in the effect of simulation debriefing, as assessed by using the NCSBN clinical judgment measurement model framework, on clinical reasoning, critical thinking, and clinical judgment of BSN nursing students. My alternate hypotheses stated that there would be a difference in the effect of simulation debriefing, as assessed by using the NCSBN clinical judgment measurement model framework, on clinical reasoning, critical thinking, and clinical judgment of BSN nursing students. In Chapter 4, I discuss the details related to volunteer recruitment, data collection, and population demographics and representation. The remaining sections of Chapter 4 contain the results of the study data analysis and statistical analysis findings.

Data Collection

Participants in the study were recruited in person from an undergraduate BSN nursing program with a presentation about the study in the last few minutes of their class session. The presentation, along with the recruitment flyer and consent form, was

provided to each potential participant during the last few minutes of two separate class sessions. Out of 42 potential participants, 40 participants consented to participate. This met the power analysis sample size of 34 participants, so no further recruitment was done. Consent was obtained from all participants by replying with the words “I consent” to my email. After participant consent was obtained and before data collection occurred, the sociodemographic background of each participant was obtained. Sociodemographic data included gender, age, marital status, ethnic origin, prior education, and job experience.

The participants were 85% female (Table 1) and 75% Caucasian (Table 2). Most participants, 82.5%, were single (Table 3); 85% indicated that high school graduate was their highest education completed, while 10% had taken undergraduate courses, 2.5% had a baccalaureate degree in a field other than nursing, 2.5% were an LPN, and 2.5% did not specify (Table 4). The level of healthcare experience was varied, as 70% of participants had CNA/nursing assistant experience (Table 5).

Table 1

Gender

	Frequency	Percent
Male	6	15
Female	34	85
Total	40	100

Table 2

Ethnic Group Identification

	Frequency	Percent
Caucasian	30	75
Hispanic	4	10
African American	1	2.5
Black African	1	2.5
African	1	2.5
Caucasian/African American	1	2.5
Hispanic/Asian	1	2.5
Caucasian/Hispanic	1	2.5
Total	40	100.00

Table 3

Marital Status

	Frequency	Percent
Single	33	82.5
Married	7	17.5
Total	40	100.00

Table 4

Highest Education Completed

	Frequency	Percent
High school graduate	33	82.5
Undergraduate courses-no degree completion	4	10
BS/BA in other field than nursing	1	2.5
High school/LPN	1	2.5
None specified	1	2.5
Total	40	100.00

Table 5

Current or Previous Healthcare Experience

	Frequency	Percent
CNA/nursing assistant	28	70.0
CNA/medication aide	1	2.5
CNA/phlebotomist	1	2.5
CNA/medical history technician	1	2.5
CNA/dialysis patient care technician	1	2.5
CNA/emergency medical technician	1	2.5
CNA/certified medical assistant/phlebotomy	1	2.5
Medical assistant	1	2.5
Behavioral technician	1	2.5
LPN	1	2.5
None	3	7.5
Total	40	100.00

According to the 2020 National Nursing Workforce Survey of RNs and the overall estimated population values for race, 81% identified as White/Caucasian, 7.2% Asian, 6.7% Black/African American, and 5.6% Hispanic/Latinx (Smiley et al., 2021). The gender distribution of RNs in this survey, and the overall estimated population values for gender, identified that 9.4% are male and 90.5% are female (Smiley et al., 2021). These data indicate that the BSN nursing student participants were demographically representative of the population as a whole and the RN workforce that these participants will become after graduation.

Data collection for the study took place on 4 separate days in the undergraduate BSN nursing courses that had a simulated learning experience. On the day of the simulated learning experience, the participants completed self-evaluation surveys prior to and after the simulation debriefing process. The debriefing process that was provided by the course nursing instructor was based on the NCSBN clinical measurement model

framework. The simulated learning experiences on the 4 days that the self-evaluation surveys were completed included a stroke and a heart failure simulation. The NCSBN clinical judgment measurement model framework script that was used for the simulated stroke and heart failure simulation included cue recognition, cue analysis, hypothesis prioritization, generation of solution(s), intervention(s), and evaluation of outcome(s). Appendices K and L provide the script and prompts for the stroke and heart failure simulations, which were used by the course instructors for the debriefing intervention of the simulation scenario with the NCSBN clinical judgment measurement model framework.

Intervention Fidelity

To maintain the intervention fidelity of the NCSBN clinical judgment measurement model framework for debriefing, which was administered by the course faculty, I met with and educated the instructors on setting up and administering the NCSBN clinical judgment measurement model debriefing intervention. Through this education, the clinical instructors and I set up a script specific to their simulation that they used for debriefing and followed the NCSBN clinical judgment measurement model framework. The NCSBN clinical judgment measurement model debriefing script that was used for the stroke and heart failure simulation are provided in Appendices K and L.

Results

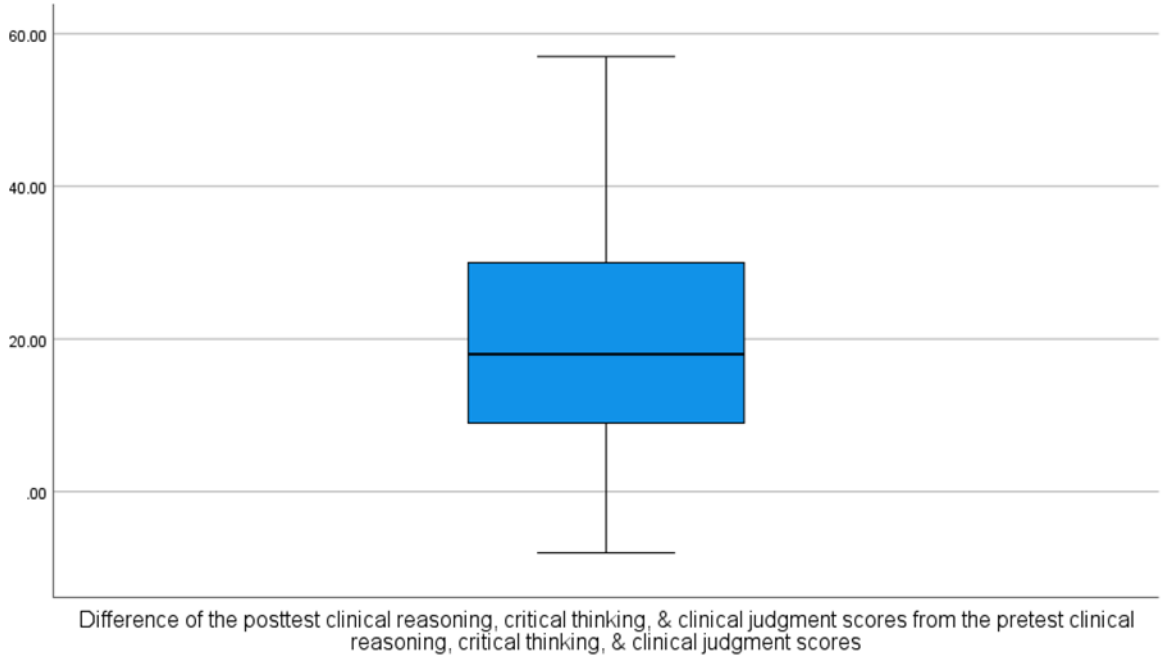
To test the null hypotheses that debriefing using the NCSBN clinical judgment measurement model framework had no difference in effect on clinical reasoning, critical thinking, and clinical judgment of BSN nursing students, I conducted a paired samples *t*-

