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Assessing Clinical Judgment Utilizing Embedded Patients In A Baccalaureate Nursing Program's Simulation Laboratory

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ASSESSING CLINICAL JUDGMENT UTILIZING EMBEDDED PATIENTS IN A
BACCALAUREATE NURSING PROGRAM'S SIMULATION LABORATORY

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ABSTRACT

The purpose of this study was to determine if clinical judgment could be assessed in baccalaureate nursing students during a 15 to 20-minute embedded (live patient) simulation scenario using role play. Graduate nurses are expected to apply critical reasoning and be clinically competent when caring for patients when they enter the nursing profession. The use of simulation scenarios is an approved and effective supplement to the clinical experience of nursing students. This study was conducted due to the sparsity of evidence referencing clinical judgment in live patient simulation scenarios. This study used a convenience sample (n=22) of baccalaureate nursing students in their final semester of a nursing program. The study used a mixed-method (quantitative/qualitative) approach to assess clinical judgment. It was framed on Khalili's *clinical simulation practise framework*. The clinical judgment section of Creighton's Competency Evaluation Instrument (C-CEI®) measured observed clinical decision making based on nine dimensions or competencies. A self-assessment pretest/posttest utilized a five-point Likert scale and an open response to record participant's perceptions of applied clinical judgment. Fisher's exact test returned a p-value of .02 ($\alpha = .05$) for the C-CEI dimensions and was considered statistically significant. Only two of the nine observed competencies met or exceeded a score of 77% (the passing grade for this program). The Likert scale mode of '4' was self-reported on the pretest, while the posttest reported a mode of '3' for clinical judgment. A

Wilcoxon Signed-Ranks test showed a statistically-significant difference between the two exams (W Statistic = 8 and W Critical = 66). Open and axial coding identified two major themes (*judgment*, and *scenario time*) and three subcategories (*emotions, task priorities*, and *missed opportunities*). For this study, clinical judgment could not adequately be observed during short, live patient, simulation scenarios. Students did not report an increase in perceived clinical judgment following the scenario. Longer scenario times and the use of the entire C-CEI instrument (or other valid rubric) should be considered for future studies.

Keywords: Nursing simulation, clinical judgment, embedded patient, role play

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

CHAPTER 1

INTRODUCTION

Nursing students of the twenty-first century are facing unprecedented challenges as they prepare to enter this demanding profession. The American Association of Colleges of Nursing (AACN) states that this next generation of nurses will be expected to apply critical reasoning and be clinically competent when caring for acutely ill patients the moment they enter their chosen field (AACN, 2008). New graduate nurses must be able to adapt to the constant changes in today's healthcare (Miraglia & Asselin, 2015). The Institute of Medicine (IOM) and the National Advisory Council on Nurse Education and Practice (NACNEP) recognize that today's novice nurses must learn and apply new and increasingly complex technologies (IOM, 2011; NACNEP, 2010a; NACNEP, 2010b).

A recently released research report from the Nursing Executive Center compounds this problem in their *Experience-Complexity Gap* excerpt (Herleth et al., 2019). They recognize that care complexity is increasing, and the experience of the nursing workforce is decreasing. According to the U. S. Census Bureau, Baby Boomers (those born between 1946-1964) have already began retiring (Colby & Ortman, 2014). In the first retirement year of this age group (2011), 60,000 registered nurses (RN's) exited the workforce. By 2020, it is expected that 70,000 RN's will be retiring annually. By 2029, the end of this population cohort will be at retirement age. Even though there is a projected growth in the supply of nurses, the majority of positions left open by this exodus will be filled by new-graduate nurses (Herleth et al., 2019).

Nursing programs place a major focus on preparing graduates for acute care (AACN, 2019). However, new graduates may begin their career in specialty areas such as intensive care units or in the community setting. The AACN (2019) recommends that "entry-level professional nurses need competences in team-based and coordinated care across a variety of venues" (p. 15).

With so many options available to the new graduate, it is not possible for programs to teach to every specialty. Currently, the board of nursing does not mandate any standardized transition programs, nor is there a required length of time hospitals must mentor a new graduate (Spector, 2011). Fifty percent of new nurses are involved in patient-care errors with 65% of those errors attributed to poor clinical-decision making (Grossenbacher, 2018). Lack of sufficient residencies can also lead to burn-out and high turn-over amongst new nurses (Twibell et al., 2012).

Due to the rapid changes in technology, graduate nurses are facing exponential growth in available medical knowledge (Densen, 2011). In 2010, medical knowledge was doubling every 3.5 years, and by 2020, it is expected to double every 0.2 years (Densen, 2011). The complexities of patient care are increasing. Patients are older and present with more than one health issue. Electronic medical record documentation is getting more complex, and patient hospitalization stays are shorter (Herleth et al., 2019). Graduate nurses must now learn more to be considered minimally competent (Herleth et al., 2019). Healthcare institutions, practitioners, educators, and students must develop approaches for processing this increase of information. (Distlehorst, Dunnington, & Folse, 2000). They must also learn how to think more critically when faced with complex patient care.

The National Council of State Boards of Nursing (NCSBN) are addressing these concerns. The NCSBN develops and administers the examination each nursing graduate must successfully pass to become a nurse – the National Council Licensure Examination (NCLEX). The NCSBN realizes that an unlimited amount of information is becoming commonly accessible and that students are learning in new ways. They are trying to determine if the NCLEX is reflecting these changes in critical thinking (Grossenbacher, 2018).

One of the classic nursing theories proposes that nurses progress through five stages of clinical knowledge; novice, advanced beginner, competent, proficient, and expert (Benner, 1984). In Benner's theory, competencies and proficiencies develop over time and build upon previous experiences. Benner argues that it takes two to three years on the job to attain the level of *competency*. Benner attributes the level of *advanced beginner* to nursing students and entry-level nurses. Also, a 2018 poll of nursing education trends in North Carolina state that 76% of baccalaureate nursing students in that state are between the ages of 17 and 25 years (North Carolina Board of Nursing, 2019a). Can this demographic provide safe nursing care when they enter nursing?

The NCSBN asked a question like the one above. They commissioned a review board and determined (through 200 peer-reviewed articles and an observational practice analysis) that they needed to develop test questions that better reflected clinical judgment in the novice nurse during the student's clinical experience. In 2017, the NCSBN began researching if the NCLEX exam could reliably assess clinical judgment (NCSBN, 2019a; NCSBN, 2019b).

A significant component of the proposed changes will include simulation scenarios that emphasize the various aspects of the clinical judgment process (Woo, 2016). With guidelines from the NCSBN, the use of simulation is now an integral element of nursing programs providing an effective substitute for clinical experiences. Simulation can be used for up to 50% of a program's clinical time (Hayden, Smiley, Alexander, Kardong-Edgren, & Jeffries, 2014a).

Associate and baccalaureate degree nursing programs have embraced the new standards and continue to expand their simulation labs to incorporate a more dynamic immersion experience (Ertmer et al., 2010). This includes the addition of realistic mannequins; referred to as human patient simulators. Standardized patients are another option available for simulation experiences. These participants can be trained members of the community, actors from the

institution's drama department or paid professionals. For the distance learner, innovative technology is being used to create virtual clinical patients (Tyo & McCurry, 2019). The other type of patient utilized in simulation is the embedded patient. For the sake of this study, embedded patients are fellow (peer) nursing students within a cohort.

These patients (either human patient simulators, standardized or embedded) are cared for in a safe learning space. This simulation environment attempts to mimic the clinical environment and often includes a variety of machines or software like those in a hospital. These can include medication dispensing units, vital sign monitors, electronic patient records, and other standard elements of a medical-surgical unit.

With embedded patients, educators can create complex, real-time scenarios where caregivers role-play with their patients. According to Ertmer et al., (2010) role play is an effective instructional strategy that allows students to work together to solve problems similar to those encountered in the clinical setting. The embedded peer model allows students within a cohort to act in the role of the patient or nurse. Each role is expected to perform at the same level of understanding.

Each participant in a simulation scenario has received the same theory of the diseases being presented during their class lectures (for example, common signs and symptoms, expected laboratory values, medications, and treatment expectations). If the student in the nursing role asks the patient a question about their presenting disease, the student in the patient role should be able to respond appropriately. This equal understanding is one of the benefits of using the embedded peer model over the standardized patient model (using actors). A study by Jin and Choi (2018) stated that standardized patients had difficulty remembering the medical facts of their scenario. An added benefit of using nursing students within the same cohort in the patient

role is that they gain an appreciation for being a patient (Bosse et al., 2010; Dalwood, Maloney, Cox, & Morgan, 2018).

Problem Statement

Clinical judgment is very complex (Tanner, 2006). Benner describes it as *thinking-in-action* and explains that complex practices depend, not only on the acquisition of knowledge but the situated use of that knowledge (Benner, Hooper-Kyriakidis, & Stannard, 1999). Currently, Clinical judgment is an essential skill in nursing, though it is difficult to measure (Dickison et al., 2016).

Assessing Clinical Judgment in Simulation. The goal of simulation is to reproduce the clinical environment within the capabilities of the available laboratory (Dalwood et al., 2018). When exploring clinical judgment within the current literature, the studies surveyed favor using high-fidelity mannequins (Ertmer et al., 2010). According to Lapkin and Levett-Jones (2011), "Some commentators suggest that for simulation experience to closely mimic the reality of clinical practice, high-fidelity HPSMs [human patient simulation mannequins] are needed…" (p. 3543). However, human patient simulators lack the subtle nuances of movement, gestures, and facial expressions of the human body. These attributes contribute to the clinical judgment process experienced nurses use to "read" their patients (Tanner, 2006, p 209).

A similar problem of assessing clinical judgment in simulation is that the length of scenarios is short in many studies. In the landmark NCSBN study determining simulation substitution for clinical hours, students were only in the role of the nurse for 15–30 minutes per scenario (Alexander et al., 2015). Short scenario times do not allow the student to adequately assess patient needs, develop and prioritize a plan of care, and adjust that care based on environmental cues (Nielsen, 2009). The NCSBN study suggested that longer periods were needed in future studies (Hayden et al., 2014a). Finally, to assess clinical reasoning, a valid

measuring tool should be integrated into simulation scenarios that have the capabilities to evaluate a student's psychomotor, emotional, and mental skills (Hayden, Keegan, Kardong-Edgren & Smiley, 2014b). The instrument should also measure clinical judgment in order to meet the expected outcomes of the baccalaureate nursing student (AACN, 2008).

The use of evidence-based patient models in simulation will help prepare the baccalaureate nursing student with the critical judgment necessary for their clinical experience. For those models to work effectively, faculty need adequate training in teaching and evaluating clinical judgment since faculty preparation is tied to the application of clinical reasoning (Hunter & Arthur, 2016; Tyo & McCurry, 2019).

Due to the complexities involved in the clinical judgment process, Dickison et al. (2016) designed a multilayer framework to aid educators in assessing difficult decisions (Figure 1). This framework utilizes an algorithm to guide clinical judgment in the classroom or laboratory environment. Layer 0 is an observation layer and contains *client needs* and *clinical decisions*. Layers 1-3 are considered construct layers and bridges *clinical judgement* (Layer 2) with layers 0 and 2-3. Layer 4 consists of individual and environmental factors. Educators can present layers 0 and 1 as an introduction to critical thinking and add subsequent layers over time to better measure psychometric performance (Dickison et al., 2016).

One resource available to faculty teaching in simulation is the International Nursing Association for Clinical Simulation and Learning (INACSL). They provide guidelines on how to meet specific outcomes and objectives when using simulation in nursing programs (INACSL Standards Committee, 2016). To objectively evaluate clinical judgment, instruments that have been rigorously tested for reliability and validity need to be available to educators (Hayden et al., 2014b). One such established rubric is Creighton's Competency Evaluation Instrument (C-CEI®). Creighton University developed an instrument that gauges the effectiveness of learning in

a simulated environment. The C-CEI focuses on four categories: Assessment, communication, clinical judgment, and patient safety (Todd et al., 2019).
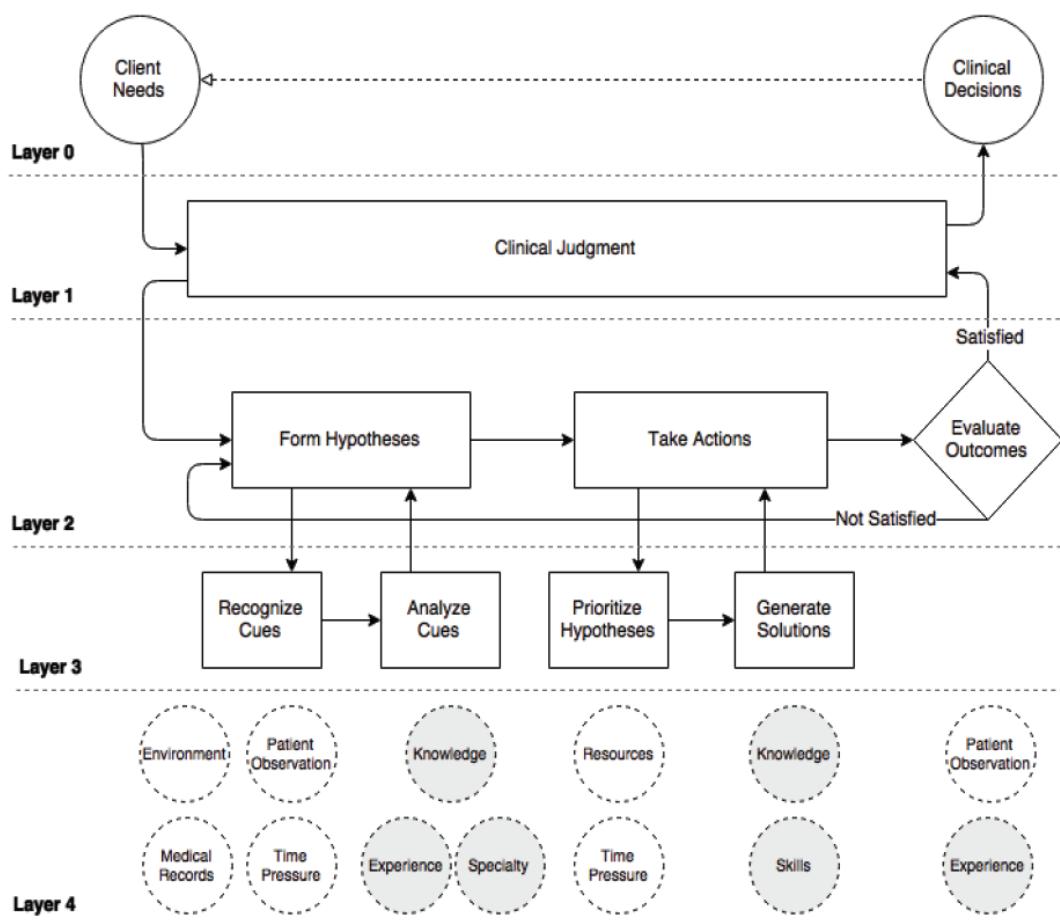
Figure 1. Nursing Clinical Judgment (NCJ). Dickison et al. (2016, p. 5).

Purpose of the Study

The purpose of this methodological cohort study was to evaluate applied clinical judgment skills in fourth-year baccalaureate nursing students during an embedded patient simulation scenario utilizing Creighton's Competency Evaluation Instrument (Appendix A). The results of this study determined if students applied clinical judgment in the time frame typically used in current studies. This study built on the recommendations of the landmark (2011) IOM report on the future of nursing that nursing programs use the technology available in simulations that "…fosters problem-solving and critical thinking skills in nurses…" (p. 321). It also

addressed elements of the National League of Nursing (NLN) research priorities in nursing education, including "[i]dentification of innovative approaches to learning that improve clinical reasoning and judgment…" (NLN, 2016, p. 3). Also, the results of this study may allow other programs to determine if they are adequately preparing students for the anticipated changes in NCLEX testing for their graduates regarding clinical judgment.

Research Question

Currently, there is a gap in the literature that clinical judgment is being quantitatively measured using the embedded patient model. The following questions guided this study:

1. Using Creighton's Competency Evaluation Instrument (C-CEI®), do students display clinical judgment while caring for an embedded patient during a nursing simulation scenario?

2. Are student perceptions of applied clinical judgment enhanced during an embedded nursing simulation scenario?

Theoretical Framework

As part of the educational process, nursing students need to link the theory they receive in the classroom with the skills they practice in the clinical setting (Hayden et al., 2014a; Khalili, 2015). Typically, this occurs in the hospital, but due to the complexity of nursing procedures and the expectations that students obtain a minimum competency early on in their training, a simulation approach is often used to teach these associations. To assist educators in designing useful simulations to achieve these connections, Khalili (2015) developed the clinical simulation practise [sic] (CSP) framework (Figure 2). The CSP framework is designed to positively transform a student's transition to practice by building a bridge between theoretical concepts and clinical applications.
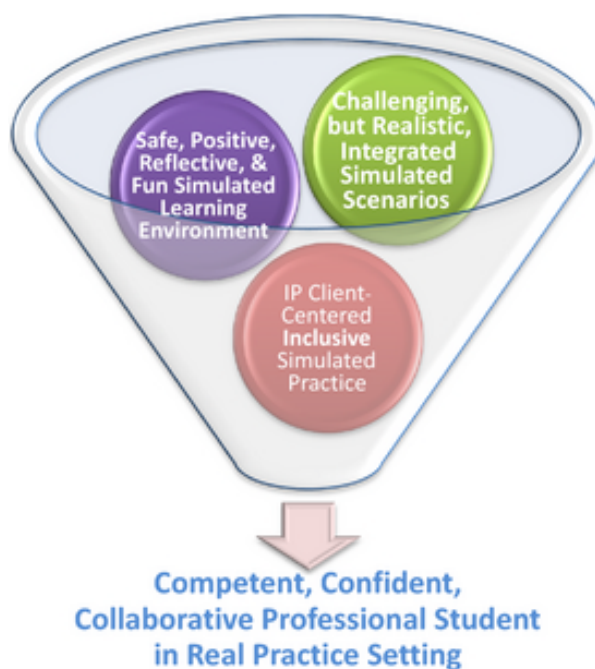
Figure 2. Clinical simulation practise [sic] framework: A knowledge to action strategy in health professional education (Khalili, 2015, p. 34).

How the Clinical Simulation Practice Framework Framed this Study. The CSP framework requires students to "integrate and apply their critical thinking, [and] clinical judgement…, along with their theoretical knowledge… to provide holistic care and treatment to their patients" (Khalili, 2015, p. 33). This framework addresses one of the recommendations of the IOM in their (2011) report on the future of nursing. The CSP framework was created "due to the lack of theoretical and conceptual frameworks underpinning this body of research" (Khalili, 2015, p. 34). The framework also addresses NLN's (2016) priorities of developing interprofessional collaborations that improve client-centered care. The CSP framework looks at three dimensions:

1) The learning environment (practice component)

2) Engaging scenarios (theory component)

3) Patient-centered care (theory/practice component)

The CSP framework describes the physical learning environment, scenario design, and patient-centered care as critical elements. This practice component mimics the hospital design

that simulation laboratories should be attempting to replicate according to the INACSL

Standards Committee (INACSL, 2016). Strategies and impacts of this framework also support

the physical, conceptual, and psychological elements required for high-fidelity simulations (with

or without mannequins) as described in the INACSL (2016) standards of best practice.

