THE EFFECT OF AN INTERACTIVE COMPUTER SIMULATION

VIDEO ON CLINICAL JUDGMENT

by

JAPONICA MORRIS

RICK HOUSER, COMMITTEE CHAIR

ANN GRAVES
VIVIAN WRIGHT
NIRMALA EREVELLES
JACQUELINE HORTON

A DISSERTATION

Submitted in partial fulfillment of the requirements
for the degree of Doctor of Education in the
Department of Educational Leadership, Policy and
Technology Studies in the Graduate School of
The University of Alabama

ABSTRACT

Simulation has been identified as an effective approach for preparing nursing students to transition from theory to practice. It is widely accepted that high-fidelity patient simulation has a positive impact on student learning and decision-making abilities. Computer-based simulation may be an effective alternative to the high cost of high-fidelity patient simulators. The purpose of this quasi-experimental study was to examine if the use of an interactive computer simulation video had an impact on the clinical judgment of undergraduate nursing students. This study also examined whether there was a relationship between students' demographic and academic characteristics and their clinical judgment scores.

A sample of 50 community college associate degree nursing students participated in this study. The students were placed into experimental (N=18) and control (N=32) groups. An interactive computer-simulation video was the intervention used for the experimental group. An independent samples *t* test was conducted to compare group findings. All participants completed a demographic/academic form including age, GPA, current working hours, and previous degrees to examine if a relationship existed between demographic and academic variables and clinical judgment scores as measured by the Lasater Clinical Judgment Rubric.

The study found no significant differences in clinical judgment scores between students who used the interactive computer-simulation video and those who did not. The

study also did not find any relationship between student demographic and academic

variables and clinical judgment scores.

LIST OF ABBREVIATIONS AND SYMBOLS

B Beta: regression equations

df Degrees of freedom: number of values free to vary after the sample

statistic has been computed

F Fisher's F distribution: A ratio of two variances

M Mean: the sum of a set of measurements divided by the number of

measurements in the set

N Sample size

p Probability of getting the sample mean value if the null hypothesis is true

R Multiple correlation coefficient

r Pearson product-moment correlation

SD Standard deviation: the average amount of variability in a set of scores

Sig. Significance level: the reported *p* value

t Computed value of *t* test

< Less than

= Equal to

ACKNOWLEDGMENTS

Also I would like to thank the faculty who participated in this research and the students who volunteered for the study.

Achieving a goal starts with taking the first step. Be positive and surround yourself with positive influences. I appreciate all that I have learned during this journey, and I hope that I can be an inspiration to others.

CONTENTS

LIST OF TABLES

Chapter 1

Introduction

Nursing is a challenging healthcare discipline. Nurses provide and coordinate care, educate patients, and work collaboratively with other healthcare disciplines to provide safe and quality healthcare. Additionally, nurses are expected to identify changes in a patient's health status and respond appropriately to the patient's condition (Tanner, 2006). If the nurse is unable to identify a change or responds inappropriately, the patient may receive delayed or inadequate care. Moreover, nursing errors may also occur resulting in harm to the patient. Tanner (2006) describes the ability to recognize and interpret patient changes and respond appropriately using the term *clinical judgment*. When faced with multiple decisions daily, nurses rely on clinical judgment to determine appropriate nursing actions to ensure safe patient care and error prevention. Nurses are expected to use accurate clinical judgment skills and these skills are learned and developed in nursing school. Consequently, nurse educators are expected to use teaching strategies that help influence and improve the clinical judgment of students.

Clinical judgment is an essential skill for nurses (American Association of Colleges of Nursing, 2008; Tanner, 2006). Clinical judgment requires the use of decision making skills, competent performance, and instinctive response (Benner, Tanner, & Chesla, 2009). According to Benner et al. (2009), clinical judgment is gained through learning experiences. For nursing students, in addition to classroom learning, these experiences are also clinic and laboratory based. The challenge for nurse educators is to identify and provide the best teaching strategies to cultivate clinical judgment.

1

Participation in laboratory simulation gives the student an opportunity to improve upon clinical judgment. Nursing research indicates that high-fidelity simulation is effective in improving nursing students' clinical judgment (Lindsey & Jenkins, 2013). Concept mapping and an expert role modeling videos are also strategies found to improve nursing students' clinical judgment (Gerdeman, Lux, & Jacko, 2013; Johnson et al., 2012). These activities allow active participation which results in deep thinking, allowing the student to better respond, organize, and process the content (Caputi, 2010). Computer-based simulation is also a teaching strategy that may help to improve clinical judgment. When compared to mannequin-based simulation, computer-based simulation was found to be just as effective in developing patient-centered care competencies for prelicensure nursing students (McKeon, Norris, Cardell, & Britt, 2009). Computer-based simulation has also been shown to improve learning outcomes among pharmacy students (Curtin, Finn, Czosnowski, Whitman, & Crawley, 2011).

With the rise in the acuity of hospitalized patients, the demand for nurses who are able to make sound clinical judgments also increases (Lasater, 2011). Clinical judgment involves action and behavior based on an analysis of patient information in relation to a specific situation (Victor-Chmil, 2013). This action must be appropriate and timely to ensure quality patient outcomes. Nursing faculty have a responsibility to support the development of clinical judgment in nursing students by evaluating students' use of clinical judgment and proving feedback to students (Lasater, 2011). Supporting the development of clinical judgment in nursing students should also lead to a more prepared student and aid the transition from nursing student to practicing nurse.

Problem

The Joint Commission (2013), an independent accrediting agency for healthcare organizations, identified inadequacies in patient assessment, patient observations, and care decisions as contributors to patient safety errors. As members of the healthcare team, nurses have a responsibility to accurately assess patients and make decisions that contribute to healthy patient outcomes. Nurses should help prevent and reduce the number of patient treatment errors. Patient assessment, observations, and care decisions all rely on the nurse's use of clinical judgment. Consequently, poor clinical judgment can lead to harmful patient outcomes (del Bueno, 2005).

Additionally, few RN graduates meet entry level expectations for clinical judgment (del Bueno, 2005). Clinical judgment is based on experiential learning and involves recognizing and interpreting patient changes (Tanner, 2006; Benner et al., 2009). Students gain experience through working with patients in the clinical setting. However, clinical experiences can be limited, based on availability of locations and restricted to the diagnoses of patients available in the clinical setting. Subsequently, student experiences are also gained in the laboratory setting. Laboratory experiences vary, but can include videos, skills practice, low-fidelity simulation, role-playing, high-fidelity patient simulation (HFPS), and computer simulation.

Nurse educators are also challenged to meet the essential competencies defined by the Quality and Safety Education for Nurses (QSEN) Institute to improve the quality and safety of patient care. According to Cronenwett et al. (2007), school faculty from 16 universities in the Institute for Healthcare Improvement Health Professions Education Collaborative reported that students were not graduating with the knowledge, skills, and attitudes needed to improve the quality and safety of patient care. QSEN developed six competencies with associated knowledge, skills, and attitudes representative of each competency: 1) patient-centered care; 2) teamwork

3

and collaboration; 3) evidence-based practice; 4) quality improvement; 5) safety; and 6) informatics. These competencies describe the qualities necessary to be a competent and respected nurse. Cronenwett et al. (2007) defined the safety competency as, "minimize risk of harm to patients and providers through both system effectiveness and individual performance" (pg. 128). Clinical judgment requires decision making skills. Therefore, improving clinical judgment should effectively reduce the risk of harm to patients.

Just as nurses have a responsibility to patients; nurse educators have a responsibility to nursing students. Educators must develop ways of teaching that meet the needs of new nursing graduates (Bartels, 2008). It is important to identify strategies that impact learning, clinical judgment skills, and development of the QSEN competencies. Although, there is research on clinical judgment across disciplines (Karthikeyan & Pais, 2010; Lasater, 2007; Mccullough, 2013; Tanner, 2006), research on the impact of computer simulation on clinical judgment in nursing students resulted in mixed findings. These findings are indicative of the need to further investigate the impact of computer simulation on clinical judgment in nursing students. Research in this area would be beneficial to nurse educators, nurses, and ultimately patients requiring nursing care.

Purpose

The purpose of this study was to examine if the use of an interactive computer simulation video had an impact on the clinical judgment of undergraduate nursing students. This study also examined whether there was a relationship between students' demographic and academic characteristics and their clinical judgment scores. The study was guided by the following research questions:

1. What is the effectiveness of an interactive computer simulation video on clinical judgment of undergraduate nursing students?

2. What is the relationship between students' demographic (age) and academic variables (current grade point average (GPA), hours currently working, previous degrees obtained) and their clinical judgment scores?

It was expected that students who completed the interactive computer simulation would have higher clinical judgment scores. It was also anticipated that characteristics such as age and gender would have no impact on clinical judgment. Previous research found no significant differences in clinical judgment scores while participating in a simulated activity among participants aged 21 to 64 years of age (Fenske, Harris, Aebersold, & Hartman, 2013). However, it was expected that current GPA, hours currently working, and previous degrees obtained would have an impact on clinical judgment. Romeo (2013) found GPA to be a positive predictor of critical thinking skills and first-time National Licensure Examination for Registered Nurses (NCLEX-RN®) success, an exam which measures knowledge and graduate nurse skills.

Significance

According to Benner et al. (2009), clinical judgment is gained through experience. For nursing students, clinical education has been the traditional setting for patient experiences. Students are accompanied by an educator or preceptor in a clinical setting and tasked with caring for assigned patients. However, it is becoming increasingly difficult for nursing schools to obtain clinical placements due to the shortage of clinical facilities and limitations placed on the number of students allowed in a clinical area (Lambton, 2008; Nehring, 2008). Furthermore, experiences are limited to the availability of patients in the clinical setting.

In a multisite study, McNelis et al. (2014) reported inadequacies in clinical experiences during observation of nursing students completing their final medical-surgical clinical course. The study cited missed opportunities for learning, lack of delegation experience, failure to enact meaningful learning experiences during downtime, and a lack of engagement with inter-professional teams. McNelis et al. (2014) suggested a transformation of the current way of teaching clinical education, moving from traditional task completion toward new pedagogies that promote clinical reasoning and decision-making.

Considering the decreasing clinical placement sites for nursing schools, HFPS has become increasingly popular as an adjunct to and replacement for clinical experiences. HFPS has been shown to improve students' clinical judgment (Lindsey & Jenkins, 2013) and cognitive skills (Brannan, White, & Bezanson, 2008). Therefore, computer-based simulation may also help to ease the burden of finding adequate clinical experiences for nursing students. Additionally, computer-based simulation is more cost effective compared to HFPS.

This study contributed to the limited nursing education literature describing computer-based simulation and its effects on nursing students' clinical judgment. This study also contributed to the literature by researching a teaching strategy aimed at addressing the safety competency as outlined by QSEN. Furthermore, if student characteristics such as experience working in healthcare or previous degrees obtained enhances clinical judgment, nursing schools can use this information to inform curricula and design strategies to foster clinical judgment in nursing students.

Theoretical Framework

According to Piaget (1961), new knowledge and ways of thinking are built from old knowledge and ways of thinking. Knowledge is constructed out of interaction with the environment. Piaget discussed the formal and dynamic aspects of thought. The formal involves knowing through perceptions and images, while the dynamic involves transformations leading to understanding. Piaget believed knowledge resulted from a gradual movement from formal to dynamic thought. Piaget's research provides the foundation of constructivism. Thus, the constructivist theory of learning was used as the framework for investigating the effects of an interactive computer simulation video on clinical judgment.

Piaget's (1961) research and theory centered on cognitive development in children, but have been used to provide a general description of how knowledge development occurs in adult learners (Wadsworth, 1989). Harlow, Cummings, and Aberasturi (2006) presented a view of constructivism that encompassed Piaget's theory. Harlow et al. argued that dynamic and active participation of the learner are necessary to accommodate the construction of new knowledge. Constructivism is not a prescription for instruction, but a broad description of knowledge development (Schwartz, Lindgren, & Lewis, 2009; Wadsworth, 1989) which can be used as a guide for instruction. The use of constructivism as a framework for problem-based teaching strategies is supported by Wadsworth's (1989) implications of constructivism to education. Wadsworth notes knowledge is a continuous process, constructed from active mental, social, and physical interactions; and assimilation or accommodation of new knowledge is dependent on old knowledge.

