Enhancing the Clinical Judgment Ability of the Student Nurse

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Abstract

Enhancing the Clinical Judgment Ability of the Student Nurse

Background: Nursing education is challenged to effectively prepare students for clinical practice and develop teaching strategies that promote clinical judgement. The intent of this project is to implement an evidence-based designed program to enhance the clinical judgment ability of our undergraduate nursing students.

Problem: In current healthcare, there is limited clinical time available for student nurses to encounter learning experiences to develop the essential skills necessary to make reliable clinical judgments (Andrew, 2019). Evidence highlights that up to 65 percent of errors in healthcare could be prevented if nurses had the skills to make appropriate, life altering decisions (Benner et al., 2010; Muntean, 2012; NCSBN, 2019). Nursing education needs to explore the most effective methods of fostering future nurses to make evidence-based decisions that lead to positive patient outcomes (Kavenaugh & Szweda, 2017).

Purpose: The purpose of this evidence-based practice implementation project is to examine the PICOT question "Among 4th semester senior undergraduate nursing students at small private university in Northwest Ohio, what are best practice recommendations for the incorporation of simulation activities into the nursing curriculum to enhance the clinical judgement ability of the student nurse, in order to ultimately improve patient outcomes by preventing failure to rescue?

Methods: The methods incorporated include the use of human patient simulation, with measurement of knowledge obtained through a pre/post-test survey, and use of the Lasatar Clinical Judgment rubric to assess critical decision-making points. The study was designed as a Mixed Method Cohort Study.

Results: The results of the simulation study portion of this evidence-based practice project are inconsistent with most of the research, as the reporting variables did not reflect a positive difference between the baseline and post- intervention scores. Potential rationales for the lack of improvement in the post-simulation scores are multifactorial, and support that the students are unprepared to apply their knowledge. This further reinforces the need for pedagogical changes to focus on the application of knowledge, as successful test-taking abilities does not determine competency.

Conclusions: This evidence-based project provided valuable insight on the simulation implementation processes to cultivate desired outcomes, with the need for a process change to incorporate a CJ model throughout nursing education curricula identified. Implications include to further incorporate teaching strategies into existing curricula that promote the application of knowledge to enhance the clinical judgment ability of student nurses.

Keywords: clinical judgment, critical thinking, clinical reasoning, human patient simulation, nursing education, teaching strategies, failure to rescue

Enhancing the Clinical Judgment Ability of the Student Nurse

Clinical Judgment (CJ) is an essential component of professional nursing practice and has been shown to have a direct impact on patient outcomes (Benner, Sutphen, Leonard, & Day, 2010; Kavanaugh & Szweda, 2017). In her breakthrough study, Tanner (2006) provides a research-based model of CJ in nursing. She summarizes that Critical Thinking (CT) is when a nurse acts on what he/she knows, whereas clinical reasoning requires a deep understanding of pathophysiology, in order to filter data and determine what is relevant to identify the priority nursing problem. Based upon this analysis of data, the nurse makes the decision to respond or not with an action, which is known as CJ.

The National Council of State Boards of Nursing (NCSBN®) has refined their definition of CJ to align with leading researchers (Benner et al., 2010; Dickison, Haerling, & Lasater, 2019; Tanner, 2006) as the outcome of two cognitive processes; CT and decision making (NCSBN, 2019). Alfaro-LeFevre (2017) further elaborates that CT is the application of knowledge at the bedside, and the understanding of the "why" behind concepts, whereas clinical reasoning is viewed as grasping the essence of the current situation and the ability to reason as the situation changes. With CJ being the consequence of the thinking and reasoning of a nurse, the understanding and development of each component allows for measures to be taken to improve each skill, hence develop CJ. This thought is reinforced by Tanner, who acknowledges that CJ cannot be directly taught, but rather the CT and reasoning of the nurse must be cultivated to develop necessary judgment skills.

Nursing education continues to be challenged to ensure that nursing graduates not only have the knowledge, but are able to apply this knowledge to respond appropriately to changes in patient condition and make accurate clinical decisions in order to ensure safe care (Benner et al.,

2010; NCSBN, 2019). Nursing students need to practice this high-level cognitive process prior to entering the workforce to foster the enrichment of these essential skills. As educators, it is imperative to explore effective pedagogies to assist the student nurse in developing the CJ skills necessary to improve patient outcomes (Alfaro-LeFevre, 2017; Benner et al., 2010; Cappelletti, Engel, & Prentice, 2014; Kavanaugh & Szweda, 2017).

In order to effectively prepare students for clinical practice and develop teaching strategies that promote CJ, it is crucial for nursing programs to reassess their curriculum structure. With limited clinical time available to encounter the experiences needed for the development of CJ and CT skills, the use of human patient simulation (HPS) has been integrated in nursing curricula to replicate clinical experiences and connect theory to practice (Aebersold, 2018; Andrew, 2019; Robinson & Dearmon, 2013). Students need more opportunity to cultivate decision-making skills to aid their transition to the role of a nurse (Aebersold, 2018; Andrew, 2019; Robinson & Dearmon, 2013). Though it is the belief of many nurse educators that student engagement in HPS can enhance their development of CJ abilities, and be instrumental to translate knowledge and theory into practice, it is important to explore the evidence available to support this claim.

Clinical Significance and Knowledge Gap

It is a concern of acute care administrators and researchers that newly graduated nurses are not effectively prepared as they transition to the role of professional nurse in the complexity of today's healthcare arena (Benner et al., 2010; NCSBN, 2019). In a study by Kavanagh and Szweda (2017), only 23% of new graduate nurses met entry-level expectations of CJ. Findings of their study, aptly titled "A Crisis in Competency" (2017), suggest the majority of students were unable to make evidence-based clinical decisions according to the defined components of CJ and

using Tanner's (2006) CJ model. These novice nurses were able to recognize basic changes in the client condition, but most were unable to interpret additional data and respond to the problem appropriately. Similar results were obtained in a study conducted by Lancaster, Westphal, and Jambunathan (2015), with only 22% of students able to demonstrate safe clinical decision-making and identify the need to respond with continued assessment of data and evaluate the current status of the patient.

Based upon substantial research of clinical decision-making abilities and the amount of errors made by novices in nursing care, evidence highlights that up to 65 percent of errors could be prevented if nurses had the skills to make appropriate, life altering decisions (Benner et al., 2010; Brennan, Leape, Laird, Hebert, Localio, Lawthers, & Hiatt., 2004; Muntean, 2012; NCSBN, 2019). This failure to recognize relevant data and the urgency of situation, with the additional factor of not communicating or further investigating a problem, leads for the failure to respond appropriately (Aiken & Clarke, 2003). This phenomenon is known as "Failure to Rescue", and research has demonstrated a direct relationship with a new nurse's lack of knowledge or inexperience (Aiken & Clarke, 2003; Garvey, 2015).

Nursing education programs need to focus more on helping students learn how to think like nurses and use clinical reasoning to make evidence-based decisions that lead to positive patient outcomes (Kavenaugh & Szweda, 2017). Passage of the NCLEX exam does not indicate competency, and simply having knowledge does not translate to CJ (Benner et al., 2010; NCSBN, 2019). Changes in curricula are essential now, with incorporation of strategies to promote clinical decision making and CT, to improve CJ and outcomes at the bedside. The need to teach the recognition of relevant information and apply this to make decisions must be

accentuated, with learning activities which foster the transfer of knowledge from the classroom to clinical practice.

In order to address these identified gaps in developing CJ in the student nurse, HPS has been broadly adapted within nursing programs. Research continues to demonstrate an array benefits offered from HPS, such as increase knowledge, confidence, problem solving, CT, therapeutic communication, and teamwork (Aebersol, 2011; Andrew, 2019; Billings & Halstead, 2019; Lee & Oh, 2015; Robinson & Dearmon, 2013; Weaver, 2015). With all of the published literature surrounding the benefits of simulation activities, it is important to explore evidence to determine the best methods for integration of activities to achieve optimal results.

Purpose and Overall Aims

The purpose of this evidence-based project was to design and implement a program to enhance the CJ ability of undergraduate nursing students. Patient outcomes will be improved secondary to the heightened ability of the nurse to recognize changes in patient conditions and make reliable clinical decisions to prevent failure to rescue. The overall aims included 1) identify methods to incorporate best practice standards in simulation to improve the student nurses' ability to recognize changes in patient condition, 2) assess the relationship of the CJ ability of undergraduate students experiencing HPS compared to traditional teaching methods not using HPS, 3) evaluate existing tools to implement EBP to measure the efficacy of fostering CT and CJ, and 4) explore CJ models to integrate within existing nursing curricula to enhance the CJ of student nurses.

Theoretical Model

Benner's Novice to Expert Theory (1982), provided a theoretical framework for identifying knowledge acquisition and level of clinical expertise based on skill competency,

knowledge, and experience, and underpinned this study. This theory is based on the Dreyfus Model of Skill Acquisition which categorizes performance within the realms of one's educational background and their experience, and also serves as a basis for clinical development (Benner, 1982). How one acquires and develops skills is characterized by five levels of proficiency: novice, advanced beginner, competent, proficient, and expert (Benner, 1982).

The novice is described as a new nurse with no prior experience in a particular situation, who relies on rules to guide how tasks are performed (Benner, 1982). The second level of advanced beginner is where Benner places most new nurse graduates, and is characterized by the demonstration of acceptable performance with some prior experience in real situations for recognition. By learning from practice and through the observation of colleagues' actions, the nurse can now prioritize actions and manage many aspects of clinical nursing, which is hallmark of the competent level (Benner, 2001). As one begins to anticipate occurrences and uses past experiences to guide decision making, intuition develops as they enter the stage of proficiency. Finally, the expert in Benner's model possesses the ability to expect the unexpected and see the whole picture, and functions from a deep understanding of the given situation using past experiences to guide their practice (Benner, 2001). Engagement in simulation experiences has been shown to facilitate the transition of the nurse from a novice to a competent health care professional (Aebersol, 2011; Andrew, 2019; Billings & Halstead, 2019; Lee & Oh, 2015; Robinson & Dearmon, 2013; Weaver, 2015). As simulation is integrated within the nursing curriculum, it is important to utilize a structured approach in order to achieve optimal outcomes.

The conceptual model of Jeffries *Nursing Education Simulation Framework was* used to guide the integration process for simulation, while facilitating the design, implementation, and evaluation of simulation activities. Introduced in 2005 by P. Jeffries, this framework

demonstrates the interrelationship among characteristics of the teacher and student, the simulation design, educational practices, and student outcomes. This model was chosen based on the theory that one develops more expertise as they encounter more experiences, which aligns with Benner's Novice to Expert theory. Nursing experience is typically obtained by actually caring for patients, but simulation offers the opportunity to develop experience through simulated patient care experiences.

Within the Nursing Education Simulation Framework, there are five conceptual components, with identifying variables for each concept. The underlying affirmation of the framework is that student-learning outcomes are directly related to or influenced by the characteristics of each concept within the simulation framework (Rizzolo, Durham, Ravert, & Jeffries, 2016). Figure 1 depicts the relationships among the constructs as they impact learning outcomes, and illustrates the variables for each construct. This fundamental model has evolved since its origination, with clarifying definitions, application to practice, and from a framework to now being accepted as a theory.

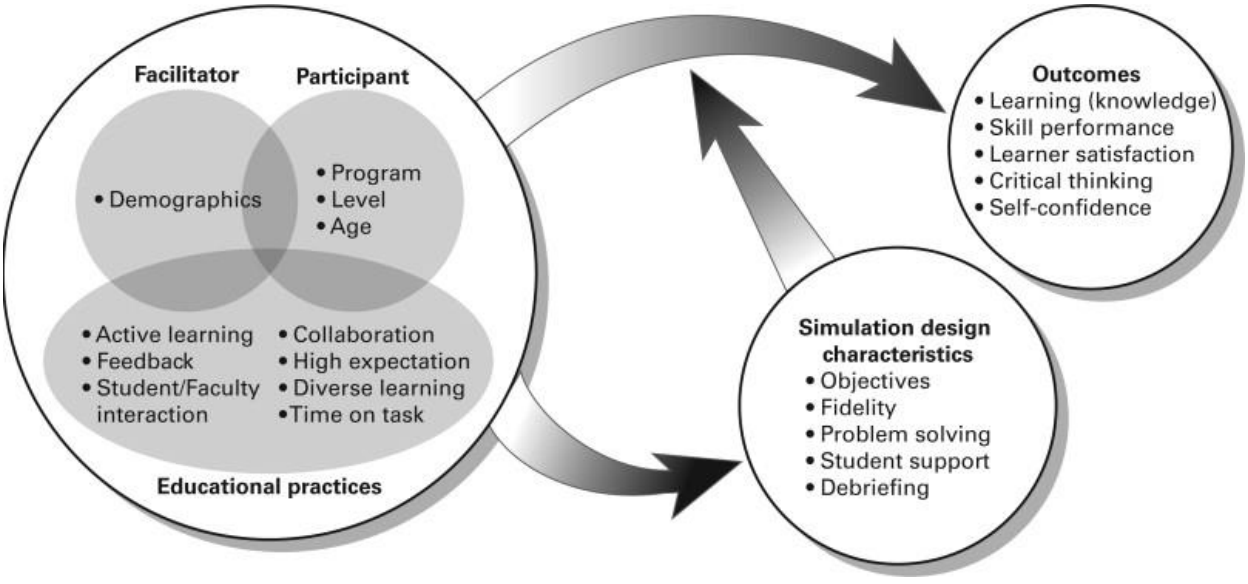


Figure 1. NLN/Jeffries Simulation Framework. (From Jeffries, P.R. (Ed.). (2012). Simulation in nursing education: From conceptualization to evaluation (2nd Ed). New York, NY: National League for Nursing). ©Copyright, National League for Nursing

Model Development

The Nursing Education Simulation Framework was developed initially in 2003 by the National League for Nursing (NLN) to support a nationwide project to develop a model for the use of simulation to promote learning outcomes (Rizzolo, Durham, Ravert, & Jeffries, 2016). Dr. Pamela Jeffries was selected as the project director, and this framework is today known as the National League for Nursing/Jeffries Simulation Framework (NLN/JSF). No theoretical framework for simulation existed at inception, which prompted a review of the literature on various learner-centered theories to guide the design of a theoretical framework (Rizzolo, et al., 2016). Further work continued in 2011 in a partnership with the INACSL to investigate how the framework has been applied in nursing academia. The reviews of the literature were instrumental in identifying challenges in the use of the model, and revealed the need for further modifications and refinement of the model (Rizzolo et al., 2016).