The design focuses on interactive patient encounters with human patient simulators and

takes into consideration levels of fidelity based on a mannequin's design (low, medium or high

fidelity). Since the framework considers the mannequin's abilities to mimic the human condition,

it also fits the embedded (or standardized) patient role-play model to allow for natural dialogue

between the caregiver, patient, and instructor. The framework proposes that by utilizing the three

dimensions, the outcome will be a competent, confident, and collaborative professional student.

Assumptions and Limitations

This study assumed that participants had a basic understanding of the simulation

laboratory environment including the roles and responsibilities of the nurse and the embedded

peer patient during a simulation scenario. Participants were expected to have a basic

understanding of current technology and equipment used, how simulation scenarios unfolded,

and primary patient care using the nursing process (assessing, planning, implementing, and

evaluating care) to establish clinical judgment. The study also assumed that the simulation

environment met INACSL standards of best practice to mimic the clinical experience.

One limitation of this study was that it was conducted in a dedicated simulation

laboratory at a single university. Participants were introduced to the embedded peer patient

model in their second semester of study. In the third semester, students continued utilizing

simulated scenarios with greater scenario complexities. Student's familiarity with this model

may have biased their performance during the study.

Significance and Scope of the Study

Today's nursing students are facing complex changes in their clinical experience. Undergraduate nursing programs are encouraged to prepare them as generalist nurses who can work across the healthcare spectrum. At the same time, students are expected to adapt to changes in how healthcare may be provided based on emerging trends (NACNEP, 2010a). The available clinical space for learning the required skills and critical concepts is at a premium (IOM, 2011).

This deficiency is due, in part, to competition from other nursing programs and from staffing issues. These restrictions make the simulated clinical experience a necessary component for developing sound clinical judgment. For today's nursing educator, transformative approaches will be needed to bridge critical thinking across the curriculum in anticipation of changes to the NCLEX exam. Being able to assess higher-order constructs, such as demonstrating clinical judgment in the simulation environment, validates the use of this supplemental clinical approach in helping students learn the skills necessary to perform as safe, competent nurses.

Definition of Terms

Clinical judgment. The process by which nurses use higher-order cognitive ideas to form a hypothesis, take action, and evaluate outcomes when assessing a patient problem (Tanner, 2006). Often used interchangeably with the terms *clinical reasoning* and *critical thinking*.

Embedded peer patient. A classmate assumes the role of the patient in-lieu of a mannequin.

In-situ clinical simulation. Simulated space created within a medical/surgical unit where nurses can respond to a simulation scenario as part of their shift workload (Kelsey & Claus, 2016).

High fidelity. As close to real as possible (Lasater, 2007). When used in the context of simulation laboratories, a high-fidelity simulation closely mimics the clinical experience. It is a

technique; it is not a technology (Bradley, 2006; Ellinas, Denson, & Simpson, 2015) though it is often associated with the use of human patient simulators.

Human patient simulator. A sophisticated, programmable mannequin that can mimic some of the signs and symptoms of the human body.

Mannequin fidelity (low/medium/high). Fidelity refers to the capabilities of a mannequin to reproduce human abilities. A low fidelity mannequin is an anatomical model with no physiological capabilities. It is also known as a task trainer. A medium-fidelity mannequin has programming capabilities for vital signs and often breathing and pulses. High fidelity mannequins are life-like, often connected to other devices via Bluetooth, and can be programmed through supporting software to respond to actions performed (Lapkin & Levett-Jones, 2011).

National Council Licensure Exam (NCLEX). The NCLEX is a standardized exam that measures practice (versus education) knowledge consisting of four categories: Safe and effective care, health promotion, psychological integrity, and physiological integrity. All graduate nursing students must pass the NCLEX to become a nurse (NCSBN, 2019b).

Simulation. The imitation of a situation or response (Bradley, 2006). Simulation labs attempt to recreate critical elements of a clinical hospital site in a safe environment to allow participants to gain experience and confidence in skill and theory integration.

Simulation-Based Learning (SBL). Learning experiences that are designed to prepare the student for clinical practice using simulated patient-care scenarios (Victor, Ruppert, & Ballasy, 2017).

Standardized patient. The patient's role is assumed by a trained actor who has been prompted to provide specific responses about the disease process.

Conclusion

Nursing students are required to address healthcare issues in an expanding technology-focused clinical experience while substituting a percentage of that clinical time with simulation. Nurse educators must balance the demands of the healthcare industry, the requirements of nursing programs, the expectations of students, the standards of best practice, and the paradigm shift of replacing clinical hours with simulation time.

Following the evidence of best practice, the NCLEX exam writers are researching whether clinical judgment can be assessed using a standardized exam. Nursing programs will need to adopt a transformative approach to revise the current method of instruction, one that will embed clinical judgment throughout the didactic and clinical portions of their programs. Like the NCLEX writers, nursing programs will need to investigate and test models that teach and assess the clinical judgment model, including cue recognition, hypothesis generation, action, and outcome evaluation (Grossenbacher, 2018).

In 1860, Florence Nightingale, the founder of modern nursing, concluded her 'Notes on Nursing: What It Is and What It Is Not' by eloquently stating:

> In dwelling upon the vital importance of *sound* observation, it must never be lost sight of what observation is for. It is not for the sake of piling up miscellaneous information or curious facts, but for the sake of saving life and increasing health and comfort. (p. 72)

The next chapter will provide an overview of the study's focus from the literature. Clinical judgment in the simulation environment will be explored. The effectiveness of role-playing with embedded patients will be compared to other simulation models.

CHAPTER 2

REVIEW OF THE LITERATURE

When referencing the literature on traits required for the graduating nurse, clinical judgment is a common theme amongst the agencies that guide nursing education and nursing practice. The AACN states, "Professional nursing requires strong critical reasoning, clinical judgment, communication, and assessment skills" (2008, p. 9). In 2012, when the NCSBN was determining the effectiveness of the NCLEX exam, they asked the question "…can [graduate nurses], at the entry-level, appropriately put together those facts, asses the client under their care and make crucial clinical judgments about the care they need to deliver?" (Grossenbacher, 2018, p. 11). The question launched a review on what traits graduate nurses needed to be safe healthcare practitioners.

When the NCSBN published their (2014) white paper on simulation effectiveness, they looked at the impact of simulation on "knowledge, clinical competence, critical thinking and readiness for practice" (Hayden et al., 2014a, p. S6). Since simulation produces competencies similar to those found in the clinical setting (Hayden et al., 2014b; Victor et al., 2017), clinical judgment can be applied and tested in a safe, simulated clinical environment.

Nursing programs can integrate theoretical components into simulated clinical experiences to align clinical judgment with curriculum, teach critical thinking, and bridge theory to clinical applications. Nursing labs have evolved from focusing solely on skill acquisition to including full-immersion scenarios where students can practice individualized patient care in a realistic surrounding. The methods used to accomplish this include the use of mannequins or live patients. Both methods introduce role-play to allow interactions between the nurse and the patient and can be evaluated using a standardized grading rubric to measure the effectiveness of the experience.

Enacting the Literature Review

A systematic approach was used to identify classic, current, and appropriate literature. A search for the keywords *clinical judgment, nursing simulation, embedded patient,* and *role-play* was performed. Databases such as EBSCO Host, ProQuest, CINAHL, Google Scholar, internet sources, and library holdings were accessed. The profession of nursing provided most of the articles. Other disciplines using simulation in similar education, such as medicine, were included with one reference from agricultural economics.

Content was considered based on Callahan's (2014) 'Five C' method of literature review: *Concise* (succinct view of the literature), *clear* (process for inclusion), *critical* (content reflection and analysis), *convincing* (synthesis supports rationale of inclusion), and *contributive* (to the body of knowledge). Articles were included based on fundamental concepts relevant to simulation in baccalaureate nursing programs as identified by the American Association of Colleges of Nursing [AACN], Institute of Medicine [IOM], National League of Nursing [NLN], National Council of State Boards of Nursing [NCSBN], and the International Nursing Association for Clinical Simulation and Learning [INACSL].

Clinical Judgment. Critical thinking is a reasoning process of making a judgment about what to do (Goodstone et al., 2013). When referring to nurses making judgments in the healthcare setting, clinical judgment, *or* clinical reasoning may be used (IOM, 2011; Tyo & McCurry, 2019). The synonymous use of these terms in the literature creates challenges in discerning which concept is studied. For example, when instructors are facilitating simulation experiences, their role is to explore a participant's "…critical thinking, problem-solving, clinical reasoning, clinical judgment, and apply their theoretical knowledge to patient care…" (INACSL, 2016, p. S16). For the sake of this study, the term *clinical judgment* will define the various terms for critical reasoning.

One of the challenges facing nursing education is teaching and assessing clinical judgment (Lasater, 2007; NACNEP, 2010b). The AACN (2008) emphasizes the concept of *clinical reasoning/critical thinking* as interchangeable elements of the baccalaureate nursing curriculum (p. 3). They assume that the baccalaureate graduate will be able to use clinical judgment in both simple and complex healthcare situations.

One of the concepts that makes clinical judgment challenging to assess is the way a nurse responds to a given situation. Judgment is based not only on the nurse's theoretical knowledge but by their ethical perspectives, experience, and relationship with the patient (Lasater, 2007). To explore clinical judgment in a manner to be evaluated, Tanner (2006) created a model (figure 3) to define the stages necessary to establish clinical judgment. For this seminal model, Tanner reviewed the literature looking for processes nurses used to assess patients, how experience played into decision making, and what factors affected clinical judgment.

The conclusion is that clinical judgment is complex and based more on experience than presenting data. Also, clinical judgment is contextual, and nurses use a variety of methods to guide their reasoning. When a breakdown in one of these elements occurs, the experienced nurse reflects on the error to improve future reasoning (Tanner, 2006).

When combined, these conclusions form the basis of the clinical judgment model of noticing, interpreting, responding, and reflecting. Novice nursing students may not have the experience to integrate Tanner's model fully, but nursing faculty can use the model as a guide to identify where pedagogical breakdowns may be occurring and address these errors during debriefing sessions (Tanner, 2006).
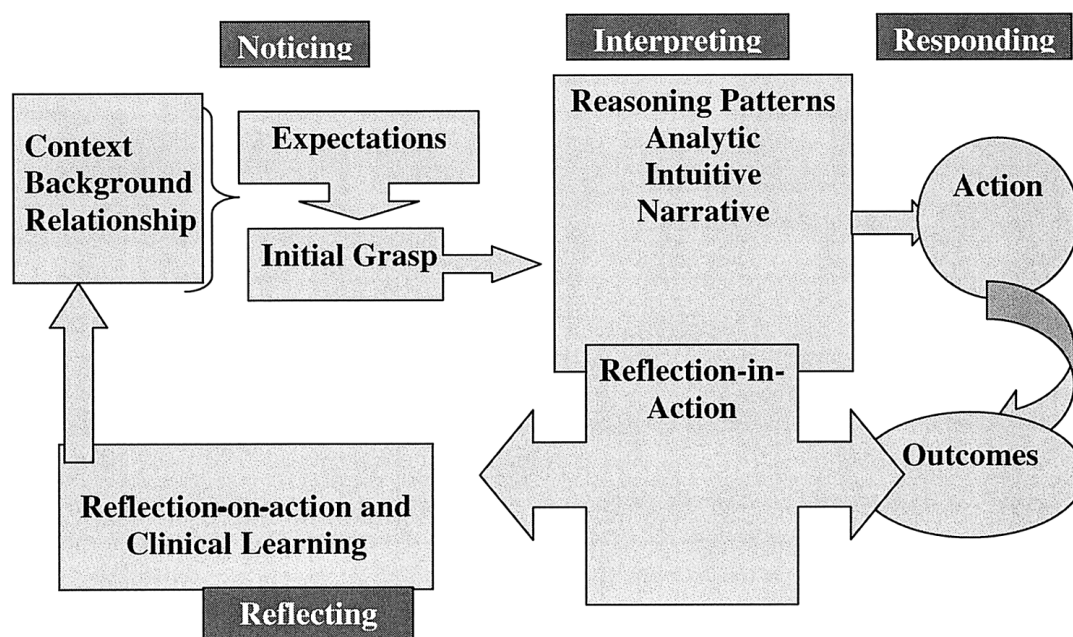
Figure 3. Tanner's clinical judgment model (Tanner, 2006, p. 208).

One thought addressed in a study by Cazzell and Anderson (2016) that needs considering when assessing the ability of the baccalaureate nursing student to think critically is the under-developed cognitive capabilities in late adolescents (18-25-year old's). The prefrontal cortex is involved in all decision-making processes (Bergland, 2015). Students in their early-twenties are still developing the neural connections necessary to establish critical judgment skills (Arain et al., 2013; Kotulak, 2006). The maturing adolescent brain makes the individual susceptible to improper decisions. This decision process makes it difficult to critically think through complex decisions (Arain et al., 2013).

Nursing students may not be able to think abstractly by their age, not from lack of training. The majority of students enrolled in nursing programs in North Carolina are of this age group (Tillman, 2019). Nursing instructors need to consider and plan for this phenomenon when teaching critical thinking concepts and evaluating clinical judgment with younger students.

Process oriented guided inquiry learning and clinical judgment. There are a variety of approaches available when teaching clinical judgment. One method available to educators that blends theory with practice is Process Oriented Guided Inquiry Learning (POGIL). POGIL originated in college chemistry courses and uses a student-centered strategy that works well in the simulation environment. POGIL develops processing skills, such as critical thinking and problem solving, through cooperation and reflection (POGIL, 2016). This approach nurtures concept invention and application through carefully designed materials. For example, a case study on caring for a client with diabetes is designed based on current evidence regarding the disease. A small group of students participates in the role of the nurse, charge nurse, patient, and assistive personnel. The charge nurse assigns tasks in a timed scenario, and the scenario is played out using role play. At the end of the scenario, students reflect on their care with questions related to the group scenario (Roller & Zori, 2017).

Instruction must be evidence-based and consist of high-quality experiences that foster critical thinking to teach clinical judgment (NLN, 2015). Also, these exercises need to be embedded throughout the nursing program and coincide with educational theory. This experiential learning replaces traditional passive learning and allows students to become the center of an engaging, active learning process (NLN, 2015). This approach is utilized in Khalili's (2015) clinical simulation practise [sic] framework. The POGIL method is one transformative approach that links theory to clinical application in a simulated clinical experience. Course exemplars can then be practiced clinically as they are taught theoretically.

Simulation. As a teaching method, simulation can trace its roots to the sixth century with the game of chess being created to teach war strategies (Rosen, 2008). In medicine, simulation has been used in primitive forms for centuries (Rosen, 2008). Pelvic models were used in the 1700's to train midwives in proper infant delivery techniques. In the late 1800's, jointed

skeletons and models were recommended in schools of nursing to teach patient care, such as bandaging (Sanko, 2017). These task trainers gave rise to more sophisticated anatomical models. Simulation labs began emerging in the 1930's as basic skills labs. By the 1970's, instructors versed in simulation met and collaborated, leading to the creation of INACSL (Sanko, 2017). INACSL has become the defacto organization in North Carolina for establishing the standards for simulation laboratories (North Carolina Board of Nursing, 2019b); their recommendations are widely followed (Sanko, 2017).

Simulation in the aviation field gained support after several catastrophic events (Rosen, 2008) and introduced other disciplines to the effectiveness of simulation. In 1999, the IOM released *To Err is Human: Building a Better Health System*, their seminal report on hospital deaths from preventable medical errors which were attributed to between 44,000 and 98,000 patient deaths per year (Kohn, Corrigan & Donaldson, 2000; Sanko, 2017). The IOM provided various recommendations to mitigate these injuries, including the use of interdisciplinary team simulations. Around this same time, standardized patients began showing up in the literature, though the adoption of simulation as a complimentary clinical competency in nursing education was slow to evolve.

To address the growing need and supporting evidence for simulation, the NCSBN performed a pilot study to look at the impact of simulation on knowledge and clinical performance to replace clinical time to reduce the demand on clinical sites (Hicks, Coke, & Li, 2009). Though the NCSBN results were inconclusive for *replacing* clinical time, they found that a *combination* of simulation and clinical experiences were effective.

In 2011, the IOM gathered a panel of experts to discuss U.S. and global health concerns. A large part of the conversation centered on the role of nurses in improving the delivery of healthcare and the role of nurse educators to help make this a reality. They acknowledged that

high-fidelity simulations would be essential in producing competent nurses. Their recommendations included priorities that, again, focused on teamwork (collaboration and testing innovative models), technology (testing new technologies for meaningful use), and value (analyzing impact); elements that can be re-created and tested in a simulation environment.

To provide definitive guidance on the use of simulation in nursing, the NCSBN released their landmark paper on simulation effectiveness. The NCSBN performed a rigorous, longitudinal, randomized, control study measuring student's "knowledge, competency, and critical thinking" (Hayden et al., 2014a, p. S8) using simulation scenarios that included medium to high-fidelity mannequins, role-playing, and other methods (for example, virtual patients). The results support the use of simulation as a component of the clinical experience. After the NCSBN released their findings on simulation effectiveness, the use of simulation has seen an exponential growth in nursing programs. Simulation is currently estimated to be a $1.5 billion industry (Sanko, 2017, p. 81).

High fidelity mannequins. Mannequins have been used in nursing education as far back as 1874 (Nehring & Lashley, 2009). Early models were simple, straw-filled, life-sized dolls (Sanko, 2017). The first life-size mechanical dummy (Mrs. Chase) was produced for nursing education in 1911 (Hayden et al., 2014a). Mrs. Chase was a full-body mannequin with realistic, movable joints. She had orifices for inserting indwelling catheters and enemas and could receive injections (Nehring & Lashley, 2009).

Laerdal® began designing mannequins for the healthcare industry in the 1950's. Their collaboration with various organizations and their brand recognition kept them at the forefront of basic and advanced life support education (Laerdal, 2018). In the 1960's, it was recommended that healthcare providers learn CPR. Classes used Laerdal mannequins. Their influence upon hands-on learning is evident by the pervasive presence of their equipment.

The medical field had been using advanced patient simulators to teach anesthesia administration for decades before nursing realized their benefits (Aebersold, 2016). As nursing programs began adopting higher-fidelity mannequins, newer models could replicate blood pressures, pulses, and receive intravenous catheters (Bradley, 2006). As the realism of these simulation experiences increased, instructors could speak for (or through) the mannequin to provide cues to the student in skill assessments or patient-care vignettes (Kisner & Johnson-Anderson, 2010). As more complex experiences emerged (administering medications or assessing changing vital signs), the bedside facilitator would acknowledge a student's response or action when demonstrating specific skills. If the student missed a critical element, an evaluation instrument could be utilized to provide feedback (Hayden et al., 2014a). Evaluations assessed the student's interactions with the mannequin and their successful completion of tasks.

When the NCSBN was determining how much clinical time could be completed in a simulation lab, they referenced a study done in 2002 that indicated 66 nursing programs used high-fidelity mannequins. Eight years later, that number jumped to 917 nursing programs using medium or high-fidelity mannequins (Hayden et al., 2014a). It was noted in the same journal, that 87% of respondents to a survey indicated using medium to high fidelity mannequins.