In previous research, Secomb, McKenna, and Smith (2012) used constructivism as a theoretical approach in determining the effectiveness of simulation activities on cognitive

7

abilities of nursing students. Secomb et al. embraced the notion that learning occurs through active engagement and integration of prior knowledge. When comparing computer-based and laboratory-based simulation, the authors found no difference in student cognitive development and no significant impact of either simulation on cognitive scores. Porter and Tousman (2010) also used constructivism as the basis of research evaluating the effectiveness of a learning strategy on the perceived learning of nursing students. Interactive audience response systems were introduced to students as a teaching strategy to promote knowledge construction. Students responded positively to the teaching strategy and Porter and Tousman reported a better understanding of the content and increased interactivity among the students. Furthermore, Peters (2000) suggests constructivism challenges traditional pedagogy, takes into account the context of learning, and encourages learning with transferability.

Using the constructivist approach to learning, educators are able to prepare students to construct new knowledge outside of teacher-led instruction and prepare students for future learning by building upon old knowledge and constructing new knowledge (Schwartz, Lindgren, & Lewis, 2009). Schwartz et al. (2009) argued that learning should not end when students leave the classroom and lose the direct guidance of the teacher. Learning should be continuous. New nurses must continue learning in practice and be prepared to practice nursing safely, accurately, and compassionately in various settings (Benner, Sutphen, Leonard, & Day, 2010).

There are a variety of instructional methods that can be used to characterize constructivist learning, including active, cooperative, collaborative, and problem-based learning. An active learning strategy is an educational activity that "involves students in doing things and thinking about the things they are doing" (Bonwell & Eison, 1991, p. 2). Collaborative and cooperative learning both refer to instructional methods in which students work together in groups (Prince,

2004). Problem-based learning is an instructional method that introduces the student to a realistic problem that might be encountered in their personal or professional work (Fink, 2003). Essentially, the problem is presented first, and the student works to solve the problem. This can be achieved individually or collaboratively. Students are challenged to apply previously learned information and construct new knowledge to accurately solve the problem (Rogal & Snider, 2008).

Problem-based learning promotes critical thinking and the application of classroom concepts to clinical practice (Rogal & Snider, 2008). In a study comparing nursing programs, students who graduated from a problem-based nursing program associated their ability to meet competencies and think critically with the structure and process of the problem-based curriculum (Applin, Williams, Day, & Buro, 2010). Students have also reported increased satisfaction and self-efficacy and demonstrated an improvement in exams with problem-based learning (Docherty, Hoy, Topp, & Trinder, 2004). However, some studies have found no difference in learning between problem-based methods and non-problem-based methods. For example, studying the effects of problem-based instructional methods on learning outcomes for social work students pursuing a master's degree, non-problem-based learning was found to be equally as effective as problem-based learning approaches (Westhaus, Barsen, Freymond, & Train, 2014).

As a problem-based instructional method, the interactive computer simulation video in this study prompted students to make clinical decisions based on clinical situations. Students received summarized feedback for self-evaluation and remediation. Students responded to patient changes and determined appropriate actions. This required interaction with the simulated computer environment and an accommodation of new knowledge. This research study, based on

constructivism as the theoretical approach and the use of a problem-based learning instructional

method, was guided by the following questions: (1) What is the effectiveness of an interactive

computer simulation video on clinical judgment of undergraduate nursing students? (2) What is

the relationship between demographic (age,) and academic variables (current GPA, hours

currently working, previous degrees obtained) and clinical judgments scores?

It is hypothesized that students participating in an interactive computer clinical

simulation video will have higher clinical judgment scores compared with students in the control

group. The interactive clinical simulation video will involve students actively participating in

scenarios to solve patient problems. As a problem-based instructional method, students will be

prompted to make clinical decisions and respond to patient changes. It is also hypothesized that

demographic characteristics will have no effect on the clinical judgment scores of undergraduate

nursing students. It is hypothesized that academic variables will have an effect on the clinical

judgment of undergraduate nursing students.

Definition of Terms

Active Learning Strategy

An active learning strategy is an educational activity that "involves students in doing

things and thinking about the things they are doing" (Bonwell & Eison, 1991, p. 2). Active

learning, however, is not a single approach to teaching, but can include multiple approaches

including, but not limited to, problem-based, case-based, team-based, and ability-based learning

(Gleason et al., 2011). Previous research suggests active learning strategies such as computer-

based simulation may enhance clinical judgment in nursing students (Weatherspoon & Wyatt,

2012).

Problem-based Learning

Problem-based learning began as an instructional method to educate medical students, and has since been embraced by nursing education (Alexander, McDaniel, Baldwin, & Money, 2002). Barrows and Tamblyn (1980) defined problem-based learning as learning that occurs as a result of working toward understanding and resolving a problem. Barrows and Tamblyn assert that the problem is presented first in problem-based learning. The content for solving the problem is not presented to the student, rather the student must identify the problem (Ohman, 2010) through critical thinking, existing knowledge, or research. Problem-based learning is active, can be collaborative or cooperative, and involves self-directed learning (Prince, 2004). This strategy adds rigor to the learning process and should help to deepen understanding of the content through active engagement.

Problem-based learning has been found to improve exam scores (Docherty et al., 2004), and when compared to lecture-based learning, midwifery students participating in problem-based learning were found to have increased learning motivation, more learning progress, and reported more learning satisfaction (Sangestani & Khatiban, 2012).

Simulation

Simulation reconstructs an environment. It refers to "technologies that recreate the full environment in which one or more targeted tasks are carried out" (Cooper & Taqueti, 2004, p. i11). Simulation can refer to a device or activities that recreate that environment. Training via simulation can be traced to flight simulation for military and civilian aviation which was used to make training less expensive and without the risk of danger for those involved (Grenvik, 2004). Simulation has since evolved and is used extensively in nursing and medical education.

Various types of simulation are used in nursing education. Part task trainers which were first used in the 1960s (Cooper & Taqueti, 2004), are relatively inexpensive, replicate a portion of the body or environment, such as an arm for venipuncture or a mannequin used for teaching cardiopulmonary resuscitation (Durham & Alden, 2008). Simulated patients are also commonly used in nursing education. Through role-play, simulated patients (either paid or volunteer individuals) recreate clinical interactions (Durham & Alden, 2008). These simulations help students practice skills and communication in a safe environment.

Computer-based Simulation

Durham and Alden (2008) described computer-based simulation as a computer program that models an environment requiring the learner to make clinical decisions that result in an action. Computer-based simulation offers many of the same experiences as mannequin simulations without the high cost often associated with high-fidelity simulators (Schwid, 2004). Furthermore, scenarios are computer-driven, eliminating the need for an instructor or simulation coordinator to be present during the case simulations (Schwid, 2004). An additional advantage to computer-based simulation is the ability to access the simulation in a laboratory setting, home, hospital, or office space. This increased access provides flexibility in studying and reviewing content.

The computer-based simulation video used in this study required the user to interact with a computerized environment to problem solve and make decisions during a clinical scenario. Decisions made during the scenario then affected the outcome of the patient in the scenario. The use of computer-based simulation has been shown to be an effective strategy to improve students' skills and confidence (Curtin et al., 2011). Computer-based simulation has also resulted in the development of patient-care competencies among nursing students (McKeon et al., 2009).

High-Fidelity Patient Simulation

Simulations are often defined according to their degree of sophistication. Jeffries, Settles, Milgrom, and Woolf (2010) described a continuum of simulation ranging from low fidelity to high fidelity. Low-fidelity simulation requires little manipulation such as case studies and role-playing. Partial talk trainers, such as low-technology mannequins, , intravenous arms, and injection cushions, are often used to teach skills. The use of sophisticated, realistic, technology-driven mannequins to provide a realistic experience to the student is considered of high quality (Durham & Alden, 2010; Jeffries et al., 2010).

HFPS incorporates a computer-manipulated, anatomically correct mannequin with realistic responses, such as voice control, vital signs, chest movement, and auscultation of body systems sounds. Most models have features allowing insertion of chest tubes, urinary catheters, and IVs while also providing real time displays of vital signs, electrocardiogram, arterial pressures, and pulse oximetry (Durham & Alden, 2010). The mannequins can be controlled remotely by laptop or desktop computers and often have video capability allowing the educator to observe the simulation from a separate room. HFPS has proven beneficial in enhancing critical thinking (Partin, Payne, & Slemmons, 2011) and effective in promoting a safe enjoyable learning experience (Wotton, Davis, Button, & Kelton, 2010).

Clinical Judgment

The term *clinical judgment* has used been interchangeably in the literature with *critical thinking* and *clinical reasoning*. However, each term represents different processes that lead to evidence-based nursing practice (Victor-Chmil, 2013). Since these terms are used interchangeably, defining each will provide the necessary delineation in this current study. Critical thinking is an interactive process used to form a purposeful self-regulatory judgment

(Facione, Facione, & Sanchez 1994). Clinical reasoning is described as the processes by which nurses make clinical judgments (Tanner, 2006).

For the purposes of this study, clinical judgment is defined as an interpretation and reaction to a patient's response (Tanner, 2006); and a nurse's understanding of patient problems, issues, or concerns; and the ability of the nurse to address salient information and respond in an involved way (Benner et al., 2009). Tanner (2006) offers five assumptions of clinical judgment: (a) clinical judgments are influenced by what the nurse brings to the situation, (b) sound clinical judgment relies on knowing the patient and engaging with the patient, (c) clinical judgments are influenced by the context of the situation, (d) nurses use a variety of reasoning patterns, and (e) reflection on practice is a critical component. In a clinical situation or simulation activity, the nurse recognizes salient observations and responds according to the situational context and what the nurse brought to the situation (Benner et al., 2009). Improving the nursing student's ability to recognize changes and respond accordingly may, therefore, improve clinical judgment skills.

Student Characteristics

For this study, students will be asked to self-report each characteristic. Student characteristics of age, current GPA, current working hours, and previous educational degrees obtained will be used to determine the potential for influence on clinical judgment. In a Taiwanese study, Chen et al. (2010) found that characteristics such as years of experience and hours of education positively impacted the accuracy of emergency department nurses' judgment when triaging patients. Similarly, Falvey (2001) reported differences in the ability to identify signs and symptoms in a client, based upon profession and years of experience. Falvey compared professions (psychologist, social worker, and mental health counselor) and found mental health

counselors scored highest; and across the professions those with 5-15 years of experience scored higher than those with 15 years or more of experience.

In addition, when comparing traditional and nontraditional students, Seidl and Sauter (1990) found higher clinical judgment scores among the non-traditional students. The authors focused their research on the non-traditional student defined as an adult student with extensive work experience. Therefore for this study, age and gender will also be obtained to determine any significant differences that may exist among students.

Overview of Chapters

Chapter 1 discusses the purpose of the study and provides the theoretical framework for the study. Chapter 2 presents a comprehensive review of the literature related to clinical judgment and nursing, clinical judgment and medical practice, student demographic and academic variables and clinical judgment, video simulation, computer-based simulation, and HFPS. Chapter 3 outlines the methodology of the study including the setting, sample, design, and procedures. The intervention and instrument used in the study are also discussed in chapter 3. Chapter 4 reports the results of the study, and Chapter 5 provides a discussion of the results. Chapter 5 also includes a discussion of the limitations and implications of the study.

Chapter 2

Literature Review

An extensive review of the literature was conducted regarding HFPS, computer simulation, and clinical judgment in medical and nursing education using the following online databases: CINAHL Plus with Full Text, ERIC (EBSCO: Online), ProQuest Nursing and Allied Health Source, and PubMed. The search was narrowed to articles pertaining to simulation and clinical judgment outcomes. The search included the following key terms: student outcomes, simulation, and clinical judgment. Based on the search results, the following themes emerged: clinical judgment and nursing, clinical judgment and medical practice, student demographic/academic variables and clinical judgment, video simulation, computer-based simulation, effectiveness of HFPS, and HFPS as an evaluation method.