test. The paired samples *t*-test determines whether there is a statistically significant mean difference between the pretest and posttest scores of clinical reasoning, critical thinking, and clinical judgment before and after the simulation debriefing intervention using the NCSBN clinical judgment measurement model framework. There are four basic assumptions that I needed to consider to conduct a paired-samples *t*-test. The first statistical assumption was that there is one dependent variable that is measured on a continuous ratio/interval level or Likert scale (Lund Research Ltd., 2022c; Norman, 2010; Pallant, 2016). In the study, clinical reasoning, critical thinking, and clinical judgment were included as one dependent variable measured on a Likert scale, so the first assumption was met.

The second assumption that I needed to consider to conduct a paired-samples *t*-test was that there needed to be one independent variable that consisted of two related groups or matched pairs (Lund Research Ltd., 2022c). This assumption was met because the participants who completed the pretest and posttest were two related groups that were matched pairs of BSN nursing students. The third and fourth assumptions that I needed to consider to run a paired-samples *t*-test were: (a) in the differences between the two related groups there should be no significant outliers (Lund Research Ltd., 2022c); and (b) the distribution of the differences of the dependent variable between the two related groups should be approximately normally distributed (Lund Research Ltd., 2022c; Pallant, 2016). The difference between the two related groups showed no outliers, as shown below in the boxplot (Figure 3), and therefore the third assumption was met.

Figure 3

Boxplot of Pretest-Posttest Clinical Reasoning, Critical Thinking, and Clinical Judgment Difference Scores



Because the participant size was fewer than 50, the Shapiro-Wilk test was used to assess distribution between the two related groups. The normal distribution assumption was met as identified with a significance of .391 on the Shapiro-Wilk test (Table 6) because a significance of more than .05 indicates that the two related groups are normally distributed.

Table 6

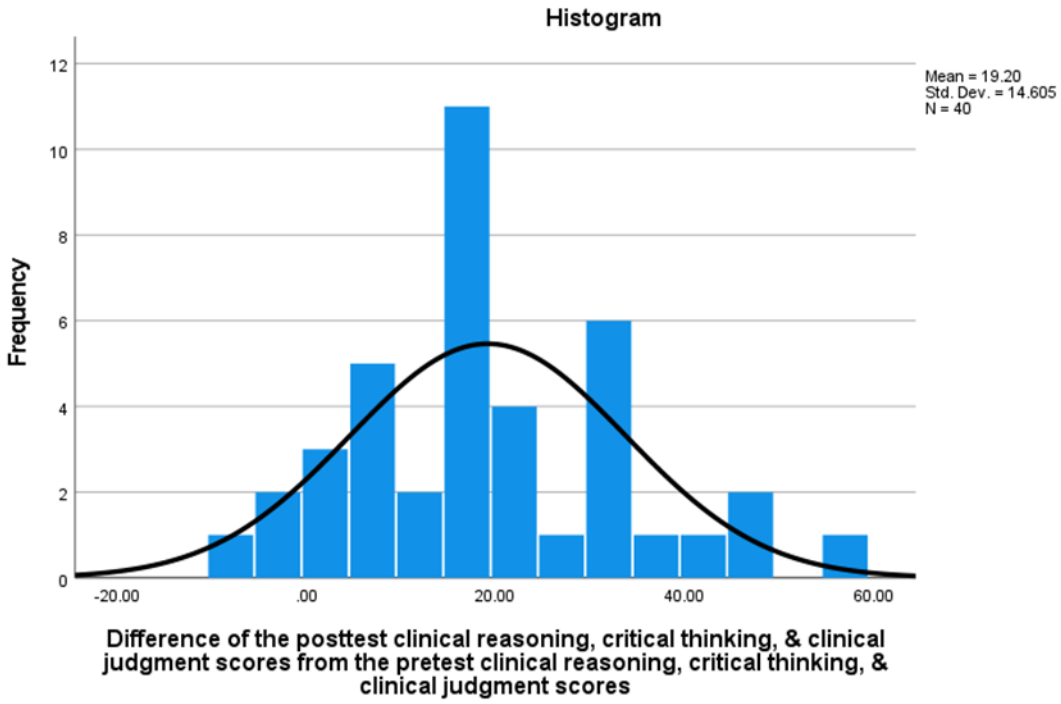
Test of Normality

	Shapiro-Wilk		
	Statistic	df	Sig.
Difference of the posttest scores of clinical reasoning, critical thinking, and clinical judgment from the pretest scores of clinical reasoning, critical thinking, and clinical judgment	.971	40	.391

The histogram in Figure 4 shows a classic bell curve shape, which also indicates that the data are approximately normally distributed and meet the normal distribution assumption.

Figure 4

Distribution Histogram



In addition, the difference of the posttest clinical reasoning, critical thinking, and clinical judgment scores from the pretest clinical reasoning, critical thinking, and clinical

judgment scores are shown to be normally distributed with a skewness of .510 (SE = .374) and kurtosis of .219 (SE = .733), as Table 7 shows.

Table 7

Difference of Posttest from Pretest Scores of Clinical Reasoning, Critical Thinking, and Clinical Judgment

Skewness	.510
Std. error of skewness	.374
Kurtosis	.219
Std. error of kurtosis	.733

The participant scores in clinical reasoning, critical thinking, and clinical judgment improved from pretest to posttest after the debriefing intervention used the NCSBN clinical judgment measurement model framework. The pretest clinical reasoning, critical thinking, and clinical judgment score increased from M = 188.45, SD = 19.32 to a posttest clinical reasoning, critical thinking, and clinical judgment score of M = 207.65, SD = 15.83 (Table 8).