Numerous researchers have utilized the NLN/JSF over the years. In a critique of the framework (LaFond &Van Hulle Vincent, 2013), sixteen publications were identified utilizing the NLN/JSF as a theoretical model to guide the simulation design. Other theories reported included constructivist learning, Benner's novice to expert, and Kolb's experimental learning theories. The NLN/JSF contrasts these learning theories as it links the specific elements of the simulation experience directly to the learning outcomes. The report of LaFond and Van Hulle Vincent (2013) detailed a theory analysis and evaluation of each construct and learner outcomes, concluding that the NLN/JSF provides a solid foundation of theoretical and experiential evidence to support application of the framework that will lead to positive student outcomes.

A systemic review completed by Adamson (2015), included 153 studies which revealed recurring themes of positive outcomes, benefits of level in fidelity of the simulation, and the vital

importance of proper debriefing to achieving desired outcomes. Though the literature supports the theme of positive outcomes, the need was identified for valid and reliable instruments to measure the impact of the simulation outcomes. The second theme identified a gap with the simulation design variable of fidelity, questioning which aspects of fidelity need addressed and the impact this could have on the outcome of the simulation learning. Debriefing is the third theme, and the literature validated that debriefing is strongly recognized as a best practice in simulation, though the requisite for developing sound strategies on how to structure debriefing activities, including the use of videotaping, still exists. Priority areas for future research were recognized as improved measurement of specific student outcomes, exploration of virtual simulation techniques, and the impact that improved learner outcomes has on patient outcomes.

Theoretical Development

The NLN/JSF was originally described as a model (Jeffries, 2005), and then as a theoretical framework (Jeffries, 2012). LaFond and Van Hulle Vincent (2012) depict the NLN/JSF as concrete, with testable concepts that can be applied in specific situations, linking it more to the definition of a theory. Being that the constructs of the NLN/JSF have operational measures, this allows comparison of the construct variables with measured outcomes to determine if a relationship exists among the concepts and the desired outcomes (LaFond & Van Hulle Vincent, 2013). The transformation from a framework to the current NLN Jeffries theory has evolved over the years, through rigorous research and literature review, to create an effective guide to implement simulation activities **(**Durham, Cato, & Lasater, 2014; O'Donnell, Decker, Howard, Levett-Jones, & Miller, 2014; Ravert & McAfooes, 2014).

The evidence acquired through literature reviews overwhelmingly support the use of the NLN/JSF to guide the implementation of simulation learning activities. The strengths of the

framework surround that it is founded on a solid base of empirical evidence. The uniqueness of this framework for use with the simulation implementation project is the fact that it links the specific elements of the simulation experience directly to the desired learning outcomes. With the identified outcome for the project being improved CJ, the variables within the concepts of facilitator, student, educational practices, and simulation design can be individualized to meet the established objectives.

Review of the Literature

Through the review of literature, three distinct areas became the focus to answer the research question of best practice recommendations for the incorporation of simulation activities into the nursing curriculum to enhance the CJ ability of the student nurse. The examined research highlighted methods to incorporate simulation into existing curricula. CJ cannot be directly taught, and we as educators must focus on developing the CT and clinical reasoning of our nursing students. Therefore, the second area of review centers on CT and potential tools to measure and cultivate this concept. The final theme focuses on the impact of simulation on CJ enhancement, and the use of CJ models to guide educational pedagogies.

Simulation Implementation Best Practice

Simulation has been progressively embraced as a teaching methodology in nursing education, and is valued for its ability to provide context-rich learning in a safe environment to bridge the gap between classroom education to clinical practice (Aebersold, 2018; Andrew, 2019; Robinson & Dearmon, 2013). While the didactic instruction offers the platform to learn the foundational concepts, simulation allows the learners to transfer this knowledge into practice. As an adjunct to the clinical experience, simulation poses the opportunity to be exposed to high risk, low volume situations in a controlled and safe learning environment (Aebersold, 2018;

Andrew, 2019; Robinson & Dearmon, 2013). Research has demonstrated the multitude of benefits of HPS, from tactical skills, therapeutic communication, confidence, knowledge, CT, prioritization, delegation, all leading to clinical readiness (Aebersold, 2018; Andrew, 2019; Robinson & Dearmon, 2013).

CJ is developed with practical experience, and simulation provides this experience for students (Lasatar, 2007). Lawrence, Messias, & Cason (2018) reiterate that CJ is founded on cumulative experience, and their review highlighted the emerging body of evidence of contributions of simulation activities to the students' development of CJ. A meta-analysis by Lee and Oh (2015) also substantiated that the use of HPS led to noteworthy advances in problem-solving, CT, CJ, and clinical competence of novice nurses. In 2014, the National Council of State Boards of Nursing (NCSBN®) published a broad randomized trial using student nurses from across the country, to explore the effect of simulation on educational outcomes, with results strongly supporting the use of simulation activities to prepare nursing students (Hayden, Smiley, Alexander, Kardong-Edgren, & Jeffries, 2014).

Traditionally, HPS is categorized based on the level of fidelity, from high fidelity with the use of interactive mannequins, to low fidelity, which can be as simple to employ as an unfolding case study, and now the virtual world (Aebersold, 2018; Andrew, 2019; Robinson & Dearmon, 2013). Each context offers a unique perspective to foster the learning experiences. Case studies are classified as low-fidelity simulation, and are an effective pedagogy that involves a clinical scenario, with questions related to the story which requires thinking to translate knowledge into nursing practice (Oermann and Gaberson, 2017). It is encouraged that nurse educators begin to replace lecture with meaningful case studies to assist in the development of

CJ skills needed to make safe patient care decisions (Benner, et al., 2010, Dickison, 2019). The use of simulation can bring case studies to life for learners.

Virtual simulation is emerging with intensity in nursing education, and has shown to be an engaging approach to advance cognitive skills in an online format (Foronda & Bauman, 2014). While replicating critical encounters, virtual simulation also addresses current challenges of providing valuable clinical experiences in nursing education. This innovative learning platform provides immersive learning with an array benefits, including the development of prioritizing clinical decisions, while offering diverse experiences for the learner to be able to connect prior learning in new contexts. In addition, virtual activities can address the limited physical space in the lab setting and challenges encountered with the lack of clinical sites (Foronda & Bauman, 2014).

Though simulation is well supported in the literature for its wealth of contributions to nursing education, the current challenge is to consider how best to use the simulation process as a way to achieve optimal desired outcomes and enhance student learning. The simulation process itself and how each of the components contribute to effective learning need to be considered. Victor (2017) emphasized that models are needed to add structure with simulation learning activities. His retrospective study illustrated a significant increase in CJ with simulation activities, concluding that the consistent use of standards of best practice can substantially improve outcomes.

Page-Cutrara (2014) contributed to this knowledge by comprehensively reviewing available nursing simulation literature regarding the benefits of pre-briefing in simulation, and how to enrich this phase for learners to develop complex thinking skills. She identified that educators' need guidance with the application of teaching strategies during the pre-briefing

phase, to offer direction for learning while supporting the student in assimilating prior knowledge. Through guided facilitation and prompting, instructors can aid students in the understanding of the patient condition and bridge the theory-practice knowledge. With proper structured pre-briefing, learners can be more actively engaged in the learning activities, and are more prepared to notice all aspects of the clinical situation and learn to anticipate patient needs. When educators are equipped to facilitate this phase appropriately, students benefit greatly by being able to focus on the application of existing knowledge to meet the specific objectives of the simulation activity.

Debriefing is known as the cornerstone of the simulation process, and research has shown that this component requires structure to meet the objective of the learning activity and ensure optimal outcomes (INACSL, 2017). Hines & Wood, (2016) further investigated whether a standardized debriefing script, based on Tanner's CJ model, could foster CJ. Students deemed the script to be effective for debriefing after a simulation, and statistically significant improvements were observed in CJ scores from all data collected. The researcher summarize that scripts provide structure and standardization during debriefing, which encourages reflective thinking and adds clarity in achieving the learning objectives.

When integrating simulation within the undergraduate nursing curricula, studies have emphasized the need to utilize an evidence-based approach to achieve the desired goals. In response, the standards from the International Nursing Association for Clinical Simulation and Learning (INACSL) provide the needed structure to effectively incorporate simulation into existing curricula and standardize the simulation design. These standards were written to provide the evidence-based needed to guide the implementation of simulation, through the provision of detailed processes of the simulation experience. Eight standards for best practice have been

identified and detailed, from simulation design, outcomes and objectives, facilitation, to debriefing. Within each standard are detailed criteria that is needed to be followed in order to meet the identified standard (INACSL, 2017).

In collaboration with the INACSL, NCSBN, American Association for Colleges of Nursing, NLN, and the Society for Simulation in Healthcare developed national guidelines and checklists to ensure evidenced-based simulation for the nursing program and the faculty. The Program Checklist highlights criteria for the provision of adequate resources, policies and procedures to ensure quality, educated simulation faculty members, subject matter expertise for each scenario debriefing, and the incorporation of INACSL Standards of Best Practice. For faculty, all must have knowledge of using the INACSL standards, communicate clear objectives and expected outcomes to students prior to each simulation activity, provide a learning environment that encourages active learning, repetitive practice, reflection, and guidance with each activity. Use of a standardized method of debriefing and a rubric for student assessments is necessary (NCSBN, 2019).

Critical Thinking Measurement

To measure the outcome of CT, various approaches were used in the selected studies. Park, Park, Kim and Song (2013) utilized a pre and post-test design for their study, as did Shinnick and Woo (2013). Both used known validated and reliable tools to measure the outcome of CT; one employed the Critical Thinking Disposition Scale (Park et al., 2013) and the other used the Health Sciences Reasoning Test (Shinnick & Woo, 2013). Though Park et al. (2013) found statistically significant gains in the CT disposition, the findings from Shinnick and Woo (2013) did not reveal statistically significant changes in CT scores. Interestingly, the other studies did not use a specific tool to measure CT of the participants.

Wayne and Lotz (2013) described students perspectives of their perceived benefits of CT voiced during a post HPS debriefing session. In contrast to the previous discussed studies, their method lacked any use of a measurement tool or standardized questions. Though their study employed a unique approach of having the students create and implement all aspects of the simulation experience, their findings lack validity and reliability. Shelestak, Myers, Jarzembak, and Bradley (2015) included findings of the impact HPS has on the development of CT for not only the participant, but also explored the impact among the role of the observer as well. These researchers used a self-created scoring rubric to calculate responses and examine underlying relationships among the answers to identify clinical decision-making points. In addition, findings from Stroup's (2014) integrative literature review consistently supported the use of HPS, as themes were identified and generalizable. The review identified consistent findings regardless of the complexity or length of the HPS. In summary, there is congruency among all authors for the identified need of a meaningful method to consistently evaluate the effectiveness of HPS.

Clinical Judgment Assessment Models

In 2006, Tanner developed a practice-based model based upon the concepts of clinical judgement, leading to the optimal goal of "Thinking like a Nurse". This model outlines the process through which a CJ is made, the conclusion or decision made as a result of CT and CR. According to Tanner, aspects of the process include noticing, interpreting, responding, and reflection, and adds that each component contributes to a nursing student's development of CJ. In essence, if a student is not able to make sense of what they are noticing with their patient condition, they will not be able to respond appropriately with an action or make an accurate judgment. Each element of the CJ model and a synthesis of the meaning is depicted in figure 2.