Clinical Judgment and Nursing

Nurses are expected to use clinical judgment to make multiple patient decisions daily. Based on an extensive review of over 200 articles, Tanner (2006) found clinical judgments are influenced by what the nurse brings to the situation and the context in which the situation occurs. Tanner also explained how nurses use a variety of reasoning patterns and how reflection on the clinical judgment process is critical to improving decision making. Since clinical judgment is a complex process, Tanner created the Tanner Clinical Judgment Model to describe four phases of clinical judgment as a problem solving activity: (1) noticing – the ability to perceive the situation; (2) interpreting – understanding the situation; (3) responding – determining an

appropriate course of action or inaction; and (4) reflecting – evaluating the patient's response to the nursing action or inaction (Tanner, 2006). The model is the foundation of the Lasater Clinical Judgment Rubric (LCJR) and requires the nurse to reflect in-action and on-action. Reflection is a continual process necessary to make subsequent decisions. Through this process of clinical judgment, nurses make decisions that affect patient outcomes and the quality of healthcare provided.

Tanner (2006) further divides the four phases of clinical judgment into 11 dimensions measured by the LCJR: (1) focused observation, (2) recognizing deviations from expected patterns, (3) information seeking, (4) prioritizing data, (5) making sense of data, (6) calm, confident manner, (7) clear communication, (8) well-planned intervention/flexibility, (9) being skillful, (10) evaluation/self-analysis, and (11) commitment to improvement. Nursing students reported a perceived benefit of the 11 dimensions of clinical judgment described by the Tanner Clinical Judgment Model as contributing to their use of clinical judgment (Kelly, Hager, & Gallagher, 2014). Students were given survey questions that addressed the 11 dimensions of clinical judgment using components of previous simulations and were asked to rate each component on the benefit it had on applying clinical judgment. Although all components were found beneficial, the highest rated components were facilitated debriefing, post-simulation reflection, and guidance by the academic (Kelly et al., 2014).

Clinical judgment focuses on cognitive processes of thinking and psychomotor processes of actions; it takes into account not only the knowledge and application to a specific patient, but also the affective aspects of the caregiver and the environment (Victor-Chmil, 2013). Benner et al. (2009) suggested clinical judgment includes conscious decision-making actions as well as intuitive responses based on practical reasoning versus rational reasoning. Using the five

17

assumptions of clinical judgment, Benner et al. supported this claim with a detailed exemplar of a nurse practicing at the expert level. First, the nurse presents to the situation with knowledge of what is good and right. Second, the nurse relies on extensive knowledge from the experience of working with many patients with similar illnesses. Third, the nurse's response is contextually based on the situation and the nurse's emotional responses. The fourth aspect is intuition, which is based on experience and doesn't involve a calculated response. The fifth aspect is the understanding of the patient's story, concerns, intents, and meaning; this understanding requires the nurse to be engaged in the experience, not simply making observations and calculated responses based on rational theory (Benner et al.; 2009).

Lasater and Neilsen (2009) suggested, in light of the complex nature of clinical education, alternative activities to promote clinical judgment should be explored in nursing students. Lasater and Neilsen studied the effect of concept-based learning activities on clinical judgment. Using a quasi-experimental design, concept-based learning activities were introduced to baccalaureate nursing students in their third term of nursing school. The experimental group was compared with third term nursing students with no concept-based learning activities. Clinical judgment was measured using the LCJR during student participation in HFPS. The researchers found students in the concept-based learning group scored higher in overall clinical judgment (mean 25.67, SD = 4.02) and higher in all four individual phases of the LCJR than students in the control group (mean 20.46. SD = 4.29), $F(1,26) = 10.99$, $p < 0.01$.

In a quasi-experimental, international, multi-site study, Johnson et al. (2012) studied the effect of a role modeling video on nursing students' clinical judgment. Students were enrolled in their first clinical course and chosen from four diverse nursing schools in the United States and one in the United Kingdom. The study included a mix of associate and baccalaureate students.

Students in the experimental group viewed a video recording of a nurse using clinical judgment while caring for a geriatric client with a hip fracture. The nurse's thinking was narrated using voice-over on the video. All students participated in HFPS. Clinical judgment was measured using the LCJR during the HFPS activity. No significant difference was found in the mean reflecting scores overall (p=.44). However, significant differences were found for the phases of noticing, interpreting, and responding (p=.000).

In a qualitative study, Gerdeman, Lux, and Jacko (2012) used the LCJR to design a concept mapping rubric for students to use in the clinical setting. Students designed concept maps during a 12 hour clinical day once day per week for six weeks. Students reported that the concept mapping helped them to make better clinical decisions and increased clinical judgment skills (Gerdeman et al., 2012).

Fenske, Harris, Aebersold, and Hartman (2013) discussed the importance of self-assessment when making clinical judgments. The authors argued nurses should have a clear perception of their own ability to make clinical judgments. In a study of 74 registered nurses, Fenske et al. studied whether nurses' perceptions of their clinical judgment abilities matched their demonstrated clinical judgment during a simulation. The nurses viewed a video and were asked to respond to questions and to record their thoughts and actions on a worksheet during video scenes. At the conclusion of the video, the nurses were asked to complete the LCJR and rate their own performance. An investigator for the researchers then reviewed the nurses' worksheets and assessed the nurses' clinical judgment using the LCJR. No significant difference was found between the nurses' self-assessed clinical judgment scores and actual demonstrated scores as a group. However, Fensk et al. noted nurses with 1 year or less of nursing experience self-assessed their ability at a higher level compared with actual demonstrated abilities.

Although, the study used the LCJR in a way it had not previously been used, the results underscore the need for effective feedback to nursing students to prevent any disparity between perception and performance.

Clinical Judgment and Medical Practice

Clinical judgment is employed in various healthcare disciplines and fields of study (Waltman, Williams, & Christiansen, 2013; Weatherspoon & Wyatt, 2012;). Clinical judgment is regarded as an approach to decision making, and research has focused on influences of clinical judgment and comparative studies determining the effectiveness of teaching strategies on clinical judgment. In the medical profession, clinical judgment develops from knowledge, practice, and experience (Kienle & Kiene, 2010). It requires the application of knowledge and expertise to solve a problem (Karthikeyan & Pais, 2010) and takes into account the individual patient (McCullough, 2013). In a study examining the influence of nonverbal cues, physicians reported that patients' nonverbal clues influenced clinical judgment (Henry, Forman, & Fetters, 2011). Participants and physicians were interviewed separately about decisions made during an examination visit while watching a video of that same visit. Both physicians and patients referenced nonverbal cues as an influence of judgments made during the visit. The physicians, for example, noted how nonverbal cues could lead to a clinical judgment of depression in a patient. The study did not, however, determine the degree of influence or whether it led to better or worse judgments.

The literature on clinical judgment in medical practice yielded mixed-results. Unlike nursing education literature which focuses on the development of and strategies to improve clinical judgment; the focus of most medical literature is on determining the accuracy of clinical

judgment and patient and physician characteristics that influence clinical judgment. The use of clinical judgment appears to depend on the field of medical practice under discussion.

Tomko and Munley (2012) also examined clinical judgment with the use of a case vignette of an older client. The case vignette described a 70-year-old woman who met the criteria for depression. Following the case vignette, counseling psychologists answered questions about treatment, clinical judgment, attitudes towards older adults, multicultural competence, training, and experience. Tomko and Munley found older age and multicultural knowledge of the counseling psychologists to be predictors of less professional bias in clinical judgment when examining an older client.

Waltman et al., (2013) also studied clinical judgment in the field of psychology and found a difference in the clinical judgment of student clinicians when compared to licensed psychologists. However, the authors did not note the degree of difference or the relationship between the differences. The majority of research surrounding medical practice and clinical judgment has focused on the result of using clinical judgment as opposed to influencing or improving clinical judgment skills. This highlights the need for research on clinical judgment development and determining learning strategies that influence and lead to clinical judgment.

In terms of clinical judgment accuracy, clinicians have been found to have low accuracy when analyzing observational gaits in adults with traumatic brain injury (Williams, Morris, Schache, & McCrory, 2009). Williams et al. reported that experienced physicians were more accurate than inexperienced physicians, but overall accuracy remained low. The results suggest a need for an objective quantification of gait analysis versus clinical judgment in adults in traumatic brain injury. Conversely, when assessing patients presenting with symptoms of a myocardial infarction, Katus, Giannitsis, and Jaffe (2012) argue clinical judgment is essential.

Using laboratory values alone (specifically cardiac troponin) can lead to costly admissions and unnecessary vascular procedures. The physician should use laboratory values, patient symptoms, and clinical judgment to determine the course of treatment (Katus et al., 2012).

Likewise, combining clinical judgment with laboratory values can reduce the need for costly repeat tests, invasive procedures, and added anxiety in patients with a first time negative prostate biopsy (Tombal et al., 2013). Tombal et al. suggested that clinical judgment alone is ineffective, but combined with prostate cancer gene 2 assay testing, becomes an accurate means of determining which patients should receive follow up prostate biopsy treatment.

Student Demographics/Academic Variables and Clinical Judgment

Using a correlational design, Bowles (2000) evaluated the effects of age, years in college, and cumulative GPA on clinical judgment. Baccalaureate nursing students used the Clinical Decision-Making in Nursing Scale (CDMNS) to assess clinical judgment. The CDMNS consisted of 40 items related to decision-making processes in nursing. Based upon item responses, Bowles (2000) found no significant relationship between student age, number of years spent in college, or the student's GPA on clinical judgment skills. On the contrary, Romeo (2013) found nursing students' overall GPA in nursing courses to correlate positively with assessment test composite scores, which measure critical thinking ability. Romeo also reported that nursing GPA was the strongest predictor of NCLEX-RN success.

Comparing demonstrated clinical judgment and perceived clinical judgment, Fenske et al. (2013) divided nurses into three age groups: 21-25 years, 26-39 years, and 40-64 years. The nurses participated in a video simulation and self-assessed their performance using LCJR. Their performance was also evaluated by the investigator to compare results. The researchers found no significant differences among the three groups. However, there was statistical significance

between the group aged 40-64 years and the group aged 21-25 years. The researchers concluded younger nurses were more likely to self-assess their abilities at a higher level compared with actual skills.

Video Simulation

In a pre-test/post-test study, video vignettes were found to increase knowledge in first year nursing students (Chau et al., 2001). Students viewed four clinical video vignettes as a supplement to clinical skills practice to determine the effect of the videos on knowledge level. The findings resulted in a significant increase in post-test scores ($P < 0.01$) for first year students after viewing the videos. In a quasi-experimental study, a role modeling video was found to improve aspects of clinical judgment in baccalaureate nursing students in the Unites States and the United Kingdom. (Johnson et al., 2012).

Campbell, Grant, and Congdon (2009) simulated a surgical procedure and subsequent transfer of an infant from a surgical unit to a neonatal intensive care unit. Participants viewed the video, identified workflow errors embedded throughout the video, and evaluated the effectiveness of the video using a post-video survey. The video was evaluated as an effective method of teaching (Campbell et al., 2009). Another relevant study also researched the effect of video simulation on undergraduate nursing student skills (Cardosa et al., 2012). Cardosa et al. evaluated the effect of an educational video simulating care of an implantable access port. Using a pretest/posttest design, the authors found an improvement in cognitive and technical knowledge. However, when comparing students using video-taped vignettes or HFPS. Fero et al. (2010) found that most students (75%) did not meet overall performance expectations for critical thinking. Furthermore, no difference was found between the use of video vignettes or HFPS ($P=2.277$). Tomlin (2005) found similar results when predicting clinical performance of

occupational therapy students. The study did not reveal a positive relationship between video simulation and clinical rating; but revealed students who scored higher on the video simulation activity were rated lower by supervisors in the clinical setting.

Although the studies discussed involved video simulation, the limitation of each study was the absence of branching logic within the videos. According to Caputi (2010), students should do more than look and listen. Students should participate, which results in the ability to better respond and process content (Caputi, 2010). This current study gave students the opportunity to respond to questions throughout the interactive computer simulation video scenario, promoting active student participation. Each student decision determined the next course of action in the video leading to a final patient response. Students received feedback, and effectiveness was determined using high-fidelity simulation to evaluate clinical judgment.