Table 8

Pretest/Posttest Paired Samples Statistics

	Mean	N	Std. deviation
Clinical reasoning (CREST), critical thinking (CTD), clinical judgment (LCJR) retest	188.45	40	19.32
Clinical reasoning (CREST), critical thinking (CTD), clinical judgment (LCJR) posttest	207.65	40	15.83

The mean score of the CREST, CTD, and LCJR showed a statistically significant ($p < 0.001$) mean score increase from pretest to posttest of 19.20, 95% CI [23.87, 14.53], $t(39) = 8.32$, $p < 0.001$ (Table 9). Therefore, the null hypothesis is rejected.

Table 9

Pretest/Posttest Paired Samples Test

	Paired differences				*t*	df	Significance	
	Mean	Std. Deviation	95% C.I. of the difference				One-sided *p*	Two-sided *p*
			Lower	Upper				
Clinical reasoning (CREST), critical thinking (CTD), clinical judgment (LCJR) pretest to clinical reasoning (CREST), critical thinking (CTD), clinical judgment (LCJR) posttest	19.20	14.60	23.87	14.53	8.32		<0.001	<0.001

I analyzed the effect and found the effect size of clinical reasoning, critical thinking, and clinical judgment using Cohen's d, is 1.32 which is a large effect (Table 10).

Table 10

Pretest/Posttest Paired Samples Effect Sizes

	Cohen's *d* point estimate
Clinical reasoning (CREST), critical thinking (CTD), clinical judgment (LCJR) pretest – clinical reasoning (CREST), critical thinking (CTD), clinical judgment (LCJR) posttest	1.32

The mean difference in clinical reasoning, critical thinking, and clinical judgment are all statistically significant from zero ($p < 0.001$). Therefore, I rejected the null hypothesis, indicating there was a difference in the effect of simulation debriefing, as assessed by using the NCSBN clinical judgment measurement model framework, on clinical reasoning, critical thinking, and clinical judgment of BSN nursing students.

Additional Findings

While the research question combined clinical reasoning, critical thinking, and clinical judgment into one dependent variable, I also separated each pretest and posttest scores of clinical reasoning, critical thinking, and clinical judgment to determine if the simulation debriefing model, based on the NCSBN Clinical Measurement Model framework had any affect individually on clinical reasoning, critical thinking, and clinical judgment of BSN nursing students. The details of those results are provided below.

The participant scores in clinical reasoning improved from pretest to posttest after the debriefing intervention using the NCSBN clinical judgment measurement model framework. The pretest clinical reasoning score increased from M = 40.78, SD = 4.098 to a posttest clinical reasoning score of M = 44.88, SD = 3.722 (Table 11).

Table 11

Clinical Reasoning (CREST) Paired Samples Statistics

	Mean	N	Std. deviation
Clinical reasoning (CREST) pretest	40.78	40	4.098
Clinical reasoning (CREST) posttest	44.88	40	3.722

This is a statistically significant mean score increase of 4.1, 95% CI [5.226, 2.974], t(39) = 7.364, p < 0.001, (Table 12). Therefore, the null hypothesis is rejected.

Table 12

Clinical Reasoning (CREST) Paired Samples Test

	Paired differences				*t*	df	Significance	
	Mean	Std. deviation	95% C.I. of the difference				One-sided *p*	Two-sided *p*
			Lower	Upper				
Clinical reasoning (CREST) pretest – clinical reasoning (CREST) posttest	4.1	3.521	5.226	2.974	7.364	39	<0.001	<0.001

I analyzed the clinical reasoning pretest/posttest paired samples effect size using Cohen's d point estimate and found the effect size of clinical reasoning using Cohen's d is 1.164, which is a large effect.

The participant scores in critical thinking improved from pretest to posttest after the debriefing intervention using the NCSBN clinical judgment measurement model framework. The pretest clinical reasoning score increased from M = 112.23, SD = 12.248 to a posttest clinical reasoning score of M = 123.13, SD = 10.000 (Table 13).

Table 13

Critical Thinking (CTD) Paired Samples Statistics

	Mean	N	Std. deviation
Critical thinking (CTD) pretest	112.23	40	12.248
Critical thinking (CTD) posttest	123.13	40	10.000

This is a statistically significant mean score increase of 10.9, 95% CI [13.918, 7.882], t(39) = 7.305, $p < 0.001$, (Table 14). Therefore, the null hypothesis is rejected.

Table 14

Critical Thinking (CTD) Paired Samples Test

	Paired differences				*t*	df	Significance	
	Mean	Std. deviation	95% C.I. of the difference				One-sided *p*	Two-sided *p*
			Lower	Upper				
Critical thinking (CTD) pretest – critical thinking (CTD) posttest	10.9	9.438	13.918	7.882	7.305	39	<0.001	<0.001

I analyzed the critical thinking pretest/posttest paired samples effect size using Cohen's d point estimate and found the effect size of critical thinking using Cohen's d is 1.155, which is a large effect.

The participant scores in clinical judgment improved from pretest to posttest after the debriefing intervention using the NCSBN clinical judgment measurement model framework. The pretest clinical judgment score increased from M = 35.45, SD = 4.717 to a posttest clinical judgment score of M = 39.65, SD = 3.613 (Table 15).

Table 15

Clinical Judgment (LCJR) Paired Samples Statistics

	Mean	N	Std. deviation
Clinical judgment (LCJR) pretest	35.45	40	4.717
Clinical judgment (LCJR) posttest	39.65	40	3.613

This is a statistically significant mean score increase of 4.2, 95% CI [5.404, 2.996], $t(39) = 7.058$, $p < 0.001$, (Table 16). Therefore, the null hypothesis is rejected.

Table 16

Clinical Judgment (LCJR) Paired Samples Test

	Paired differences				*t*	df	Significance	
	Mean	Std. deviation	95% C.I. of the difference				One-sided *p*	Two-sided *p*
			Lower	Upper				
Clinical judgment (LCJR) pretest – clinical judgment (LCJR) posttest	4.2	3.764	5.404	2.996	7.058	39	<0.001	<0.001

I analyzed the clinical judgment pretest/posttest paired samples effect size using Cohen's d point estimate and found the effect size of clinical judgment using Cohen's d was 1.116, which is a large effect.