Today, mannequins have evolved to the point that one of the leading high-fidelity human patient simulators costs upwards of one-hundred thousand dollars (Lapkin & Levett-Jones, 2011). It can blink and display a wide range of vital signs – including pupils that can dilate and react to light by constricting. It can expel drops of liquid from its eyes or sweat glands, display a blue light in its mouth to indicate cyanosis (a lack of perfusion), and can vibrate to mimic a seizure. Each sign and symptom is programmed into a computer module using a complex network of technology, which requires necessary training. Mannequins are becoming specialized, with some having the ability to deliver a baby in real time and others for teaching the

administration of general anesthesia. When using these mannequins, the instructor communicates with the student, usually from a control room, and observes patient interactions through a glass window, one-way mirror, or video camera.

However, such technology has inherent problems. There is a concept called Bonini's paradox, which is the name given to the problems encountered when a complex model of a phenomenon is just as hard to understand as the phenomenon it is trying to explain (Inglis-Arkell, 2013). In other words, either the model is simple but not useful (like a straw-filled dummy), or it is accurate but too complicated (like a high-fidelity mannequin); it cannot be both.

Using technology to simulate the human body is a challenging endeavor. When considering how mannequins achieve this, the term used is *fidelity*. The higher the mannequin's fidelity, the more body systems it can replicate. However, as the fidelity increases, so does the likelihood of problems associated with Bonini's paradox (such as equipment failure, specialized training, and advanced programming).

One other problem associated with high-fidelity simulators is a term coined by this author called *simulation syndrome*. Students are instructed to make allowances for the limits of technology in simulation and are expected to realistically role play with a mannequin but then must recognize the difference between a mannequin and a human in the clinical setting. For example, students in simulation understand that a blue light in the mannequin's mouth indicates cyanosis; this is a sign of poor circulation. In a real patient, the lips, not the mouth, would be slightly blue or ashen in color. High fidelity mannequins have become a mainstay for nursing schools. However, due to the cost and the inability of many programs to afford high fidelity mannequins, other patient models need to be explored (Dalwood et al., 2018).

Embedded patients. One alternative to human patient simulators is to encourage role play by the introduction of a live patient (also referred to as an embedded patient). Embedded patient

role-play allows the nurse-patient interaction, otherwise simulated by a mannequin, to occur more realistically. In the example of the patient with cyanosis mentioned earlier, a small application of blue theatre paste (moulage) to the patient's lips or fingertips minimizes the simulation syndrome effect.

Another benefit to role play with the embedded model is the ability for students to interact within their cohort. In a study by Roberts (2008), students stated that they learned more from their peers than from qualified staff, peers were more approachable and were better at giving explanations and providing tips. In a study by Kelsey and Claus (2016), they embedded a standardized patient within the clinical unit of a hospital (called in-situ simulation) to allow staff to work together in a familiar environment.

Embedded peer patient role-play may be low-fidelity (simple dialogue - as with a patient interview) or medium- to high-fidelity using more complex audio-visual cues (as with the integration of a vital-signs monitor) (Nehring & Lashly, 2009). Fidelity in these situations refers to the *quality* of the scenario, not the use of mannequins. Instead of receiving prompts from a control room, the student acting in a nursing role can relate with a scripted patient who can interact with their environment and display a wider variety of changing symptoms in real-time. For example, there are seven basic emotions and universal expressions: joy, surprise, anger, sadness, contempt, disgust, and fear (Matsumoto & Hwang, 2011). These emotions do not include the cultural emotion of pain.

Mehrabian's (1981) classic study of personal communication identified the spoken word as only seven percent of communication. Voice and tone accounted for 38%, and body language added 55%. There are numerous voice tones, modulations, poses, and gestures involved with communicating a message (Belludi, 2008). Any combination of these expressed emotions cues the nursing student to an appropriate course of action (Tanner, 2006). For example, to accurately

determine if a patient is experiencing pain, the nurse performs a basic assessment, interviews the patient, analyzes facial cues, observes body movements, and determines how each element interacts to form a conclusion. In short, nurses use all their senses to recognize changes in their patients (Burbach, Barnason, & Hertzog, 2015).

This assessment leads to an implemented plan of care and a follow-up evaluation. This approach is known as the nursing process and is an effective strategy for teaching problem-solving to novice nursing students (Tanner, 2006). One standard pain scale used with patients is the Wong-Baker Faces Scale and relies on facial expressions to determine a pain level of zero to ten (Wong-Baker Faces Foundation, 2016). Pain (and other physical expressions), therefore, is difficult to infer with a mannequin. Once the nurse has analyzed the patient's symptoms, he or she uses critical reasoning to carry out a plan of care. With practice and experience, this becomes clinical judgment (Tanner, 2006).

The embedded peer model provides more of an in-situ, realistic, learning environment as all the players are real. The constraints associated with high-fidelity technology (Bonini's paradox) are minimized, and scenarios can play out realistically. This added realism allows students to critically think and apply that thinking to clinical judgment to better guide their care. When a student assumes the patient's role (embedded peer model), dialog between the nurse and the patient progresses more organically. Since the instructor is not providing the patient's response, there is no preconceived idea of where the scenario should conclude as it is unfolding for both participants.

Scenario lengths. One of the limitations in simulation studies when looking at clinical judgment is the length of the scenario. The NLN suggests that scenarios run 15 to 20 minutes. The first five minutes are used to check the vital signs of the mannequin. Minutes five through

ten are used for performing a basic patient assessment. Minutes 15 through 20 allow the student to recognize and respond to symptoms (Jefferies, 2007).

Kelsey and Clause (2016) noted that typical in-situ simulation scenarios were only 10-15 minutes in length. The landmark NCSBN (2014) study had students in the role of the nurse for only 15-30 minutes (Hayden et al., 2014a). This compressed time frame accelerates the subtle changes in a patient's symptoms from hours to minutes. This limitation prevents what Kelsey and Claus (2016) refer to as *reasoning-in-transition*. Interventions that are recognized and implemented by clinical judgment in a more realistic time frame may not occur when the scenario is condensed and not allowed to evolve.

Kelsey and Claus referred to a study by Duncan, McMullan, and Mills (2012, p. 38) stating that many patients experiencing a cardiac arrest exhibit signs and symptoms of deterioration for hours before the arrest. Had healthcare providers picked up on the subtle clues over that time period, 95% of those arrests could potentially have been avoided. Missed warning signs such as these became the impetus for the creation of the Rothman Index – an early warning system that analyses changes in vital signs and neurological status (amongst other cues) to predict the mortality potential over 24 hours (Finlay, Rothman, & Smith, 2014). Worsening patient status often occurs over time, and condensing those changes in a simulated learning environment may create a false sense of symptom recognition (Lavoie, Pepin & Boyer, 2013). Benner, Sutphen, Leonard, and Day (2010) suggests that the nurse must be able to read the patient's condition over time to grasp the implications of a situation.

Creating a realistic simulated space. Though they are not a governing body, INACSL sets the international standard for establishing simulation effectiveness. The NCSBN suggests that faculty and programs follow checklists designed by INACSL (Alexander et al., 2015). Within their standards of best practice for simulation, INACSL provides eight principals for

effective simulation. These inter-related principals represent the progression from basic skills to higher-level reasoning (INACSL, 2016).

1. Simulation design (purposeful)

2. Outcome and objectives

3. Facilitation (approach and simulation design are tailored based on objectives)

4. Debriefing (planned session to increase future performance)

5. Participant evaluation

6. Professional integrity (maintaining ethics and professional behavior)

7. Simulation-enhanced intra-professional education (Sim-IPE)

8. Operations (infrastructure of the simulation laboratory)

Conclusion

Strong clinical judgment skills are required for baccalaureate graduate nurses as they face the challenges awaiting them in the clinical setting. Simulation scenarios occur in a laboratory learning space that has been designed to mimic an in-situ clinical experience. Literature suggests that clinical judgment obtained in a simulated environment will transfer to the clinical environment (Hayden et al., 2014b).

Students need experiential learning that combines theory and clinical practice in a safe and positive learning environment. Simulation can complement their clinical experience using challenging and realistic scenarios to develop their critical thinking capabilities. Multiple healthcare agencies have weighed in on the needs and benefits of using high-fidelity simulations with or without mannequins (INACSL, 2016; IOM, 2011; NLN, 2015).

Nurse educators nurture students who, upon graduation, can work in a variety of healthcare settings. Educators must also address issues identified by various agencies as necessary for an entry-level nurse; this includes clinical judgment. Currently, only 20% of

employers are happy with the decision-making skills of novice nurses (Grossenbacher, 2018). Simulation is one solution to meet these demands.

For educators who are comfortable with the technology of high-fidelity simulations, human-patient simulators are useful in a variety of learning outcomes in multiple studies. For those educators facing budgetary constraints, who may be intimidated by technology, or who desire human interaction, the embedded patient is an alternative to meet the requirements of a robust role-play learning experience. However, there is a dearth of research determining the effectiveness of the embedded model when assessing clinical judgment.

The profession of nursing and that of nursing education is at a cross-road. Nursing students are being constrained in their clinical activities due to a lack of available sites or the inability to perform care on patients due to various circumstances. Graduate nurses are expected to do more and know more than their predecessors using increasingly sophisticated technologies. Educators are faced with a paradigm shift as they try to anticipate how clinical judgment will be integrated across the curriculum to prepare students for the NCLEX exam. Knowing which innovative models and technologies are available in the simulated space to teach and assess critical reasoning will help the educator choose the best method in preparing their students to apply clinical judgment in a complex healthcare system.

The next chapter will focus on the methodology used to assess clinical judgment in this study. The design of the study's simulated laboratory setting will be described. The roles of the participants and a detailed description of the data collection methods and analysis will be presented.

CHAPTER 3

METHODOLOGY

Clinical judgment is a critical component of nursing education though approaches to teach this concept are not always effective (Tyo & McCurry, 2019). Measuring clinical judgment can be elusive (Lasater, 2007; Lewallen & Van Horn, 2019). Poor clinical judgment can result in compromised patient safety (Tyo & McCurry, 2019). One component of clinical judgment is the ability to recognize patient deterioration. For this to be effective, the nursing student must be able to recognize changes in their patient, intervene appropriately, and manage complications over time (Tyo & McCurry, 2019). This study determined if students were displaying clinical judgment while caring for an embedded patient during a 15 to 20-minute scenario.

This chapter includes the methodology used in this study, the study's setting, participants, data collection methods, analysis, and potential limitations.

The following questions guided this study:

1. Using Creighton's Competency Evaluation Instrument (C-CEI®), do students display clinical judgment while caring for an embedded patient during a nursing simulation scenario?

   H_0: Participants displayed clinical judgment during an embedded patient scenario.

   H_a: Satisfactory clinical judgment was not displayed during the simulation scenario.

2. Are student perceptions of applied clinical judgment enhanced during an embedded nursing simulation scenario?

   H_0: Participants increased their perception of applied clinical judgment following an embedded patient simulation scenario.

   H_a: Participants indicated a decrease in clinical judgment following a simulated patient care scenario.

When evaluating the perceived gaps in nursing simulation research, Mariani and Doolen (2016) stated that the concept of transferring clinical judgment to practice settings needed further evidence of support when applied to simulation outcomes. Another gap they identified was evaluation methods and the validity of measurements. Therefore, clinical judgment was evaluated using the embedded (peer) patient model to allow the student in the role of the nurse to engage more fully with their patient than is possible with a high-fidelity mannequin.

Setting

This study occurred in the nursing simulation laboratory of a regional university in the South-Eastern United States. Institutional Review Board (IRB) approval was obtain from the University of New England (Appendix B). Permission was obtained to perform the study in the primary investigator's simulation laboratory. The simulation suite was located within the host university's health science building. The laboratory space was designed by the primary investigator (PI) of this study to follow INACSL's eight standards of best practice: a) design, b) objectives, c) facilitation, d) debriefing, e) evaluation, f) integrity, g) intra-professional education (IPE), and, h) operations (INACSL, 2019).

The simulated hospital setting consisted of four beds, a nursing station, a control room, a medication dispensing area, and mobile computer carts. Computers at bedside displayed patient vital signs reflecting the appropriate disease process. A computer at the nursing station mimicked a typical medication dispensing unit that displayed the patient roster, medication inventory, and dispensing procedures. Scenario-based electronic patient records, complete with patient demographics, medical orders, procedural considerations, laboratory results, and documentation abilities, were accessed via the simulated hospital's web site on the mobile medication carts. Beds One, Two, and Three were designed for embedded patients, and bed Four was an ICU bed

containing a high-fidelity human patient simulator (mannequin). This study utilized one of the non-mannequin beds.

The patient scenarios were based on established curricular framework for concepts and exemplars for adult medical surgical nursing I and II and were designed by the primary investigator to coincide with classroom theory based on the required exemplars for those courses. The primary investigator created the embedded role-play scenarios based on a template for other scenarios that had been used during previous semesters to coincide with the program's regular clinical course work.

Nursing students within the program followed Benner's Novice to Expert model (Benner, 1984) (Figure 4). In the first semester of their junior year, students learned fundamental skills in an adjoining skills lab as novice practitioners with no experience. In the second semester of their junior year, students were introduced to the simulation environment as advanced beginners and participated in guided scenarios involving medically-stable patients. By the first semester of their fourth year, students returned to the simulation laboratory as competent providers and were involved in evaluative, advanced patient scenarios with potentially unstable medical patients. The C-CEI instrument enhanced Benner's novice to expert model during simulated exercises as students learned to notice cues in their environment, interpret those cues, respond appropriately, and reflect on their actions.

Figure 4. Benner's From Novice to Expert Model (Benner, 1984).

Participants

For this study, senior-year nursing students in the university's nursing program were invited to participate. The university requires courses in liberal studies with electives. The school of nursing admits two cohorts per year. Entry into the program requires the successful completion of basic anatomy, physiology, and chemistry courses, as well as classes in infectious diseases and nutrition. Entry into the program is competitive, with an average of 50 applicants for 30 seats. Minimum accepted grade point average of 3.0. Above-average scores on the American College Testing (ACT) composite section and the Test of Essential Academic Skills (TEAS) are also required.

Students begin the nursing program in their third year of study after completing their liberal studies and nursing pre-requisites. Students are required to attend scheduled simulation sessions mid-way through their junior year, as part of their required clinical coursework. Small, break out groups of eight to ten students receive a two-hour orientation to the unit. The orientation consists of how the simulation lab is structured, expectations of participant roles

(including instructional documents they can access during scenarios), and how scenarios transpire. Students are introduced to the electronic medical record and various technical procedures (such as the medication dispensing unit and intravenous pumps).

Students participate in progressively complex scenarios as they progress from their junior year into their senior year. Time is set aside at the end of scenarios for debriefing and resetting. One instructor observes four students who act in the nursing roles and one who acts in the role of the charge nurse. The other students assume the role of patients and follow a loosely guided script to keep the scenarios aligned with the objectives and exemplars of the disease portrayed.

Simulation sessions run four hours for second-semester students. Students attend a short pre-brief regarding their patient's disease process and goals for their scenario. Three or four scenarios run concurrently. The patients are usually stable and present with chronic diseases that present with minimal complexity. Students are provided time to research their patient's disease and plan for the day. After receiving a patient report, students assess their patients, provide care, integrate the provider's orders, and follow up on care. Scenarios run approximately 60-75 minutes. The lab is reset, and nurse/patient roles are reversed. At the end of the second scenario, a debriefing occurs.

Simulation sessions for third-semester students are more complex and consist of acute diseases that require more attention to detail. Scenario lengths are 90-120 minutes and follow the same format for the second-semester. Students have more autonomy but are expected to build on previous simulation and clinical experiences when caring for their clients. Students receive pre-briefing instruction, as well as a debriefing session. For these extended scenarios, students also receive what the primary investigator has termed *in-situ briefings*. For these extended scenarios, critical thinking considerations, skill correction, and priority of care are addressed by the instructor at the time of observance for positive and immediate feedback.

Fourth-semester students only attend one simulation review session to help prepare them for their transition to practice (TTP) experience. TTP consists of 120 hours of embedded clinical time. Students are paired up with a qualified nurse on an assigned hospital unit. The TTP experience occurs toward the end of their final semester and is designed to prepare students for entry into practice.

For this study, senior-year nursing students (the fourth-semester cohort of approximately 25 students) were invited to participate. Students in this cohort had completed all simulation experiences but had not begun their final TTP experience. Only those participants in the nursing role were considered subjects for the data collection portion of the study.

Participant's Rights. There were no anticipated risks for participants aside from the everyday risks associated with the use of a simulation lab (e.g., slips, trips, or machine pinch points). Participants were not expected to lift patients. Due to the complexity of the simulation scenarios, participants experienced some anxiety. Although invited participants were familiar with being observed as part of their simulated clinical experience, the novelty of being observed in a research study may have altered their performance (Cherry, 2018). Participants were encouraged to take a break if they felt anxious. Some participants may have felt self-conscious when being evaluated in the presence of a peer. However, since participants have worked together in similar situations throughout the nursing program, this was not expected. If this situation occurred, the student in the nursing role might have requested a different participant in the role of the patient. Participants were advised that they could withdraw from the study at any time.

Data were collected as part of a specifically-scheduled simulation lab separate from regular simulation course work. As a convenience to the participant, times were scheduled based on participant availability. Scoring rubrics excluded participant identifiers and were stored in the primary investigator's secured office within a locked cabinet.

During the invitation session, potential participants were provided a copy of the C-CEI measuring instrument and advised that they would be evaluated on the *clinical judgment* section of the C-CEI instrument, which included nine corresponding competencies. They were informed on how they would be graded (0=does not demonstrate competency or 1=demonstrates competency) for each item. The primary investigator described the method used to calculate the results. Invited participants were advised that one of the exemplars (diseases) from the core competencies of their coursework would be used, but not which concept.

Research Design Overview

This study consisted of a cohort convenience sample and utilized a mixed-method format consisting of quantitative and qualitative data. For the quantitative element, an instrument that incorporated cognitive, psychomotor, and affective domains was selected. This instrument has undergone rigorous development in regards to objectively evaluating competency (Hayden et al., 2014). For the qualitative section, a repeated-measure design was incorporated using a pretest/posttest format (David, 2019). For this study, a questionnaire was the method used to obtain a pretest baseline and a posttest endline. A pilot test of the questions was provided to the baccalaureate nursing faculty at the testing university for wording and consistency.

For this study, students in the primary nursing role were evaluated using the NLN's recommended scenario length of 15-20 minutes as care was provided to one patient displaying a disease process reflecting course exemplars. Each of the exemplars were crafted into scenarios by the primary investigator following a standard format. Students were expected to meet standard learning objectives that applied to all scenarios (e.g., proper hand-hygiene, patient assessment, communication, identifying abnormal findings) as well as scenario-specific learning objectives based on unique aspects of the presenting disease.

For this study, two scenarios were created by the primary investigator based on established exemplars for this level of learning. The two scenarios were designed to include clinical judgment elements reflected in the C-CEI evaluation instrument, including:

1. The interpretation of vital signs

2. The interpretation of laboratory values

3. The ability to recognize relevant data from irrelevant data

4. The prioritization of care

5. The ability to perform evidence-based care (including rationale for interventions)

6. The ability to evaluate interventions and outcomes

7. The ability to delegate appropriately and

8. The opportunity to reflect on the experience

Two students were scheduled based on available time slots. One assumed the role of the patient while the other assumed the role of the nurse. Students within the program were familiar with this simulation approach, so orientation was not necessary other than to reiterate the goal of the study. Participants in the nursing role were provided a pretest questionnaire. During this time, the embedded patient assumed their role and reviewed their cue sheet. When the participant in the nursing role was ready, the PI provided a report describing the patient for their assigned scenario.