Computer-Based Simulation

Computer-based simulation can provide a variety of simulation activities ranging from low to high fidelity (Durham & Alden, 2010) and allows for individualized decision making and development of critical thinking skills (Zwirn & Muehlenkord, 2009). Students are required to apply knowledge and experience to make clinical decisions and often provided feedback during or after the simulation (Durham & Alden, 2010). A major benefit of computer-based simulation is that the student can repeat the simulation as many times as necessary to learn the content (Spunt & Covington, 2008).

Computer-based simulation research has yielded mixed results. In a study comparing computer- and laboratory-based simulation, neither intervention was found to effect nursing students' decision making ability (Secomb et al., 2012). Similarly, Weatherspoon & Wyatt (2012) tested the use of a simulated computer game among senior baccalaureate nursing

students. Using a pretest/posttest design, the authors measured clinical judgment with the researcher-developed Triage Acuity Instrument (TAI). All students received a lecture on triage and completed the TAI as a pretest. The experimental group participated in the simulated computer game and the control group received a paper study guide covering the same triage content used in the computer game. All students also completed the TAI as a posttest. The results of this study were inconclusive. Due to a significant difference in pretest scores between the groups, the authors did not report the between group differences in clinical judgment scores. Additionally, when comparing within the groups, both groups showed significant improvement in pre and post clinical judgment scores. The authors cited a small sample (N=23) and a new instrument as limitations of the study.

In South Korea, researchers examined the effects of computer-based simulation versus instructor-led resuscitation training during cardiopulmonary resuscitation training (Roh & Kim, 2014). The study found no statistically significant differences in the two methods. Roh and Kim (2014) also reported that computer-based simulation combined with hands-on training did not have an effect on nursing students' performance, self-efficacy, post-code stress, or satisfaction.

On the contrary, researchers studying the impact of computer-based simulation with third year PharmD students found an improvement in learning goals and outcomes (Curtin et al., 2011). Participants were assessed and scored during participation in a mannequin-based simulation. More of the students who completed the computer-based simulation first achieved the primary goal of patient survival than students who completed the mannequin-based simulation first (41.2% vs. 5.6%). Additionally, no difference was found in computer-based simulation scores among students who achieved the learning outcome and those who did not.

The researchers concluded that the simple completion of the computer-based simulation improved outcomes despite the score.

Researchers have also compared computer-based simulation to HFPS to determine if computer-based simulation can be used as an alternative, reducing cost and the number of faculty needed for simulation. McKeon et al. (2009) found no difference in student learning outcomes when comparing computer-based simulation to traditional simulation. These findings suggest that both types of simulation produce similar competencies.

Varying results in the research illustrate the need for additional research in this area. Moreover, none of the studies involved branching logic, which adapts the computer-based simulation to the participant's response. This current study will help to fill the gap in the literature.

Effectiveness of High-Fidelity Patient Simulation

HFPS has significantly changed the landscape of nursing education skills instruction. HFPS offers students the chance to practice clinical skills and critical thinking in a controlled, safe, and realistic clinical environment (Durham & Alden, 2010; Jeffries, Clochesy, & Hovancsek, 2009). Although the use of simulation dates backs centuries, modern day HFPS simulators can be traced to the mid-twentieth century with the advent of anesthesia simulators at Stanford University and the University of Florida for medical education (Bradley, 2006; Gaba, 2004). HFPS has since been used extensively in medical education, and vast amounts of research support the use of HFPS.

Steadman et al. (2006) compared problem-based learning and simulation-based learning in fourth-year medical students. The simulation group performed better than the problem-based learning group on the final evaluation assessment. The authors concluded that simulation-based

26

learning was superior to problem-based learning for acquiring critical assessment and management skills.

In a Best Evidence Medical Education (BEME) report, a review of 109 articles where the HFPS simulator was the intervention revealed HFPS can lead to effective learning when certain features are present (Issenberg, McGaghie, Petrusa, Gordon, & Scalese, 2005). The report listed the following features as those that lead to effective learning: (a) feedback provided during the learning experience; (b) learners engaged in repetitive practice; (c) curriculum integration of simulation; (d) increasing levels of difficulty; (e) adaptability to multiple learning strategies; (f) capturing of clinical variation; (g) controlled environment; (h) individualized learning; (i) defined outcomes; and (j) simulator validity.

When incorporated into a clinical nursing course, students found HFPS enjoyable and challenging (Wotton et al., 2010). The students also found HFPS relevant to course content and a good way to build knowledge and understand clinical concepts. Similarly, when incorporated into an obstetrics course, students responded positively to HFPS (Partin et al., 2011). Students reported a perceived enhancement in critical thinking and an ability to care for real patients. In a quasi-experimental, repeated-measures study, students indicated an impact on clinical judgment after participating in a postpartum simulation lab. Students reported learning the importance of prioritizing assessment skills, intervening appropriately, and better identifying abnormal assessment findings (Bambini, Washburn, & Perkins, 2009).

Schubert (2012) reported a significant improvement in critical thinking among medical-surgical nurses after completion of HFPS. The nurses completed a Failure to Rescue Knowledge test and the Learning Transfer Tool, an instrument used to assess nurses' critical thinking. Both the test and tool were administered pretest, posttest, and two weeks posttest. Knowledge mean

scores increased significantly (t=3.16, df=110, p=.002, 95% confidence interval) and critical thinking scores increased significantly (U=1017, p=.001) between the pretest and posttest.

Using a quasi-experimental design, Kameg, Howard, Clochesy, Mitchell, and Suresky (2010) compared the effectiveness of traditional lecture and HFPS on students' self-efficacy of communication skills. After students attended a lecture on communication, self-efficacy of communication was measured using a single-item visual analogue scale. Students then participated in a mental health HFPS scenario and completed a second single-item visual analogue scale. Kameg et al. (2010) reported a significant enhancement in students' self-efficacy following the simulation activity. Students also completed a simulation evaluation survey, reporting favorable responses to HFPS. Students viewed HFPS as valuable learning experience and reported a perceived knowledge gain.

Brannan, White, and Bezanson (2008) compared the effects of human patient simulation and traditional classroom lecture. Although students' confidence levels were not found to be significantly enhanced, cognitive skills were significantly improved with HFPS. Using a pretest/posttest design, the authors administered the Acute Myocardial Infarction Questionnaire: Cognitive Skills Test and the Confidence Level tool to both groups of students. The findings suggest human patient simulation is a valid instructional method for nursing students.

In nursing education, HFPS has traditionally been used as an adjunct to clinical experiences in healthcare facilities, i.e. hospitals, clinics, nursing homes, and hospice. However, due to limitations in clinical locations and unpredictability of experiences, nursing schools are exploring the possibility of replacing traditional clinical experiences with HFPS experiences. Schlairet and Pollock (2010) conducted such a study and researched the effectiveness of traditional and simulated clinical experiences in nursing students enrolled in a nursing

fundamentals course. Using a pretest/posttest design, students participated in both traditional and simulated clinical experiences. Based on the results of the posttest, there were no significant differences between the simulated and traditional clinical groups. The authors concluded simulated experiences were as effective as traditional clinical experiences for the acquisition of knowledge in undergraduate nursing students.

Findings from a recent longitudinal, randomized, controlled study by the National Council of State Boards of Nursing support the use of simulation as a replacement for up to 50% of traditional clinical experiences (Hayden, Smiley, Alexander, Kardong-Edgren, & Jeffries, 2014). In the study, incoming nursing students were randomly assigned to one of three groups: (1) the control group spent no more than 10% of their clinical hours in simulation; (2) the 25% group had 25% of their traditional clinical hours replaced by simulation; and (3) the 50% group had 50% of their traditional clinical hours replaced by simulation. The students (N=666) participated in the study beginning with their first nursing course in fall 2011 through graduation in spring 2013. The study found no significant differences between groups in nursing knowledge ($p = 0.478$), clinical competency ($p = 0.6888$), or NCLEX pass rates ($p = 0.737$). Additionally, after six months of clinical practice as an RN, the study reported no differences between groups in overall clinical competency and readiness for practice ($p = 0.527$). This large longitudinal study provides evidence to support the use of HFPS as a replacement for traditional clinical experiences.

High-Fidelity Patient Simulation as an Evaluation Method

Clinical judgments do not follow a linear path, but involve the use of many dimensions of thinking (Tanner, 2006). Therefore it is difficult to evaluate and measure. This current research study used HFPS as the method to evaluate clinical judgment. HFPS has been used as an

evaluation method in previous studies to measure clinical judgment and critical thinking. Lasater and Nielson (2009) used HFPS as an evaluation method to measure the effectiveness of concept-based learning activities on the development of clinical judgment. The authors used the LCJR to measure clinical judgment among 28 students (13 in the control group and 15 in the treatment group) who participated in a HFPS scenario. A rater evaluated the students assigned to the primary nurse role and assigned scores ranging from 1 to 4 for each dimension of phase of the LCJR, for a total of 44 points.

Johnson et al. (2012) also used HFPS as the method of evaluation to determine if a role-modeling video effected clinical judgment. The Laerdal high-fidelity adult mannequin, SimMan® was used. Students were assigned to one of three roles for the simulation: team leader, assessment nurse, or medication nurse/educator. Two educators at each school rated students using the 11 dimensions from the LCJR. Rating the team leader role only, each dimension was scored on a scale from 1 to 4 with a total of 44 possible points. The authors concluded that the study provided evidence to the effectiveness of simulation as an evaluation method.

In a quasi-experimental, cross-over design, Fero et al. (2010) used HFPS to evaluate critical thinking and performance of 36 nursing students. A researcher-created tool, VTV/HFHS Assessment Tool, was used as the rubric to measure performance during the HFPS scenario. Performance was rated as "met" or "did not meet expectations" for recognizing the clinical problem, reporting essential clinical data, initiating nursing interventions, anticipating medical orders, providing rationale to support decisions, and prioritizing. The findings of the study indicated most students did not meet overall expectations and reported the most difficulty with recognizing problems and reporting findings to the physician.

Conclusions

In summary, the literature supports the use of HFPS as an effective teaching strategy and a method of evaluation. The literature also supports the need for tools and strategies to foster the development of clinical judgment in nursing students. The literature reports the impact of problem-based teaching strategies on clinical judgment, knowledge, critical thinking, and other student outcomes. Problem-based learning can be an effective way to promote learning in students and can be achieved using several strategies, including computer-based simulation.

Chapter 3

Method

The primary purpose of this study was to examine if the use of an interactive computer simulation video will have an impact on clinical judgment in undergraduate nursing students. This study examined if students' demographic and academic variables had an impact on clinical judgment in undergraduate nursing students. The research questions for the study are:

1. What is the effectiveness of an interactive computer simulation video on clinical judgment of undergraduate nursing students?

2. What is the relationship between students' demographic (age,) and academic variables (current GPA, hours currently working, previous degrees obtained) and clinical judgments scores?

This chapter provides a description of the methods that were used in the study. In this chapter, the research setting and selection of participants are described. The experimental design, procedures, and instrumentation are also outlined.

Setting

The setting for the study was a community college associate degree nursing program located in the state of Alabama. The student enrollment demographics for the college are: 92% White/Non-Hispanic, 5% Black/Non-Hispanic, and 2.1% Hispanic population. The student population is 64% female and 36% male. The college is one of the largest colleges in the Alabama Community College System. The Department of Nursing promotes excellence in

nursing education through student-centered learning and has a premier simulation center that serves nursing students as well as the other health division academic majors. The simulation center is equipped with glass-enclosed rooms, two nursing stations, an operating room suite, emergency department docking area, and debriefing conference rooms. The simulation center has video and monitoring capabilities. Instructors manage simulations from a control room with one-way glass and audio capability.

Sample

The sample for this study was a convenience sample of available nursing students in the associate degree nursing program at a community college in Alabama. The students were second-level nursing students enrolled in their second medical-surgical nursing course (NUR 202 Nursing Through the Lifespan II). Second-level nursing students were chosen because of their experience with simulation and clinical decision making in previous courses. The students were invited to participate during an orientation session for the course. Participation was voluntary. There was no penalty for declining to participate.