Summary

The purpose of the study was to determine the effect simulation debriefing, as assessed by using the NCSBN clinical judgment measurement model framework, had on the clinical reasoning, critical thinking, and clinical judgment of nursing students. The research question I sought to answer was: What effect does simulation debriefing, as assessed by using the NCSBN clinical judgment measurement model framework, have on clinical reasoning, critical thinking, and clinical judgment of BSN nursing students? From the data, I found that there was a statistically significant difference in the effect of the simulation debriefing intervention, using the NCSBN clinical judgment measurement model framework, on clinical reasoning, critical thinking, and clinical judgment of BSN nursing students. Therefore, the null hypothesis was rejected, which suggested there was a difference in the effect of simulation debriefing, as assessed by using the NCSBN

clinical judgment measurement model framework, on clinical reasoning, critical thinking, and clinical judgment of BSN nursing students. In the next chapter, I provide discussion on the interpretation of the findings, limitations of the study, recommendations, implications, and conclusions of the study.

Chapter 5: Discussion, Conclusions, and Recommendations

Introduction

In this final chapter, I present the interpretation of the findings, limitations of the study, recommendations, implications, and a conclusion. The purpose of this quasi-experimental, single-group, pretest–posttest study was to determine what effect the NCSBN clinical judgment measurement model framework, when used for simulation debriefing, has on clinical reasoning, critical thinking, and clinical judgment in BSN nursing students. The goal of conducting the study was to advance the knowledge of a new debriefing technique's effect on learning outcomes and, more specifically, to test a cause-and-effect relationship of debriefing using the NCSBN clinical judgment measurement model framework's effect on clinical reasoning, critical thinking, and clinical judgment in BSN nursing students.

The importance of advancing the knowledge of teaching techniques that have an impact on clinical reasoning, critical thinking, and clinical judgment in nursing education arose because, beginning in April 2023 and going forward, NCSBN's Next Generation NCLEX RN testing format has changed and will emphasize and assess clinical judgment through testing questions. The ongoing need to assess clinical judgment highlights the importance of assessing additional teaching strategies that have the potential to improve clinical judgment in undergraduate nursing education, prepare nursing students for the NCLEX-RN examination, and lead to an improvement in the care they provide to patients.

The key findings of the study identified a statistically significant mean score increase from pretest to posttest in clinical reasoning, critical thinking, and clinical judgment after the debriefing intervention using the NCSBN clinical judgment measurement model framework. Therefore, the null hypothesis was rejected and results indicate that simulation debriefing using the NCSBN clinical judgment measurement model framework has an effect on clinical reasoning, critical thinking, and clinical judgment. The statistically significant mean score increase from pretest to posttest also indicates that the NCSBN clinical judgment measurement model debriefing framework positively influences clinical reasoning, critical thinking, and clinical judgment in BSN nursing students. Therefore, due to the improved scores from pretest to posttest, the NCSBN clinical judgment measurement model debriefing framework is a new teaching strategy that should be considered for implementation as a debriefing process for nursing students that has the potential to positively influence learning outcomes.

Interpretation of the Findings

Hall and Tori (2017) found that a safe, structured debriefing following simulation is a best practice and an essential component of simulation-based learning and that debriefing requires a structured framework. My findings support the importance of debriefing following simulation with a structured debriefing framework and extend the knowledge related to a new structured debriefing framework, the NCSBN clinical measurement model framework, which led to improved clinical reasoning, critical thinking, and clinical judgment scores. Neill and Wotton (2011) corroborated that debriefing is essential to high-fidelity simulation education. Hines and Wood (2016)

found that a standardized debriefing script based on Tanner's (2006) clinical judgment model led to improvements in students noticing, interpreting, and reflection in simulation learning experiences. Similarly, I found that using a debriefing script based on the NCSBN clinical measurement model framework shows learning improvement in clinical reasoning, critical thinking, and clinical judgment among nursing students.

My study supports the findings by Shinnick et al. (2011), Ryoo and Ha (2015), Lavoie et al. (2019), and Lee et al. (2020) that debriefing after a simulated experience should be emphasized and that debriefing has a positive effect on clinical performance. My results also revealed that posttest mean scores increased after debriefing the simulated experiences. My results were similar to Arthur et al.'s (2013) findings that debriefing immediately following the simulation leads to improvements in student knowledge in the areas of clinical reasoning, critical thinking, and clinical judgment results. Similarly, Forneris et al. (2015) found that nursing students who were debriefed using the debriefing for meaningful learning tool scored significantly higher in their clinical reasoning than students who were debriefed with the usual and customary debriefing, which is supported by my results. Levett-Jones and Lapkin (2014) reviewed 10 randomized controlled trials that included various debriefing methods such as post simulation debriefing, in-simulation debriefing, instructor facilitated debriefing, and video-assisted instructor debriefing and found a statistically significant improvement in performance of technical and nontechnical skills irrespective of the type of debriefing. Although I used the NCSBN clinical judgment model framework, my results support the results that nursing skills improved with debriefing because of the debriefing process.

As noted in the early designs of the NLN Jeffries simulation theory, a framework is needed to guide in the design and implementation and to evaluate and assess simulation nursing outcomes in nursing education, as well as to conduct research in an organized and systematic manner (Jeffries, 2005; NLN, 2016). The NLN Jeffries simulation theory supported and guided the study through the simulation design that included the debriefing and educational strategy of the NCSBN clinical measurement model framework for simulation debriefing and the simulation outcomes that examined the effect that the debriefing framework had on the participant learning outcomes of clinical reasoning, critical thinking, and clinical judgment.

Limitations of the Study

A limitation of the study was the lack of generalizability outside of the participant population due to the nonprobability convenience sampling method used (see Grove et al., 2013; LoBiondo-Wood & Haber, 2014). However, as noted by LoBiondo-Wood and Haber (2014), confidence in the findings can still be achieved through representativeness of the target population and external validity of the sampling. The target population exhibited in the participant population reflects the target population as a whole, as noted by the 2020 Nation Nursing Workforce Survey of RNs which indicated the population values for race were 81% as White/Caucasian, 7.2% Asian, 6.7% Black/African American, and 5.6% Hispanic/Latinx, and the gender distribution of RNs was 90.5% female and 9.4% male (Smiley et al., 2021). Because the participant population of the study reflected the target population, there is confidence in the findings of the sample.