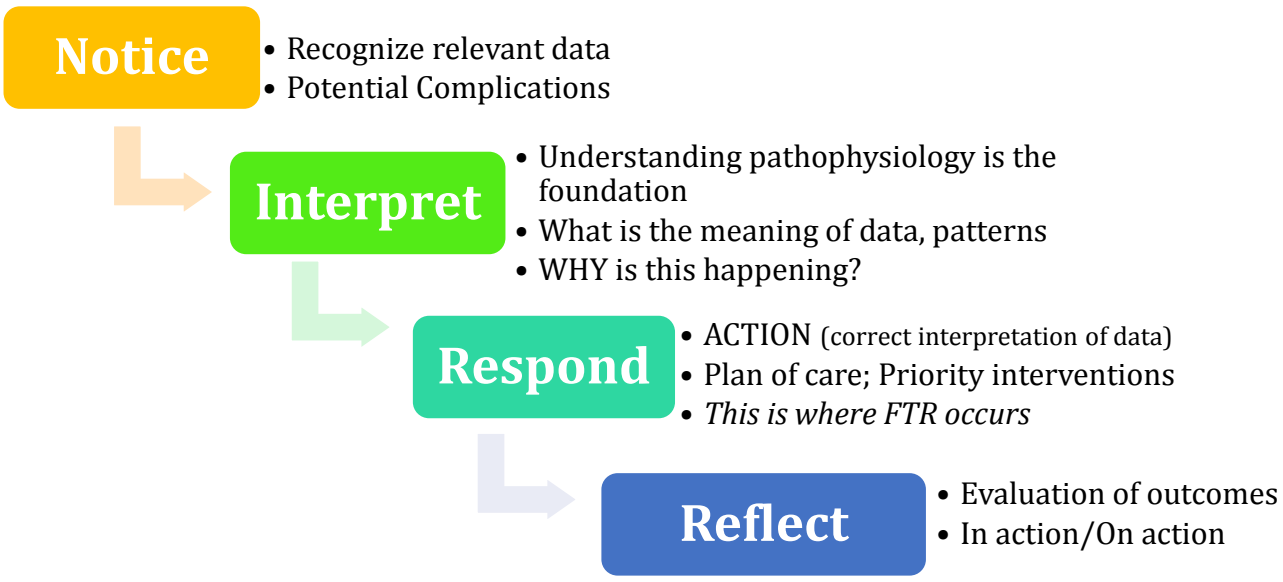


Figure 2. Student designed representation of Tanner's CJ Model and meaning synthesis.

Based on Tanner's CJ model, Lasater (2007) created a rubric to capture the essence of CJ, known as the Lasatar CJ Rubric. This rubric is comprised of a grading scale applying the four regions of CJ as noticing, interpreting, responding and reflecting. This rubric is used to provide a measurement of CJ as defined by Tanner (Lasater, 2007), and offers a means by which the concept of CJ can be described for students and faculty. This can further enrich learning as students can better learn when they are clear about expectations and receive direct feedback about their performance (Lasatar, 2007). Recommendations from the literature have included the use of a rubric that links to learning objectives of the educational experience, and that students should have the rubric beforehand to prepare with clear expectations.

Adapting the four phases as identified by Tanner (2006), Shelestak, Meyers, Jarzembak, & Bradley (2015), conducted a pilot study to describe a process to measure clinical decision-making and to examine CJ of nursing students using HPS. The authors concluded that while correctly identifying cues is foundational to making correct judgments, the relationship between cues and judgments appears to be multifaceted. They recommended that addition of context, or

conditions to include the complexities of the current health care environment to promote more realism in making nursing judgments.

Using Tanner's CJ model as a foundation, the NCSBN (Sherrill, 2020) builds with the addition of portraying the complexities of the environmental context to offer a new approach to clinical decision-making. The NCSBN's CJ Measurement Model includes six cognitive steps in a process for recognizing and analyzing cues, prioritizing hypotheses, determining and implementing interventions, and evaluating outcomes to be utilized in the clinical arena (NCSBN®, 2018). This model supports the underlying cognitive processes for nursing CJ, which are complementary to Benner and Tanner in that nursing is composed of both theoretical knowledge and practical experiences. (Dickison, Haerling, & Lasater, 2019).

Educational strategies to incorporate the NSCBN CJ Model into undergraduate nursing curricula were developed by Hensel & Billings (2020), with emphasis on the continuous commitment of nursing faculty to be successful. The authors recommend the use of prompts, where instructors can lead students through the steps of recognizing and then analyzing cues, prioritizing problems, generating solutions, taking action, and evaluating outcomes. The use of the CJ model is recommended to be integrated throughout the curriculum, with students applying all of the steps of a selected model to continually develop CJ and make the best clinical decisions possible.

Search Strategies

Guided by the PICOT question, a systematic literature search was conducted. The databases searched included the Cumulative Index to Nursing and Allied Health Literature (CINAHL), Cochrane Database of Systematic Reviews (CDSR), PubMed, Elsevier, and Lippincott-Wolters. The searches were limited to years of 2012 to 2019, using the key words

"clinical judgment, nursing education", which yielded 336 articles. When added "simulation", there were 180 articles. Of the total 516 articles, 32 were reviewed, with16 of these articles further evaluated to provide the base for an EBP change.

Keywords used to search the literature were *clinical judgment, critical thinking, clinical reasoning, human patient simulation, nursing education, teaching strategies, failure to rescue*. These keywords were effective at producing applicable articles and resulted in the tool appraisals and best practice research. Further keyword searches specific to *clinical judgment measurement tools* had low yields, though articles were generated that applied to the content of this project.

Critical Appraisal and Evaluation of the Evidence

Using the Johns Hopkins Nursing Level of Evidence Based Practice in Nursing Tool, a critical appraisal was completed to determine whether the literature identified was relevant and applicable to the clinical question (Appendix A). The level of evidence and how the studies were conducted were considered when appraising the sources (Appendix B). Through the rapid critical appraisal, 12 individual studies and one systematic review were identified for synthesis. A literature synthesis table was created to organize and clarify findings of each study, as well as reveal commonalities and variances (Appendix C). Levels of evidence ranged from level I, representing the highest quality of a systematic review, to level IV descriptive study. Synthesis from the literature identified that implementing HPS has great potential to produce a statistically significant improvement on the CJ of the student nurse (Aebersol, 2011; Andrew, 2019; Billings & Halstead, 2019; Lee & Oh, 2015; Robinson & Dearmon, 2013; Weaver, 2015).

Methods

Design

This study was designed as a Mixed Method Cohort Project. A validated Heart Failure simulation was implemented following the INASCL standards (2016). A convenience sample of 37 senior undergraduate nursing students voluntarily participated in measurement of CJ skills and simulation-based performance utilizing high-fidelity human simulation. Application of knowledge was assessed prior to the simulation experience, and again after the simulation experience. Participants were surveyed with a pre and post-test, which consisted of 10 questions regarding knowledge and care of the Heart Failure patient (Appendix D). This tool was validated by panel of cardiac experts. The data collected pre and post-simulation was analyzed to determine if there was an improvement in knowledge when caring for a patient with Heart Failure.

In addition, a rubric of the Lasatar CJ Model was utilized to rate the performance of student achievement of recognizing critical points within the simulation. The student behaviors and responses to changes in patient condition were rated as according to the validated CJ rubric, from exemplary to basic performance (Appendix E). For this project, critical points were defined as periods during the simulation where information presented indicated a change in the patient's condition, necessitating an action on the part of the student.

Project Sample and Setting

The setting for this project was in a small private University in Northwest Ohio, the annual enrollment consists of 1085 undergraduate students, with approximately 200 of these being nursing students. The BSN nursing program consists of five semesters. At the time of this study, 37 students were enrolled in the 4th semester of the nursing program, all of which were

invited to voluntarily participate in the study. It is important to note that all students partook in the lecture of Heart Failure and the simulation experience as part of the course requirement, though participation in the survey was voluntary. Thirty-one participants completed the pre-survey; 23 (*n*=23) participants completed both the pre and post-survey. Inclusion criteria for the sample included all 4th semester senior nursing students attending the target university, participation in the simulation experience, and completion of both the pre-test and post-test (*n*=23).

Measurement Methods

The study was designed as a Mixed Method Cohort Study. Convenience sampling occurred with the senior students enrolled in the 4th semester of the nursing program at the target university. All students participated in a validated moderate fidelity simulation education for Heart Failure, which was implemented according to the evidence-based practices outlined by the standards of the INACSL. One week prior to the simulation education, participants were introduced to the study via email, describing the purpose and risks (Appendix F). Consent was implied with voluntary response to the email indicating a willingness to participate in the survey. The link for the Heart Failure pre-survey was made available to participants via electronic link through the use of Jotform after the Heart Failure class lecture, and prior to the simulation experience. Post-surveys were electronically made available to participants through Jotform after the simulation completion. The data collected pre and post-simulation was analyzed to determine if there was an improvement in knowledge of caring for a Heart Failure.

The surveys consisted of identical Pre-test/Post-test, with 10 questions assessing the knowledge and nursing actions in relation to caring for a patient with Heart Failure. Prior to taking the survey, the students randomly drew a number in class to use as an identifier to link the

pre-test with the post-test. This number was anonymous to the researcher and could not be linked to an individual student. Results of each question were compared to identify if a difference in scores existed from the pre-simulation answer to post-simulation answer. Descriptive statistics were used to analyze the results.

The Lasatar CJ Rubric was used by volunteer faculty observers to observe the actions of the students. Inter-rater reliability was accounted by providing education of the simulation design, expected outcomes, and critical behaviors to achieve (Appendix G). Observation data was collected with a checklist of expected behaviors during the simulation experience (Appendix H). A three-month follow-up was planned to assess the retention of knowledge, but was not able to be completed due to emergency transition from didactic on campus learning to only online learning and suspended onsite lab use in response to the COVID 19 pandemic and mandated quarantine.

Stakeholders

Direct stakeholders in this scholarly project include the private university in Northwest Ohio College of Nursing Undergraduate nursing students and faculty/staff. Acute care cardiac patients are the indirect stakeholders, as they are the main beneficiaries of the purpose of this study. Other indirect stakeholders in the project are the administration of the university, future employers of College of Nursing graduates, and the healthcare team who will be working with the new graduates. The Zeta Theta Chapter-at-Large of the Sigma Theta Tau International nursing organization is also an indirect stakeholder, as they contributed financially through the award of a graduate student scholarship for development of this project.

Barriers and Facilitators to the Implementation Process

There were several elements that facilitated a smooth implementation of this project. It was important to begin with open communication to ensure a mutual understanding of goals for all involved within the simulation process, particularly the simulation lab staff. This engagement of the lab educators in the planning an implementation phase was well received, and aided their confidence in the use of scientific simulation knowledge along with clinical experience and student preferences. This furthered the lab staff's education using standardized simulation facilitation. Financial support obtained via Research Grant from Zeta Theta Chapter-at-Large of the Sigma Theta Tau International nursing organization was appreciated to cover costs related to educational expenses.

Anticipated barriers proved to be tangible, and included some resistance to change and the time restraints of all, with limitations in the availability of faculty. The reality of changing the nursing curriculum in the middle of the semester due to the COVID19 pandemic could never had been anticipated, but was a reality, which only resulted in minor changes to the testing design.

Implementation Process

After the project was identified, the team of stakeholders was assembled. The team included the lab director, simulation educators, and the DNP student, who was also the theory instructor for the course. The team met to review current state and overall goals. The DNP student reviewed current Heart Failure simulations, and decided upon the standardized patient provided from Computer Aided Engineering (CAE) Healthcare, Simulation Learning Experiences, as this was a validated tool. The DNP student prepared the written simulation with an algorhythm to landmark the expected critical behaviors of the student nurse (Appendix I). The

team evaluated the options and determined the implementation of the INASCL standards would be the best fit to standardize this simulation experience.

Project proposal meeting with the lab director and simulation educators was conducted in the summer of 2019. The need for a pilot simulation was identified, to work out any issues and assure understanding of the goals and roles for all involved. This pilot took place prior to the beginning of Fall 2019 semester, as the simulation was planned to occur in mid-September. Unfortunately, there was a delay with the Institutional Review Board (IRB) approval, and the project simulation had to wait until the Spring of 2020, as it needed to align with the course Heart Failure content.

Timeline

After this project was agreed upon with the faculty and the preceptor, available evidence-based simulations for Heart Failure were reviewed and presented to the team for selection based on the EBP standards. The "Ivan Imato" patient scenario from the Juno Clinical Skills Manikin simulation collection of CAE was selected (Appendix J). Planning for implementation of the sim experience began and timeline created.

The marketing plan was established as direct communication within the senior 4th semester nursing students. Simulation lab educators were informed and ideas shared. Dates and location confirmed. Collaborative team discussions centered on how many students to have in the simulation experience at one time, with three students agreed upon according to INASCL standards. The actual simulation experience time frame was decided to be 15 minutes, in order to achieve the goals of each stage. Debriefing immediately followed for 10 minutes with each group of 3 students, then an additional 30 minutes with the entire class. The debriefing

experience was designed according to the national standards as well, with specific objectives to be achieved (Appendix K).

Prior to implementation, application and permission to use tools were obtained. The project was also submitted to the organization's IRB and approved. The project planning and implementation committee met weekly to review progress.

Week **Activity**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Pilot Sim			X							
IRB Application		X								
Meet with lab staff to discuss project				X						
Survey Developed				X						
Heart Failure Lecture 4th						X				
Market sim						X				
Sim Pre-work						X				
Pre-briefing						X				
Pre-test 4th semester							X			
Heart Failure Sim							X			
Post-test 4th semester							X			
Organize and analyze data								X		

Figure 3. Student designed Timeline.