Exclusion criteria for the study included students who were repeating the course due to non-progression (these students would have previously participated in the renal simulation used in the study) and students aged less than 19 years of age (due to state laws requiring parental consent for participants less than 19 years of age). Fifty-eight students volunteered for the study. Four students were excluded due to repeating the course. Two students were absent on the day of the lab, and two students withdrew from the course. The final sample consisted of 50 students.

Design

A quasi-experimental design was used to conduct this research study using a convenience sample of associate degree nursing students as participants. The study measured the

effectiveness of an interactive clinical simulation video on clinical judgment. The study also determined if there is a relationship between select students' demographic and academic characteristics and clinical judgment scores. All students were asked to complete a demographic form detailing age, gender, current GPA, number of hours currently working, and degrees obtained (Appendix A). Using Excel randomization, the students were randomly assigned to either the experimental or control group. The experimental group completed an interactive computer simulation video as the intervention.

Experimental group. Participants in the experimental group were given access to the interactive computer simulation video via an online student account using an access identification number and password. These students were instructed to complete the video prior to participating in the HFPS activity. After logging into the student account, the participants accessed the video via the products tab on the webpage. The video was approximately 40-minutes long, but could take longer depending on student responses. The participants were given the option of completing the video at home during the established time frame. Time spent completing the video was recorded by the computer program. Each time a student logged in and out was also recorded along with the total time spent completing the video. After completing the video, the participant received feedback on selections made throughout the video.

The participant was instructed to pay close attention to the video because there was no second viewing of the video during each session. The student could, however, pause and resume the video. During the video, the participants were able to click on the electronic medical record at the top of each page to access documents with information about the patient throughout the scenario. At the completion of the video, the student received a rating of "needs improvement," "satisfactory," or "strong." The report also provided details about decisions made throughout the

video and displayed the best decisions that would have resulted in a positive outcome. The participants were instructed to repeat the video until a rating of satisfactory or strong was achieved.

Control group. The control group received a paper study guide with the same content found in the interactive computer simulation video. The paper study guide included information related to renal failure, prioritizing client care, and determining correct dosage for medication administration (Appendix B).

Control and experimental group. All participants, including control and experimental, received a lecture on renal failure a week prior to participating in the study. All participants also participated in HFPS to measure the use of clinical judgment. The participants were divided into groups of four to participate in the simulation activity with a HFPS. The HFPS was pre-programmed to simulate a client with renal failure. The participants were required to respond to patient changes during the simulation. An educator with experience in simulation controlled the simulation. All students participated in simulation using the same renal failure scenario.

Participants were recorded during the simulation; and the raters evaluated the students by viewing each simulation recording. This ensured consistency and gave the raters adequate time to evaluate each student. The evaluators were two doctorally prepared nurse educators trained to use the LCJR. The raters were unaware of which students were assigned to the control and experimental groups. The educator scores were averaged to obtain a score for each participant. The scores of the control group and experimental group were compared to determine the effectiveness of the interactive clinical simulation video.

Procedures

The following information outlines the procedures used to conduct this study:

1. The researcher met with the director of the nursing program to discuss feasibility of the study and the most appropriate course and students to use for the study. The director identified a course based on appropriateness of content and simulation. The goals were to minimize disruption to the course schedule, utilize an existing course simulation for the study, and ensure all students would receive access to the interactive computer simulation video at the end of the study.

2. Approval for the study was obtained from the director of the nursing program.

3. Approval to conduct the study was requested and obtained from the president of the college.

4. The researcher met with the director, simulation coordinator, and course faculty to determine their desire to participate and discuss integration of the interactive computer simulation video and HFPS into the course. After meeting with faculty, potential raters were identified based on their knowledge of simulation and course schedule.

5. Two experienced faculty members with doctoral degrees and simulation experience were chosen and volunteered to participate as raters.

6. The researcher met with the lead course instructor to discuss the simulations integrated into the course. The researcher and lead course instructor decided to use the renal failure HFPS and renal failure interactive computer simulation video for the study.

7. The researcher met with the simulation center coordinator to discuss the scheduled renal failure simulation, lab scheduling, and recording of students during the simulation.

8. The researcher trained the raters on the use of the LCJR. The raters were given access to and discussed with the researcher the in-depth description of the LCJR according to Lasater (2011). The raters then viewed a recording of students participating in HFPS and rated the students using the LCJR. Rater's scores were reviewed for consistency. Differences and similarities were discussed to ensure consistency among raters. Inter-rater reliability was achieved.

9. During the course orientation session, students were invited to participate and sign a consent form (Appendix C).

10. All students attended a lecture on renal failure one week prior to the study.

11. On Monday of the week of the study, the experimental group was emailed their identification number and password to access the interactive computer simulation video. The control group was emailed a paper study guide detailing the same content found in the video (Appendix B).

12. All students participated in the renal failure HFPS over the course of three days – Wednesday, Thursday, and Friday.

13. All students were emailed an identification code and password to access the interactive computer simulation video on Friday evening after all students completed the renal failure HFPS.

14. Raters viewed the recordings of students and evaluated each student using the LCJR. The raters were familiar with the students, and students signed into each lab session and introduced themselves prior to the beginning of the HFPS activity.

15. The researcher received the results of the students' evaluations and analyzed the data.

Intervention

  This study used an interactive computer simulation video as the intervention. The video was based on the National League for Nursing Competencies of Human Flourishing, Nursing Judgment, Professional Identity, and Spirit of Inquiry. The video also focused on the Quality and Safety Education for Nurses (QSEN) outcomes of evidence-based practice, patient-centered care, and safety. The content and correct actions in each scenario were based on evidenced-based information found in nursing references and textbooks.

  The students were provided with a tutorial on how to complete the computer simulation at the beginning of video. The interactive computer simulation video replicated a real-life clinical scenario of a patient newly diagnosed with renal failure with a recent previous hospitalization for atrial fibrillation and stage-three ulceration. The video exposed the student to the consequences of their actions in a safe environment. The video incorporated live action production that allowed the student to watch role models in action (Assessment Technologies Institute [ATI], 2013). The video adapted to student decisions determining the next course of action (ATI, 2013). The video also presented students with a clinical situation and prompted the student to determine the next course of action by answering questions throughout the scenario. After the student selected an action, the scenario continued, requiring subsequent student actions and concluded with a final patient response that resulted from student decisions (ATI, 2013). The choices of action available in each scenario were based on current nursing standards found in leading textbooks.

  The video integrated segments that portrayed a nurse caring for a patient in a clinical setting. The video began with the nurse receiving information about the patient from the emergency department nurse, and the video content was centered on the care of a 60-year old African-American male with renal failure and a recent previous hospitalization for atrial

fibrillation and a stage three ulceration. (ATI® Nursing Education, 2013). The scenario addressed patient-centered concepts related to fluid and electrolyte imbalance, dysrhythmias, and renal nutrition. Nursing concepts included sterile dressing change, prioritizing patient care, and discharge planning (ATI® Nursing Education, 2013). Students made clinical decisions based on information provided in the patient's virtual chart (available on screen), verbalized by the patient, or obtained by the nurse in the video. Each video segment ended with a question for the student to answer. Using branching logic, the student was directed to a new segment based on their response to each question. Essentially, the student determined what happened next in the video. The video lasted approximately 40 minutes to 1 hour, depending on the students' responses.

Because each student decision affected what happened next in the video, the end result varied. For example, if a student decided to administer an incorrect medication, the patient in the scenario responded accordingly. The student was given a variety of questions (multiple choice, ordered response, fill-in-the-blank) to answer throughout the video and the scenario adapted to the chosen decision.

At the completion of the scenario, the student received an Individual Report. The report summarized the student's overall performance with date and time use. The report also included performance-related to outcomes (QSEN, NCLEX Client Need Category, and Body Function), questions, selected options, and rationale for optimal options (ATI, 2013). Students were able to repeat the entire video as needed to gain mastery of the content. However, students were not able to rewind the video during a viewing.

Instrument

Dimensions of clinical judgment were measured using the LCJR. Based on the Tanner

Clinical Judgment Model (Tanner, 2006), the LCJR is designed to describe a student's clinical

judgment development based on four aspects of clinical judgment (Lasater, 2007). The LCJR

incorporates the four phases of the Tanner Clinical Judgment Model and further divides the

phases into 11 dimensions of clinical judgment (Appendix D). The LCJR measures: (a) Noticing

as evidenced by (1) focused observation, (2) recognizing deviations from expected patterns, and

(3) information seeking; (b) Interpreting as evidenced by (4) prioritizing data and (5) making

sense of data, (c) responding as evidenced by (6) calmness and confidence of manner, (7) clear

communication, (8) well-planned intervention/flexibility, and (9) being skillful, and (d)

reflecting as evidenced by (10) evaluation/self-analysis and (11) commitment to improvement

(Lasater, 2007). Each dimension listed above has four corresponding levels of development for

measurement: beginning, developing, accomplished, and exemplary. There were four points

available for each of the 11 dimensions. Scores ranged from 11 to 44. According to Lasater

(2011), students at the prelicensure level are expected to reach the accomplished level of each

dimension. Each level of development (beginning, developing, accomplished, and exemplary)

was assigned a number for scoring ranging from one to four. Each rater scored all participants,

and the scores were averaged to obtain a final score for each student.

The LCJR has been used in previous research to determine student self-confidence and

clinical competence (Blum, Borglund & Parcells, 2010) and the effectiveness of reflective

journaling (Lasater & Nielson, 2009). Dillard et al. (2009) also described faculty development

and the use of the LCJR in evaluating students. Using the LCJR as the evaluation tool, Mann

(2012) studied the effect of grand rounds on clinical judgment. LCJR scores for students in the

intervention group (M=36, SD=15.6) were significantly higher than students in the control group (M=22, SD=5.66).

Psychometric validity and reliability of the LCJR has been reported by two independent studies (Adamson & Kardong-Edgren, 2012; Sideras, 2007). Sideras (2007) used known-groups methodology to determine if the use of the LCJR would differentiate between two groups of nursing students having known differing levels of ability. Interrater scores ranged from 57% to 100% agreement using the LCJR during the course of the study. The author found the LCJR valid in determining differences in the known-groups. Using interclass correlations, Adamson & Kardong-Edgren (2012) reported interrater reliability of .889 among 38 nurse educators. The authors also reported a Cronbach's alpha of 0.974 to support the validity of the LCJR.

Data Collection and Analysis

Using the LCJR, data was collected during the spring of 2015. Participants were rated in groups of four during a renal HFPS. The renal HFPS focused on a 28-year-old male client admitted with right flank pain over the last two days. The client in the HFPS reported vomiting and had a history of being involved in a motorcycle accident five years ago and smoking one pack of cigarettes a day. Nurse educators from the community college with experience in simulation evaluation were trained prior to participating in the study to ensure interrater reliability. Raters were unaware of which students were assigned to the control and experimental groups.

As shown in Table 1, an independent *t* test was used to analyze the data for research question #1 using SPSS software technology. An alpha level of .05 was used to gauge statistical significance and a power analysis was conducted to determine if the planned number of participants would meet the requirements of a statistically significant study. For research

question #2, as shown in Table 1, multiple regression was used to predict whether there was a

significant relationship between demographic and academic variables and clinical judgment

scores as measured by the LCJR.

Table 1

Calculation of Independent t-test and multiple regression

Research Questions	Data Analysis Calculation
1. What is the effectiveness of an interactive clinical simulation video on clinical judgment of undergraduate nursing students?	$t = \dfrac{\overline{X}_1 - \overline{X}_2}{\sqrt{\dfrac{S_{x_1}^2}{n_1 - 1} + \dfrac{S_{x_2}^2}{n_2 - 1}}}$
2. What is the relationship between student demographic (age) and academic variables (current grade point average, course grade, hours and type of work) and clinical judgments scores as measured by the LCJR?	$Y = a + b_1 X_1 + b_2 X_2 + b_3 X_3$

Ethical Considerations

Approval for the study was obtained from the president of the participants' institution per

institutional policy. Institutional review board (IRB) approval was obtained from the researcher's

institution (Appendix E). The researcher obtained approval from the participants' institution

prior to receiving IRB approval from the researcher's institution. Anonymity and confidentiality

was maintained. All students received access to the interactive simulation videos at the

conclusion of data collection and prior to the end of the course semester. The researcher is an

employee of the producer of the interactive computer simulation video and maintained

transparency at all times by making this relationship clear during the study and stating this fact in the writing of the dissertation. The department of nursing where the study was conducted is a current customer of this researcher's employer and was made aware that participation in the study was not associated with the researcher's employer; no monetary benefits were provided to the school for participation in the study.