The sample size for the study was N = 40. The power analysis to obtain a power of 0.80, determined that the appropriate sample size was 34, which was calculated based on a t test analysis using the G*Power statistical power analyses program. A priori power analysis for means testing the difference between two dependent means or matched pairs with an alpha of 0.05 and a power of 0.80 signifies a small risk for a Type I error or the probability of rejecting the null hypothesis when the null hypothesis was correct (Warner, 2013).

A limitation of the one group pretest/posttest design is lack of a comparison group (see Grove et al., 2013). Selection bias was prevented by conducting the research on the same group of participants with a pretest and posttest (Campbell, 1957; Campbell & Stanley, 1966, as cited in Kaya, 2015). The Hawthorne effect or pretest/posttest sensitization is also a threat to external and internal validity (LoBiondo-Wood & Haber, 2014; Lund Research Ltd., 2022, 2022b). Pretest/posttest sensitization may have affected the posttest scores due to participants being sensitized to the debriefing topics because they were assessed before and after the debriefing intervention with the same pretest and posttest evaluation. Due to the testing effect exposure, there was the potential to influence the posttest scores in a positive way that may not only be due to the independent variable and therefore is noted as a limitation to the study.

Recommendations

Due to the potential generalizability limitation and the threat to external and internal validity, a recommendation for further research would include conducting the research with an experimental study design, such as a pretest–posttest control group

design, instead of the quasi-experimental design. An experimental study design would eliminate the factors that could influence the dependent variable (clinical reasoning, critical thinking, and clinical judgment), other than the independent variable (debriefing process using the NCSBN clinical judgment measurement model framework). The experimental study design would also prevent other influencers on the cause and effect relationship through randomization and specific control of the independent and dependent variables (Grove et al., 2013). An additional recommendation would be to conduct research on a larger population base to improve generalizability, by including other levels of nursing students such as those enrolled in associate degree nursing (ADN), masters programs, and RNs completing yearly competencies or educational simulations.

Implications

Positive Social Change

The study findings have the potential to influence positive social change by educating the next generation of nurses and improving the pedagogy of nursing education. The contribution to positive social change would be led by improving a student nurse's abilities to critically think, which will also lead to improved clinical reasoning and clinical judgment. Clinical reasoning, critical thinking, and clinical judgment are the hallmarks of, and key components of, student nurse comprehension. By strengthening a student nurse's comprehension ability, with the NCSBN clinical judgment measurement model framework for simulation debriefing, clinical nursing skills will also potentially be improved. These critical nursing skills are essential to recognize key indicators, prioritize patient care, act in a timely manner, and evaluate

outcomes to identify and act on patient conditions before their circumstances significantly deteriorate. Developing and enhancing critical nursing skills through the debriefing framework will lead to improved patient outcomes as student nurses transition to practice as RNs. Therefore, the study findings have the potential to positively affect social change by amplifying patient outcomes now and in the future.

For Practice

Due to the lack of research on debriefing methods, best practices, and those that improve learning outcomes, I analyzed the NCSBN clinical judgment measurement model Debriefing framework and its effect on clinical reasoning, critical thinking, and clinical judgment. While the study lacks generalizability outside of the BSN nursing student population, the recommendations for practice would be to continue to test the NCSBN clinical judgment measurement model framework for debriefing simulation scenarios for undergraduate BSN nursing students. The NCSBN clinical judgment measurement model framework could also be used in other nursing student groups such as ADN and MSN nursing students, RNs, or other healthcare students or graduates for educational competencies.

Conclusions

Advancing the knowledge in teaching techniques that have an impact on clinical reasoning, critical thinking, and clinical judgment in nursing students continues to be an important factor throughout nursing education. Improving and adapting teaching techniques in nursing education has become a high priority because NCSBN's Next Generation NCLEX-RN testing format has changed as the testing question have begun to

emphasize and assess clinical judgment. Results of the study highlight the new teaching and debriefing strategy, the NCSBN clinical judgment measurement model framework for debriefing that improve clinical reasoning, critical thinking, and clinical judgment scores in nursing students, and therefore, has the potential to improve patient outcomes.

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Appendix G: NCSBN Clinical Judgment Measurement Model Script

Cue Recognition:

What is relevant/irrelevant information in the medical history?

What is relevant/irrelevant information in the medical record?

What is relevant/irrelevant information from the assessment(s) and vital signs?

What information from the medical history, medical record, assessment(s), and vital signs are the most significant?

Analyze Cues:

What in the medical history, medical record, assessment(s), and/or vital signs are normal?

What in the medical history, medical record, assessment(s), and/or vital signs are abnormal?

What in the medical history, medical record, assessment(s), and/or vital signs are significant to the clinical situation?

Prioritize Hypotheses:

What is most likely occurring?

What in the patient's presentation and history is most significant or serious in order of priority.

Generate Solutions:

What are the indicated/contraindicated treatments/interventions that will foster an improved or stable outcome for this clinical situation?

Take Action:

What intervention or combination of interventions is most appropriate for this clinical situation?

What intervention or interventions are needed immediately?

How should the intervention or interventions be implemented, performed, requested, administered, communicated, taught, and/or documented?

What intervention or interventions can be delegated and to who?

Evaluate Outcomes:

Has the clinical situation improved, declined, or remained unchanged?

What observations/findings would indicate that the intervention(s) was effective, ineffective, or progressing as expected?

Is there any other intervention(s) that may have been more effective?

Appendix H: Critical Thinking Diagnostic

Table 1. *Nursing Executive Center's 25 Core Critical-Thinking Competencies*

25 Core Critical-Thinking Competencies*
Problem recognition
(1) Accurately anticipates changes in patient status
(2) Accurately recognizes changes in patient status
(3) Consistently recognizes unsafe practices by self and others
(4) Proactively voices concerns about unsafe practices by self and others
(5) Proactively identifies unit- or hospital-based improvement opportunities
Clinical decision making
(1) Effectively explores multiple solutions to a given problem
(2) Consistently demonstrates understanding of rationale for following (or departing from) established protocols and policies
(3) Consistently demonstrates understanding of potential clinical implications of interventions
(4) Proactively asks peers and experts for assistance when needed
(5) Proactively consults further resources (eg, literature, evidence-based tools, etc) to improve patient care
Prioritization
(1) Appropriately prioritizes the most urgent patients
(2) Appropriately sequences care for an individual patient
(3) Appropriately sequences indirect care responsibilities across the shift
(4) Appropriately delegates responsibilities
(5) Consistently demonstrates accountability for delegated responsibilities
Clinical implementation
(1) Consistently develops plan of care that reflects current evidence-based practices and protocols
(2) Consistently develops plan of care that reflects patient, family, and community needs
(3) Effectively implements nursing interventions included in plan of care
(4) Proactively adjusts plan of care according to patient needs, preferences, and cultural considerations
(5) Clearly communicates plan of care to other care team members
Reflection
(1) Appropriately applies knowledge of past experiences to present situations
(2) Consistently reevaluates assumptions to draw conclusions based on nursing evidence
(3) Proactively initiates professional dialogue around nursing practice
(4) Proactively debriefs following errors or near-misses
(5) Appropriately adjusts own practice based on others' feedback

*Assessment scale: strongly disagree = 1; disagree = 2; tend to disagree = 3; tend to agree = 4; agree = 5; strongly agree = 6.