Ethical and Legal

IRB approval was obtained from the institution where data was collected. Permission to use the NLN/JSF framework was granted for non-commercial use with the retention of the NLN copyright notice. The informed consent included information to participants on the purpose and

significance of the project (Appendix L). In addition, it was iterated that participation in this project would not have an impact on their course grade. Participation in this study was voluntary and responses were deidentified and confidential, but would be analyzed in and reported in aggregate only. It is important to note that regardless if students participated in the study, all students received the same education and content within the course.

All collected data was protected via password protection utilizing the Jotform platform. Participants in the project were not recognizable, as their identity was protected on both the pre and post-survey. Participants randomly selected a number and used this number on both surveys. The purpose for this was to link the pre-survey with the post-survey for data analysis and comparison of results. Data will be securely stored electronically as per university policy, accessible only by the student researcher. The privacy of all participants is adequately protected.

Evaluation Process

The pre and post-survey were administered electronically via Jotform. The pre-survey completion deadline was set prior to the simulation experience. The link to the post-survey link was made available to the students to complete within three days after the simulation experience had concluded. Pre and post-survey data was exported from electronic form into an Excel spreadsheet for descriptive statistical analysis to compare the pre and post-survey data. Demographic data was collected within the pre and post-surveys to describe the ages of the participants. Responses to the survey items were summarized and reported (Appendix M).

Of the 37 students invited to participate, there were 23 who completed both the pre-survey and post-survey. Those who completed only the pre-survey were not included. Three participants' responses were not included, as they completed the pre-survey twice, though the time frames indicate that the second attempts were after the simulation experience. When

analyzing responses, several others (*n*=6) were eliminated due to the participant selecting more than one answer. This reduced the total participants to 17 (*n*=17) included in the data analysis.

The scoring of the CJ rubric was analyzed by identifying how students performed in each category of the CJ model, Noticing, Interpreting, Responding, and Reflecting. Students were rated on a 4-point scale from exemplary performance to beginner performance. It is noteworthy to mention that the students were rated upon their group of 3 team members performance, as they worked together during the simulation.

Outcomes of Project

The purpose of the simulation study activity was not only to implement a Heart Failure simulation according to EBP, but also to compare the effects of traditional teaching alone with traditional methods and the addition of HPS on the CJ and knowledge of the student nurse. A pre-test and post-test approach was used to survey the 4th semester nursing students who participated in the simulation experience. Of the 37 students who partook in the simulation, only 17 competed the pre-survey and post-survey correctly, and could be used in the analysis of results. When comparing the results of the post-test to the pre-test answers, findings did not demonstrate the hypothesized improvement in scores after simulation. Descriptive statistics were used to illustrate the number of correct responses obtained for each question, as well providing the percentage of respondents who chose the correct answer (Appendix N). The survey items were grouped into domains of nursing knowledge of Heart Failure (disease process, diagnostics, and medications), application of knowledge, and priority nursing care. Results of this study were inconclusive, with only one question showing improvement in the post-simulation survey, which is not consistent with the literature findings. Participant scores and question responses are represented in Figures 4 and 5.

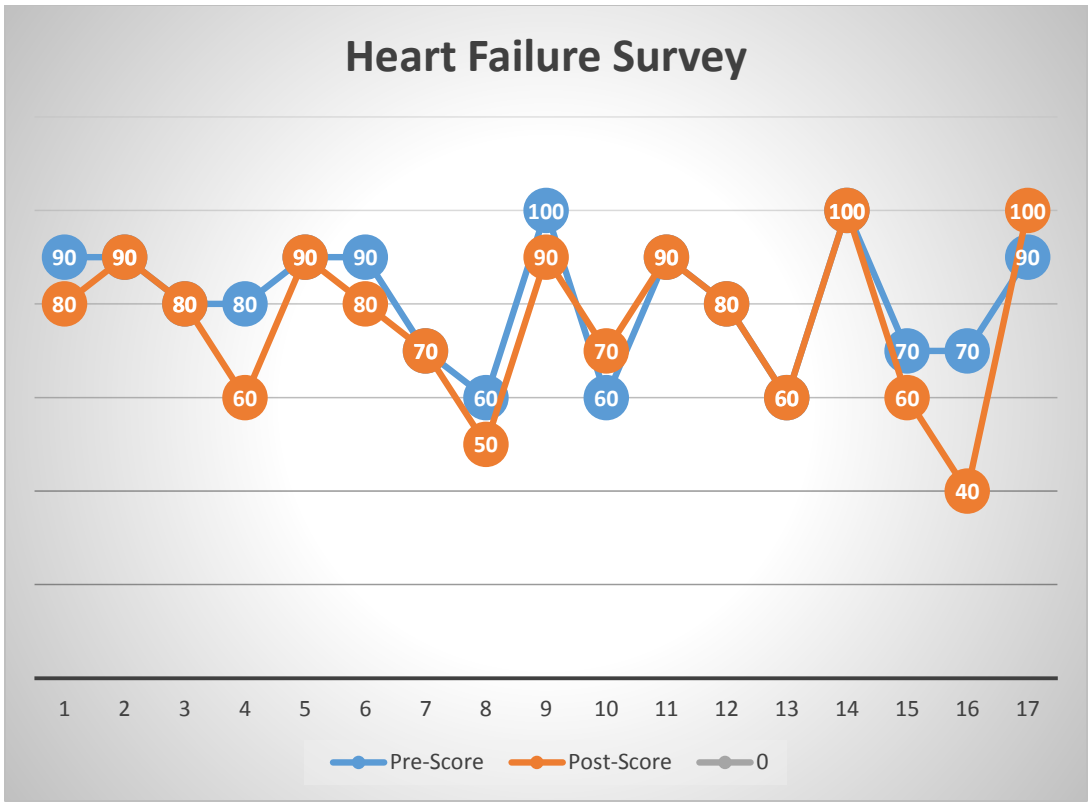


Figure 4. Student designed visual representation of participant survey scores.

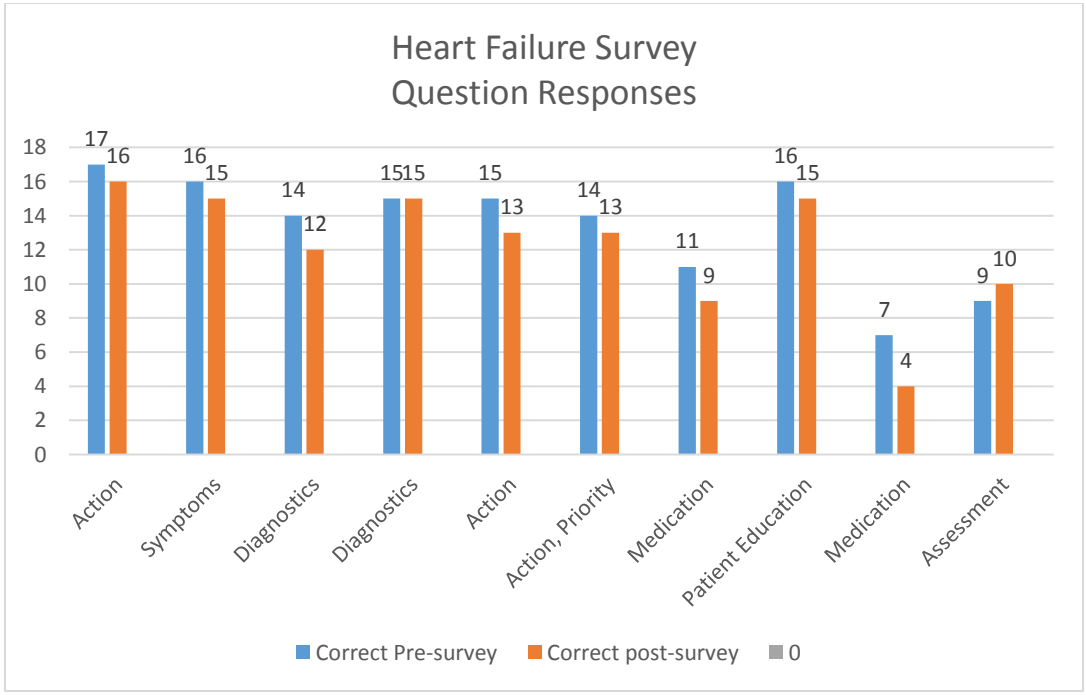


Figure 5. Student designed visual representation of individual question responses.

In evaluating the relationship between the pre-test scores and the post-test scores, the regression analysis showed a Pearson Correlation Coefficient of 0.9526, which indicated a strong positive linear correlation between the two surveys. The scatterplot (Figure 6) depicts the view of the linear relationship between the two variables, the equation for predicting the post-test scores was Post-test = 1.059 x (-1.9898). The y-intercept indicates that for a person whose pre-test was zero, their post-test predicted to be -1.99. Pre-test scores do significantly predict post-test scores. (t = 3.70, p = .002) (Appendix O).

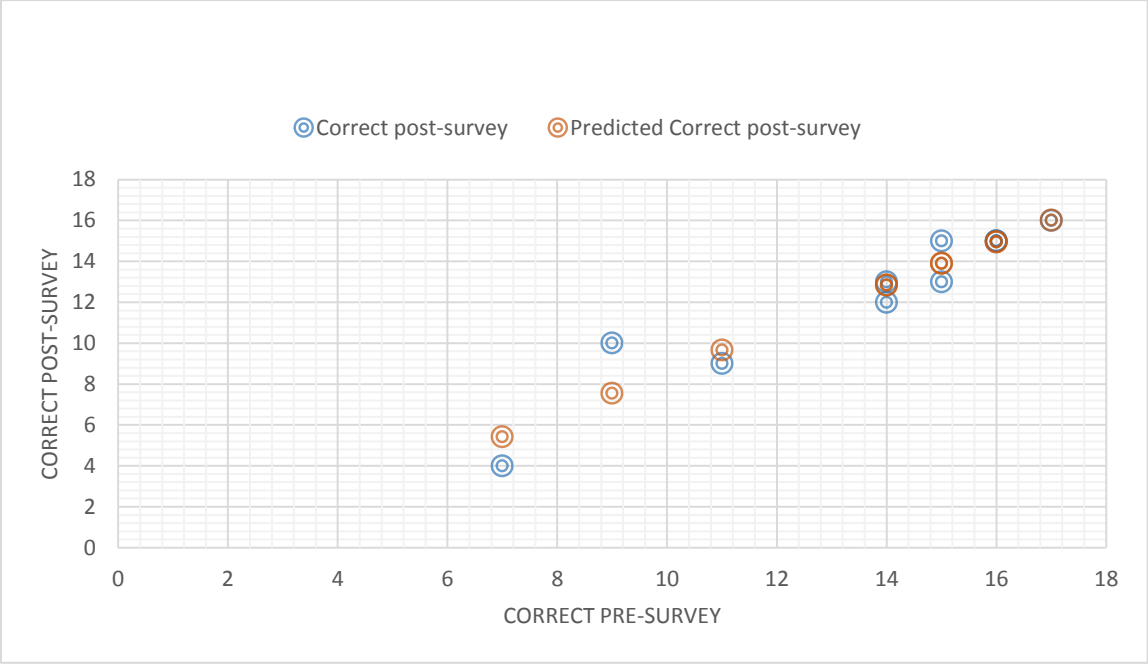


Figure 6. Correlation statistical analysis scatterplot.

The paired two sample for means t-Test provided a statistically significant difference of the average of scores, with the Mean 2 tail p<0.0086 (Appendix P). Based on the number of participants (n=17), a power analysis of 80% was used. The smaller sample size widens the confidence interval, which is a limitation of the project. Future recommendations would include to increase the sample size the improve accuracy.

The actions of the students during the HPS were evaluated using a modified Lasater CJ rubric that had been individualized to each scenario. Analysis of the results of the simulation observation revealed that the majority of the students were in the developing phase for the components of Noticing and Interpreting, while demonstrating more advanced actions with the Responding and Reflecting stages. Figures 7 and 8 depict the outcomes.