Conclusion

Preventing patient errors is essential to the delivery of safe patient care. It is imperative for nurse educators to produce clinically competent nursing graduates who can make clinical judgments and provide safe care to patients. Clinical judgment is an essential skill for health professionals (Tanner, 2006). Although, it is known that active learning strategies, such as problem-based learning, engage the learner and promote knowledge retention (Caputi, 2010), research indicating the improvement of clinical judgment based on problem-based strategies is limited. An interactive computer simulation video promotes active learning and student engagement. This research study adds to nursing literature and provides needed evidence to the effectiveness of an interactive simulation video in enhancing clinical judgment.

Chapter 4

Results

The purpose of this study was to examine if the use of an interactive computer simulation video had an impact on the clinical judgment of undergraduate nursing students. This study also examined whether there was a relationship between student demographic and academic characteristics and clinical judgment scores. The research questions for the study were:

1. What is the effectiveness of an interactive computer simulation video on clinical judgment of undergraduate nursing students?

2. What is the relationship between students' demographic (age,) and academic variables (current GPA, hours worked, and previous education) and clinical judgment scores?

The purpose of this chapter is to present the findings of this quasi-experimental research study. This chapter will discuss the findings as they relate to the research questions. The research questions were answered through analysis of the data and use of descriptive and inferential statistics.

The final research sample consisted of 50 second-level associate degree nursing students. A total of 47 participants (94%) were female and 3 (6%) were male. The ages ranged from 20 to 47 years old, averaging 27 years old. The majority of the participants were Caucasian/White (94%). Two participants (4%) were African-American/Black and one (2%) was White/Hispanic. Students' GPA scores ranged from 2.0 to 3.7, with an average of 3.0. Students reported working zero hours per week to working more than 25 hours per week, averaging 10-16 hours per week.

The statistical package for the social sciences (SPSS) Windows version 22.0 software package was used to analyze the data. Research question one was answered using an independent samples *t* test to compare the group means between the experimental and control groups and a multivariate analysis of variance to compare subscale scores among experimental and control groups. For research question two, multiple regression was used to determine if a relationship existed between clinical judgment scores and demographic and academic variables.

Research Question #1

What is the effectiveness of an interactive computer simulation video on clinical judgment of undergraduate nursing students?

The study measured clinical judgment scores using the LCJR evaluation tool. The independent variable was the interactive computer simulation video. The dependent variable was the clinical judgment score as measured by the LCJR evaluation tool. The 50 participants were divided into an experimental group (n = 18) and control group (n = 32). The initial experimental group consisted of 24 students. However, six of the students did not view the interactive computer simulation video and were subsequently moved into the control group. Therefore the design for the study was a quasi-experimental design. To examine question one, an independent samples *t* test was conducted to compare mean clinical judgment scores on the LCJR evaluation tool between the experimental and control groups. Total scores for the LCJR evaluation tool ranged from 11-44. The independent samples *t* test revealed no statistically significant differences between group scores, *t* = .846 (df, 48). Table 2 describes the results of the analysis. Levene's Equality of Error test (*F* test) variance revealed no statistically significant differences among groups, assuming equal variances. Table 3 details the mean and standard deviations of the clinical judgment scores as measured by the LCJR.

45

Table 2

Equality of Variances and Means for question 1

	Levene's Test for Equality of Variances		t-test for Equality of Means	
	F	Sig.	t	df
Average Score Equal Variances assumed	.062	.804	-.846	48

Table 3

Means and Standard Deviations of Clinical Judgment Scores on LCJR

	N	Mean	Std. Deviation	Std. Error Mean
Experimental Group	18	28.03	5.312	1.252
Control Group	32	29.36	5.362	.948

To further answer question one, the 11 dimensions of clinical judgment were grouped into the categories defined by the rubric. Focused observation, recognizing deviations from expected patterns, and information seeking were grouped under effective noticing. Prioritizing data and making sense of data were categorized under effective interpreting. Calm, confident manner, clear communication, well-planned intervention/flexibility, and being skillful were categorized under effective responding. Evaluation/self-analysis and commitment to improvement were categorized under effective reflecting. The category scores for noticing, interpreting, responding, and evaluating were compared among the experimental and control

groups. The maximum rating for each category was: noticing (12), interpreting (8), responding (16), and reflecting (8) for a total possible clinical judgment score ranging from 11-44. The results of the category scores are described in Table 4.

Table 4

Total clinical judgment and subscale score ranges

	N	Minimum	Maximum	Mean	Std. Deviation
Total clinical judgment score	50	19	40	28.88	5.329
Noticing	50	4.5	11	7.7	1.6903
Interpreting	50	3.0	7.0	4.97	1.1176
Responding	50	6.5	15.5	10.71	1.9590
Reflecting	50	3.0	7.0	5.61	1.0987

A multivariate analysis of variance was conducted comparing the category scores on the LCJR among the experimental and control groups. The multivariate analysis of variance revealed no statistically significant differences in category scores among the experimental and control groups. These findings are depicted in Table 5. Box's Equality of Covariance Matrices test revealed equal variances. See Table 6.

Table 5

Multiple Analysis of Variance for LCJR Subscales

Dependent Variable	Type II Sum of Squares	df	Mean Square	F	Sig.
Noticing	3.781	1	3.781	1.332	.254
Interpreting	.761	1	.761	.604	.441
Responding	.934	1	.934	.240	.627
Reflecting	1.742	1	1.742	1.457	.233

Table 6

Box's Equality of Covariance Matrices Test for LCJR subscales

Box's M	5.271
F	.473
df1	10
df2	5819.655
Sig.	908

Research Question #2

What is the relationship between students' demographic (age) and academic variables (current

GPA, hours worked, and previous education) and their clinical judgment scores?

A multiple regression was performed with clinical judgment score as the dependent

variable and age, GPA, hours worked, and previous degree as predictor variables. No statistically

significant relationship was found among clinical judgment scores and age, GPA, working hours, and previous degree. See Tables 7 and 8.

Table 7

Multiple Regression for Predictor Variables: Age, GPA, Working Hours, Previous Degree

R	R Square	Adjusted R Square	Std. Error of the Estimate
.202	.041	-.047	5.502

Table 8

Relationship of Predictor Variables to Clinical Judgment Scores

	Unstandardized Coefficients		Standardized Coefficients		
	B	Std. Error	Beta	t	Sig.
(Constant)	32.393	6.420		5.046	.000
Age	-.036	.103	-.053	-.350	.728
GPA	-1.455	1.841	-.119	-.790	.434
Working hours	.342	.495	.105	.692	.492
Previous degree	.399	.605	.098	.659	.513

Summary

This chapter presented the results of this quasi-experimental study. No statistically significant differences were found between the experimental and control groups for question one, and no statistically significant difference was found among the phases of the LCJR between the two groups. For question two, no statistically significant relationship was found among the variables of age, GPA, hours worked, and previous degree and clinical judgment. SPSS Windows (version 22.0) software package was used to analyze this quantitative data and included the use an independent samples *t* test, multivariate analysis of variance, and multiple regression.

Chapter 5

Discussion of Results

The purpose of this study was to examine if the use of an interactive computer simulation video had an impact on the clinical judgment scores of undergraduate nursing students. This study also examined whether there was a relationship between students' demographic and academic characteristics and their clinical judgment scores. The research questions for this study were:

1. What is the effectiveness of an interactive computer simulation video on clinical judgment of undergraduate nursing students?

2. What is the relationship between students' demographic (age) and academic variables (current GPA, course grade, hours and type of work) and their clinical judgments scores?

This chapter provides a summary of the study findings, discusses limitations and implications of the findings as they relate to the study's research questions and participants' clinical judgment scores, and provides recommendations for future research.

Findings

New graduate nurses are expected to possess the knowledge and clinical skills necessary to provide safe, quality patient care. This includes the use of clinical judgment to make patient care decisions. Recognition of a change in a patient's status, interpreting the change, and promptly responding to that change reflects good clinical judgment and potentially impacts the care provided to patients. Cappelleti, Engel, and Prentice (2014) suggested educational strategies

51

that improve clinical judgment may impact overall clinical judgment by influencing what the nurse brings to a situation. Therefore, this research study examined the use of an interactive computer simulation video as a teaching strategy to determine if the interactive computer simulation video had an impact on the student's use of clinical judgment.

The first research question was answered by analyzing the data using an independent samples t test which found no statistically significant differences in clinical judgment scores among the experimental and control groups. These findings suggest the use of an interactive computer simulation video may not produce an improvement in clinical judgment scores. The results of this study are consistent with the findings of Secomb et al. (2012) that there was no relationship between computer-based simulation and nursing students' decision making ability. Additionally, the results are also consistent with the findings of Fero et al. (2010), comparing video-taped vignettes and high-fidelity simulation. No difference was found in critical thinking scores between the use of video vignettes and HFPS.

Further analysis of the four phases of clinical judgment (noticing, interpreting, responding, and reflecting) were conducted using multivariate analysis of variance. No statistically significant differences were found in the subscale scores of noticing, interpreting, responding, and reflecting between the experimental and control groups. On the basis of these findings, completing an interactive computer simulation video did not improve any of the four phases of clinical judgment as measured by the LCJR. Unlike Lasater and Nielson (2009), who reported a statistically significant increase in all subscales of the LCJR when using concept-based teaching as the intervention, this current study found no difference between experimental and control groups.

For research question two, a multiple regression test was conducted to determine if there was a relationship between participants' age, current GPA, hours worked, or previous education and clinical judgment scores on the LCJR evaluation tool. The results revealed no statistically significant differences among participants' age, current GPA, hours worked, or previous education and clinical judgment scores on the LCJR evaluation tool.

According to these findings, age of the student is not a predictive measure of clinical judgment. This is consistent with other study findings in the literature. Fenske et al. (2013) found no significant differences in clinical judgment scores while participating in a simulated activity among participants aged 21 to 64 years of age. Age and years of nursing experience were also found to have no statistically significant effect on the perceived benefits of simulation to the use of clinical judgment in a quantitative descriptive study of student rankings of components that contribute to clinical judgment (Kelly et al., 2014).

The findings of this study also suggest that current GPA does not impact clinical judgment. Bowles (2000) also found no significant relationship between the age of the student, number of years spent in college, or the student's GPA while in the nursing program on clinical judgment skills.

This study also found no relationship between previous educational experience and clinical judgment. Likewise, Bambini, Washburn, and Perkins (2009) reported age, previous degree, and previous experience with patients did not have an effect on students' overall clinical judgment after participating in simulation lab activities.

Limitations

There are several limitations to this study. The sample was a convenience sample and had limited representation from minorities and men. Furthermore, the sample reflected one second-

level nursing class in an associate degree nursing program at one university in the southeastern United States. These features limit the generalizability of the findings.

The sample was small. Eight of the original participants were excluded from the study resulting in a decrease in the overall number of participants. Four participants were excluded due to non-progression and were repeating the course, two students were absent the day of the simulation, and two students withdrew from the course. Small samples may fail to show a relation between the independent and dependent variable (Polit & Beck, 2008).

The participants in the experimental group completed only one interactive computer simulation video scenario. This could have impacted the results. Integrating the interactive computer simulation videos into a course with multiple opportunities to review content may yield different research results.

GPAs were self-reported by students and could have potentially been misstated, potentially influencing the result of no statistical relationship found between GPA and clinical judgment.

Conclusions

This study examined if the use of an interactive computer simulation video had an impact on the clinical judgment scores of undergraduate nursing students. This study also examined whether there was a relationship between students' demographic and academic characteristics and their clinical judgment scores. Based on the study, the interactive computer simulation video did not have an effect on the clinical judgment of undergraduate nursing students. These findings support previously reported findings of computer-based simulation having no effect on decision making ability in nursing students (Secomb et al., 2012: Weatherspoon & Wyatt, 2012).