The report followed a standard hand-off format to retain consistency between scenarios. Participants in the patient role were provided a cue sheet that prompted them on required responses, such as current medications, allergies, past medical history, and current complaints. Laboratory values were available based on the disease process. Students in the nursing role were required to implement the orders from a physician's order sheet appropriate for the disease

encountered and use clinical judgment when prioritizing and carrying out care for their patients. Both scenarios had similar tasks.

The primary investigator was available to the participant in the nurse's role to clarify issues regarding the technical aspects of the scenario and for task delegation. For questions related to the content of the scenario, limited responses or simple yes/no replies were provided to minimize research bias (Curl, Smith, Chisholm McGee, & Das, 2016). Upon the completion of the twenty-minute scenario, the embedded patient was asked to step out of the simulation lab. The PI provided the participant with a posttest questionnaire.

Instrumentation

For this study, two tools were evaluated that measure clinical judgment in a simulated patient care experience:

1. Lasater Clinical Judgment Rubric. This rubric built upon Tanner's clinical judgment model and measured four major dimensions of patient engagement (Lasater, 2007).

2. Creighton Competency Evaluation Instrument (C-CEI). Each component of this model evaluated assessment skills, communication, critical judgment, and communication (Hayden et al., 2014b).

The C-CEI was the instrument selected for this study as it had a separate section on clinical judgment consisting of nine competencies. This instrument was utilized in the landmark NCSBN study on simulation effectiveness as a replacement for clinical hours (Hayden et al., 2014a). Approval to use the instrument was obtained by Creighton University (Appendix C). The primary investigator and a second faculty member who was part of the study viewed the required training videos. The C-CEI is an appropriate tool to assess the expected minimum behaviors in patient assessment, communication, clinical judgment, and patient safety. The C-CEI was designed to evaluate single episodes and, therefore, appropriate for this study.

Sampling Method

The study utilized a repeated-measures design consisting of a pretest/ posttest questionnaire. This survey was administered to participants just before beginning the study, and immediately upon completion. Instructions were provided on the survey questionnaire. The pretest questionnaire (Appendix D) consisted of eight closed-ended questions similar to the CCEI Clinical Judgment competencies and took no longer than five minutes to complete. A Likert scale numbering 1-5 was utilized to record the responses.

The posttest (Appendix E) consisted of the same eight questions. An additional section asked the participant to reflect on their use of clinical judgment during the scenario. The posttest took no more than 10 minutes based on the length of the open response. Both surveys requested a unique identifier used on each instrument for later comparison. A non-parametric hypothesis test was performed to determine if participant's attitudes were different before starting the scenario and upon completion.

For this study, participants were observed and evaluated during their role as the nurse. They were rated as either not demonstrating competency (0) or demonstrating competency (1) in each of the observed behaviors on the C-CEI. Due to the shorter scenario length (15-20 minutes), only the nine competencies under the *clinical judgment* portion of the evaluation instrument were measured.

The study used one evaluator (who was not the primary investigator) to record whether participants were displaying clinical judgment by marking the appropriate area of the C-CEI evaluation tool. This secondary evaluator was a nursing faculty member at the study site familiar with simulation and the course exemplars. Scenarios were observed and scored by the secondary evaluator from a darkened, adjoining control room through a glass window. Bedside interactions were monitored via a two-view video monitor and drop-down microphone. Participants were

made aware of the evaluator's presence and role. Rubrics were kept confidential by the evaluator during scoring.

At the 15-minute mark, participants were notified of the time and asked to complete their immediate task. At the 20-minute mark, they were stopped and asked to complete the clinical judgment posttest using the same unique identifier as the pretest. Once the posttest was complete, participants were thanked for their participation. Participants were informed that after the entire study was completed, they would be invited to a presentation on the findings.

Data Analysis

After each scenario, the rubrics were scored by the rubric evaluator and double-checked by the primary investigator. Each of the nine items were tallied separately by participant. When all data were collected, the combined results were scored to determine the percentage of items completed. Since there was no control group for this study, the results were compared to a minimum competency score of 77% (the passing rate utilized by the institution's nursing program). In a similar quantitative study, Victor et al., (2017) compared their results using the Creighton simulation evaluation instrument (the precursor to the C-CEI), to a passing score of 77%. State boards of nursing do not set minimum competencies for nursing programs. Entry-level competency is based on the successful completion of the NCLEX.

To determine if the results of this convenience sample could be applied to the general population, that is, other nursing programs with similar cohorts, a hypothesis was performed. A null hypothesis (H_0) would state that clinical judgment can be appropriately observed and measured during nursing simulations (using an embedded patient model). The strength of this evidence was measured by calculating the probability or *p*-value. If the results showed that students were not displaying such judgment skills based on the *p*-value, then the null hypothesis would be rejected and the alternative hypothesis (H_a) would be accepted. Hypothesis tests are

done to determine if smaller sample sizes can be representative of larger populations (J. Wagaman, personal communication, March 20, 2019; Stat Trek, 2019). To determine how this analysis was performed, the overall group score, as recorded on the combined C-CEI instruments, was compared to a passing score of 77%. Since the results could be lesser or greater than 77%, a two-tailed test was performed.

In addition to the quantitative element achieved by the C-CEI, participant's pretest and posttest Likert scores were analyzed. The use of the repeated-measures (pretest/posttest) analysis is appropriate for small sample sizes (David, 2019). The open response statement (question #9 on the posttest) was transcribed and coded for emerging themes regarding the participant's perspectives on clinical judgment.

Design Limitations

The sample size was small (22 participants). Participants were a convenience sample and not randomly selected. Participants were from a regional area in the South; thus, the results may not transfer to a larger population. Scenario length was shorter than the participants were used to; this may have affected their plan of care and follow up assessment.

Being observed during the study may have affected the participant's ability to focus on the environmental cues needed to display clinical judgment. Also, participant's clinical judgment may be stronger for one disease process over another. Patient scenarios were designed to reflect state-required course exemplars and theoretical learning objectives required for this level of course work. However, theoretical elements may not have been covered in classroom lectures to the depth of the simulation scenarios.

Transferability. Programs that may seek to reproduce this study may not find equitability in their results if they deviate from the INACSL standards of best practice when designing their simulation space. Programs that utilize a full-immersion, embedded peer patient model may find

similar results. It is unclear whether the study design would present similar findings using high-fidelity human patient simulators.

Conclusion

This chapter provided details on the methods utilized for this study. A mixed-methods approach consisting of a standardized assessment tool (C-CEI) and a repeated-measures design (pretest/posttest) was utilized to evaluate clinical judgment in fourth-year baccalaureate nursing students. Each participant's score was calculated individually and collectively. These findings determined if participants displayed clinical judgment. The self-assessment portion explored if participant's perceptions of clinical judgment were consistent before and after taking part in an embedded simulation scenario. The following chapters will present the findings of those results and the implications for practice and suggestions for future studies.

CHAPTER 4

RESULTS AND OUTCOMES

The purpose of this study was to assess the clinical judgment abilities of baccalaureate nursing students during an embedded (live patient) simulation scenario. Chapter Four presents the findings of this mixed-method study. Details of the statistical analysis methods will be discussed as well as the method used to code the qualitative data. This chapter goes on to describe the demographic data about the participants involved in the simulation scenarios used for this study. The chapter will conclude with how the findings reflect the effectiveness of utilizing embedded participants in short (15 to 20-minute) scenarios to establish clinical judgment.

Analysis Model

The participants were a convenience sample and consisted of second-year baccalaureate students from a regional liberal-arts university in their fourth and final semester before graduation. Two scenarios were created based on the course exemplars for that level of study. The first scenario was a patient presenting with hypovolemic shock. The second scenario was a patient with Guillain-Barre Syndrome, an ascending paralysis condition. Both scenarios were complex and required critical thinking skills to progress through the disease treatment process. No interrater reliability was established as there was only one evaluator grading the scenarios. Before the start of the study, the primary investigator and the second researcher discussed each element of the C-CEI worksheet for clinical judgment. Scenario summary sheets for Guillain-Barre Syndrome (Appendix F) and Hypovolemic Shock (Appendix G) were provided to the second researcher to reference during the study. The summary sheets contained the scenario objectives based on current evidence, a pass-down report, patient cues, lab values, and scenario information.

A total of 22 students volunteered to participate in the study. The cohort size was 24, a participation rate of 92%. Of the 22 participants, two were males (9%), and 20 were females (91%). Participant ages ranged from 21 to 51 (Figure 5). Twenty-two percent of participants were age 21, and 63% were age 22. One percent was age 24, and nine percent were aged 49 or 51. In North Carolina, 76% of BSN students are between the ages of 21 and 25 (Tillman, 2019). For this study, this age group comprised 86% of participants – a difference of 10%. Other demographic data were not gathered for this study.
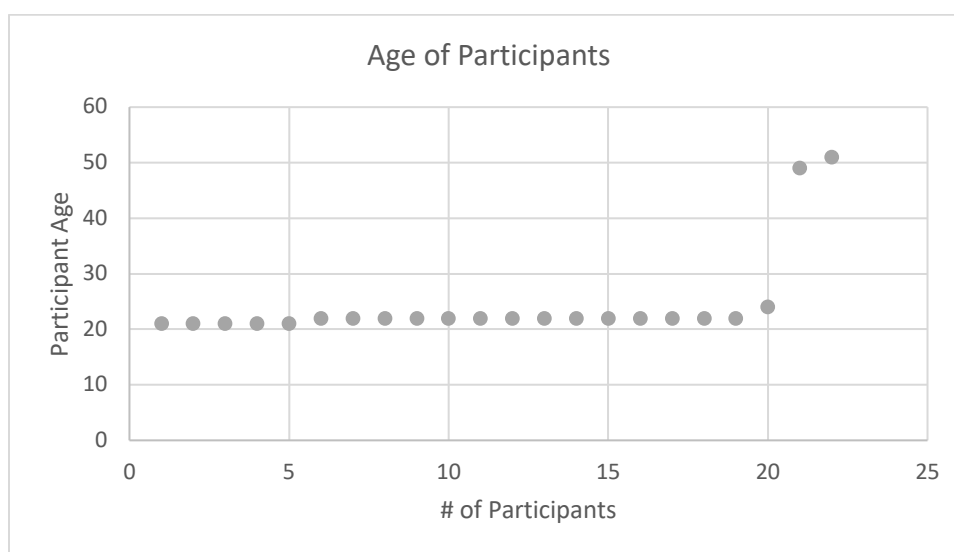

Figure 5. Age of participants (from youngest to oldest).

Participants signed up in pairs for available one-hour sessions. Time slots were based on the student's class schedule and the evaluator's availability. Data were collected over a period of three weeks.

Upon arrival to the simulation laboratory, the pair was asked to decide which participant would be the nurse. The participant in the nurse's role was asked to select one of two clipboards lying upside down on a table. The clipboards contained one of the two medical conditions. Once a scenario was selected, a pre-questionnaire was provided to the participant in the nursing role. The participant was instructed to create a unique code word and include it on the form.

The participant in the patient's role was guided to a designated bed. The 'patient' was provided a cue sheet on the medical condition and how to respond to anticipated questions. A patient gown was provided to wear over their clothes. The bed was set up with an intravenous (IV) pump, a vital signs monitor, an overbed table, resuscitation bag-valve-mask (Ambu-bag), nasal cannula, and a non-rebreather mask. The headwall unit above the bed contained a suction container, a medical-air connection, and an oxygen connection. A patient identification band was placed on the overbed table. The primary investigator created a wall-mounted bedside vital sign monitor display for the condition selected.

Once the participant in the nurse's role completed the pre-questionnaire, they were informed that they would receive a shift report using the 'IPASS' method of verbal handoffs. IPASS reports cover the vital elements of a patient's condition, including illness severity, a patient summary, action list, situation, and synthesis by the receiver (Starmer et al., 2011). After receiving a report on their patient, participants could clarify any statements or ask questions regarding their patient. A paper copy of the physician's orders was provided to the participant after the I-PASS report and before the start of patient care. They were informed that a timer set for 15 minutes would be started when they were ready. At the 15-minute mark, they would be asked to complete the task they were currently completing or just starting. They would have up to five minutes and be stopped at the 20-minute mark.

The participant in the nurse's role had access to a mobile work station containing the patient's electronic medical record (EMR). The primary investigator created an EMR that contained multiple tabs consisting of a *Home* page with the patient's demographics and back story. A *Medical Orders* tab reflected the orders written by the provider. Other tabs included the patient's *Intake and Output*, a *Vitals Sign* tab that reflected the previous shift's vital signs, a *Systems Review* tab for completing a head-to-toe survey, and a *Labs/Tests* tab to display

scenario-specific lab results. The EMR was accessible via the simulation laboratory's web site. The primary investigator designed the web site to replicate a hospital's. Participants could access patient information, policies, resources, forms, normal laboratory test parameters, and other information.

Participants had access to a central supply room with the anticipated supplies required for the scenario. The primary investigator created a medication dispensing system like those found in hospitals with the appropriate medications reflected in the provider's orders. A unique mannequin hand used for starting intravenous (I.V.) fluid therapy was available if requested.

The primary investigator remained in the general area to answer questions or perform delegated tasks but kept enough distance to allow the nurse participant freedom to work independently. The primary investigator was situated in a location to observe both the participant and the secondary investigator performing the data recording.

Participants in the study created a unique identifier to maintain confidentiality. Each participant was assessed using the *Clinical Judgment* section (questions 9-17) of the C-CEI. The questions assessed:

1. The ability to interpret vital signs (temperature, pulse, respiration, blood pressure, and pain).

2. The ability to interpret laboratory values relevant to the condition/disease presented.

3. The ability to recognize and interpret subjective statements made by the patient and objective observations displayed by the patient's actions.

4. The ability to prioritize appropriately for the condition/disease presented.

5. The ability to perform patient care interventions based on current evidence.

6. The ability to provide/display an evidence-based rationale for interventions.

7. The ability to reflect on their clinical experience.

8. The ability to delegated tasks or interventions appropriately.

      Participants were directly observed during their 20-minute assigned scenario by an IRB-approved second researcher. The second researcher acted as the data recorder for the study and observed the scenario from a darkened control room. A C-CEI worksheet was provided to the data recorder for each participant (Appendix H). If the participant demonstrated a C-CEI competency, a score of (1) was marked on the form. If the participant did not demonstrate a required competency, a score of (0) was recorded. There were no 'Not applicable' (NA) entries for the study. If a participant did not initially perform a task but remembered to perform it later, even if it was out of sequence, a point was awarded – for example; vital signs should be obtained early in the scenario, if they were not referenced until the end of the scenario, a point was given.

      At the 15-minute mark, participants were notified that they had up to five minutes to complete the task they were engaged in or about to start. Once they reached the 20-minute mark, the scenario was halted. At this point, the nurse participant was asked to complete the post-questionnaire using the same unique identifier they provided on the pre-questionnaire. The 'patient' was asked to exit the room to allow the investigators to reset and prepare for the next assessment. The same procedure was followed for the second scenario.

      Once the results were obtained from all participants, the scores from the C-CEI evaluation form were entered by the primary investigator into an Excel® spreadsheet reflecting the nine dimensions of the C-CEI form as columns and the number of participants (n) as rows (Table 1).

Table 1

C-CEI Evaluator Results

C-CEI Worksheet Results

CCEI Dimension ↓ Participant # →	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	OB	EX	%	% EX	Var	SD
Clinical Judgment																												
9). Interprets Vital Signs (temp, pulse, resp, bp, pain)	1	1	1	1	1	1	1	1	0	1	1	0	1	1	0	1	1	1	1	1	1	1	19	22	86%	77%	0.1	0.4
10). Interprets Lab Results	0	0	0	1	0	0	0	0	1	0	0	1	0	0	0	0	1	1	0	0	0	0	5	22	23%	77%	0.2	0.4
11). Interprets Subjective / Objective Data	0	1	1	1	1	0	1	1	1	0	1	0	0	1	0	1	1	0	1	1	0	0	13	22	59%	77%	0.3	0.5
12). Prioritizes Appropriately	0	0	0	1	1	1	1	0	1	1	1	0	0	1	1	1	1	1	0	1	0	1	14	22	64%	77%	0.2	0.5
13). Performs Evidence-Based Interventions	0	0	1	1	0	1	1	1	1	1	1	0	0	1	0	1	1	0	0	1	1	1	14	22	64%	77%	0.2	0.5
14). Provides Evidence-Based Rationale for Interventions	1	0	1	1	1	1	1	1	1	1	1	0	0	1	0	0	1	0	0	0	0	0	12	22	55%	77%	0.3	0.5
15). Evaluates Evidence-Based Interventions and Outcomes	1	0	1	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	4	22	18%	77%	0.2	0.4
16). Reflects on Clinical Experience	1	0	0	1	0	0	1	1	0	0	1	0	1	0	0	0	1	0	0	0	0	0	7	22	32%	77%	0.2	0.5
17). Delegates Appropriately	1	1	1	0	1	1	1	0	0	1	1	1	1	1	1	1	1	1	1	1	0	0	17	22	77%	77%	0.2	0.4
Average:	0.6	0.3	0.7	0.8	0.6	0.6	0.9	0.6	0.6	0.6	0.9	0.2	0.3	0.7	0.2	0.6	0.9	0.4	0.3	0.6	0.2	0.3			53%	53%	0.2	0.4
Total Percent (%):	56%	33%	67%	78%	56%	56%	89%	56%	56%	56%	89%	22%	33%	67%	22%	56%	89%	44%	33%	56%	22%	33%		=	53%	53%		

The sum of each dimension *observed* (OB) by participant (as indicated by 1's or 0's) was compared to the maximum *expected* (EX) points (22). Both data sets were also included as a percentage with the *expected* percentage (%EX) equal to the program's pass rate percentage of 77%. Seventy-seven percent is considered a letter grade of 'C' for this program. The variance (Var) and standard deviation (SD) were recorded. Standard deviation and variance consider the variability or dispersion of tested data. The smaller the SD, the closer the average is to a typical score (Polit, 1996).

Table 2

Fisher's Exact Test

Fisher's Exact Test Results					
CCEI	Dimension ↓	Observed #	Expected # *	Total #	Exact Sig. (2-sided)
9).	Interprets Vital Signs (temperature, pulse, respirations, blood pressure, pain)	19	17	22	0.826
10).	Interprets Lab Results	5	17	22	0.038
11).	Interprets Subjective / Objective Data (recognizes from irrelevant data)	13	17	22	0.639
12).	Prioritizes Appropriately	14	17	22	0.815
13).	Performs Evidence-Based Interventions	14	17	22	0.815
14).	Provides Evidence-Based Rationale for Interventions	12	17	22	0.485
15).	Evaluates Evidence-Based Interventions and Outcomes	4	17	22	0.029
16).	Reflects on Clinical Experience	7	17	22	0.126
17).	Delegates Appropriately	17	17	22	1.000
	Total Instrument:	**105**	**153**	**198**	**0.020**

* The expected number of 17 is the equivalent of a passing rate of 77%.

The average and total percent of all dimensions met for each participant were recorded. Pearson's chi-square and Fisher's exact test were performed using IBM© SPSS statistics software (Table 2). Pearson's chi-square test (also called chi-square test of independence) is used to make an inference about the relationship between two variables (Polit, 1996). Pearson's is valid for sample sizes larger than 20 (K. Chen, personal communication, October 24, 2019).