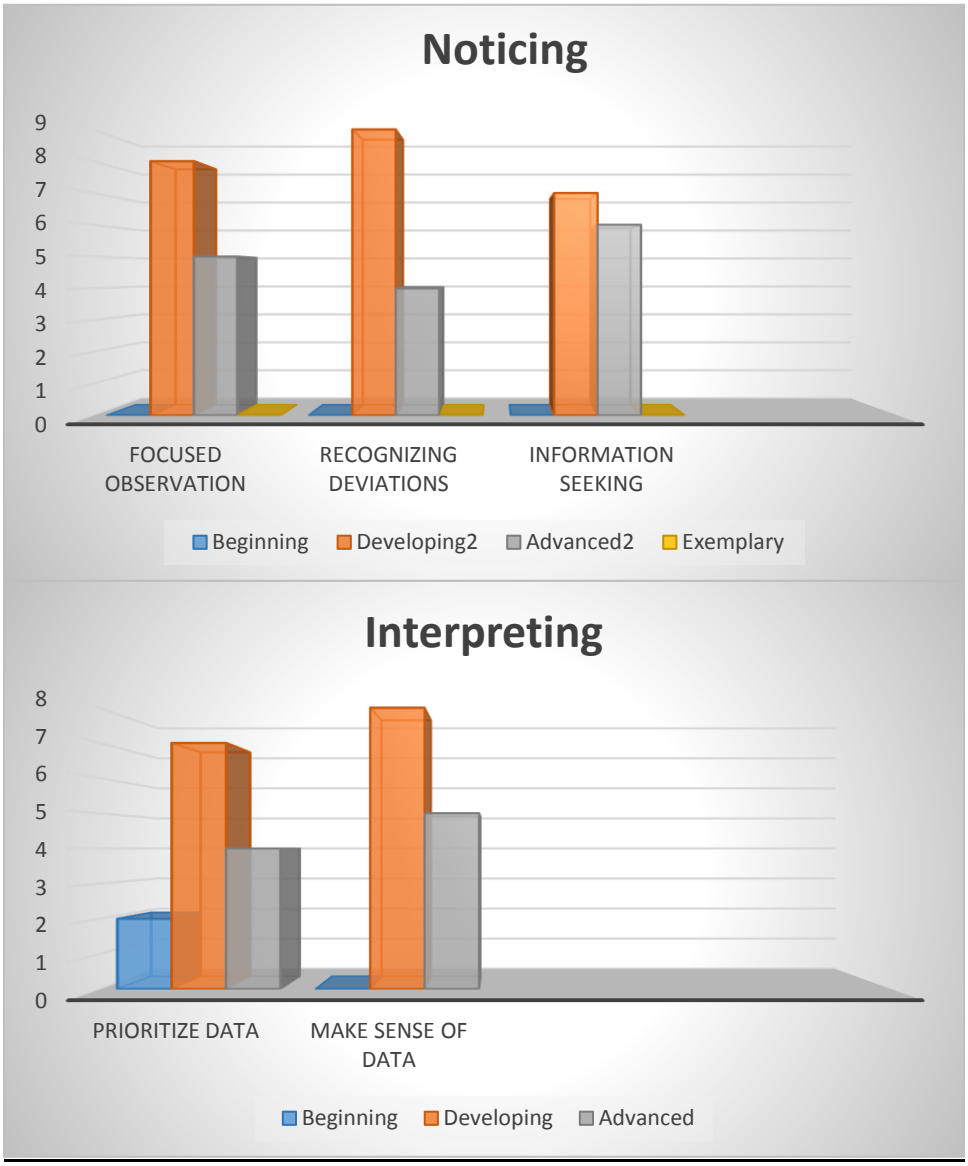
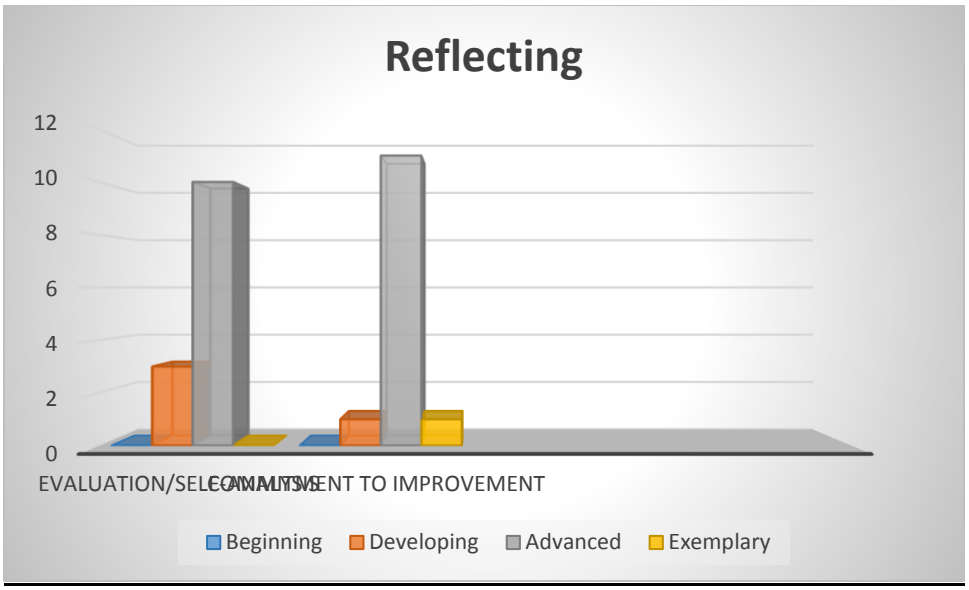


Figure 7. Observation data of Noticing and Interpreting.



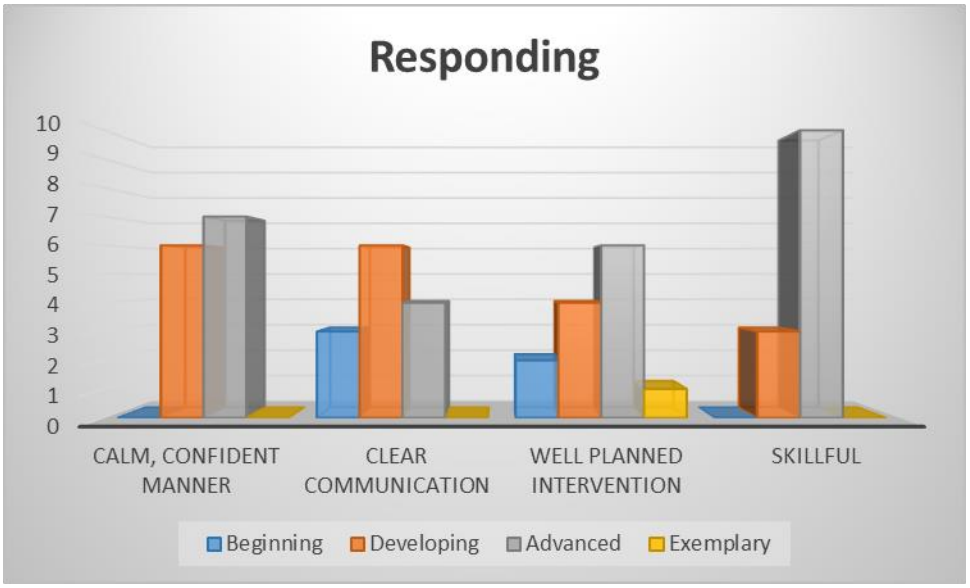


Figure 8. Observation data of Responding and Reflecting.

The overall outcomes of this evidence-based project provide valuable insight to the use of simulation in the undergraduate nursing curriculum, to achieve the desired outcome of enhanced CJ. Standards to guide HPS processes have been identified, along with methods to integrate evidence-based practice within all simulation activities. A process change for future simulation activities has been outlined, with the incorporation of standardized implementation of simulation experiences within the undergraduate nursing curricula. The literature review reinforced the

identified need for continued research pertaining to valid and reliable tools to measure CT and CJ. In addition, the appraisal of research also revealed and synthesized the use of Tanner's CJ model along with the evolution of the current NCSBN CJ Model, and how to integrate these within the curricula to enhance the CJ of student nurses.

Discussion

Through the implementation of simulation activities with a structured and evidence-based format, along with the incorporation of a CJ model integrated throughout the nursing curricula, the desired outcome of developing CJ can be achieved, thus preparing the novice nurse to recognize changes in patient conditions and respond appropriately. Ultimately, patient safety and outcomes will be improved. Conclusions can be generalized to hypothesize that morbidity and mortality rates will be impacted with reduction of incidences in cardiac related events. Though the study activity portion of this project did not demonstrate improvement in knowledge with the addition of a simulation experience, it did generate discussion of contributing factors, and supported the need to focus on the application of knowledge throughout the nursing program.

Literature demonstrates that simulation improves nursing CJ, recognition and response to clinical deterioration. The results of the simulation study portion of this evidence-based practice project are inconsistent with most of the research, as the reporting variables did not reflect a positive difference between the baseline and post- intervention scores. Potential rationales for the lack of improvement in the post-simulation scores are multifactorial. It is well-defined that when integrating simulation into existing course curriculum, all involved need a clear understanding of simulation pedagogy, with the incorporation of best practice standards to minimize inconsistencies among educators. Distinct objectives and measurable outcomes are essential, as well as following the recommendation of the INASCL for facilitation, pre-briefing and de-

briefing. Without this, the differences in educators can lead to variable education shared, which contributes to confusion among the students. Students may then leave the simulation experience with less confidence, thus questioning their knowledge.

Unfortunately, time limitations among all resulted in not being able to fully educate all educators in the evidence-based standards for simulation processes. Effectively integrating these standards within the curricula could be the focus of a future project. In addition, the students were aware this testing and survey was not part of their class grade, so this could have generated less effort on their part to choosing the correct response. The researcher was not present during the debriefing, but did provide a detailed guide of key points to direct the post-simulation discussion, but it is unclear if there was drift from this structure.

Additional limitations can be appreciated with the smaller than expected sample size, and also the limited ability to assess long-term retention. Moving forward, a larger sample size with randomized experimental studies would strengthen the existing literature findings to support the use of HPS to enhance the development of CJ. Although one could surmise that as the literature supports, the implementation of standardized processes for simulation experiences reinforces best practice and create sustainable practice for future simulations. Extended follow up surveys at six and 12 months should be conducted to examine long term sustainability.

Findings of this study show that students are not able to apply their knowledge, which *is* consistent with current research. This further supports what leading researchers have emphasized, that content knowledge does not mean competency, and is not sufficient to make accurate clinical decisions (Benner et al., 2012; Billings, 2019; NCSBN, 2019). There is a dire need for educators to change their approach to teaching, and concentrate on pedagogies which

focus on the application of knowledge. Bringing HPS and active learning to the classroom will bridge the theory to practice gap, and improve outcomes for students and patients.

Significance for Nursing

Enhancing the CJ of student nurses is imperative now. This needs to start upon admission to the nursing program, with a variety of teaching strategies aimed at the goal of improving the decision-making ability of the student nurse, with application of knowledge. This evidence-based practice project demonstrated that a standardized approach utilizing evidence-based practices were essential to integrate simulation activities within the curriculum. The use of the NFL/Jeffries simulation model guided the implementation process, and provided detailing in the relationships among the simulation design process, facilitator, and students to achieve the objective of improved clinical decision making and CJ. The use of a validated model for assessing CJ provides objective data and aids in eliminating bias when evaluating clinical performance in a simulated environment.

Implications for Practice

The results of this project indicate a need to facilitate changes in implementing EBP and team development. Building a team with input from key stakeholders and gaining their trust lend valuable support to EBP projects and promote a culture that is supportive of future DNP led projects. DNP leaders have the potential to have significant impact on future transition to practice skills for novice nurses, and set the course for structure and faculty development within an institution. Implications of this project include to further enhance and incorporate teaching strategies into existing curricula that promote CJ ability of student nurses.

Conclusions/Summary/Future Recommendations

This findings from EBP greatly reinforced that application of knowledge is directly related to the development of CJ, as content knowledge by itself is not sufficient. Nursing education programs need to embrace active learning strategies which focus attention on applying the knowledge that they are attaining in the classroom. Through the use of the INACSL standards and CJ model, a working plan supportive of the future of nursing education was developed. When simulation activities are implemented with a structured format, the ultimate outcome of developing CJ can be achieved. With enhanced CJ and decision-making skills, positive patient outcomes are more likely to be achieved, as novice nurses are more able to recognize cues and respond appropriately to changes in patient conditions.

Future recommendations for evidence-based projects could be to specifically facilitate integration of INASCL standards into all simulation experiences, detailing the evidence-based protocol for each stage to sustain a structured approach. In addition, it would be important to explore the implementation of a CJ model throughout the undergraduate nursing curriculum, to cultivate the development of CJ and improve outcomes. Overall recommendations for academic nurse leaders and educators include utilizing a variety of approaches in the classroom, simulation lab, and in the clinical area for nursing students to apply their attained knowledge and practice complex decision making in a safe, simulated setting using a CJ model.