The four phases of clinical judgment provide a more comprehensive view of clinical judgment. This study found no impact on any of the four phases. However, previous research found an increase in all four subscales when using concept-based teaching strategies (Lasater & Nielson, 2009).

According to this current study, clinical judgment does not appear to be related to age, current GPA, previous educational background, or number of hours currently working. This may provide encouragement to students who do not possess a previous degree or are working a substantial number of hours while attending school.

In summary, clinical judgment is influenced by a variety of factors. What the nurse brings to the situation, knowing the patient and engaging with the patient, the context of the situation, reasoning patterns, and reflection are all critical to the development and use of clinical judgment (Tanner, 2006). Moreover, nursing faculty are in a position to influence and provide teaching strategies that impact the use of clinical judgment. Further exploration of strategies that effect clinical judgment will add to current nursing education knowledge and provide options to meet a variety of learning needs in nursing students.

Implications

Nurse Education

Experiential learning is a key component for nursing students to develop clinical judgment skills (Benner et al., 2009). Students gain experience in the classroom, clinical, and laboratory setting. Nurse educators are obligated to incorporate teaching strategies that allow students to gain experience and use clinical judgment. Therefore, this study is relevant to nursing education. It remains important to research strategies that impact and improve upon the clinical

judgment of nursing students. Nurse educators should carefully identify teaching strategies such as computer-simulation videos and use strategies that are founded on evidence-based practice.

Practice

It is essential for nurses to accurately assess patients, prioritize findings, and respond appropriately to patient changes. This requires the use of competent clinical judgment. Research indicates new graduates overestimate their clinical judgment abilities compared with actual skills (Fenske et al., 2013). Despite the results found in this current study, there remains a need to determine if clinical judgment can be improved with interactive computer simulation video intervention. It is imperative for new graduates to have an accurate perception of their clinical judgment and to be confident when making clinical judgments that impact patient care. Teaching strategies aimed at improving clinical judgment may impact students' decision making and ultimately patient outcomes. Therefore, this study is relevant to nursing practice.

Research

The theoretical framework for this study was the constructivist theory of learning. Elements of constructivism were evident in the study. Piaget (1961) discussed the formal and dynamic aspects of thought, involving learning through perceptions, images, and actions. The interactive computer simulation video required students to view images of a nurse caring for a patient, and required students to interact with the video by making decisions that affected the patient's outcome in the scenario. Additionally, important aspects of constructivist learning experiences are reflection, evaluation, and the construction of new knowledge (Peters, 2000). Students were provided an evaluation of their performance at the conclusion of the video, including a score of unsatisfactory, satisfactory, or strong. Students could reflect on their chosen decisions, remediate, and repeat the interactive computer simulation video as many times as

necessary to achieve a satisfactory or strong score. This process allowed the students to use their existing knowledge to construct new knowledge and modify the learning as needed.

Consequently, this study has implications for research. Although this study involved nursing students, it is also relevant to other fields of study. Research pertaining to constructivist teaching strategies can inform educators of educational frameworks that may work best for student learning. Using the constructivist theory of learning puts the focus of learning on the student rather than the teacher (Peters, 2000). This approach may lead to graduates that are capable of learning beyond the classroom, resulting in self-learning and knowledge transfer.

Although this study resulted in no statistically significant findings to support the use of an interactive computer simulation video to improve clinical judgment, further research on this subject is warranted. Research indicates there is no single strategy that is most effective at developing clinical judgment, albeit identifying strategies that improve the understanding of patient cues and information may then improve clinical judgment (Cappelleti, Engel, & Prentice, 2014). Further research regarding interactive computer simulation may provide insight into what works alone or in combination with other strategies to improve clinical judgment skills in nursing students. Furthermore, companies that develop products such as the interactive computer simulation video can use research results to improve their products. Research can indicate whether or not the product meets standards or requires revisions to achieve learning outcomes. For example, based on the results of this study, companies may decide to explore ways to provide additional student interaction within the video to more closely align with the constructivist theory of learning. Future research may also provide evidence to support teaching strategies that reflect constructivism and promote clinical judgment. Researchers should use true experimental or quasi-experimental designs similar to the design used in this study (APA, 2006).

Recommendations

It is recommended that future studies expand the size of the sample by using multiple sites and randomization. This would increase the generalizability of the findings by including a larger sample size, diverse ethnic backgrounds, and male participants. Future researchers may also choose to compare clinical judgment among degree types, such as baccalaureate, associate, and diploma nursing students.

Implementing more than one treatment would also be advisable. Future studies could provide several interactive computer simulation videos throughout a course as they relate to course content and compare the findings to a similar group of students who did not have interactive computer simulation videos integrated into the course. The interactive computer simulation videos could be used as a course requirement or as preparation for HFPS activities. A longitudinal study could also potentially yield substantial findings. Evaluating students during nursing school and again graduation while working as a nurse would provide relevant information about the transfer of clinical judgment when transitioning to student to practicing nurse.

Further study of additional outcomes would expand the content area. Other variables such as course grade or test grade can be explored to determine if the interactive computer simulation video has an effect on these variables. This would also explore the effect on knowledge as opposed to clinical judgment.

The addition of a qualitative component to the study is also recommended. This component could explore the students' learning and clinical decision making while participating in the interactive computer simulation video. This would give educators information about how

58

and why students make patient care decisions. Future findings can impact how other videos are developed and how educators integrate the videos into the course design.

It remains important to explore the effect of teaching strategies on clinical judgment. Nurses rely on clinical judgment to make patient care decisions. Clinical judgment is gained through experience. Therefore, it is essential for nurse educators to provide learning experiences that supplement the limited number of clinical opportunities available to nursing students. Future research on teaching strategies that impact clinical judgment in nursing students remains relevant. Future research offers a great opportunity to identify methods to meet graduate nurse competencies to provide quality patient care and promote better patient outcomes.

REFERENCES

Adamson, K. A., & Kardong-Edgren, S. (2012). A method and resources for assessing the reliability of simulation evaluation instruments. *Nursing Education Perspectives, 33*(5), 334-339.

Alexander, J. G., McDaniel, G. S., Baldwin, M. S., & Money, B. J. (2002). Promoting, applying, and evaluating problem-based learning. *Nursing Education Perspectives, 23*(5), 248-253.

American Association of Colleges of Nursing (2008). *The essentials of baccalaureate education for professional nursing practice*. Washington, D. C.: Author.

Anderson, N. B. (2006). Evidence-based practice in psychology. *American Psychologist*, *61*(4), 271-285.

Applin, H., Williams, B., Day, R., & Buro, K. (2010). A comparison of competencies between problem-based learning and non-problem-based graduate nurses. *Nurse Education Today, 31*(2), 129-134.

Assessment Technologies Institute® (ATI). (2013). RN Real Life Clinical Reasoning Scenarios. Retrieved from http://www.atireallife.com/.

ATI® Nursing Education. (2013). RN Real Life Clinical Reasoning Scenarios Medical Surgical. Educator Implementation Guide. Retrieved from http://www.atireallife.com/

Bambini, D., Washburn, J., & Perkins, R. (2009). Outcomes of clinical simulation for novice nursing students: Communication, confidence, clinical judgment. *Nursing Education Research, 30*(2), 79- 82.

Barrows, H., & Tamblyn, R. (1980). *Problem-based learning: An approach to medical education*. New York: Springer Publishing.

Bartels, J. E. (2008). Learner-centered teaching. In B. K. Penn (Ed.), *Mastering the teaching role: A guide for nurse educators*, (pp. 105-117). Philadelphia, PA: F. A. Davis Company.

Benner, P., Sutphen, M., Leonard, V., & Day, L. (2010). *Educating nurses: A call for radical transformation*. San Francisco, CA: Jossey-Bass.

Benner, P., Tanner, C., & Chesla, C. (2009). *Expertise in nursing practice: Caring,*

clinical judgment, and ethics (2nd ed.). New York, NY: Springer Publishing Company.

Bonwell, C. C., & Eison, J. A. (1991). *Active learning: Creating excitement in the classroom* (ASHE-ERIC Higher Education Report No. 1). Washington, DC: George Washington University, School of Education and Human Development.

Bowles, K. (2000). The relationship of critical-thinking skills and the clinical-judgment skills of baccalaureate nursing students. *Journal of Nursing Education, 39*(8), 373-376.

Blum, C. A., Borglund, S., & Parcells, D. (2010). High-fidelity nursing simulation: Impact on student self-confidence and clinical competence. *International Journal of Nursing Education Scholarship, 7*(1), 1-14.

Bradley, P. (2006). The history of simulation in medical education and possible future directions. *Medical Education, 40*, 254-262.

Brannan, J. D., White, A., & Bezanson, J. L. (2008). Simulator effects on cognitive skills and confidence levels. *Journal of Nursing Education, 47*(11), 495-500.

Campbell, R. J., Gantt, L., & Congdon, T. (2009). Teaching workflow analysis and lean thinking via simulation: A formative evaluation. *Perspectives in Health Information Management, 6*(3), 1-21.

Cappelleti, A., Engel, J. K., & Prentice, D. (2014). Systematic review of clinical judgment and reasoning in nursing. *Journal of Nursing Education, 53*(8), 453-458.

Caputi, L. (2010). Teaching in the classroom. In L. Caputi (Ed.), *Teaching nursing: The art and science* (2nd ed., Vol. 1, pp. 686-710). Illinois: College of Dupage Press.

Cardosa, A. F., Moreli, L., Braga, F. T. M. M., Vasques, C. I., Santos, C. B., & Carvalho, E. C. (2012). Effect of a video on developing skills in undergraduate nursing students for the management of totally implantable central venous access ports. *Nurse Education Today, 32*, 709-713.

Chau, J. P. C., Chang, A. M., Lee, I. F. K., Ip, W. Y., Lee, D. T. F., & Wootton, Y. (2001). Effects of using videotaped vignettes on enhancing students' critical thinking ability in a baccalaureate nursing programme. *Issues and Innovations in Nursing Education, 36*(1), 112-119.

Chen, S., Chen, J., Ng, C., Chen, P., Lee, P., & Chang, W. (2010). Factors that influence the accuracy of triage nurses' judgment in emergency departments. *Emergency Medicine Journal, 27*, 451-455.

Cooper, J. B., & Taqueti, V. R. (2004). A brief history of the development of mannequin

simulators for clinical education and training. *Quality and Safety in Healthcare, 13*(Suppl 1), i11-i18.

Cronenwett, L., Sherwood, G., Barnsteiner, J., Disch, J., Johnson, J., Mitchell, P.,… Warren, J. (2007). Quality and safety education for nurses. *Nursing Outlook, 3*(55), 122-131.

Curtin, L. B., Finn, L. A., Czosnowski, Q. A., Whitman, C. B., & Cawley, M. J. (2011). Computer-based simulation training to improve learning outcomes in mannequin-based simulation exercises. *American Journal of Pharmaceutical Education, 75*(6), 1-6.

Del Bueno, D. A. (2005). Crisis in critical thinking. *Nursing Education Perspectives, 26*(5), 278-282.

Dillard, N., Sideras, S., Ryan, M., Carlton, K. H., Lasater, K., & Siktberg. L. (2009). A collaborative project to apply and evaluate the clinical judgment model through simulation. *Nursing Education Perspectives, 30*(2), 99-104. Rockville, MD.

Docherty, C., Hoy. D., Topp, H., & Trinder, K. (2004). eLearning techniques supporting problem-based learning in clinical simulation. *International Journal of Medical Informatics, 74*, 527-533.

Durham, C. F., & Alden, K. R. (2008). Enhancing patient safety in nursing education through patient simulation. In R. G. Hughes (Ed.), *Patient Safety and Quality: An Evidenced-Based Handbook for Nurses*. AHRQ Publication No. 08-0043. Rockville, MD: Agency for Healthcare Research and Quality.

Durham, C. F., & Alden, K. R. (2010). The nuts and bolts of using simulation. In L. Caputi (Ed.), *Teaching nursing: The art and science* (2nd ed., Vol. 2, pp. 28-55). Illinois: College of Dupage Press.