Due to the low expected frequencies of this study (n=22), Fisher's exact test was also run and is reported here. The Fisher's exact test compares *observed* frequencies (in this case, the number of times a clinical judgment dimension was observed), with the *expected* frequencies (the passing score of 77%). The two-tailed exact significance (Exact. Sig. (2-sided)) is also displayed. Two-tailed tests take into consideration both ends of the data distribution (Polit, 1996). The total instrument's sum p-value was 0.02 and was statistically significant.

Due to the sample size (n=22), a power analysis was performed for a two-tailed, binomial test (Figure 6). The results indicate a power of 63.7%, meaning that there was a 63.7% chance of observing a significant difference if there was a real difference (K. Chen, personal communication, October 27, 2019).
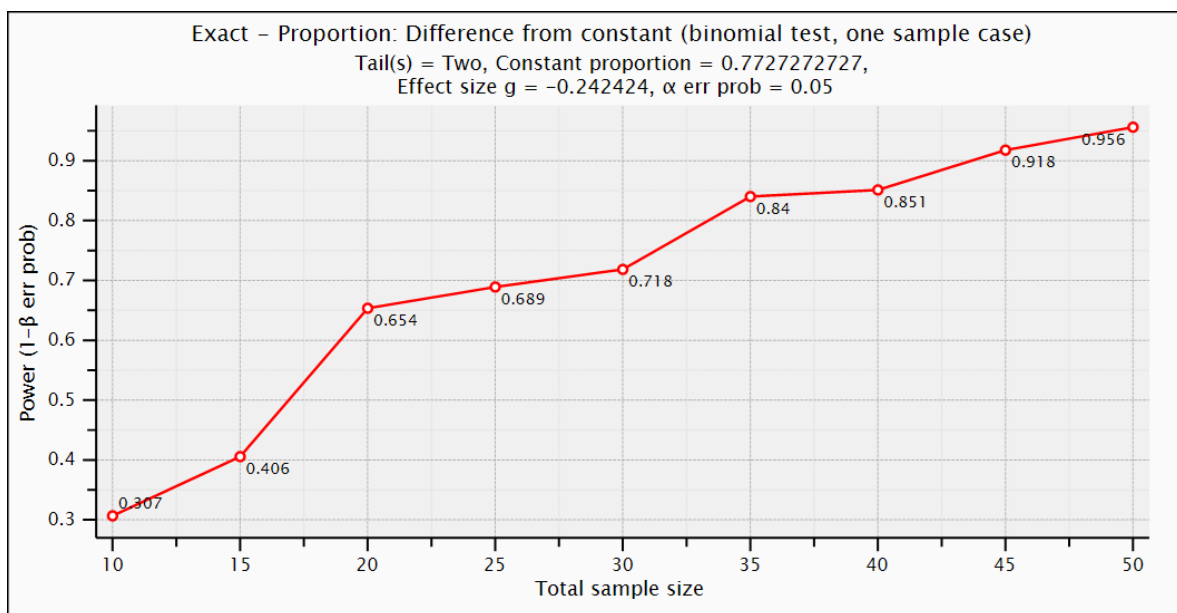

Figure 6. Power analysis for sample size (n=22).

The Likert responses from the pretest questionnaire for each participant were entered into a separate Excel® table (Table 3). Eight questions were included in the five-point Likert scale. Each question represented all but one of the dimensions of the C-CEI evaluation rubric for clinical judgment. Question #16 of the C-CEI evaluation rubric was a post-scenario reflection statement and was not included in the pretest.

The questions asked how the participant thought they would respond in regards to the use of clinical judgment during a scenario. Respondents were asked to score their perception of each of the eight dimensions with (1) being 'not at all true' and (5) being 'very true.' The results reflect the sum of all observed scores (Ob), the expected score (Exp), mean, mode, variance (Var), and standard deviation (SD).

After the scenario, participants were asked to complete the posttest questionnaire in the same manner as the pretest. The eight dimensions were written in past tense to record their perceptions of how they applied clinical judgment during the scenario. The posttest included question #16 from the C-CEI evaluation rubric as an open-reflection response.

Table 3

Participant Pre-test Questionnaire.

Participant PRE-TEST Questionnaire

CCEI#	Clinical Judgment Dimension	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	Ob	Exp	Mean	Mode	Var	SD
(9) 1	Interprets Vital Signs	5	4	4	4	3	5	4	5	4	4	4	4	4	4	5	4	5	5	4	4	5	5	95	110	4.3	4	0.3	0.6
(10) 2	Interprets Lab Results	4	3	3	3	3	3	3	4	3	4	3	3	3	4	4	3	3	4	4	3	3	3	73	110	3.3	3	0.2	0.5
(11) 3	Interprets Subjective / Objective Data)	3	4	3	4	3	4	4	5	4	4	4	3	4	3	4	2	4	4	4	4	4	5	83	110	3.8	4	0.5	0.7
(12) 4	Prioritizes Appropriately	4	3	3	4	4	4	4	4	4	4	4	3	3	3	3	3	4	4	3	3	4	5	80	110	3.6	4	0.3	0.6
(13) 5	Performs Evidence-Based Interventions	2	3	3	3	3	4	3	4	4	4	3	3	3	4	4	3	4	5	4	3	4	5	78	110	3.5	4	0.5	0.7
(14) 6	Provides Evidence-Based Rationale for Interventions	3	3	3	3	3	4	3	4	4	4	3	4	3	3	4	3	4	4	3	4	3	5	77	110	3.5	3	0.4	0.6
(15) 7	Evaluates Evidence-Based Interventions / Outcomes	3	4	3	4	3	4	3	3	4	4	3	4	3	3	3	4	4	4	4	3	4	5	78	110	3.5	3	0.4	0.6
(17) 8	Delegates Appropriately	4	4	4	4	4	4	5	4	4	4	4	4	2	4	3	3	4	3	4	4	4	5	85	110	3.9	4	0.4	0.6
	Individual SUM:	28	28	26	29	26	32	29	33	30	32	28	28	25	28	30	25	32	33	30	28	31	38	649	=	2.8		0.4	0.5
	Likert Mean:	3.5	3.5	3.3	3.6	3.3	4.0	3.6	4.1	3.8	4.0	3.5	3.5	3.1	3.5	3.8	3.1	4.0	4.1	3.8	3.5	3.9	4.8	649	3.7	3.2			
	Likert Mode:	4	4	3	4	3	4	3	4	4	4	4	4	3	4	4	3	4	4	4	4	4	5	=	4	4			

Likert responses from the posttest questionnaire were entered into a separate Excel®
table (Table 4).

Table 4

Participant Posttest Questionnaire Responses.

CCEI#	Clinical Judgment Dimension	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	Ob	Exp	Mean	Mode	Var	SD
(9) 1	Interprets Vital Signs	4	3	4	4	4	4	4	4	4	4	3	2	4	4	3	4	4	4	4	2	5	5	83	110	3.8	4	0.8	16.9
(10) 2	Interprets Lab Results	2	2	2	4	2	3	1	3	4	4	2	4	4	3	2	3	4	3	1	2	2	4	58	110	2.6	2	1.0	11.8
(11) 3	Interprets Subjective/Objective Data	2	3	3	3	2	3	3	3	4	4	2	4	3	4	3	3	4	4	3	3	3	4	70	110	3.2	3	0.7	14.2
(12) 4	Prioritizes Appropriately	3	4	2	3	3	3	4	3	4	3	2	4	4	4	3	2	3	2	3	3	4	3	69	110	3.1	3	0.7	14.1
(13) 5	Performs Evidence-Based Interventions	3	3	3	3	3	3	2	2	3	4	2	3	4	3	3	3	4	5	3	2	3	2	66	110	3.0	3	0.8	13.5
(14) 6	Provides Evidence-Based Rationale for Interventions	3	4	3	3	3	3	2	3	3	4	2	3	3	3	3	3	4	4	3	3	3	3	69	110	3.1	3	0.6	14.1
(15) 7	Evaluates Evidence-Based Interventions / Outcomes	4	3	2	3	3	3	2	3	4	4	2	3	3	3	1	2	4	3	3	2	4	4	66	110	3.0	3	0.9	13.5
(17) 8	Delegates Appropriately	3	3	3	4	3	3	4	4	5	5	2	4	4	4	2	4	5	4	4	3	4	1	78	110	3.5	4	1.0	15.9
	Individual SUM:	24	25	22	27	23	25	22	25	31	32	17	27	27	29	20	24	32	29	24	20	28	26	=	559	2.4		0.5	8.9
	Likert Mean:	3.0	3.1	2.8	3.4	2.9	3.1	2.8	3.1	3.9	4.0	2.1	3.4	3.4	3.6	2.5	3.0	4.0	3.6	3.0	2.5	3.5	3.3	=	3.2	2.7		0.6	10.4
	Likert Mode:	3	3	3	3	3	3	4	3	4	4	2	4	4	4	3	3	4	4	3	2	3	4	=	3	3		0.6	10.4

Participant POST-TEST Questionnaire

A Wilcoxon Signed-Ranks Test was performed. The university's research support center specified that the Wilcoxon Signed-Ranks test is appropriate for comparing Likert responses (Table 5).

Table 5

Wilcoxon Signed-Ranks for Pretest / Posttest Responses

Pretest-Posttest by Participant				
Pretest	Posttest	Difference	Absolute Value of the Difference	Rank of Abs Diff
25	27	-2	2	5
30	31	-1	1	1
28	29	-1	1	2
32	32	0	0	0
32	32	0	0	0
28	27	1	1	3
25	24	1	1	4
29	27	2	2	6
28	25	3	3	7
26	23	3	3	8
31	28	3	3	9
28	24	4	4	10
26	22	4	4	11
33	29	4	4	12
30	24	6	6	13
32	25	7	7	14
29	22	7	7	15
33	25	8	8	16
28	20	8	8	17
30	20	10	10	18
28	17	11	11	19
38	26	12	12	20

Sum + Ranks	202
Sum - Ranks	8
N (n)	22
W Statistic	8
W Critical (a - 0.05)	66
Null Hypothesis	Reject

Open responses were transcribed and coded based on the study's two research questions and overarching themes. Free-text comments from all participants were transcribed verbatim from the posttest into a separate document. Most of the replies were two to three sentences. The responses assisted the primary investigator in identifying thematic elements in regards to the two simulation scenarios. During the open coding phase, distinct concepts were explored and separated into master headings and subheadings (Biddix, 2009). During the axial coding phase, the topics were analyzed for additional emerging themes.

Presentation of Results

A mixed-methods approach was utilized in this study to evaluate clinical judgment in fourth-year baccalaureate nursing students. Clinical judgment was assessed during a 15-20 minute embedded (peer) patient simulation scenario.

Quantitative Findings

C-CEI Results. For the quantitative section of this study, a Fisher's exact test was performed for the C-CEI Clinical Judgment evaluation instrument. The results returned a *p*-value of .02 for the entire C-CEI (all nine dimensions). The alpha level (α) was .05 and considered significant. Therefore, the null hypothesis (H_0) for research question #1 was rejected. The H_0 postulated that *participants would display clinical judgment during an embedded patient scenario.* The results from this study indicate that the alternative hypothesis (H_a) should be accepted – that *satisfactory clinical judgment was not displayed during the simulation scenario.*

Of the tasks included in the C-CEI, only two dimensions met or exceeded the program's passing rate of 77% (Figure 7). *Vital signs* were properly interpreted by 86% of participants. *Appropriate delegation* was observed in 77% of participants. The dimensions with the two lowest observed scores were *Evaluating interventions and outcomes* (18%) and *Interpreting lab results* (23%).
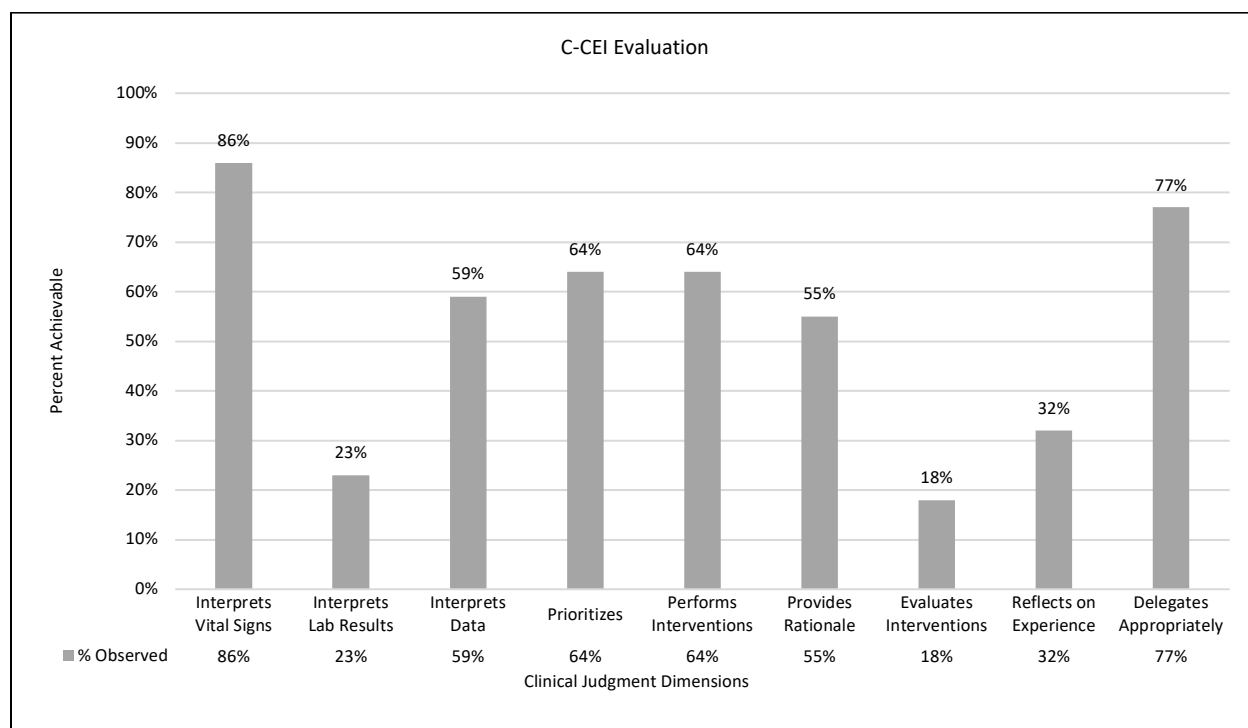
Figure 7. The percent of dimensions achieved in each of the nine C-CEI dimensions observed.

Pretest/Posttest Questionnaire. The pretest questionnaire responses completed by participants before each scenario were compared to the self-reported posttest scores following the scenario (Figure 8). Participants rated their pretest clinical judgment higher in every dimension over that of their posttest clinical judgment abilities (difference of 13.8%). The dimension with the narrowest difference was the ability to delegate appropriately (7%). The widest difference was the ability to interpret laboratory values (15%).
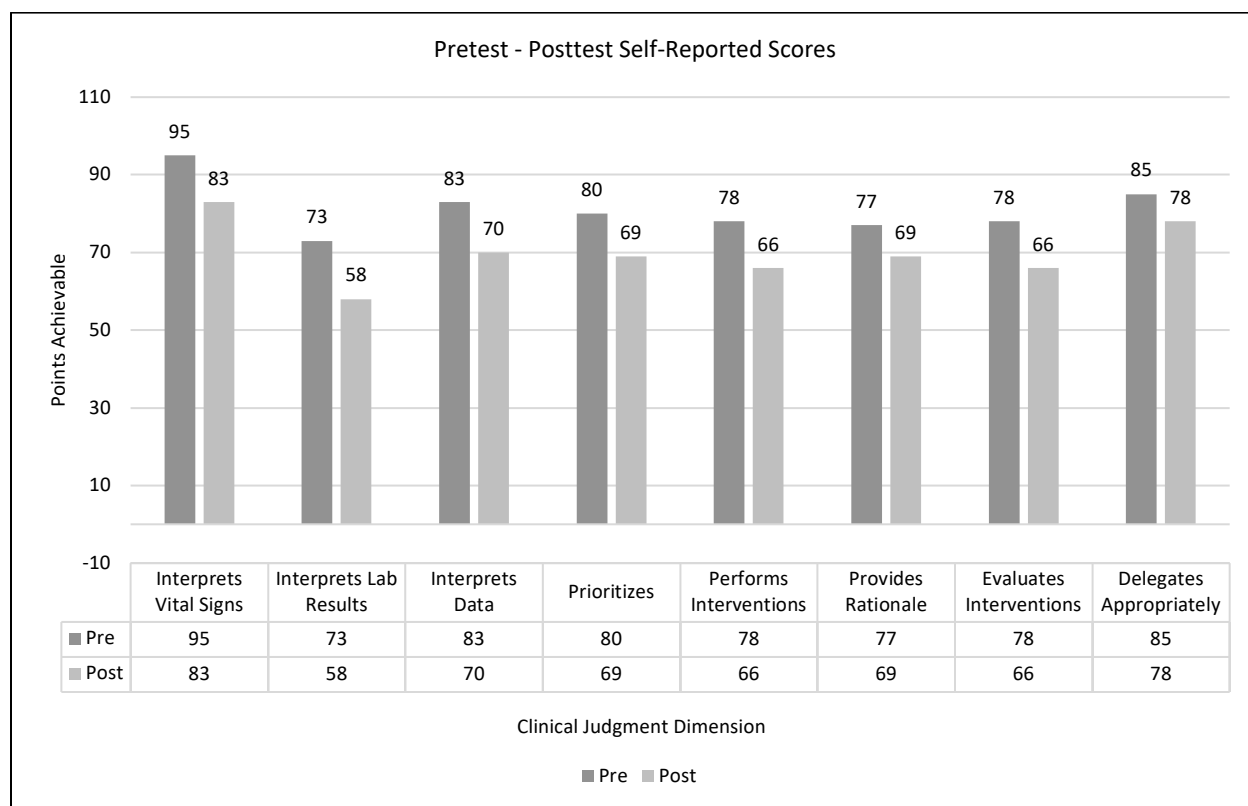
Figure 8. Pretest/posttest Likert self-scoring comparisons based on the eight C-CEI dimensions.

The expected outcome of this portion of the study's quantitative section was that

student's perceptions of applied clinical judgment would be enhanced during an embedded

nursing simulation scenario. The Wilcoxon Signed-Ranks test showed a statistically significant

difference between the two exams (W Statistic = 8 and W Critical = 66). These data suggest that

the null hypothesis (H_0) for research question #2 should be rejected and the alternative

hypothesis (H_a) should be accepted:

H_a: Participants indicated a decrease in clinical judgment following a simulated patient

care scenario.

Qualitative Findings

During the open coding phase, two significant themes emerged. *Judgment (or judgement)*

was mentioned or referenced 12 times by the 22 participants. *Time,* as it applied to the length of

the scenario, was mentioned 13 times. During the axial coding phase, repeated themes were

grouped. For example, there were nine words *(stress, difficult, overwhelmed, nervous,* and other feelings) that were subcategorized under *Emotions*.

Similarly, seven comments were subcategorized under the heading of *Task Priorities*, and six under *Missed Opportunities* (such as *could have* or *should have*). Some sub-categories overlapped and fit in more than one category. Since the open-ended response asked the participants to reflect on their critical thinking abilities, the first theme to emerge was on the application of clinical judgment.