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Appendix A- Johns Hopkins Nursing Level of Evidence

Category (Level Type)	Number of Sources	Overall Quality Rating	Synthesis of Findings Evidence That Answers the EBP Question
Level I • Experimental study • Randomized controlled trial (RCT) • Systematic review of RCTs with or without meta-analysis • Explanatory mixed method design that includes only a Level I quantitative study	1	High	*See Literature Extraction table*
Level II • Quasi-experimental studies • Systematic review of a combination of RCTs & quasi-experimental studies, or quasiexperimental studies only, with or without meta-analysis • Explanatory mixed method design that includes only a Level II quantitative study	3	High 2 Good 1	*See Literature Extraction table*
Level III • Nonexperimental study • Systematic review of a combination of RCTs,quasi-experimental and nonexperimental studies, or nonexperimental studies only, with or without meta-analysis • Qualitative study or meta- synthesis • Exploratory, convergent, or multiphasic mixed-methods studies • Explanatory mixed method design that includes only a level III Quantitative study	4	High 3 Good 1	*See Literature Extraction table*
Level IV • Opinions of respected authorities and/or reports of nationally recognized expert committees or consensus panels based on scientific evidence	3	High 3	*See Literature Extraction table*
Level V • Evidence obtained from literature or integrative reviews, quality improvement, program evaluation, financial evaluation, or case reports • Opinion of nationally recognized expert(s) based on experiential evidence	4	High 2 Good 2	*See Literature Extraction table*

Appendix B- Level and Quality of Evidence
Keeper Studies for Inclusion Examining Level of Evidence and Quality of Evidence

		Level of Evidence						Quality of Evidence	
Author(s)	**Year**	**I**	**II**	**III**	**IV**	**V**	**VI**	**High**	**Good**
Park, Park, Kim, & Song.	2017		X						X
Wayne & Lotz	2013			X					X
Shelestak, Meyers, Jarzembak, & Bradley	2015			X				X	
Stroup, C.	2015					X			X
Shinnick & Woo	2013		X					X	
Cappelletti, A., Engel, J. K., & Prentice, D.	2014		X					X	
Lasater, K. (2007).	2006					X		X	
Sherrill, K. J.	2020				X			X	
Billings, D. M.	2019				X			X	
Dickison, P., Haerling, K. A., & Lasater, K. (2019).	2019				X			X	
Lawrence, K., Messias, D. K. H., & Cason, M. L.	2018								
Hines, C. B., & Wood, F. G.	2018			X				X	
Page-Cutrara, K.	2014					X		X	
Victor, J.	2017			X				X	
Kavanagh and Szweda	2018	X						X	
Foronda, C. & Bauman, E.B.	2014					X			X

Appendix C- Literature Synthesis Table

Human Patient Simulation (HPS) and Effect on Critical Thinking

Title	Author, Year	Sample Size	Study Design	Purpose	Findings	Limitations	Future Research
Development and validation of simulation teaching strategies in an integrated nursing practicum.	Park, Park, Kim, & Song. (2017)	69 senior nursing students Convenience sample Mean age 22 yrs Korea	• prospective, one group • pre and post-test design • *Quazi-experimental*	Evaluate effects of simulation strategies on the CT disposition, ~~general self-efficacy, and learning motivation.~~ -based on NLN Jeffries Simulation framework	significant ↑ • CT disposition, (P<0.001) *used CT disposition scale to measure CT	-Resources required for simulation -generalizing findings to other settings -Measurement scales needed specific for CT and sim	RCT with larger sample size and additional settings
The simulated clinical environment as a platform for refining critical thinking in nursing students: A pilot program.	Wane & Lotz 2013	• Associate degree • Last semester • clinical group n=12 Convenience sample USA	Two subgoups of 6 *Qualitative study, though this was not identified by authors*	Determine the impact of s*tudent development* of simulation scenarios on their growth of CT and clinical judgment. *Students create, implement, and evaluate all aspects of simulation experience the increase awareness of interprofessional patient care*	-students voiced ability to better able analyze assessment data and clinical manifestations in order to develop scenario **Student perceptions* - ↑knowledge, CT, clinical judgment & teamwork skills	Not discussed in article. *-Lack of measurement tool.* *-No standardized questions, only debriefing.* *-This was a graded assignment (potential bias)* *-no discussion of impact of awareness of interprofessional care, though stated as objective.*	Further studies to document benefits of student development of simulation scenarios. -Stated need to validate effectiveness via improved NCLEX scores and ability of students to CT with real patient care *(no discussion of how to measure this) Lacks validity and reliablity*

A Process to Assess clinical decision-making during human Patient simulation: A Pilot study	Shelestak, Meyers, Jarzembak, & Bradley 2015	N= 51 Convenience sample USA	Descriptive design Non-experimental	To describe a process to measure clinical decision-making (CDM) using HPS • assess students' understanding at various critical decision points during an HPS. • Includes both observers and active participants	The data suggest that while correctly identifying cues is essential to making correct judgments, the relationship between cues and judgments appears to be more complex and interrelated. -examines impact not only on active participant, but observers as well. **not graded*	Small convenience sample -limited generalizability	Need identified for valid and reliable process to examine components of CDM -Further studies with replication of the pilot with a larger sample of students -study design should include interrater agreement of critical points in the HPS
Simulation usage in nursing fundamentals: Integrative literature review	Stroup, C. 2014	Selected studies: n= 15 research articles appraised for rigor, design, sample size, and generalizability	Literature Review: Integrative Overall *congruency in findings*, replication effect strengthened reliability of conclusions, though variability in methods	(Due to lack of empirical evidence), Reviews current evidence as it relates to simulation application in nursing fundamentals courses. Numerous research designs	Findings affirm the effectiveness of simulation as an educational tool. *-results of themes generalizable* *-Consistent findings regardless of sim complexity*	Will narrow further searches to outcome of CT only, and throughout all nursing curriculum.	Need for meaningful method to consistently evaluate sim studies -evaluate clinical experiences post sim: did sim have an impact on preparing for practice? -longitudinal studies for continued effect throughout nursing program

				with small sample sizes were explored to find commonalities. Analysis: divided into concepts of student learning (CT) and curriculum application.			-a stronger base of experimental studies -Studies to measure outcomes for patient safety
The effect of human patient simulation on critical thinking and its predictors in prelicensure nursing students	Shinnick & Woo 2013 USA	n=154 (age 25.7±6.7; gender=87.7% female) from 3 schools	• quasi-experimental • pre-test post-test design • Students from 3 universities studied at the same point in their curriculum used HRST to measure CT (valid and reliable)	Due to lack of objective nursing data to support HPS impact on CT, authors studied knowledge and CT before and after HPS to identify predictors of higher CT scores. <u>Methods:</u> • Pre/post-HPS assessments of knowledge, critical thinking, and self-efficacy • assessments for demographics and learning style.	While a mean improvement in knowledge scores, no statistically significant change in CT scores. Revealed three variables to be predictors of higher critical thinking scores: • greater "age" • baseline "knowledge" • a low self-efficacy score ("not at all confident") Conclusion: This study reveals that gains in knowledge with HPS do not equate to changes in CT.	-different faculty at each site giving cardiac lecture content -To eliminate bias, faculty not involved in the study did the lecture -post HRST was available for 2 weeks post sim - Various clinical experiences of students -Student discussing sim content -Previous sim experience differed	Further study is warranted to determine the effect of repeated or <u>sequential</u> simulations (dosing) and timing after the HPS experience on CT gains. -determine optimal preparation for sim -the integration of problem solving into the sim scenarios and eval CT during the sim may be more valuable

Clinical Judgment Assessment and Models							
Systematic review of clinical judgment and reasoning in nursing. *Journal of Nursing Education, 53*(8), 453-458.	Cappelletti, A., Engel, J. K., & Prentice, D. (2014).	15 studies	• Systemic Review	To examine the findings on CJ nursing that have emerged since Tanner's review.	The findings support Tanner's original model, although the role of experience in clinical reasoning and judgment is still not well understood		consideration of a sixth conclusion on CJ;education strategies to improve CJ may influence what a nurse brings to the situation.
Clinical judgment development: Using simulation to create an assessment rubric	Lasater, K. (2007). •	NA	NA	Develop a rubric to assess CJ (LCJR)	Simulation provides the practical experience needed for the development of CJ. •students can better learn when they have clear expectations and receive direct feedback about their performance.		Offers performance expectations, feedback mechanisms, and guide for development students' CJ. •offers a means by which CJ can be described

Clinical Judgement and Next Generation NCLEX® – A Positive Direction for Nursing Education!	Sherrill, K. J. (2020).	NA	NA	The CJ Model supported by NCSBN® offers a new approach to bedside decision-making.	• The process of recognizing and analyzing cues, prioritizing hypotheses, generating solutions, taking action, and evaluating outcomes is a dynamic process that can be applied in every clinical situation. • Adds complexities of internal and external conditions such as environment, time constraints, task complexity, consequences, to push students to make realistic CJ	Creating a habit of CJ will better prepare our students as they transition to the entry-level nurse role.
Teaching Nurses to Make Clinical Judgments That Ensure Patient Safety.	Billings, D. M. (2019).	NA	NA	Describes the NCSBN CJ model and teaching strategies nurse educators can use to prepare nurses to make effective and safe CJ.	Provides suggestions for the use of prompts within all components of the CJ Model	
Integrating the National Council of State Boards of Nursing Clinical Judgment Model Into Nursing Educational Frameworks.	Dickison, P., Haerling, K. A., & Lasater, K. (2019).		Qualitative comparative analysis among CJ models	• presents a model for assessing the ability of nursing students to provide solid CJ. • Reviews use of the assessment model within the nursing theoretical frameworks	The educational framework proposed by NCSBN provides a converging perspective inclusive of the concepts defined in the three leading paradigms for assessing clinical judgment. The NCSBN-CJ model is a flexible model that expresses the complexities associated with decision making in a simplified manner to enable better assessment of CJ.	

Simulation Processes and Implementation						
The Influence of Simulation Experiences on New Nurses' Clinical Judgment	Lawrence, K., Messias, D. K. H., & Cason, M. L. (2018).	Registered nurses with one to three years of work experience. N=20	Qualitative descriptive study	•The development of CJ depends on cumulative knowledge and experience. Simulation provides nursing students opportunities to begin to develop CJ.	• CJ involves the interpretation of a patient's condition, decision to act, and engage in ongoing reflection (Tanner, 2006). • There is a growing body of evidence describing the contributions of HFS to students' development of CJ HPS provided students opportunities to think and act in the nursing role, supporting development of CJ. HFS contributed to enhanced learning in clinical settings.	Further research needed to examine approaches that may enhance the ongoing development of CJ
Clinical judgment scripts as a strategy to foster clinical judgments.	Hines, C. B., & Wood, F. G. (2016).	Senior nursing students in their final semester of study. N=75	Convenience sample	To investigate whether a standard debriefing script, based on Tanner's CJ model, could foster CJ.	Results showed statistically significant improvement in students' reflective thinking skills after the introduction of the debriefing script. Helped students focus on learning process, improved all areas of CJ	
Use of prebriefing in nursing simulation: A literature review.	Page-Cutrara, K. (2014).	Literature Review N=15	Reviews available nursing sim literature about prebriefing and evaluates its current role as a component of nursing simulation.		Prebriefing offers opportunities engage more fully in learning • Offers critical support and direction for learning • Consolidation of theory-practice knowledge • Allows learners to more actively engage	How to best use sim process to teach complex skills

Improving Clinical Nursing Judgment in Prelicensure Students	Victor, J. (2017).	Two cohorts of nursing students N=102	Retrospective study Independent samples t tests to examine differences in mean CJ development scores between students who completed a nursing program without sim to students who completed the program with sim activities.	Results showed a significant increase in CJ at both the beginning and end of a BSN program in which all scenario-based simulation used an ELT design.	Conclusion: Consistency with INACSL standards of best practice can improve student outcomes by fostering the development of CJ.	
"A Crisis in Competency",	Kavanagh and Szweda 2017	N=5000 Post hire developmental assessments			only 23% of new graduate nurses met entry-level expectations of CJ. majority of students unable to make a correct CJ by using components of Tanner's CJ model. able to recognize basic changes in the client condition, but could not interpret additional data and respond to the problem appropriately	nursing education need to focus more on helping students learn how to think and make evidence-based decisions for positive outcomes

Strategies to incorporate virtual simulation in nurse education	Foronda, C. & Bauman, E.B. (2014).	NA	NA	Explored benefits and uses of virtual simulation n nursing and methods to incorporate into exiting curricula	• complimentary support to existing curriculum at all levels. • provides students with opportunities to safely practice and think through rare events in a low-anxiety environment. • foster intradisciplinary and interdisciplinary education, enhance student engagement within courses, and address practical challenges and barriers to contemporary nursing education.	As technology continues to improve, the possibilities of virtual sim will follow. Should have a standard place in future nurse education

Appendix D- Survey (Heart Failure pre/post-test)

1. The client is admitted to the unit for exacerbation of heart failure. What is the most important action for the nurse to take upon arrival?
   - Assess the respiratory status and oxygen saturation level
   - Check to see of serum potassium levels have been ordered
   - Ask the client about current medications and doses
   - Notify the client's primary care provider

2. Which statement should the nurse expect when admitting a client with right-sided heart failure exacerbation?
   - "I sleep with four pillows at night"
   - "My shoes fit tight lately".
   - "I wake up coughing every night"
   - "I have trouble catching my breath."

3. The most accurate diagnostic test to assess the function of the heart muscle is:
   - Electrocardigram
   - Chest X-ray
   - Cardiac catheterization
   - Echocardiogram

4. A 74 year old female presents to the ER with complaints of dyspnea, persistent cough, and unable to sleep at night due to difficulty breathing. On assessment, you note crackles throughout the lung fields, respiratory rate of 25, and an oxygen saturation of 90% on room air. Which of the following lab results confirm your suspicions of heart failure?
   - BUN 15
   - Troponin < 0.01
   - BNP 860
   - K+ 3.7

5. The nurse is caring for a patient on a telemetry unit with the admitting diagnosis of heart failure. The night nurse reports that the patient has been sleeping comfortably all night without any problems. Upon entering the room in the am, the patient is sitting up in bed, with short, rapid respirations. His skin is pale, cool, and sweaty. O2 is on at 2 liter/minute per nasal cannula. Vital signs are as follows: BP 84/48 mm Hg, heart rate 132/min, respirations 38/min, and the pulse oximetry reveals Sp02 of 84%. Upon assessment, the nurse hears bibasilar rales and notes jugular vein distention. The first response of the nurse should be to:
   - Assist the patient to a lying position since his blood pressure is low.
   - Increase oxygen rate to achieve Sp02 greater than 90%
   - Administer the morning dose of the prescribed beta-blocker.
   - Call MD to transfer to the intensive care unit.