Appendix I: Lasater's Clinical Judgment Rubric

Effective NOTICING involves:	**Exemplary**	**Accomplished**	**Developing**	**Beginning**
Focused Observation	Focuses observation appropriately; regularly observes and monitors a wide variety of objective and subjective data to uncover any useful information	Regularly observes/monitors a variety of data, including both subjective and objective; most useful information is noticed, may miss the most subtle signs	Attempts to monitor a variety of subjective and objective data, but is overwhelmed by the array of data; focuses on the most obvious data, missing some important information	Confused by the clinical situation and the amount/type of data; observation is not organized and important data is missed, and/or assessment errors are made
Recognizing Deviations from Expected Patterns	Recognizes subtle patterns and deviations from expected patterns in data and uses these to guide the assessment	Recognizes most obvious patterns and deviations in data and uses these to continually assess	Identifies obvious patterns and deviations, missing some important information; unsure how to continue the assessment	Focuses on one thing at a time and misses most patterns/deviations from expectations; misses opportunities to refine the assessment
Information Seeking	Assertively seeks information to plan intervention: carefully collects useful subjective data from observing the client and from interacting with the client and family	Actively seeks subjective information about the client's situation from the client and family to support planning interventions; occasionally does not pursue important leads	Makes limited efforts to seek additional information from the client/family; often seems not to know what information to seek and/or pursues unrelated Information	Is ineffective in seeking information; relies mostly on objective data; has difficulty interacting with the client and family and fails to collect important subjective data

Effective INTERPRETING involves:	Exemplary	Accomplished	Developing	Beginning
Prioritizing Data	Focuses on the most relevant and important data useful for explaining the client's condition	Generally focuses on the most important data and seeks further relevant information, but also may try to attend to less pertinent data	Makes an effort to prioritize data and focus on the most important, but also attends to less relevant/useful data	Has difficulty focusing and appears not to know which data are most important to the diagnosis; attempts to attend to all available data
Making Sense of Data	Even when facing complex, conflicting or confusing data, is able to (1) note and make sense of patterns in the client's data, (2) compare these with known patterns (from the nursing knowledge base, research, personal experience, and intuition), and (3) develop plans for interventions that can be justified in terms of their likelihood of success	In most situations, interprets the client's data patterns and compares with known patterns to develop an intervention plan and accompanying rationale; the exceptions are rare or complicated cases where it is appropriate to seek the guidance of a specialist or more experienced nurse	In simple or common/familiar situations, is able to compare the client's data patterns with those known and to develop/explain intervention plans; has difficulty, however, with even moderately difficult data/situations that are within the expectations for students, inappropriately requires advice or assistance	Even in simple of familiar/common situations has difficulty interpreting or making sense of data; has trouble distinguishing among competing explanations and appropriate interventions, requiring assistance both in diagnosing the problem and in developing an intervention

Effective RESPONDING involves:	Exemplary	Accomplished	Developing	Beginning
Calm, Confident Manner	Assumes responsibility: delegates team assignments, assess the client and reassures them and their families	Generally displays leadership and confidence, and is able to control/calm most situations; may show stress in particularly difficult or complex situations	Is tentative in the leader's role; reassures clients/families in routine and relatively simple situations, but becomes stressed and disorganized easily	Except in simple and routine situations, is stressed and disorganized, lacks control, making clients and families anxious/less able to cooperate
Clear Communication	Communicates effectively; explains interventions; calms/reassures clients and families; directs and involves team members, explaining and giving directions; checks for understanding	Generally communicates well; explains carefully to clients, gives clear directions to team; could be more effective in establishing rapport	Shows some communication ability (e.g., giving directions); communication with clients/families/team members is only partly successful; displays caring but not competence	Has difficulty communicating; explanations are confusing, directions are unclear or contradictory, and clients/families are made confused/anxious, not reassured
Well-Planned Intervention/ Flexibility	Interventions are tailored for the individual client; monitors client progress closely and is able to adjust treatment as indicated by the client response	Develops interventions based on relevant patient data; monitors progress regularly but does not expect to have to change treatments	Develops interventions based on the most obvious data; monitors progress, but is unable to make adjustments based on the patient response	Focuses on developing a single intervention addressing a likely solution, but it may be vague, confusing, and/or incomplete; some monitoring may occur
Being Skillful	Shows mastery of necessary nursing skills	Displays proficiency in the use of most nursing skills; could improve speed or accuracy	Is hesitant or ineffective in utilizing nursing skills	Is unable to select and/or perform the nursing skills

Effective REFLECTING involves:	Exemplary	Accomplished	Developing	Beginning
Evaluation/Self-Analysis	Independently evaluates/ analyzes personal clinical performance, noting decision points, elaborating alternatives and accurately evaluating choices against alternatives	Evaluates/analyzes personal clinical performance with minimal prompting, primarily major events/decisions; key decision points are identified and alternatives are considered	Even when prompted, briefly verbalizes the most obvious evaluations; has difficulty imagining alternative choices; is self-protective in evaluating personal choices	Even prompted evaluations are brief, cursory, and not used to improve performance; justifies personal decisions/choices without evaluating them
Commitment to Improvement	Demonstrates commitment to ongoing improvement: reflects on and critically evaluates nursing experiences; accurately identifies strengths/ weaknesses and develops specific plans to eliminate weaknesses	Demonstrates a desire to improve nursing performance: reflects on and evaluates experiences; identifies strengths/ weaknesses; could be more systematic in evaluating weaknesses	Demonstrates awareness of the need for ongoing improvement and makes some effort to learn from experience and improve performance but tends to state the obvious, and needs external evaluation	Appears uninterested in improving performance or unable to do so; rarely reflects; is uncritical of him/herself, or overly critical (given level of development); is unable to see flaws or need for improvement

Appendix J: Clinical Reasoning Evaluation Simulation Tool

The CREST is designed specifically to evaluate the clinical reasoning skills of a nurse or a nursing student in recognizing and responding to clinical deterioration in a simulated environment.