Clinical Judgment. When considering the nurse's decision-making process, Gazarian, Henneman, and Chandler (2010) noted that clinical reasoning is impaired when clinical situations unfold rapidly. They also stated that the ability to intervene with at-risk patients is based on previous experience and teamwork. An example from a participant: 'I think my clinical judgment was a bit cloudy in 15 minutes. It is hard to complete everything I know is necessary for this patient. In an attempt to rush and complete my big task, I completely forgot simple things' (Participant #10).

This cohort of students was used to working as a team with their peers during simulation experiences. In regards to lack of peer support during this study, one participant commented, 'I felt a little lost and not confident in my skills and knowledge for this disease process. Even though I had support I felt alone and unsure of what to do. I feel like my nerves got the best of me' (Participant #16).

Returning to Benner's clinical competence model, the novice nurse, who has no experience in the situation they are exposed, lacks the confidence to demonstrate judgment (Benner, 1984). A nurse's clinical judgment is influenced by practical experience (Lasater, 2007). One student commented on their approach when caring for a patient with Guillain-Barre Syndrome for the first time: 'I felt like I barely accomplished anything. The main concern for

today was pain & seeing if paralysis ascended more, so I tried to make sure I gave pain medication & noted that swallowing was a new problem she was having. I felt like my clinical judgement was decent, but there are still things I can work on' (Participant #4).

Another participant commented on their application of clinical judgment while attending the patient in hypovolemic shock: 'I felt that I may have needed to focus more on [the] patients comment of being tired. Administering fluid may have helped with blood pressure and heart rate, so I administered that medication first. Implementing oxygen, tele [telemetry], and position helped with vital signs and assessment. I did not consider lab values during assessment. Doing so may have changed the approach of care. Overall, I could have used a rounded approach by observing all signs & symptoms' (Participant #17).

Time (scenario length). Part of the AACN's 2020 vision for academic nursing is to prepare graduates for the evolving changes in healthcare. These learning opportunities should include clinical and simulated immersion experiences in real time (Pacini et al., 2019). One participant noted the difficulty of applying critical thinking skills during a shortened scenario: 'I feel that I used clinical judgement fairly well. However, 15 minutes is a very short time to get all of my thoughts together. I feel that with more time it's much easier to put everything in order. I don't feel that I used my critical thinking skills as well as I could have if I would have had more time. I definitely feel that I missed some things that usually I could catch' (Participant #13).

Victor et al., (2017) state that simulation-based learning needs to be realistic and mimic the clinical experience. They stipulate that performance in simulated activities to expected to carry over to behaviors in clinical practice. Short scenario lengths do not allow clinical judgment to develop. Therefore, it cannot be expected that students will display clinical judgment in the hospital setting if they are not allowed to develop their critical thinking in a safe environment. One student reflected that sentiment: 'I felt the pressure tremendously from the time-crunch and

feel that I struggled w/ thinking clearly and accomplishing the tasks in the time provided' (Participant #11).

Another example demonstrates critical thinking and how extended scenario times would have allowed a continued plan of care: 'Going in to this scenario, I was concerned for falls and urinary output. I wanted her vitals to keep a baseline for her current condition and I wanted to start fluids immediately to replace what she had thrown up and hopefully get some output so I can assess kidney function. I would have liked to get a set of orthostatics [vital signs] on her, and I would have liked to be able to get all her meds to her' (Participant #22).

Emotions. Many of the comments regarding emotions were emblematic of the shortened scenario length. However, returning to the idea that the prefrontal cortex is underdeveloped in this age group, Arain et al., (2013) reported that emotions are also developing as part of the cognitive process. Burbach et al., (2015) stated that situational control in a stressful environment implies that the nurse has mastered their emotions and actions.

This study was framed on Khalili's (2015) clinical simulation practise [sic] framework. Part of that framework was to provide a "positive, reflective and fun simulated learning environment" in "challenging, but realistic" scenarios (p. 32). Students within the nursing program attended simulation labs as part of their clinical experience. They have adapted to the embedded patient model and have strived to perform at the same level as expected during a clinical rotation. Their comments reflected the complexity of the patients and the difficulty in providing the necessary care in the condensed time allotment. 'This model is great for learning experiences both for yourself and how others do when treating you as a patient. This short period of time was difficult and I much rather enjoy the longer time periods' (Participant #2).

The expressed emotions from participants due to a challenging scenario was apparent. However, Kahlili's first dimension of *providing a fun environment* was not reported. The

framework's goal was to provide a learning space that bridged theory and practice. This study showed that this framework might not be suitable for shorter scenarios or as a foundation for high-stress clinical judgment assessments. An example from Participant #1 reflects this: 'Stressful. I remembered the key points of Guillian [sic] Barre Syndrome but couldn't remember task by task what I needed to do for tx [treatment].'

Priorities. Clinical competency includes prioritization of care (Herleth, 2019). Tanner (2006) describes multiple factors that influence clinical judgment when prioritizing tasks. When the NCSBN began designing the *Next Gen* NCLEX exam, they included prioritizing patient concerns as part of their definition for clinical judgment (Grossenbacher, 2018). In Benner's (1985) classic Novice to Expert model, novice nurses have not developed the ability to understand which tasks are most relevant.

The appropriate priority of care was referenced or alluded to seven times. However, proper prioritization was observed only 64% of the time. Each scenario consisted of a physician's order sheet with a minimum of four tasks and three medications. Due to the short scenario length, and the number of tasks that needed to be completed, participants prioritized which interventions were most important in their opinion, but not necessarily what was best for the patient.

One student commented with the following: 'I think I had the right intention to fulfill tasks in the right order/by priority, but I got flustered by time. From what I did I feel I used good clinical judgement by assessing first, asking for clients main concern, starting O2 + starting to get together correct meds + calculations to administer' (Participant #8). Participant #7 stated succinctly, 'I was so nervous about the time and everything needing to be done, that it was hard to remember what I needed to prioritize.'

Missed opportunities. Tanner (2006) states that "[a]s in any situation of uncertainty requiring judgment, there will be judgment calls that are insightful and astute and those that result in horrendous errors. Each situation is an opportunity for clinical learning…" (p. 209). Participant #21 reflected on missed opportunities with the following: 'I believe I applied clinical judgement, but it's difficult to assess myself. I felt like I was looking for my preceptor but didn't have one. I would've looked up the disease Guillain Barre and looked over the provider notes before entering the room.'

Lasater (2007) emphasizes the importance of reflection and the opportunity it provides in allowing novice learners to sort through their learning using exploration. The AACN's vision for academic nursing states that education should "…include strategies that engage the learner in challenging and purposed learning, and where reflection on that learning is incorporated" (Pacini et al., 2019, p. 5). Participant #3 summarized this by saying, 'I used my clinical judgment to determine what interventions were necessary & why I was implementing them.'

Conclusion

Clinical judgement was displayed in select dimensions of the C-CEI instrument, but overall satisfactory clinical judgment was not displayed during the simulation scenarios. Before beginning the scenarios, participants perceived their ability to meet the listed dimensions for clinical judgment with a mean of 3.7 (mode of 4) on a 5 point Likert scale. Upon completion of the scenarios, participant's self-perceived confidence in applying clinical judgment decreased to a mean of 3.2 (mode of 3) on a 5 point Likert scale.

Faculty observation of the required dimensions were displayed, on average, 53% of the time. Four participants demonstrated minimum competency in clinical judgment based on a 77% passing rate (participant 4 at 78% and participants 7, 11, and 17 at 89%). Two of the nine

dimensions met the 77% passing grade (interpreting vital signs at 86% and delegating appropriately at 77%).

      Participant comments reflected findings in the literature regarding clinical judgment and the need for adequate scenario length. Also, students shared emotional components, the need for prioritizing care, and a realization of missed opportunities.

CHAPTER 5

CONCLUSION

This chapter presents an overview of the study, including conclusions drawn from the data presented in Chapter Four. It will conclude with a discussion of the implications for nursing education, nursing practice, and recommendations for future studies.

Summary of the Study

The purpose of this study was to evaluate the clinical judgment of students in their senior semester of a baccalaureate nursing program. The study utilized Creighton's competency evaluation instrument (C-CEI), a pretest/posttest questionnaire, and open response comments. The method utilized peer patients in a twenty-minute simulated patient care scenario. Khalili's (2015) clinical simulation practise [sic] framework guided this study's methodology.

Overview of the Problem

The ability to apply critical thinking to clinical applications is a necessary trait for nurses. Measuring this higher-order construct in the student nurse is a challenging endeavor. Upon graduation, all nursing students must successfully pass the NCLEX licensure examination. Changes to the NCLEX exam will include questions on clinical judgment. To prepare students for this change, nurse educators must find new ways to teach and assess critical thinking skills.

Purpose Statement and Research Questions

The purpose of this study was to evaluate clinical judgment in fourth-year baccalaureate nursing students during an embedded patient simulation scenario. The research questions that guided this study were:

1. Using Creighton's Competency Evaluation Instrument (C-CEI®), do students display clinical judgment while caring for an embedded patient during a nursing simulation scenario?

2. Are student perceptions of applied clinical judgment enhanced during an embedded nursing simulation scenario?

Interpretation of Findings

The results of this study indicate that clinical judgment cannot be adequately displayed in shorter simulation scenarios in smaller cohort sizes. Participants also have stated that there was not enough time to perform the necessary elements needed to establish clinical competency. From an observational point of view, it was challenging to assess clinical judgment by observation alone. For example, a participant may have accessed a patient's vital signs or viewed the laboratory reports, but there was no way to assess what interpretations occurred after accessing the information. In comparison, participants may have demonstrated actions that mirrored clinical reasoning, but were just performing tasks in correct order by happenstance.

Participant's perception of their ability to clinically reason was rated higher pre-scenario than post-scenario. This suggests that students were developing assertiveness and confidence based on their past performances in the simulated or clinical environment. Lower posttest scores suggest that, when faced with a new and complex patient care scenario, confidence in their skills and critical thinking ability dropped.

Khalili's (2015) clinical simulation practise [sic] framework supported the study's method and environment. The tool was designed to improve a student's confidence and competence by interactively bridging theory with practice using three dimensions. The first dimension promoted a positive learning environment. The second dimension called for challenging scenarios. The third dimension focused on patient-centered practice. The stress experienced by many of the participants due to the realism (dimension #2) conflicted with the positive and fun element of dimension #3.

Findings Related to the Literature

One of the first challenges graduate nursing students face after graduation is the NCLEX licensing examination. This exam is the entryway to a nursing career. Currently, the NCSBN, which oversees the NCLEX exam, is performing a pilot study with NCLEX test takers on clinical judgment.

In 2023, the NCLEX exam will assess clinical judgment abilities. Currently, the NCLEX exam uses multiple choice or multiple response questions. The current exam focuses on safe practices; however, the next generation (Next Gen) exams will focus more on critical thinking and decision making in nursing practice (Paton, 2019). The NCSBN has released prototypes of the test items. These prototypes deviate from the multiple-choice format and utilize a wide variety of testing modalities, including case studies (Brenton, 2019).

Case studies are projected to begin with a short vignette of the problem, supplemented with nurse's notes. Test participants will be required to click on data requiring follow up (such as vital signs or client statements). Candidates will be required to complete sentences using a drop-down option of specific word choices. Drag and drop questions may require examinees to select appropriate actions or sequential steps when considering care for a client, or to click a hot button on findings that may be effective, ineffective or unrelated (Brenton, 2019).

These prototype questions are currently being tested as part of a special research section following the exam (Grossenbacher, 2018). The data collected will allow the NCSBN to determine scoring rules, item legitimacy, and how much time candidates spend on each question (Benton, 2019). It is unknown at this time how effective this new methodology will be. The test writers may find it difficult to assess clinical judgment in a standardized, national exam. The results of this study suggest that shorter scenario lengths may not be sufficient to adequately predict success for NCLEX candidates in this domain.

There was a shortage of information on the use of embedded (peer) patients in simulation. One similar study by Beroz (2016) explored the performance outcomes of senior nursing students. Though the type of patient was not mentioned (high-fidelity or embedded), the method was similar to this study. A complex scenario was utilized to assess skill performance. Results indicated that 25% of the students were unable to identify subtle cues of patient complications. For this study, 41% did not correctly interpret subjective or objective data. Almost 42% in Beroz's study were unable to demonstrate critical thinking and decision making. In this study, 47% of participants were unable to demonstrate clinical judgment. It should be noted that Beroz's study used a different measuring instrument and results may not be comparable.

It was difficult to compare the scenario length in this study (15-20 minutes) with others in the literature in regards to clinical judgment. Scenarios of shorter time lengths that included critical thinking focused on additional elements or used human patient simulators. For example, in a qualitative study by Ertmer et al., (2010), the 15-minute embedded model scenarios investigated *reflection* as an expression of critical thinking. A study by Guhde, (2011) utilized 30 minute scenarios to compare simple and complex high-fidelity simulation and used mannequins in assessing critical thinking

This study supported the findings of Hayden et al., (2014) NCSBN study on simulation effectiveness, that 15-30 minute scenarios may not be effective and that more extended periods are needed. By utilizing a variety of simulated patient encounters in longer scenarios, students can practice the complexities of evaluating and responding to environmental cues that help develop the critical thinking skills needed to best benefit the patient in a given situation.

Unexpected Findings

During these full immersion scenarios, it was relatively easy to observe performed tasks. Leadership traits were observed by how effectively delegation occurred. Priority of care could be observed by which tasks were performed first. What was difficult was the ability to quantify how these observations were based on critical thinking and clinical judgment skills.

As the primary investigator, it was difficult not to engage the participant and guide them to a conclusion based on experience instead of allowing their own experiences to develop through practice. Without that guidance, participants appeared reluctant or unsure of their process. Students in the nursing program were used to working out problems with their peers. Lack of dialogue between the investigators and the participants created a barrier to collaborative decision making.

It was surprising how many dimensions of the C-CEI were below the minimum competency criteria – especially *prioritizing care* and *performing evidence-based interventions*, which was a heavy focus of the curriculum. It was equally surprising that in the last semester of the program, participants ranked their perceived clinical judgment abilities lower than anticipated going into the scenarios and higher than expected coming out.

Implications for Practice

The NCSBN study on NCLEX exam effectiveness stated that only 20% of employers were satisfied with the decision skills of novice nurses (Grossenbacher, 2018). Hayden, Smiley, Alexander, Kardong-Edgren, and Jeffries, (2014) stated that only 10% of employees believed that new graduates were ready for practice. However, they also stated that 90% of nurse educators believed that they had properly prepared their graduates for practice.

Based on this study, when considering simulation as a preparation for clinical experience, short simulation times are not sufficient for assessing clinical reasoning in the baccalaureate

student. To better prepare graduates for entry to practice, longer scenario times may help develop the critical thinking capabilities of novice nurses.

The prefrontal cortex, which is responsible for cognitive analysis, emotions, and abstract thought, is not fully developed until the age of 25 (Arain et al., 2013). Nursing instructors need to account for this lack of maturation and guide students in organizing thoughts, problem solving, and forming strategies (Arain et al., 2013). Clinical instructors may need to remind employers that clinical reasoning will develop overtime as the novice nurse hones their skills with exposer to repeated situations.

One commonly used nursing skills textbook identifies over 250 distinct skills the nurse must master (Smith, Duell, Martin, Aebersold, & Gonzalez (2017). Educators cannot teach every skill the graduate nurse will need to be successful. Educators must begin teaching critical thinking early in a program and weave that instruction throughout the curricula. This will allow students to clinically reason through new skills and tasks.

 The AACN's vision for academic nursing includes the transition of nursing programs to competency-based education and assessment (Pacini et al., 2019). It is imperative that nursing programs design assessment strategies that measure competence through critical thinking. These competencies need to encompass didactic, simulated, and clinical learning opportunities (Pacini et al., 2019). The AACN's vision also emphasizes the development of innovative learning methods. This directive includes "high risk, low volume clinical experiences through a mix of simulated and real-life field training" (p. 2).

Similarly, the AACN's (2008) paper on the essentials of baccalaureate nursing includes the necessity for simulated experiences that augment clinical learning. The AACN paper stated reality-based simulations increase role development. The paper goes on to say, within the same paragraph, that "patient care experiences with actual patients form the most important

component of clinical education" (Martin et al., 2008, p.34). If these patient encounters are performed in simulation, the scenario time should be of sufficient length to allow for reasoning in transition to occur. In other words, scenarios cannot just focus on the nursing process of assessing, planning, and implementing care, there must be enough time allotted to allow for evaluation of that care – in as close to real time as possible. This will help prevent what the NCSBN (2009) calls *negative transfer*. Negative transfer refers to learning something incorrectly due to an improperly designed simulation. The primary investigator referenced a similar phenomenon earlier in this paper known as *simulation syndrome*. This occurs when the participant is instructed to make allowances for simulation limitations, but is expected to recognize and differentiate between simulated findings and real treatment considerations.

The embedded model employed in this study meets the AACN's objectives. The model augments clinical learning and has shown to be useful in measuring clinical judgment. The embedded peer model also provides live patient care experiences close to the clinical environment with statistical significance when used in conjunction with a tested evaluation rubric and scenarios that adhere to INACSL standards.

Simulation has been shown to be effective in preparing graduates for transition to practice. Hospitals need to step up to the plate and better integrate in-situ simulations for new-hire graduate nurses (Twibell et al., 2012). Such embedded simulations will allow novice nurses to strengthen their skills and clinical judgment in the venue where they practice, while utilizing the technology and resources of their newly adopted healthcare setting.

Recommendations for Future Research

Hayden et al., (2014) reported that the ratings achieved using the C-CEI were slightly higher in the simulation environment when compared to the clinical environment. This may be due to clinical faculty having to divide their time amongst multiple students, or focusing on

single skill sets such as passing medications (Hayden et al., 2014). Future studies may want to utilize the complete C-CEI evaluation rubric (or other validated instrument) for more extended (1-2 hour) scenarios. A more robust evaluation would better assess patient contact over time. Additional studies might focus on how simulation enhances clinical judgment from one semester to the next or from the final semester to the graduate nurse's first year of practice.

Conclusion

Nurse educators are tasked with preparing students for entry-level competency. Nursing students are facing a technologically-challenging profession that is innovative and on the cutting-edge of patient care. The healthcare industry is facing a shortage of experienced nurses as an aging workforce retires and is replaced by younger, novice nurses, whose cognitive abilities are not fully developed. With the exponential growth of technology in healthcare, entry-level nurses are expected to enter the profession with greater knowledge and skill sets to be considered competent.

Clinical reasoning skills will be necessary to adapt to the ever-changing landscape of healthcare. Active clinical experiences in a variety of patient-care settings, supplemented by robust, well-designed simulation scenarios of appropriate length, can assist the graduate nurse in developing their clinical judgment as they enter this new and dynamic profession.