6. The physician's order says to administered Lasix 40 mg IV twice a day. The patient has the following morning labs: Na+ 148, BNP 900, K+ 2.8, and BUN 10. Which of the following is a nursing priority?
   - Administer the Lasix as ordered, but slowly over 4 minutes
   - Recognize the abnormal BUN level, and request to reassess this level after administration of Lasix.
   - Hold the Lasix and notify the provider about the Potassium level
   - Notify the physician of the BNP level prior to administering the Lasix.

7. Which of the following classes of medications protects the weak myocardium by blocking catecholamines and sympathetic nerve stimulation?
   - Calcium Channel Blockers
   - ACE Inhibitors
   - Inotropic Agents
   - Beta Blockers

8. The nurse has completed discharge teaching regarding assessment of fluid balance. The nurse recognizes that the instruction has been successful when the client states:
   "I need to make sure to cook my chicken without the skin"
   "I will weigh myself every morning on my bathroom scale".
   "I will keep track of how much I urinate every day".
   "I will make sure to eat bananas and spinach every day".

9. The primary care provider prescribes lisinopril for the client with biventricular heart failure. How does this medication decrease the workload of the heart?
   - Increase preload and decease afterload
   - Increase preload and increase afterload
   - Decrease preload and decrease afterload
   - Decrease heart rate and decrease contractility

10. A client is admitted with heart failure. What assessment finding is an expected physiologic response to maintain cardiac output?
    - Urine output 240 ml in 8 hours
    - Heart Rate 56
    - Blood Pressure 148/82
    - Heart rate 106

Appendix E- Lasater's CJ Rubric (Simulation Observation)

Lasater Clinical Judgment Rubric Scoring Sheet

STUDENT NAME: OBSERVATION DATE/TIME: SCENARIO #:

CLINICAL JUDGMENT COMPONENTS NOTICING:					OBSERVATION NOTES
• Focused Observation:	E	A	D	B	
• Recognizing Deviations from Expected Patterns:	E	A	D	B	
• Information Seeking:	E	A	D	B	
INTERPRETING:					
• Prioritizing Data:	E	A	D	B	
• Making Sense of Data:	E	A	D	B	
RESPONDING:					
• Calm, Confident Manner:	E	A	D	B	
• Clear Communication:	E	A	D	B	
• Well-Planned Intervention/ Flexibility:	E	A	D	B	
• Being Skillful:	E	A	D	B	
REFLECTING:					
• Evaluation/Self-Analysis:	E	A	D	B	
• Commitment to Improvement:	E	A	D	B	
SUMMARY COMMENTS:					

E = exemplary, A = accomplished, D = developing, B = Beginning

Cato, M.L., Lasater, K., & Peeples, A.I. (2009). Nursing students' self-assessment of their simulation experiences. Nursing Education Perspectives, 30 (2), 105-108.
Copy permission obtained from Lasater

(U:\SON\Diane\Bussard\Lasater Clinical Judgment Rubric Scoring Sheet.doc)

Appendix F- Letter to Participants

Survey Study for Lourdes University 4th Semester Nursing Students

Dear Students,

My name is Robin Glaza and I am a Doctor of Nursing Practice student at Lourdes University, as well as faculty member of the university. I am in the process of completing my thesis, which is looking at the effectiveness of simulation on the critical thinking and clinical judgment ability of the student nurse. My hypothesis is that the simulation experience will help the student nurse to apply what is learned in the classroom, and ultimately to recognize changes in the patient when they are not clinically stable. Essentially, the proposal being evaluated is that you will participate in a simulation learning experience after the content has been covered in the classroom setting. The simulation is part of the course curriculum, and will be videotaped for the purpose to review if anticipated actions were completed, and for your review during the debriefing. This video will not be shared outside of the lab experience and privacy will be maintained. I am asking for your participation in this study by completing an online survey of a pretest prior to the simulation, and, an online post-test after the simulation.

You will be one of approximately 65 student nurses invited to participate in this project. Participation in the pre-test and post-test survey is voluntary, anonymous, with confidentiality maintained on the strictest level. There is no penalty for non-participation. I as the researcher will not be able to identify who has participated and who has not, as there will be no identification on the surveys to link to individual students.

The two surveys will be offered via Jot-form, to complete in the lab setting during your scheduled lab day. Your participation in the survey implies your consent to participation. No physical, psychosocial, or medical risks are anticipated for the collection of data for this research.

The data will be compiled to determine if the simulation experience impacted your learning by answering the questions on the survey. You may receive direct benefit from participation in this study, as you will have the opportunity to view questions to enhance your understanding of the content. Should you have any questions about this study, you may contact me by email at: rglaza@lourdes.edu.

This nursing research project has been approved by the Lourdes University Institutional Review Board (IRB). You can contact the Lourdes IRB at should you have any questions or concerns at irb@lourdes.edu.

Sincerely,

Robin Glaza, MSN, BSN, RN
Student, Doctor of Nursing Practice
Lourdes University College of Nursing
Sylvania, Ohio
(419) 343-3874

Appendix G- Observer Education Sheet

NOTICING

- Focused observation (Assessment)
  - Recognizes the cues as relevant; Does the student notice?
- Recognized deviations
  - (identifies abnormals and recognizes changes)
- Information seeking

INTERPRETING

- Prioritize data
  - Focuses on most relevant and important data
- Make sense of data
  - Notices *patterns* in data
  - Interprets meaning of the data; understands pathophysiology
  - Understands the "why"

RESPONDING (Action)

- Calm, confident manner (assumes responsibility, organized, delegates appropriately)
- Clear communication
- Well planned interventions (monitors progress and adjusts as needed, prioritizes)
  - What is the priority problem?
  - What is the priority assessment and intervention based on this?
- Skillful: Mastery of skills

REFLECTING

- Evaluation/self-analysis
  - Reflection IN action (in the moment)
  - Evaluates personal clinical performance and decision points
- Commitment to improvement
  - Reflection ON action
    - Why things did not go as expected
    - Learn from mistakes

Appendix H- Critical Behaviors

Expected Actions to recognize changes in patient condition and intervene promptly in order to prevent further deterioration and failure to rescue.

State 1 Initial Assessment:

• Performs a complete physical assessment
• • Recognizes abnormal findings:
- Recent weight gain
- Shortness of breath, Decrease in oxygen saturation
- Increasing anxiety
- Peripheral edema

• Applies oxygen at 2 LPM via nasal cannula
• Reassesses oxygenation status
• Assesses IV site and patency of saline lock
• Administers medications as ordered according to the Six Rights
• Requests and interprets lab results

State 2 Condition Worsens:

• Performs a focused assessment
• Recognizes changes in condition:
- Increasing anxiety
- Decreasing SpO2
- Increasing pulse
- Posturing

• Increases oxygen to 4 LPM via nasal cannula or initiates use of NRM
• Notifies the healthcare provider of changes in patient condition

Performance Measures After State 2

Orders Received:

• Administers 40 mg furosemide IV bolus STAT
• Reassesses patient after furosemide is administered
• Notifies the healthcare provider of little improvement in the patient's condition AR
• Clarifies phone orders by repeating them back to healthcare provider
• Administers furosemide 80 mg IV bolus STAT

State 3

Second Furosemide:

• Inserts indwelling urinary catheter and assesses the amount of urine output
• Performs a focused assessment

State 4 Improvement:

• Performs a focused assessment
• Evaluates urine output
• Interprets cardiac rhythm

Appendix I- Simulation Plan and Algorhythm

Heart Failure Simulation NUR 435

Purpose: 4th semester students are to apply knowledge obtained from class to the care of a HF patient, to recognize changes in patient condition and intervene promptly in order to prevent further deterioration and failure to rescue.

Objectives

- Identify signs and symptoms of heart failure
- Recognize impact of health history on HF
    - Correlate MI with heart failure
- Correlates diagnostic findings for the patient with an acute exacerbation of HF
- Safely prepare medications and administer
    - Understand the purpose for, mechanism of action, nursing implications
- Demonstrates effective interprofessional communication to deliver safe patient care

Pre-class Preparation

- Heart Failure class
- Heart Failure worksheet
- Medication chart completion

Pre-test (completed-on line)

Prebriefing/Report

**students use report sheet as in clinical to organize data*

Simulation

- 15 minutes
- 3 students per group

Debriefing

- 10 minutes immediately following simulation with small group
- 60 minute with entire group with guided reflective questions

Post sim Activities

- Develop plan of care
    - Impaired gas exchange
    - Decreased cardiac output
    - Anxiety
- Patient education plan
    - Medication education/compliance

Post-test (completed-on line)

Synopsis: Ivan Emoto, 67 year old Latino male

- Called his MD this morning complaining of SOB, fatigue, swelling in his ankles and feet
- Admitted to Medical-Surgical Unit in moderate respiratory distress for chronic HF exacerbation
- Weight: 100 kg Height: 174 cm

Background Patient History

- chronic heart failure x 6 years
- Smoker 1 ppd for 40 years, states quit after MI 6 months ago
- Inguinal hernia repair 15 years ago

Allergies

- PCN, Cephalosporin, Midazolam

Medications:

• States he is on several water pills and heart pills but doesn't know their names and didn't bring them to the hospital

- Per his pharmacy, his prescribed medications include
  - furosemide 20 mg daily
  - potassium 20 mEq daily
  - metoprolol 100 mg daily
  - Captopril 12.5 mg tid

Code Status: Full code

Social/Family History:

• Retired veteran from US Navy
• After military service, he worked as a bookkeeper at the local box factory
  • retired 16 months ago after his wife was diagnosed with Alzheimer's disease
• sole caregiver for 70-year-old wife, who has Alzheimer's with moderate cognitive decline
• They have three grown sons who live out of state

Report to Students

Situation:

• The patient is a 67-year-old male, hx chronic HF, admitted to the Medical-Surgical Unit
• He called MD this morning c/o increasing SOB, fatigue and swelling in his ankles and feet
• He reports recent weight gain, had not been taking all of his prescribed medications
• Admission orders have been written and are on the chart
• He is awake, alert and anxious

Background:

• The patient's primary diagnosis is chronic HF exacerbation
• Upon questioning the patient about the events leading up to this morning, he stated he did not take his water pill for the last five days because his wife's ankles were swollen and he gave the pills to her
• He also admitted to being out of one of his heart pills but cannot remember which one
• He states he is on several heart medications; did not bring any of his meds with him

Assessment:

Vital Signs: HR 100 • BP 158/100 • RR 32 • Temperature 36.8C SpO2 is 94% on RA
General Appearance: • Cachectic and anxious • Appears older than stated age

Cardiovascular: • Circumoral and peripheral cyanosis • Pedal pulses difficult to palpate; • Bilateral edema in lower extremities 3+

Respiratory: • Crackles in lower lung fields, mild respiratory distress

GI: • Active bowel sounds • Poor appetite

GU: • Has not voided since arrival

Extremities: • Movement is weak in all four extremities (3+)

Skin: • Cool, dry and pale; Poor turgor

Neurological: A&O x3 • PERRLA • No neurological deficits

IVs: • 20-gauge IV to saline lock in the left arm • Patent and non-reddened

Pain: • Denies pain

Diagnostics:

• Admission lab results and echocardiogram are pending

• 12-lead ECG revealed sinus tachycardia without ectopy

• CXR: cardiomegaly with perihilar infiltrates

Recommendations:

• Complete admission orders

• Monitor for instability

Initial: State 1	**Expected Actions**	**Diagnostics**	**Initial Orders**
Weight: 100 kg. (normal 90 kg) Alert, anxious, oriented x3 The patient states, • "I am very short of breath. It is worse when I get up and walk." • "I feel so tired" • "I don't ever remember my feet being this swollen" VS • HR 32, ST • BP 150/90 • RR 32, shallow, labored • SpO2 86% RA • T 36.8 Assessment • Crackles in bases • S3 when heart auscultation • Circumoral cyanosis • Pedal pulses weak • Skin cool and dry • Bowel sounds x4, normal	Recognize Subjective complaints • c/o SOB, tired, feet swelling • ask about recent weight gain Initial Assessment • take VS, recognize abnormals ○ ↑HR, ↑RR, shallow labored ○ SpO2 86% RA • Listen to lung and heart sounds ○ Crackles in bases ○ S3 • Circumoral cyanosis • Pitting edema, weak pulses Expected Interventions • Raise HOB • Apply O2 2L NC • Review admission orders • Request lab results • Implement nursing measures to decrease the patient's anxiety • Call MD	NOW: CBC, basic metabolic panel PT, PTT, Mg, Troponins BNP UA • Echocardiogram NOW • 12 lead EKG NOW • Chest x-ray NOW	Admit to Med-Surg Diagnosis: CHF exacerbation Full code Na 2Gm diet Fluid restriction1000 mL/day Activity: BRP with assistance Vital Signs q 4 hours • Daily weights • I&O every shift • Telemetry monitoring • Continuous pulse oximetry • O2 2-5 LPM • IS 4 hours while awake • Saline lock IV, EPC cuffs Medications • Digoxin 0.25 mg PO daily • Captopril 12.5 mg PO tid • Metoprolol 25 mg PO bid • Furosemide 40 mg PO bid • Potassium 20 mEq PO bid • Docusate sodium 100 mg daily • Nitroglycerin 0.4 mg SL prn q 5 minutes, up to 3 doses for chest pain • Morphine sulfate 2 mg IV, 1 dose prn for unrelieved chest pain (notify healthcare provider) Notify healthcare provider • HR < 60 or >120, • development of arrhythmias, • SpO2 < 95% or acute changes