There are 10 items, scored with a five-point Likert rating scale, that are grouped into 8 subscales. These are either rated based on questioning (items 1, 4, 5, 6, & 10) to elicit verbal responses or observations of a simulation performance (items 2, 3, 7, 8, & 9). A final global item, scored with a 10-point Likert rating scale, allows rating of the nurse/nursing student's performance as a whole.

The following steps are recommended:

1. Reading time. The individual should be given some time (e.g. 5 minutes) to read the case notes of the simulated scenario.

2. Questioning. The assessor rates item 1 through face-to-face questioning.

3. Simulation performance. The assessor rates items 2, 3, 7, 8, & 9 by observing the individual's simulation performance and use of the 'think aloud' strategy.

4. Questioning. The assessor rates items 4, 5, 6, & 10 through face-to-face questioning.

Domain/Item	Questioning (Q)/ Observation(O)	1	2	3	4	5	Score
Considering patient situation							
1) Interpretation of patient's current situation from case information	**Q :** How have you interpreted the given information?	Unable to interpret relevant case information	Limited attempt to interpret relevant case information	Interprets case information to reveal some important patterns or deviations	Interprets case information to reveal most important patterns or deviations	Interprets case information thoroughly to reveal all important patterns or subtle deviations	
Collecting cues							
2) Performs physical assessment to gather cues	**O :** Observe performance of physical assessment	Unable to collect important cues relevant to the case	Collects a limited number of cues relevant to the case	Collects important cues relevant to the case with limited use of a systematic approach	Collects important cues relevant to the case using a systematic approach	Collects important cues relevant to the case using a thorough systematic approach	
Processing information							
3) Recognizes and interprets patient abnormalities	**O :** Observe through "think aloud" on the recognition and interpretation	Unable to recognize obvious abnormalities	Limited ability to recognize abnormalities	Recognizes patient abnormalities with limited	Recognizes patient abnormalities with some	Recognizes all patient abnormalities with clear	

	of abnormalities			interpretation	interpretation	interpretation	
4) Clusters cues together to identify relationships among them	**Q :** How do you link the signs and symptoms of the patient together?	Unable to make connections between cues	Limited ability to make connections between cues	Clusters main cues together with limited reasoning	Clusters main cues together with sound reasoning	Able to cluster main cues together with thorough reasoning	
Identifying problem/ issue							
5) Identifies appropriate problem(s) with reasoning	**Q :** What do you think had happened to the patient?	Unable to identify appropriate problems	Limited ability to identify appropriate problems	Identifies appropriate problems with limited reasoning	Identifies appropriate problems with sound reasoning	Identifies appropriate problems with thorough reasoning	
Establishing goals							
6) States desired patient outcomes	**Q :** What did you aim to do for the patient and why?	Unable to identify desired outcomes	Identifies limited desired outcomes	Identifies desired outcomes with limited reasoning	Identifies desired outcomes with sound reasoning	Identifies desired outcomes with thorough reasoning	
Domain/ Item	**Questioning (Q)/ Observation(O)**	**1**	**2**	**3**	**4**	**5**	
Taking actions							
7) Performs	**O :** Observe	Unable to	Performs	Performs	Performs	Performs	

action(s) to achieve desired outcomes	actions taken to manage situation	perform appropriate actions	limited appropriate actions	appropriate actions with limited effectiveness	appropriate actions with effectiveness	appropriate actions with optimal effectiveness and efficiency	
8) Communicates effectively to escalate for help	**O :** Observe communication skills via phone call	Unable to communicate main issues	Limited ability to communicate main issue	Communicates main issues with limited use of ISBAR	Communicates main issues clearly and concisely using ISBAR	Communicates main issues clearly and concisely using ISBAR and with a sense of urgency	
Evaluating outcomes							
9) Evaluates effectiveness of action outcomes	**O :** Observe actions taken to evaluate outcome and adjust interventions	Unable to evaluate action outcomes	Limited evaluation of action outcomes	Evaluates the effectiveness of action with limited ability to adjust action plans	Evaluates the effectiveness of action with some ability to adjust action plans	Evaluates the effectiveness of action with clear ability to adjust action plans	
Reflecting on process and new learning							
10) Performs effective reflection for ongoing improvement	**Q :** What do you think were your strengths and weaknesses ? Where do you	Unable to reflect on strengths and weaknesses	Limited reflection on strengths and weaknesses	Reflects on strengths and weaknesses with limited ability to identify plans	Reflects on strengths and weaknesses with some ability to identify plans	Reflect on strengths and weaknesses with clear ability to identify plans	

	think you could have done better?			for improvement	for improvement	for improvement	
11) Overall **On a scale of 1-10, rate the participants' overall clinical reasoning skill** 1 2 3 4 5 6 7 8 9 10 Unsatisfactory Outstanding							
Total score:							

Appendix K: Stroke Simulation Script

Cue Recognition:

What is relevant/irrelevant information in the medical history?

Relevant: Age; Hypertension; History of Atrial Fibrillation (under control currently with Betalol); Hyperlipidemia; Recent cholecystectomy (postop day #2)

Irrelevant: Surgical history (Appendectomy 1962; Hysterectomy, 1980); Osteoporosis

What is relevant/irrelevant information in the medical record?

Same answer as #1.

What is relevant/irrelevant information from the assessment(s) and vital signs?

Relevant: New onset of stroke symptoms; ECG rhythm analysis (client develops recurrence of atrial fibrillation); heart rate trends up; respiratory rate trends up; blood pressure and MAP remains elevated; pulse oximetry trends down to 92%

Irrelevant: Vital signs which are normal (Temp); Chemistry profile results; Complete Blood Count results

What information from the medical history, medical record, assessment(s), and vital signs are the most significant?

New onset of stroke symptoms; Reoccurrence of Atrial fibrillation; Blood pressure /Pulse/ Respiratory rates trending up; Oxygenation saturation levels trending down

Analyze Cues:

What in the medical history, medical record, assessment(s), and/or vital signs are normal?

Vital signs which are normal (Temp); Chemistry profile and Complete Blood Count results

What in the medical history, medical record, assessment(s), and/or vital signs are abnormal?