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Appendix A

Creighton Competency Evaluation Instrument (C-CEI)

Creighton Competency Evaluation Instrument (CCEI)

	0= Does not demonstrate competency 1= Demonstrates competency NA= Not applicable	Date: ___/___/___ MM / DD / YYYY

Student Name: _____
Staff Nurse Instructor Name: _____

Circle Appropriate Score for all Applicable Criteria -
If not applicable, circle NA

COMMENTS:

ASSESSMENT			
1. Obtains Pertinent Data	0	1	NA
2. Performs Follow-Up Assessments as Needed	0	1	NA
3. Assesses the Environment in an Orderly Manner	0	1	NA
COMMUNICATION			
4. Communicates Effectively with Intra/Interprofessional Team (TeamSTEPPS, SBAR, Written Read Back Order)	0	1	NA
5. Communicates Effectively with Patient and Significant Other (verbal, nonverbal, teaching)	0	1	NA
6. Documents Clearly, Concisely, & Accurately	0	1	NA
7. Responds to Abnormal Findings Appropriately	0	1	NA
8. Promotes Professionalism	0	1	NA
CLINICAL JUDGMENT			
9. Interprets Vital Signs (T, P, R, BP, Pain)	0	1	NA
10. Interprets Lab Results	0	1	NA
11. Interprets Subjective/Objective Data (recognizes relevant from irrelevant data)	0	1	NA
12. Prioritizes Appropriately	0	1	NA
13. Performs Evidence Based Interventions	0	1	NA
14. Provides Evidence Based Rationale for Interventions	0	1	NA
15. Evaluates Evidence Based Interventions and Outcomes	0	1	NA
16. Reflects on Clinical Experience	0	1	NA
17. Delegates Appropriately	0	1	NA
PATIENT SAFETY			
18. Uses Patient Identifiers	0	1	NA
19. Utilizes Standardized Practices and Precautions Including Hand Washing	0	1	NA
20. Administers Medications Safely	0	1	NA
21. Manages Technology and Equipment	0	1	NA
22. Performs Procedures Correctly	0	1	NA
23. Reflects on Potential Hazards and Errors	0	1	NA

COMMENTS

Total: _____
Total Applicable Items: _____
Earned Score _____

Revised for DEU use 8/20/2013

CLINICAL JUDGMENT			
9. Interprets Vital Signs (T, P, R, BP, Pain)	0	1	NA
10. Interprets Lab Results	0	1	NA
11. Interprets Subjective/Objective Data (recognizes relevant from irrelevant data)	0	1	NA
12. Prioritizes Appropriately	0	1	NA
13. Performs Evidence Based Interventions	0	1	NA
14. Provides Evidence Based Rationale for Interventions	0	1	NA
15. Evaluates Evidence Based Interventions and Outcomes	0	1	NA
16. Reflects on Clinical Experience	0	1	NA
17. Delegates Appropriately	0	1	NA

Appendix B:

IRB Approval Letter

UNE | UNIVERSITY OF NEW ENGLAND

Institutional Review Board
Mary DeSilva, Chair

Biddeford Campus
11 Hills Beach Road
Biddeford, ME 04005
(207)602-2244 T
(207)602-5905 F

Portland Campus
716 Stevens Avenue
Portland, ME 04103

To:	David Wells
Cc:	Bill Boozang, Ed.D.
From:	Lliam Harrison, M.A., J.D. CIM
Date:	August 7, 2019
Project # & Title:	19.07.24-019 Assessing Clinical Judgment Utilizing Embedded Patients in a Baccalaureate Nursing Program's Simulation Laboratory

The Institutional Review Board (IRB) for the Protection of Human Subjects has reviewed the materials submitted in connection with the above captioned project and has determined that the proposed work is exempt from IRB review and oversight as defined by 45 CFR 46.104 (d)(1).

Additional IRB review and approval is not required for this protocol as submitted. If you wish to change your protocol at any time, including after any subsequent review by any other IRB, you must first submit the changes for review.

Please contact Lliam Harrison at (207) 602-2244 or wharrison@une.edu with any questions.

Sincerely,

William R. Harrison, M.A., J.D. CIM
Director of Research Integrity

IRB#: 19.07.24-017
Submission Date: 07/24/19
Status: Exempt, 45 CFR 46.104 (d)(1)
Status Date: 08/07/19

Appendix C

Agreement for use: C-CEI Instrument

Agreement for use of the Creighton Competency Evaluation Instrument (C-CEI©)*
"I understand that I have been granted permission by the creators of the C-CEI© to use the C-CEI© for academic and/or research purposes. https://blueq.co1.qualtrics.com/jfe/form/SV_djaI0k51Gbao1V3

* Upon agreeing to the conditions, the C-CEI© downloads for use.

Appendix D

Participant Pretest Instrument

Participant Pretest

Please provide a unique identifier that is known only to you: _____

(You will use this identifier again on the POSTTEST)

The following questions relate to your ability to use clinical judgment during simulated patient scenarios for your level of training. Different people have different perceptions regarding clinical judgment, and we would like to know how true each of these perceptions is for you. There are eight statements related to clinical judgment. Using the Likert scale, please indicate how true each of the statements are for you:

1	**2**	**3**	**4**	**5**
Not at All True		Somewhat True		Very True

_____ 1. I believe that I can properly interpret a patient's vital signs (temperature, pulse, respirations, blood pressure and pain).

_____ 2. I believe that I can adequately interpret basic lab results (e.g. Complete Blood Count, Basic Metabolic Panel) to guide my care.

_____ 3. I believe that I can recognize the difference between relevant and irrelevant subjective and objective patient data.

_____ 4. I believe that I can prioritize patient care appropriately.

_____ 5. I believe that I can perform evidence-based patient care interventions.

_____ 6. I believe that I can provide rationale for evidence-based interventions.

_____ 7. I believe that I can evaluate evidence-based interventions and outcomes.

_____ 8. I believe that I can delegate appropriately.

Appendix E:

Participant Posttest Instrument

Participant Posttest

Please provide the unique identifier that you used on the PRETEST: _____

The following questions relate to your perception as to how you used clinical judgment during a simulated patient scenario. Different people have different perceptions regarding clinical judgment, and we would like to know how true each of these perceptions is for you. There are eight statements related to clinical judgment. For the POSTTEST, there is an additional free-response statement. Using the Likert scale, please indicate how true each of the statements are for you:

1	**2**	**3**	**4**	**5**
Not at All True		Somewhat True		Very True

_____ 1. I believe that I properly interpreted the patient's vital signs (temperature, pulse, respirations, blood pressure and pain).

_____ 2. I believe that I adequately interpreted basic lab results (e.g. Complete Blood Count, Basic Metabolic Panel) for my patient.

_____ 3. I believe that I recognized the difference between relevant and irrelevant subjective and objective patient data.

_____ 4. I believe that I prioritized patient care appropriately.

_____ 5. I believe that I performed evidence-based patient care interventions.

_____ 6. I believe that I provided rationale for evidence-based interventions.

_____ 7. I believe that I evaluated evidence-based interventions and outcomes.

_____ 8. I believe that I delegated appropriately.

9. Please reflect on your application of clinical judgment during this simulation experience (use the backside of this form, if necessary).

_____

_____

_____

_____

Appendix F:

Scenario Summary Reference Sheet

Guillain-Barre Syndrome

Causes
Unknown. Appears after germ or viral infection. Immune system is attacked (IgM response). Symptoms may last 2 weeks to 1 month and should resolve.

Symptoms
- Muscle weakness
- Pins & Needles in hands / feet
- Malaise
- (Temporary) ascending paralysis

Treatment
- Immunoglobulin (IVIG) [the scenario approach], or plasmapheresis
- Consider lumbar puncture (CSF will be high in protein)

Nursing Considerations
1. **Respiratory assessment (O2 sat is low)**
2. **Cranial nerve check (scenario has patient with some facial nerve involvement)**
3. **Thorough neurological assessment (lower extremity paresis)**
4. **Pain management**
5. **Vent management possibility for the teaching topic**

Provider's Orders
- Telemetry is on Order sheet but should be a LOW priority

The standardized patient for this scenario is:

Name:	**Jessie Cotwell ♂ or ♀**
Dr.:	**Aaron Morgan, D.O.**
Patient Number:	**120562 Bed 1 (May run simultaneously with Bed 3)**
Birthday:	**04/24/1972**

Scenario I.D. Bands – Bed 1 Patient

Patient Name:	__COTWELL, Jessie_____
Date of Birth:	__05-24-1972___ Age__43___
Room / Bed #:	__327-1_____ Sex ___F___
Med Rec #:	__120562_____

COTWELL, JESSIE

Scenario Notes – Gullain-Barre Syndrome

Nurse's Pass-down Report (start of shift)		

Nurse's Pass-down Report (start of shift)

I - "This is Jessie Cotwell his/her illness severity is 'watcher.'

P - "She was admitted for Guillain-Barre Syndrome.
"She acquired a viral illness a few weeks back.
"She is currently experiencing muscle weakness and facial nerve involvement with some paralysis.
"He/She is experiencing some pain.
"Plan is to observe neuro involvement and keep pain in check.

A - "Integrate provider's orders.

S - "Watch ascending neuro involvement.

S- "Do you want to summarize? Questions?

I	Illness Severity	• Stable, "watcher," unstable
P	Patient Summary	• Summary statement • Events leading up to admission • Hospital course • Ongoing assessment • Plan
A	Action List	• To do list • Time line and ownership
S	Situation Awareness and Contingency Planning	• Know what's going on • Plan for what might happen
S	Synthesis by Receiver	• Receiver summarizes what was heard • Asks questions • Restates key action/to do items

Image Source:
http://ipassstudygroup.com/home

BED 1: Bedside Monitor *(Manual Advance Mode):*

Slide 1:	Pulse: 62	Resp: 10	SpO2: 86%	BP: 110 / 78	Temp: 98.4
Slide 2:	Pulse: 68	Resp: 10	SpO2: 86%	BP: 112 / 78	Temp: 98.6
Slide 3:	Pulse: 74	Resp: 12	SpO2: 88%	BP: 116 / 78	Temp: 99.1
Slide 4:	Pulse: 78	Resp: 14	SpO2: 90%	BP: 118 / 78	Temp: 99.9
Slide 5:	Pulse: 80	Resp: 14	SpO2: 90%	BP: 118 / 78	Temp: 99.9
Slide 6:	Pulse: 82	Resp: 14	SpO2: 92%	BP: 118 / 78	Temp: 99.8

BED 1: Telemetry Monitor:
Sinus Rhythm.

Bedside Monitors

Physician's Order Sheet

Simla *Regional Hospital* ➕
Serving the community through simulation & education.

Authorization is hereby given to dispense the generic equivalent unless otherwise indicated by the physician.

Date	Time	Complete top portion with each Level of Care change. Indicate order entered with a Check ✓.
12/18/2019	1:35 PM	☒ Inpt. ☐ Observ. Dx: Guillain Barre Syndrome Room: 327-1
Physician Signature		Aaron Morgan, D.O.

Date	Time	Additional Orders: (Dates/Times required)
12/18/2019	1:35 PM	**Code Status:** Full Code
		Vital Signs: Q2 hours, notify D.O. if BP changes drastically.
		Diet: Mechanical Diet
		Activity: Bed Rest – Up with assist.
		Consults: Neuro. PT/OT, Social Worker
		Medication Reconciliation: Hold home meds.
		I.V.: Saline Lock/INT
		Oxygen: 2 L / min.
		EKG: Telemetry
		Labs: ABGs, CBC.
		Radiology: Will consider MRI or CT after Neuro consult
		Assess motor movement every 2 hours while awake.
		Meds *(Continue on second page if needed)*:
		Immunoglobulin (IVIG), IV per protocol daily for 5 days – obtain/pharm.
		Oxycodone 15 mg p.o. prn every 4 hours: Pain – if unrelieved call for PCA order.
		Atropine 0.5 mg I.V. prn for bradycardia – for rate below 50 bpm.- repeat Dose x 1 in 5 minutes if rate remains below 50 bpm.
		Aaron Morgan, D.O.

Patient Name: **Cotwell, Jessie**   Allergies: NKA   Medical Record: 120562

Attach Patient I.D. Sticker Here:

COTWELL, JESSIE

PATIENT CUES – Guillain-Barre Syndrome (*provide copy to patient before scenario*).

Required patient actions, comments, requests
NURSING STUDENT: You are required to research this condition when nurse is not at bedside and respond appropriately.   While gowning up tape down an INT to your arm (C.N.A. can help)

Due to facial nerve involvement – you cannot whistle, smile, frown or drink from straw. You have some difficulty swallowing. Not able to take a full breath – often coughs up 'gunk.' Hard to speak (speech muscles affected).

Signs & Symptoms
1. Shortness of breath
2. Unable to walk – but able to feel sensations and wiggle toes/feet.
3. Leg cramps
4. Discouraged / Depressed
5. Not hungry (if asked)

Current Medications (Med Reconciliation)
☐ None.
☒ List: Tylenol

Medication Allergies
☒ None.
☐ List:

Food / Other Allergies
☒ None.
☐ List:

Other Considerations
☒ None.
☐ List:

Past Medical History (include work and social history, surgeries):
None significant. If it is mentioned, you know Dr. Morgan personally "Aaron is a family friend."

History of Present Illness:
Speaking slowly: "I had some kind of viral illness a few weeks ago. Then I got a sudden onset of muscle weakness and pain. My facial nerve is affected. The pain is worse at night – it is a deep type of pain." *Request a pain med.*

ANTICIPATED NURSING ACTIONS
Symptom Recognition
e.g Pain treatment.

Physical exam:
Thorough cranial nerve check.

Other:
Treat for immobility – TED hose, DVT prevention.
Elevate HOB, have suction ready, assure BVM is intact and at HOB.
Consider atypical pain relief: imagery, massage, relaxation, distraction techniques.

IVIG Flow Sheet (in 'Forms' folder and attached to IVIG Policy)

Simulamen Laboratorii *Regional Hospital* ✚
Serving the community through simulation & education.

Intravenous Immunoglobulin Therapy
(IVIG) Flow Sheet

Pre-medicate
☐ Acetaminophen 650 mg p.o. x 1   ☐ Name of IVIG: _____
☐ Diphenhydramine 25 mg p.o. x 1   ☐ Lot # of IVIG: _____

Time: _____   **Pre-transfusion (minute 0)**
Obtain set baseline vitals: P- _____   BP- ____ / ___   R- ____   Pulse Ox- _____   T- _____

Time: _____   **Start transfusion (minute 1)**
☐ Rate of 0.01 ml/kg/minute – lbs _____ / kg _____ x 0.01 = _____ x 60 = _____
☐ Second Nurse double check. 2nd nurse initial: _____

Time: _____   **Mid-transfusion (minute 15)**
Obtain second set of vitals: P- _____   BP- ____ / ___   R- ____   Pulse Ox- _____   T- _____
☐ Double rate for minutes 15 – 30. New rate: _____ mL / hour

Time: _____   **Second mid-transfusion (minute 30)**
Obtain third set of vitals: P- _____   BP- ____ / ___   R- ____   Pulse Ox- _____   T- _____
☐ Rate of 0.08 ml/kg/minute – lbs _____ / kg _____ x 0.01 = _____ x 60 = _____
☐ Second Nurse double check. 2nd nurse initial: _____

Time: _____   **Third mid-transfusion (minute 60)**
Obtain fourth set of vitals: P- _____   BP- ____ / ___   R- ____   Pulse Ox- _____   T- _____

Time: _____   **Fourth mid-transfusion (minute 90)**
Obtain fifth set of vitals: P- _____   BP- ____ / ___   R- ____   Pulse Ox- _____   T- _____

Time: _____   **Fifth mid-transfusion (minute 120)**
Obtain sixth set of vitals: P- _____   BP- ____ / ___   R- ____   Pulse Ox- _____   T- _____

Time: _____   **Post-transfusion (minute 120+)**
Obtain final set of vitals: P- _____   BP- ____ / ___   R- ____   Pulse Ox- _____   T- _____

Total Transfusion Time: _____

Nurse #1 Signature: _____   Date/Time: _____

Nurse #2 Signature: _____   Date/Time: _____

Place completed form in patient's chart.

Form – IVIG Flow Sheet.docx

SIMLA
REGIONAL HOSPITAL

- - -PATIENT NAME- - -	AGE	BIRTH	ADMIT	M/R#	PATIENT#	RM	TYPE
Cotwell, Jessie.	43	052472	111310	04325	120562	327-1	MED

ORDERING PHYSICIAN: A. Morgan, D.O.   PRIVATE PHYSICIAN: A. Morgan, D.O.

- - -PROCEDURE- - -

ABG – Arterial Blood Gas

ORDERED	COLLECTED	RECEIVED	RESULTED	VERIFIED
12/18/2019 1:35 PM	12/18/2019 1:35 PM	12/18/2019 1:35 PM	12/18/2019 1:35 PM	12/18/2019 1:35 PM
DRR	BLJ	BLJ	BLJ	GMB

===

Test	Result	Flag	Units	Range		
pH	7.47	H		(L= 7.35	H= 7.45	)
PCO2	46.9	H	mmHg	(L= 35	H= 45	)
PO2	84		mmHg	(L= 80	H= 100	)
HCO3	27.2		mm/dL	(L= 22	H= 26	)
BE	3.6		mm/dL	(L= -2	H= (2)	)
TCO2	28.4					

	Abbreviations:		
pH	Power of Hydrogen	mg/Hg	milligrams per hemoglobin
PCO2	Partial Pressure Carbon Dioxide	mm/dL	millimeters per deciliter
PO2	Partial Pressure Oxygen	gm/dL	grams per deciliter
HCO3	Bicarbonate		
BE	Base Excess		
TCO2	Total Carbon Dioxide content		

SIMULA
REGIONAL HOSPITAL

- - -PATIENT NAME- - -	AGE	BIRTH	ADMIT	M/R#	PATIENT#	RM	TYPE
Cotwell, Jessie.	43	052472	111310	04325	120562	327-3	MED

ORDERING PHYSICIAN: A. Morgan, D.O.   PRIVATE PHYSICIAN: A. Morgan, D.O.

CBC W/ AUTO DIFF

ORDERED	COLLECTED	RECEIVED	RESULTED	VERIFIED
12/18/2019 1:35 PM	12/18/2019 1:35 PM	12/18/2019 1:35 PM	12/18/2019 1:35 PM	12/18/2019 1:35 PM
DRR	BLJ	BLJ	BLJ	GMB

==

Test	Result	Flag	Units	Range		
WBC	9.6		K/ul	(L= 4.50	H= 11.0	)
RBC	4.11		M/ul	(L= 4.00	H= 5.20	)
HGB	14.4		gm/dl	(L= 12.00	H= 16.0	)
HCT	40.3		%	(L= 37.00	H= 47.0	)
MCV	96		fl	(L= 80	H= 100	)
MCH	30.0		pg	(L= 28.00	H= 34.0	)
MCHC	35.7		gm/dl	(L= 31.00	H= 37.0	)
RDW	12.6		%	(L= 11.50	H= 14.50	)
PLT	300		K/ul	(L= 130	H= 400	)
MPV	8.1		fl	(L= 7.40	H= 10.40	)
%LYMPH	36.2		%	(L= 20.00	H= 51.0	)
%MONO	6.5		%	(L= 1.70	H= 9.30	)
%GRAN	52.6		%	(L= 42.0	H= 74.0	)
%EOS	3.7		%	(L= 0.0	H= 5.0	)
%BASO	1.1		%	(L= 0.0	H= 2.0	)
#LYMPH	3.5	H	K/ul	(L= 1.20	H= 3.40	)
#MONO	0.60	H	K/ul	(L= 0.11	H= 0.59	)
#GRAN	5.0		K/ul	(L= 1.40	H= 6.50	)
#EOS	0.4	H	K/ul	(L= 0.0	H= 0.30	)
#BASO	0.1		K/ul	(L= 0.0	H= 0.20	)

Dietary Tray Ticket (Bed 1)

Place on clipboard with Physician's Orders or if using a Unit Secretary have that role disseminate the tickets.