State 2: Condition Worsens	**Expected Actions**	**Diagnostics**	**New Orders**
• Remains A&O x3 • states his SOB is getting much worse • increasingly anxious and saying that he can't breathe • sits in tripod position. • "Help me sit up so I can breathe better." • • HR 144 • • BP 160/100 • • RR 36 and labored • • SpO2 92, O2 2 LPM NC • • Temp 36.8C • Crackles increased up to T1 bilaterally on his posterior chest	• Perform focused resp. assess *Recognize changes in condition* • →Increase O2 to 4 LPM or consider NRM • Review and interpret lab results *(recognize low K+ prior to giving Lasix)* • Notify MD of findings → After new orders are received, ○ *Administer Albuterol aerosol if student does not report fluid overload s/s* ***OR*** ○ Administer 40 mg IV Lasix (i*f K+ level not recognized, the patient develops s/s hypokalemia, ie. PVC'S??)* →The patient states, "I'm still having a hard time catching my breath." **The learners are expected to:** • Reassess the patient after Lasix give →Recognize little improvement →Notify the healthcare provider of the patient's response to treatment After the second set of orders are received • Administer furosemide 80 mg IV	WBC 11.9, H&H 11.5/35.1 Platelets 250 Na 137, K 3.5, Cl 100, CO2 24, BS 118, BUN 6, Creatinine 1.2 , Mg 1.6, Troponin 0.1 BNP: 936 Echo: Normal position and movement of heart valves, enlarged dilated LV, ejection fraction 30% 12 lead ECG: ST at 134 CXR: bilateral perihilar infiltrates , cardiomegaly	Furosemide 40 mg IV bolus NOW • if administered too fast, →↓BP (10-20 mg/min IVP) • Possible Albuterol 0.25 mg via nebulizer now *IF the student recognized lower K+ level and reports to MD,* • Order for K+ 40 meq IV • Furosemide 80 mg IV bolus NOW • Insert indwelling urinary catheter

State 3	Expected Actions	Diagnostics	New Orders
State 3 Second Furosemide • the patient's condition improves slightly • patient states the SOB decreasing ○ "It is getting a little easier to breathe." • HR 130 • BP 140s/90 • RR 30 and labored • SpO2 95O2 4 LPM via nasal cannula • T 36.8 C	• Insert a urinary catheter, → Assess the amount of output using a urimeter • Reassess the patient → scant amount of yellow urine obtained during the catheterization.		

State 4	Expected Actions
State 4 Improvement • is 40 minutes later and the patient's condition has improved. • He states, "It is much easier to breathe." • HR 114 • BP 130/90 • RR 22 and nonlabored • SpO2 97 O2 4 LPM • Breath sounds are now clear • SR • No S3 on auscultation Total urine output of 500 mL	

Appendix J- Validated CAE Simulation, "Ivan Imato"

CAE

Chronic Heart Failure Exacerbation

JUNO Preconfigured SCEs

Ivan Emoto

Age: 67

Weight: 100 kg

Height: 174 cm

Overview

Synopsis

The physiological values documented in this SCE indicate appropriate learner actions and timely interventions. If learners do not act as anticipated, differences will be encountered.

Best practices have been included in this SCE, but since interventions may vary by region, you may wish to include medications, treatments, and standards of care that reflect current practice in your region. No intentional errors, such as incorrect treatments or medication doses, were included in this SCE.

Since preparation is key to a successful simulation experience, you should read through the SCE in its entirety before beginning the simulation. You will find suggestions in the **Facilitator Notes** to assist you in setting up the environment and manikin moulage.

Synopsis:
The learners are caring for a 67-year-old male with a six-year history of chronic heart failure.

- He called his physician this morning complaining of shortness of breath, fatigue and swelling in his ankles and feet
- He is now being admitted directly to the Medical-Surgical Unit in moderate respiratory distress for chronic heart failure exacerbation
- He is assessed and treated with diuretics, digoxin, angiotensin-converting enzyme (ACE) inhibitors and beta blockers
- His condition improves after he receives a second dose of diuretic

The Simulated Clinical Experience (SCE) has four states that are *transitioned manually* at the discretion of the facilitator. With manual transitions, facilitators should advance to the applicable state when appropriate interventions are performed.

Appendix K- Debriefing Plan

(small groups, immediate after)

1) Initial Reactions, allow venting; Summarize what happened
   - Brief overview of situation to develop a shared view of what happened.
2) What were the priorities for this patient?
3) Identify a nursing action during the scenario that was effective in helping the patient. Why did it help?
4) Discuss Your Interventions:
   • Were they performed appropriately and in a timely manner?
   • How did you decide on your priorities for care and what would you change?
   • How did patient safety concerns influence your care? What did you overlook?
   • In what ways did you personalize your care (recognition of culture, concerns, anxiety) for this patient and family members?
7) How was medication administration safety handled during the sim?
8) Describe the communication that occurred during the sim.
   - Identify any therapeutic or non-therapeutic responses.
   - How did you collaborate with your team?

HF Application of Knowledge questions (entire group)

- Why does this patient present with cyanosis and pedal edema?
  - Pulmonary congestion→labored breathing, ↓ O2 → respiratory distress
  - Rt. HF back up to venous system → pedal edema
- Did you *recognize* the weight gain?
  - What led to the 10 kg weight increase?
- Why are oxygen therapy and incentive spirometry ordered?
- What measures can a nurse take to decrease the patient's anxiety?
  • Give clear, concise explanations of activities and procedures
  • Spend time with patient, convey a willingness to listen ; Offer reassurance
  • Reduce as many environmental stressors (including people) as possible
  • Remain with patient during severe anxiety
  • Teach relaxation techniques such as imagery, progressive muscle relaxation and meditation, as these can restore psychological and physical equilibrium by ↓ autonomic response to anxiety

Correlating Diagnostics

K+ : *Did they recognize low level and consider this with administering Lasix?*
??: correlate hypokalemia with increase risk dig toxicity
BNP; Echo (Ejection fraction); CXR

Understanding Medications

• Furosemide
• Digoxin: increase force of myocardial contraction; also slows AV conduction.
• ACE inhibitors
  - prevent conversion of angiotensin I to angiotensin II
  - preventing vasoconstriction and fluid retention
  - → ↓BP, ↓ afterload, improve cardiac output
• Beta blockers

Appendix L- IRB approval Letter

Robin Glaza 6832 Convent Blvd. Sylvania, Ohio 43560

Re: IRB #19-19 Investigator: Glaza, Robin, "Enhancing the Critical Thinking Ability of Student Nurses", Advisor: Shank, Heidi

October 15, 2019

Dear Ms. Glaza,

Congratulations! Your research proposal, "Enhancing the Critical Thinking Ability of Student Nurses" was approved effective 10/9/19. The IRB determined that your research presents no more than minimal risk to subjects and involves only procedures listed in Expedited Review Category (7): Research on individual or group characteristics or behavior (including, but not limited to, research on perception, cognition, motivation, identity, language, communication, cultural beliefs or practices, and social behavior) or research employing survey, interview, oral history, focus group, program evaluation, human factors evaluation, or quality assurance methodologies (45 CFR 46.110, Category 7).

The IRB has received a signed, hard copy of the final protocol. The approval period will end on 10/9/20. If you plan to continue research beyond the initial approval period, you must submit an application to the IRB for continuing review.

Please note that if you wish to make changes or alterations to your protocol, you must submit the proposed changes for IRB consideration. When you have completed your project, please complete a Project Closure Form, available on the IRB website. The IRB would also welcome a brief summary of your research results and conclusions. Upon completion of study, data should be kept for 3 years.

Respectfully,

Matthew E. Lancaster, Ph.D. Chair, Institutional Review Board Lourdes Universi

Appendix M- Survey Responses Question Analysis

	Pre-test Correct Response N=	Post-test Correct Response n=
1. The client is admitted to the unit for exacerbation of heart failure. What is the most important action for the nurse to take upon arrival **(action)**	17 100%	16 94%
2. Which statement should the nurse expect when admitting a client with right-sided heart failure exacerbation? **(knowledge, s/s)**	16 94%	15 88%
3. The most accurate diagnostic test to assess the function of the heart muscle is: **(knowledge/diagnostics)**	14 82%	12 71%
4. A 74 year old female presents to the ER with complaints of dyspnea, persistent cough, and unable to sleep at night due to difficulty breathing. On assessment, you note crackles throughout the lung fields, respiratory rate of 25, and an oxygen saturation of 90% on room air. Which of the following lab results confirm your suspicions of heart failure? **(knowledge/diagnostics)**	15 88%	15 88%
5. The nurse is caring for a patient on a telemetry unit with the admitting diagnosis of heart failure. The night nurse reports that the patient has been sleeping comfortably all night without any problems. Upon entering the room in the am, the patient is sitting up in bed, with short, rapid respirations. His skin is pale, cool, and sweaty. O2 is on at 2 liter/minute per nasal cannula. Vital signs are as follows: BP 84/48 mm Hg, heart rate 132/min, respirations 38/min, and the pulse oximetry reveals Sp02 of 84%. Upon assessment, the nurse hears bibasilar rales and notes jugular vein distention.The first response of the nurse should be to: **(action)**	15 88%	13 76%
6. The physician's order says to administered Lasix 40 mg IV twice a day. The patient has the following morning labs: Na+ 148, BNP 900, K+ 2.8, and BUN 10. Which of the following is a nursing priority? **(action/priority)**	14 82%	13 76%

7. Which of the following classes of medications protects the weak myocardium by blocking catecholamines and sympathetic nerve stimulation? **(knowledge/medications)**	11 61%	9 50%
8. The nurse has completed discharge teaching regarding assessment of fluid balance. The nurse recognizes that the instruction has been successful when the client states: **(knowledge/patient education)**	16 94%	15 88%
9. The primary care provider prescribes lisinopril for the client with biventricular heart failure. How does this medication decrease the workload of the heart? **(knowledge/medication)**	7 39%	4 24%
10. A client is admitted with heart failure. What assessment finding is an expected physiologic response to maintain cardiac output? **(knowledge/assessment)**	9 53%	10 59%

Appendix N- Observation Scored Rubric Analysis

Rated in a group of three students (#13 rubrics)

NOTICING

- **Focused observation** (recognizes cues as relevant)
  - Developing (8) **62%**
  - Advanced (5) **38%**
- **Recognized deviations** (identifies abnormals and recognizes changes)
  - Developing (9) **69%**
  - Advanced (4) **31%**
- **Information seeking**
  - Developing 7 **54%**
  - Advanced 6 **46%**

INTERPRETING

- **Prioritize data** (Focuses on most relevant and important data)
  - Beginning2 **15%**
  - Developing 7 **54%**
  - Advanced 4 **31%**
- **Make sense of data** (Notices patterns in data, understands the "why")
  - Developing 8 **62%**
  - Advanced 5 **38%**

RESPONDING

- **Calm, confident manner** (assumes responsibility, organized, delegates appropriately)
  - Developing 6 **46%**
  - Advanced 7 **54%**
- **Clear communication**
  - Beginning 3 **23%**
  - Developing 6 **46%**
  - Advanced 4 **31%**
- **Well planned interventions** (monitors progress and adjusts as needed, prioritizes)
  - Beginning2 15%
  - Developing 4 31%
  - Advanced 6 46%
  - Exemplary1 8%
- **Skillful**
  - Developing 3 23%
  - Advanced 10 77%

REFLECTING

- **Evaluation/self-analysis**
  - Developing 3 23%
  - Advanced 10 77%
- **Commitment to improvement**
  - Developing 1 7.5%
  - Advanced 11 85%
  - Exemplary 1 7.5%

Appendix O- Pearson's Correlation

Statistical Analysis: Pearson Correlation

Regression Statistics	
Multiple R	0.952584219
R Square	0.907416693
Adjusted R Square	0.89584378
Standard Error	1.186282538
Observations	10

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	110.3418699	110.3419	78.40867	2.0881E-05
Residual	8	11.25813008	1.407266		
Total	9	121.6			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	-1.989837398	1.645813331	-1.20903	0.261168	-5.7850897	1.805415	-5.785089746	1.805414949
Correct Pre-survey	1.058943089	0.119588822	8.854867	2.09E-05	0.78317077	1.334715	0.783170771	1.334715408

RESIDUAL OUTPUT

Observation	*Predicted Correct post-survey*	*Residuals*
1	16.01219512	-0.012195122
2	14.95325203	0.046747967
3	12.83536585	-0.835365854
4	13.89430894	1.105691057
5	13.89430894	-0.894308943
6	12.83536585	0.164634146
7	9.658536585	-0.658536585
8	14.95325203	0.046747967
9	5.422764228	-1.422764228
10	7.540650407	2.459349593

Appendix P- Paired-t Analysis

t-Test: Paired Two Sample for Means

	Correct Pre-survey	*Correct post-survey*
Mean	13.4	12.2
Variance	10.93333333	13.51111111
Observations	10	10
Pearson Correlation	0.952584219	
Hypothesized Mean Difference	0	
df	9	
t Stat	3.342516087	
P(T<=t) one-tail	0.004312791	
t Critical one-tail	1.833112933	
P(T<=t) two-tail	0.008625582	
t Critical two-tail	2.262157163	