New onset of stroke symptoms (expressive aphasia; decreased motor function and muscle strength on right side arms and legs); Reoccurrence of Atrial fibrillation; Blood pressure /Pulse/ Respiratory rates trending up; Oxygenation saturation levels trending down;

What in the medical history, medical record, assessment(s), and/or vital signs are significant to the clinical situation?

History of Atrial Fibrillation (under control currently with Betalol); Hypertension; Hyperlipidemia; Recent cholecystectomy (postop day #2) (stressor to body which sets off a recurrence of Atrial Fibrillation)

Prioritize Hypotheses:

What is most likely occurring?

Stroke secondary to new onset of Atrial Fibrillation

What in the patient's presentation and history is most significant or serious in order of priority?

1. Altered Neurological Function: New onset of stroke symptoms (expressive aphasia; decreased motor function and muscle strength on right side arms and legs);
2. Increased O2 demand secondary to atrial fibrillation recurrence, elevated BP, tachycardia, tachypnea

Generate Solutions:

What are the indicated/contraindicated treatments/interventions that will foster an improved or stable outcome for this clinical situation?

Indicated: a. Rapid Response for Early Onset Stroke; Vital Signs; NIH Stroke Scale baseline; Elevate head of bed; initiate oxygen therapy at 1-2 liters per nasal cannula and monitor oxygen saturation levels; Continuous ECG monitoring; Inform patient of all findings, providing reassurance / education; Remain with patient at all times (provide for all safety measures)

b. Report all findings in "a" to HCP and initiate further orders

c. Prepare patient for CT scan and inform patient.

Contraindicated / Not necessary: All other basic care measures

Take Action:

What intervention or combination of interventions is most appropriate for this clinical situation?

Indicated: a. Rapid Response for Early Onset Stroke; Vital Signs; NIH Stroke Scale baseline; Elevate head of bed; initiate oxygen therapy at 1-2 liters per nasal cannula and monitor oxygen saturation levels; Continuous ECG monitoring; Inform patient of all findings, providing reassurance / education; Remain with patient at all times (provide for all safety measures)

b. Report all findings in "a" to HCP and initiate further orders

c. Prepare patient for CT scan and inform patient.

What intervention or interventions are needed immediately?

NIH Stroke Scale (Bedside Nurse and Charge Nurse) and Oxygenation interventions (RT); update provider of findings when provider arrives

How should the intervention or interventions be implemented, performed, requested, administered, communicated, taught, and/or documented?

Bedside nurse and Charge Nurse initiate and perform NIH Stroke Scale and ID atrial fibrillation; RT initiates oxygen therapy and monitors pulse oximetry readings; provider orders CT scan

What intervention or interventions can be delegated and to who?

Oxygenation interventions handled by RT

Evaluate Outcomes:

Has the clinical situation improved, declined, or remained unchanged?

Oxygenation status will improve slightly; Stroke symptoms will not improve and patient is sent down for emergent CT scan.

What observations/findings would indicate that the intervention(s) was effective, ineffective, or progressing as expected?

Pulse oximetry levels rise from 92% to 94% if oxygen therapy is applied at 1-2 liters per minute per nasal cannula.

Stroke symptoms do not resolve.

Atrial fibrillation does not resolve.

Is there any other intervention(s) that may have been more effective?

No delay in NIH Stroke assessment and no delay oxygenation management

Appendix L: Heart Failure Script

Cue Recognition:

What is relevant/irrelevant information in the medical history?

Age, male, hx of HTN, CAD, DM II, obesity

What is relevant/irrelevant information in the medical record?

Exertional dyspnea, increased edema,

What is relevant/irrelevant information from the assessment(s) and vital signs?

EKG rhythm analysis, elevated HR, elevated BP, O2 requirements, exertional dyspnea, lung sounds, heart sounds, POC glucose reading

What information from the medical history, medical record, assessment(s), and vital signs are the most significant?

A Fib, hx of HTN, SOB, new edema, requiring supplemental O2, POC glucose level, elevated BP, lung sounds, heart sounds

Analyze Cues:

What in the medical history, medical record, assessment(s), and/or vital signs are normal?

Respiratory rate, POC glucose, pulses, I/O's

What in the medical history, medical record, assessment(s), and/or vital signs are abnormal?

BP, HR, EKG rhythm, edema, activity intolerance, heart sounds, lung sounds

What in the medical history, medical record, assessment(s), and/or vital signs are significant to the clinical situation?

BP, HR, EKG rhythm, edema, activity intolerance, heart sounds, lung sounds

Prioritize Hypotheses:

What is most likely occurring?

A Fib RVR with possible new onset HF, uncontrolled BP (possibly not taking home medications as prescribed)

What in the patient's presentation and history is most significant or serious in order of priority.

Increased O2 demand, dyspnea upon exertion, A Fib, peripheral swelling

Generate Solutions:

What are the indicated/contraindicated treatments/interventions that will foster an improved or stable outcome for this clinical situation?

Conversion of abnormal heart rhythm into NSR, remove excess fluid through the use of medications such as Lasix, provide digoxin to assist heart in pumping more efficiently (positive inotrope), continue to provide supplemental oxygen, high fowlers position, and morphine to help with feelings of SOB, TEDs to bilateral lower extremities, monitor I/O's, 2000 mL/day fluid restriction, constant telemetry and POX monitoring

Take Action:

What intervention or combination of interventions is most appropriate for this clinical situation?

Assess patient prior to administration of medications, Administer Lasix, digoxin, and morphine as ordered, hourly I/O's, telemetry/POX, TEDs, supplemental O2, high fowlers, activity as tolerated

What intervention or interventions are needed immediately?

Assessments, O2, telemetry/POX, medication administration, fluid restriction

How should the intervention or interventions be implemented, performed, requested, administered, communicated, taught, and/or documented?

Through the review of MD orders, IVP stat, continuous tele/POX

What intervention or interventions can be delegated and to who?

Tele/POX and TEDs initiation to technician, notify staff (tech/dietary) of fluid restriction; ambulation to technician

Evaluate Outcomes:

Has the clinical situation improved, declined, or remained unchanged?

The clinical situation will improve after the implementation of the above interventions

What observations/findings would indicate that the intervention(s) was effective, ineffective, or progressing as expected?

Worsening SOB or swelling would indicate that an intervention was missed; worsening heart rhythm (A Fib to A Flutter or heart block), worsening lung sounds (crackles), increased edema (3+ or 4+), increased O2 requirement (4-6L NC)

Is there any other intervention(s) that may have been more effective?

Not delaying the administration of appropriate medications and continuous monitoring (tele/POX)