☒ Regular Diet (Mechanical)
☐ Low Sodium Diet
☐ Diabetic Diet
☐ Soft Diet
☐ Full Liquid Diet
☐ Clear Liquid Diet

Appendix G:

Scenario Summary Reference Sheet

Hypovolemic Shock

Causes
Sudden loss of a significant amount of blood (30% or greater). This patient is in Non-Progressive stage of shock (vs progressive).

Symptoms
- Increased pulse / drop in BP / increased respirations
- Weakness, cool, clammy skin
- anuria

Treatment
- Oxygen, stop blood loss, replace fluids

Nursing Considerations
1. **Thorough vital sign assessment to assess shock progression (should not delegate this task due to critical application of findings)**
2. **IV fluids (consider warmed fluids)**
3. **Oxygenation and Perfusion**
4. **Lab values (Hemoglobin should be around 12. May look at hematocrit).**

Provider's Orders
- Dopamine drip is ordered and has an attached algorithm for Weight/Dose/Rate

Advanced Concepts
- Mean Arterial Pressure (MAP).   Systolic BP + (2 x Diastolic BP) – 3 = MAP.
- Non-Progressive = drop in MAP by 10-15 mmHg.
- Narrowing pulse pressure.

The standardized patient for this scenario is:

Name:	**Majors, Kelly** ♂ **or** ♀
Dr.:	**Powers, A.**
Patient Number:	**100459** **Bed 1**
Birthday:	**04/23/1979**

Scenario I.D. Bands

Patient Name: _MAJORS, Kelly_____
Date of Birth: _04/23/1979_ Age _37_____
Room: _327_ - 1_____ Sex __M_____
Med Rec #:   _100459_____

MAJORS, KELLY

Scenario Notes – Hypovolemic Shock

Nurse's Pass-down Report (start of shift)

I -   "This is Kelly Majors, her illness severity is 'Watcher.'

P -   "He/She was admitted for hypovolemic shock.
       "He/She got the norovirus and has been vomiting non-stop.
       "He/She developed a Mallory-Weiss tear (ruptured some esophageal varices).
       "He/She became hypovolemic and anuric.
       "Plan is to continue IV fluid replacement. Dr. Powers is starting him/her on Dopamine.

A -   "His/her MAP hasn't changed and the urine output is still poor.

S -   "Need to plan for possibility of worsening shock.

S-   "Do you want to summarize? Questions?

| I	Illness Severity	• Stable, "watcher," unstable
P	Patient Summary	• Summary statement • Events leading up to admission • Hospital course • Ongoing assessment • Plan
A	Action List	• To do list • Time line and ownership
S	Situation Awareness and Contingency Planning	• Know what's going on • Plan for what might happen
S	Synthesis by Receiver	• Receiver summarizes what was heard • Asks questions • Restates key action/to do items

Image Source:
http://ipassstudygroup.com/home

Bedside Monitor *(Manual Advance Mode):*

Slide 1:	Pulse: 98	Resp: 18	SpO2: 93%	BP: 102 / 76	Temp: 98.0
Slide 2:	Pulse: 99	Resp: 18	SpO2: 93%	BP: 102 / 76	Temp: 98.0
Slide 3:	Pulse: 100*	Resp: 18	SpO2: 94%	BP: 101 / 74	Temp: 98.0
Slide 4:	Pulse: 98	Resp: 16	SpO2: 96%	BP: 100 / 76	Temp: 98.5
Slide 5:	Pulse: 96	Resp: 14	SpO2: 96%	BP: 110 / 76	Temp: 98.5
Slide 6:	Pulse: 86	Resp: 14	SpO2: 98%	BP: 138 / 68	Temp: 99.0

Telemetry Monitor:
*Tele Lead II – NSR with tachycardia.

Bedside Monitor
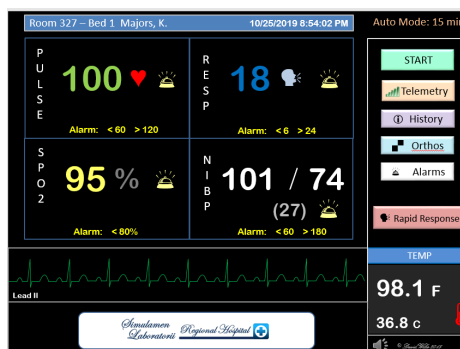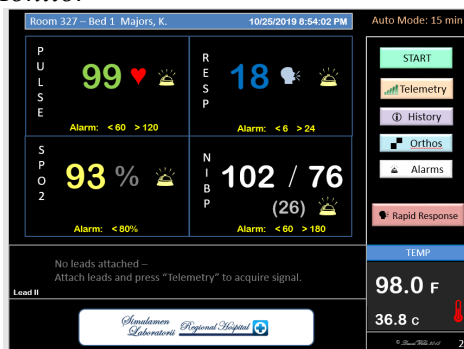
Physician's Order Sheet

Simla *Regional Hospital*
Serving the community through simulation & education.

Authorization is hereby given to dispense the generic equivalent unless otherwise indicated by the physician.

Date	Time	Complete top portion with each Level of Care change. Indicate order entered with a Check ✓.
12/18/2019	1:35 PM	☒ Inpt. ☐ Observ. Dx: Hypovolemia Room: 327-1
Physician Signature		A. Powers, D.O.

Date	Time	Additional Orders: (Dates/Times required)
12/18/2019	1:35 PM	**Code Status:** FULL
		Vital Signs: Q 2 hours.
		Diet: Regular
		Activity: Up ad lib. w/assistance if negative orthostatic v.s.
		Consults:
		Medication Reconciliation: Hold home meds
		I.V.: Hep Lock (INT)
		Oxygen: Nasal cannula – maintain O2 > 95%
		EKG: ∅
		Labs: ABG's, CBC, CMP
		Radiology: ∅
		Indwelling urinary catheter.
		Strict I&O. Measure urine output.
		Meds *(Continue on second page if needed)***:**
		Dopamine I.V. 5 mcg/kg/min per policy/protocol.
		K-Tab – decrease to 10 meq. P.o. every day. For low K+
		0.9% NaCl IV, 50 mL / hour run over 12 hours.
		Type/cross and infuse 1 unit of RBC if Hemoglobin < 8 g / dL

Patient Name: **Majors, Kelly**   Allergies: NKA   Medical Record: 100459

Attach Patient I.D. Sticker Here:

MAJORS, KELLY

PATIENT CUES – **Hypovolemic Shock** (*provide copy to patient before scenario*).

Signs & Symptoms
1. Weakness, lethargy.

Current Medications (Med Reconciliation)
☒ None.
☐ List:

Medication Allergies
☒ None.
☐ List:

Food / Other Allergies
☒ None.
☐ List:

Vital Signs
1. BP will be low, pulse pressure is narrow/decreased and pulse is elevated.
2. Vitals will show on monitor / EMR will show history.

Past Medical History (include work and social history, surgeries):
No significant medical history.

History of Present Illness:
"I got really sick. I ate out and got to throwing up and couldn't stop. Then I started vomiting blood and really got scared. I was pretty sick when they admitted me. The vomiting has stopped – and the bleeding. Now I just feel like a wet wash cloth. They say I might go home tomorrow."

ANTICIPATED NURSING ACTIONS

Symptom Recognition
Recognize which phase of shock is presenting
Considered raising the foot of the bed

Physical exam:
Detailed cardiac exam with cardiac auscultation points.

Other:
RN Obtain vitals instead of delegating due to nature of the illness.

Dopamine Administration
A standard bag of 200 mg/250 mL is stocked in the formulary. The order is for 5 mcg/kg/min.

The algorithm below is in the policy & procedure manual. Patient weighs 70 kg.

Dopamine (Intropin)	Mixture:	$\frac{200 \text{ mg}}{250 \text{ mL D5W or NS}}$	Infusion Dose: 2 - 20 µg/kg/min
IV Loading Dose: None	Concentration: **800** µg/mL		

Dopamine (Intropin) 2 - 20 mcg/kg/min

A mixture of 800 mg Dopamine in 250 ml = 3,200 mcg/ml

mcg/kg/ minute	2.5	5	10	20	30	40	50	60	70	80	90	100
2 mcg	-	-	-	1	1	2	2	2	3	3	3	4
5 mcg	-	-	1	2	3	4	5	6	7	8	8	9
10 mcg	-	1	2	4	6	8	9	11	13	15	17	19
15 mcg	1	1	3	6	8	11	14	17	20	23	25	28
20 mcg	1	2	4	8	11	15	19	23	26	30	34	38

Patient's Weight in Kilograms

With a 60 drop per ml drip set this is the number of drops/minute (or ml/hr)

Observe for extravasation - swelling, pallor, pain. etc. at IV site.

Image Source:
http://2.bp.blogspot.com/_8Z869lPmoNo/StgEH-oEcOI/AAAAAAAAAoA
/TgXm9Vlf_Sc/s400/Dopamine+-+800+mg+in+250+ml+chart+2.bmp

SIMLA
REGIONAL HOSPITAL

- - -PATIENT NAME- - -	SEX	AGE	BIRTH	ADMIT	M/R#	PATIENT#	RM	TYPE
MAJORS, KELLY		37	042379	111310	04325	100459	327	MED

ORDERING PHYSICIAN: A. Powers   PRIVATE PHYSICIAN: A. Powers

- - -PROCEDURE- - -

ABG: ARTERIAL BLOOD GAS

ORDERED	COLLECTED	RECEIVED	RESULTED	VERIFIED
12/18/2019 1:35 PM	12/18/2019 1:35 PM	12/18/2019 1:35 PM	12/18/2019 1:35 PM	12/18/2019 1:35 PM
DRR	GMB	GMB	GMB	BRH

==

Test	Result	Flag	Units	Range		
pH	7.36			(L= 7.35	H= 7.45	)
PaCO2	45.4	H	mmHg	(L= 35	H= 45	)
PaO2	81		mmHg	(L= 80	H= 100	)
HCO3	27.2		mm/dL	(L= 22	H= 26	)
BE	3.6		mm/dL	(L= -2	H= (2)	)
TCO2	28.4					

	Abbreviations:			
pH	Power of Hydrogen		mg/Hg	milligrams per hemoglobin
PaCO2	Partial Pressure Carbon Dioxide		mm/dL	millimeters per deciliter
PaO2	Partial Pressure Oxygen		gm/dL	grams per deciliter
HCO3	Bicarbonate			
BE	Base Excess			
TCO2	Total Carbon Dioxide content			

SIMLA
REGIONAL HOSPITAL

- - -PATIENT NAME- - -	SEX	AGE	BIRTH	ADMIT	M/R#	PATIENT#	RM	TYPE
MAJORS, KELLY		37	042379	111310	04325	100459	327	MED

ORDERING PHYSICIAN: A. Powers   PRIVATE PHYSICIAN: A. Powers

- - -PROCEDURE- - -

CBC: COMPLETE BLOOD COUNT W/ AUTO DIFF.

ORDERED	COLLECTED	RECEIVED	RESULTED	VERIFIED
12/18/2019 1:35 PM	12/18/2019 1:35 PM	12/18/2019 1:35 PM	12/18/2019 1:35 PM	12/18/2019 1:35 PM
DRR	GMB	GMB	GMB	BRH

==

Test	Result	Flag	Units	Range		
WBC	9.6		K/ul	(L= 4.50	H=	11.0)
RBC	4.11		M/ul	(L= 4.00	H=	5.20)
HGB	11.4	L	gm/dl	(L= 12.00	H=	16.0)
HCT	38.2		%	(L= 37.00	H=	47.0)
MCV	96		fl	(L= 80	H=	100)
MCH	32.0		pg	(L= 28.00	H=	34.0)
MCHC	35.7		gm/dl	(L= 31.00	H=	37.0)
RDW	12.6		%	(L= 11.50	H=	14.50)
PLT	300		K/ul	(L= 130	H=	400)
MPV	8.1		fl	(L= 7.40	H=	10.40)
%LYMPH	36.2		%	(L= 20.00	H=	51.0)
%MONO	6.5		%	(L= 1.70	H=	9.30)
%GRAN	52.6		%	(L= 42.0	H=	74.0)
%EOS	3.7		%	(L= 0.0	H=	5.0)
%BASO	1.1		%	(L= 0.0	H=	2.0)
#LYMPH	1.35		K/ul	(L= 1.20	H=	3.40)
#MONO	0.50		K/ul	(L= 0.11	H=	0.59)
#GRAN	5.0		K/ul	(L= 1.40	H=	6.50)
#EOS	0.4	H	K/ul	(L= 0.0	H=	0.30)
#BASO	0.1		K/ul	(L= 0.0	H=	0.20)

The "differential count" gives the percentage of each white blood cell type.

SIMULA
REGIONAL HOSPITAL

- - -PATIENT NAME- - -	SEX	AGE	BIRTH	ADMIT	M/R#	PATIENT#	RM	TYPE
MAJORS, KELLY		37	042379	111310	04325	100459	327	MED

ORDERING PHYSICIAN: A. Powers   PRIVATE PHYSICIAN: A. Powers

- - -PROCEDURE- - -

CMP: COMPREHENSIVE METABOLIC PANEL

ORDERED	COLLECTED	RECEIVED	RESULTED	VERIFIED
12/18/2019 1:35 PM	12/18/2019 1:35 PM	12/18/2019 1:35 PM	12/18/2019 1:35 PM	12/18/2019 1:35 PM
DRR	GMB	GMB	GMB	BRH

==

Test	Result	Flag	Units		Range		
GLUCOSE	80		mg/dl	(L=	74	H= 118	)
CALCIUM	8.8	L	mg/dl	(L=	8.90	H= 10.30	)
CREATININE	0.78		mg/dl	(L=	0.61	H= 1.24	)
AGE	35		yrs				
eGFR	89.9		mL/min/BSA				
BUN	9		mg/dl	(L=	8	H= 26	)
SODIUM	139		mmol/l	(L=	136	H= 144	)
POTASSIUM	3.5	L	mmol/l	(L=	3.60	H= 5.10	)
CHLORIDE	107		mmol/l	(L=	101	H= 111	)
CO2	27		mmol/l	(L=	22	H= 32	)
ANION GAP	5		mmol/L				
OSMOLALITY	276			(L=	275	H= 295	)
AST	17		IU/L	(L=	15	H= 41	)
ALT	18		IU/L	(L=	14	H= 54	)
ALK PHOS	37		IU/L	(L=	47	H= 133	)
TBIL	0.7		mg/dl	(L=	0.30	H= 1.20	)
PROTEIN T	6.7		gm/dl	(L=	6.50	H= 8.10	)
ALBUMIN	4.0		gm/dl	(L=	3.50	H= 5.0	)
GLOBULIN	2.7		gm/dl	(L=	1.50	H= 4.0	)
A/G RATIO	1.50		RATIO	(L=	1.10	H= 2.50	)

ESTIMATED GLOMERULAR FILTRATION RATE (Egfr)
Normal: >60 mL/min/BSA
Estimated GFR units are reported in mL/min normalized for a body surface area
(BSA) of 1.73m squared. For African-American patients multiply the eGFR
results by 1.21.

	Abbreviations:		
BUN	Blood Urea Nitrogen	mg/dl	milligrams per deciliter
CO2	Carbon Dioxide	IU/L	International Units per Liter
AST	Aspartate Aminotransferase	gm/dl	grams per deciliter
ALT	Alanine Transaminase	mmol/l	millimoles per liter
ALK PHOS	Alkaline Phosphatase		
TBIL	Total Bilirubin		

Dietary Tray Ticket

Consider adding dietary considerations to 3rd semester (NSG 411) scenarios. Place on clipboard with Physician's Orders or if using a Unit Secretary have that role disseminate the tickets.

☒ Regular Diet
☐ Low Sodium Diet
☐ Diabetic Diet
☐ Soft Diet
☐ Full Liquid Diet
☐ Clear Liquid Diet

Dietary Tray Ticket

Majors, Kelly

Regular Diet
Room 327 - 1
Breakfast

JUICE & FRUIT
Orange Juice   Peaches
CEREAL
Oatmeal   Corn Flakes
Cream of Wheat   100% Bran
ENTRÉE
Wheat Toast   White Toast
Bagel   Margarine
BEVERAGE
Milk   Skim Milk
Coffee   Hot Tea
CONDIMENTS
Jelly   Salt
Sugar   Pepper

Allergies: _____

(Request-if avail.) _____

Breakfast

Majors, Kelly

Regular Diet
Room 327 - 1
Lunch

MAIN COURSE
Hamburger   Vege Plate
Tilapia   Broccoli
DESSERT
Applesauce   Cheese Cake
BREAD
Dinner Roll   Bagel
White Bread   Margarine
BEVERAGE
Milk   Skim Milk
Coffee   Ice Tea
CONDIMENTS
Lemon   Salt
Tarter Sauce   Pepper

Allergies: _____

(Request-if avail.) _____

Lunch

Majors, Kelly

Regular Diet
Room 327 - 1
Dinner

MAIN COURSE
Pork Chops   Baked Chicken
Whipped Potatoes   Corn
DESSERT
Fruit Cup   Ice Cream
BREAD
Dinner Roll   Italian Bread
                          Margarine
BEVERAGE
Milk   Skim Milk
Coffee   Hot Tea
CONDIMENTS
Jelly   Salt
Sugar   Pepper

Allergies: _____

(Request-if avail.) _____

Dinner

Shock

Appendix H:

C-CEI Worksheet

C-CEI Worksheet

Participant Unique Identifier: _____   Date/Time: _____

CRITICAL JUDGMENT Worksheet

Interprets Vital Signs (T, P, R, BP, Pain)

•
•

Interprets Lab Results

•
•

Interprets Subjective/Objective Data (recognizes relevant from irrelevant data)

•
•

Prioritizes Appropriately

•
•

CLINICAL JUDGMENT

	0	1	NA
9. Interprets Vital Signs (T, P, R, BP, Pain)	0	1	NA
10. Interprets Lab Results	0	1	NA
11. Interprets Subjective/Objective Data (recognizes relevant from irrelevant data)	0	1	NA
12. Prioritizes Appropriately	0	1	NA
13. Performs Evidence Based Interventions	0	1	NA
14. Provides Evidence Based Rationale for Interventions	0	1	NA
15. Evaluates Evidence Based Interventions and Outcomes	0	1	NA
16. Reflects on Clinical Experience	0	1	NA
17. Delegates Appropriately	0	1	NA

Performs Evidence Based Interventions

-
-

Performs Evidence Based Rationale for Interventions

-
-

Evaluates Evidence Based Interventions and Outcomes

-
-

Reflects on Clinical Experience

-
-

Delegates Appropriately

-
-

CLINICAL JUDGMENT

9. Interprets Vital Signs (T, P, R, BP, Pain)	0	1	NA
10. Interprets Lab Results	0	1	NA
11. Interprets Subjective/Objective Data (recognizes relevant from irrelevant data)	0	1	NA
12. Prioritizes Appropriately	0	1	NA
13. Performs Evidence Based Interventions	0	1	NA
14. Provides Evidence Based Rationale for Interventions	0	1	NA
15. Evaluates Evidence Based Interventions and Outcomes	0	1	NA
16. Reflects on Clinical Experience	0	1	NA
17. Delegates Appropriately	0	1	NA