Facione, N. C., Facione, P. A., & Sanchez, C. A. (1994). Critical thinking disposition as a measure of competent clinical judgment: The development of the California Critical Thinking Disposition Inventory. *Journal of Nursing Education, 33*(8), 345-350.

Falvey, J. E. (2001). Clinical judgment in case conceptualization and treatment planning across mental health disciplines. *Journal of Counseling and Development, 79*(3), 292-303.

Fenske, C. L., Harris, M. A., Aebersold, M. L., & Hartman, L. S. (2013). Perception versus reality: A comparative study of the clinical judgment skills of nurses during a simulated activity. *The Journal of Continuing Education in Nursing, 44*(9), 399-405.

Fero, L. J., O'Donnell, J. M., Zullo, T. G., Dabbs, A. D., Kitutu, J., Samosky, J. T.,

Hoffman, L. A. (2010). Critical thinking skills in nursing students: Comparison of simulation-based performance with metrics. *Journal of Advanced Nursing, 66*(10), 2182-2193.

Fink, L. D. (2003). *Creating significant learning experiences:. An integrated approach to designing college courses*. San Francisco, CA: Jossey-Bass.

Gaba, D. M. (2004). A brief history mannequin-based simulation & application. In W. F. Dunn (Ed.), *Simulators in Critical Care and Beyond* (pp. 7-14). Des Plaines, NY: Society of Critical Care Medicine.

Gerdeman, J. L., Lux, K., & Jacko, J. (2013). Using concept mapping to build clinical judgment skills. *Nurse Education in Practice, 13*, 11-17.

Gleason, B. L., Peeters, M. J., Resman-Targoff, B. H., Karr, S., McBane, S., Kelley, & K. Denetclaw, T. H. (2011). An active-learning strategies primer for achieving ability-based educational outcomes. *American Journal of Pharmaceutical Education, 75*(9), 1-12.

Grenvik, A., & Schaefer, J. (2004). From Resusci-Anne to Sim-Man: The evolution of simulators in medicine. *Critical Care Medicine, 32*(2), 556-557.

Harlow, S., Cummings, R., & Aberasturi, S. M. (2006). Karl Popper and Jean Piaget: A rationale for constructivism. *The Educational Forum, 71*, 41-48.

Hayden, J. K., Smiley, R. A., Alexander, M., Kardong-Edgren, S., & Jeffries, P. R. (2014). The NCSBN national simulation study: A longitudinal, randomized, controlled study replacing clinical hours with simulation in prelicensure nursing education. *Journal of Nursing Regulation, 5*(2), S3-S64.

Henry, S. G., Forman, J. H., & Fetters, M. D. (2011). How do you know what Aunt Martha looks like? A video elicitation study exploring tacit clues in doctor-patient interactions. *Journal of Evaluation in Clinical Practice, 17*(5), 933-939.

Issenberg, S. G., McGaghie, W. C., Petrusa, E. R., Gordon, D. L., & Scalese, R. J. (2005). Features and uses of high-fidelity medical simulations that lead to effective learning: A BEME systematic review. *Medical Teacher, 27*(1), 10-28.

Jeffries, P. R., Clochesy, J. M., & Hovancsek, M. T. (2009). Designing, implementing, and evaluating simulations in nursing education. In D. M. Billings & J. A. Halstead (Eds.), *Teaching in nursing: A guide for faculty* (3rd ed.). St. Louis, MO: Saunders Elsevier.

Jeffries, P. R., Settles, J., Milgrom, L., & Woolf, S. (2010). Using simulations: Guidelines and challenges. In L. Caputi (Ed.), *Teaching nursing: The art and science* (2nd ed., Vol. 2, pp.56-79). Illinois: College of Dupage Press.

Johnson, E. A., Lasater, K., Hodson-Carlton, K., Siktberg, L., Sideras, S., & Dillard, N. (2012). Geriatrics in simulation: Role modeling and clinical judgment effect. *Nursing Education Perspectives, 33*(3), 176-180.

Kameg, K., Howard, V. M., Clochesy, J., Mitchell, A. M., & Suresky, J. M. (2010). The impact of high fidelity human simulation on self-efficacy of communication skills. *Issues in Mental Health Nursing, 31*, 315-323.

Karthikeyan, G., & Pais, P. (2010). Clinical judgment & evidence-based medicine: Time for reconciliation. *Indian Journal of Medical Research, 132*, 623-626.

Katus, H. A., Giannitsis, E., & Jaffe, A. S. (2012). Interpreting changes in troponin – clinical judgment is essential. *Clinical Chemistry, 58*(1), 39-44.

Kelly, M. A., Hager, P., & Gallagher, R. (2014). What matters most? Students' rankings of simulation components that contribute to clinical judgment. *Journal of Nursing Education, 53*(2), 97- 101.

Kienle, G. S. & Kiene, H. (2011). Clinical judgment and the medical profession. *Journal of Evaluation in Clinical Practice, 17*, 621-627.

Lambton, J. (2008). Integrating simulation into a pediatric nursing curriculum: A 25% solution*? Simulation in Healthcare, 3*(1), 53-57.

Lasater, K. (2007). Clinical judgment development: Using simulation to create an assessment rubric. *Journal of Nursing Education, 46*(11), 496-503.

Lasater, K. (2011). Clinical judgment: The last frontier for evaluation. *Nurse Education in Practice, 11*, 86-92.

Lasater, K., & Nielsen, A. (2009). The influences of concept-based learning activities on students' clinical judgment development. *Journal of Nursing Education, 48*(8), 441-446.

Lindsey, P. L, & Jenkins, S. (2013). Nursing students' clinical judgment regarding rapid response: The influence of a clinical simulation education intervention. *Nursing Forum, 48*(1), 61- 70.

Mann, J. (2012). Critical thinking and clinical judgment skill development in baccalaureate nursing students. *The Kansas Nurse, 87*(1), 26-30.

Mccullough, L. B. (2013). Critical appraisal of clinical judgment: An essential dimension of clinical ethics. *Journal of Medicine and Psychology, 38*, 1-5.

McKeon, L. M., Norris, T., Cardell, B., & Britt, T. (2009). Developing patient-centered

care competencies among prelicensure nursing students using simulation. *Journal of Nursing Education, 48*(12), 711- 715.

McNelis, A. M., Ironside, P. M., Ebright, P. R., Dreifuerst, K. T., Zvonar, S. E., & Conner, S. C. (2014). Learning nursing practice: A multisite, multimethod investigation of clinical education. *Journal of Nursing Regulation, 4*(4), 30-35.

Nehring, W. M. (2008). U.S. boards of nursing and the use of high-fidelity patient simulators in nursing education. *Journal of Professional Nursing, 24*(2), 109-117.

Ohman, K. (2010). Revitalizing for success with active learning approaches. In L. Caputi (Ed.), *Teaching nursing: The art and science,*(2nd ed., Vol. 1, pp. 711-739). Glen Ellyn, IL: College of DuPage Press.

Partin, J. L., Payne, T. A., & Slemmons, M. F. (2011). Students' perceptions of their learning experiences using high-fidelity simulation to teach concepts relative to obstetrics. *Nursing Education Perspectives, 32*(3), 186-188.

Piaget, J. (1961). The genetic approach to the psychology of thought. *Journal of Educational Psychology, 52*(6), 275-281.

Peters, M. (2000). Does constructivist epistemology have a place in nurse education? *Journal of Nurse Education, 39*(4), 166-172.

Polit, D. F., & Beck, C. T. (2008). *Nursing research: Generating and assessing evidence for nursing practice* (8th ed.). Philadelphia, PA: Wolters Kluwer Lippincott Williams & Wilkins.

Porter, A. G. & Tousman, S. S. (2010). Evaluating the effect of interactive audience response systems on the perceived learning experience of nursing students. *Journal of Nursing Education, 49*(9), 523-527.

Prince, M. (2004). Does active learning work? A review of the research. *Journal of Engineering Education, 93*(3), 223-231.

Rogal, S. M. M. & Snider, P. D. (2008). Rethinking the lecture: The application of problem-based learning methods to atypical contexts. *Nurse Education in Practice, 8*, 213-219.

Roh, Y. S., & Kim. S. S. (2014). The effect of computer-based resuscitation simulation on nursing students' performance, self-efficacy, post-code stress, and satisfaction. *Research and Theory for Nursing Practice: An International Journal, 28*(2), 127-139.

Romeo, E. M. (2013). The predictive ability of critical thinking, nursing GPA, and SAT

scores on first-time NCLEX-RN performance. *Nursing Education Perspectives, 34*(4), 248- 253.

Sangestani, G., & Khatiban, M. (2013). Comparison of problem-based learning and lecture-based learning in midwifery. *Nurse Education Today, 33*, 791-795.

Schlairet, M. C. & Pollock, J. W. (2010). Equivalence testing of traditional and simulated clinical experiences: Undergraduate nursing students' knowledge acquisition. *Journal of Nursing Education, 49*(1), 43-47.

Schubert, C. R. (2012). Effect of simulation on nursing knowledge and critical thinking in failure to rescue events. *The Journal of Continuing Education in Nursing, 43*(10), 467-471.

Schwartz, D. L., Lindgren, R., & Lewis, S. (2009). Constructivism in an age of non-constructivist assessments. In S. Tobias & T. Duffy (Eds.), *Constructivist Instruction: Success or Failure?* (pp. 34-61). New York: Routledge.

Schwid, H. A. (2004). Screen-based simulation for critical care medicine. In W. F. Dunn (Ed.), *Simulators in critical care and beyond* (pp. 61-66). Des Plaines, IL: Society of Critical Care Medicine.

Secomb, J., McKenna, L., & Smith, C. (2012). The effectiveness of simulation activities on the cognitive abilities of undergraduate third-year nursing students: A randomized control trial. *Journal of Clinical Nursing, 21*, 3475-3484.

Seidl, A. H. & Sauter, D. (1990). The new non-traditional student in nursing. *Journal of Nursing Education, 29*(1), 13-19.

Sideras, S. (2008). *An examination of the construct validity of a clinical judgment evaluation tool in the setting of high-fidelity simulation*. (Unpublished doctoral dissertation). Oregon Health & Science University, Portland, Oregon.

Spunt, D., & Covington, B. G. (2008). Utilizing clinical simulation. In B. K. Penn (Ed.), *Mastering the Teaching Role* (pp. 233-251). Philadelphia, PA: F. A. Davis Company.

Steadman, R. H, Coates, W. C., Huang, Y. M., Matevosian, R., Larmon, B. R., McCullough, L., & Ariel, D. (2006). Simulation-based training is superior to problem-based learning for the acquisition of critical assessment and management skills. *Critical Care Medicine, 34*(1), 151-157.

Tanner, C. A. (2006). Thinking like a nurse: a research-based model of clinical judgment in nursing. *Journal of Nursing Education, 45*(6), 204-211.

The Joint Commission. (2013). *Sentinel Event Data Root Causes by Event Type 2004-2012*. Retrieved from http://www.jointcommission.org/sentinel_event.aspx on February 13, 2013.

Tombal, B., Andriole, G. L., de la Taille, A., Gontero, P., Haese, A., Remzi, M., & Stoevelaar, H. (2013). Clinical judgment versus biomarker prostate cancer gene 3: Which is best when determining the need for repeat prostate biopsy? *Urology, 5*, 998-1004.

Tomko, J. K., & Munley, P. H. (2013). Predicting counseling psychologists attitudes and clinical judgments with respect to older adults. *Aging Mental Health, 17*(2), 233-241.

Tomlin, G. (2005). The use of interactive video client simulation scores to predict clinical performance of occupational therapy students. *The American Journal of Occupational Therapy, 59*(1), 50-56.

Victor-Chmil, J. (2013). Critical thinking versus clinical reasoning versus clinical judgment: Differential diagnosis. (2013). *Nurse Educator, 38*(1), 34-36.

Wadsworth, B. J. (1989). *Piaget's theory of cognitive and affective development* (4th ed.)*.* White Plains, NY: Longman.

Waltman, S. H., Williams, A., & Christiansen, L. R. (2013). Comparing student clinician and licensed psychologist clinical judgment. *Training and Education in Professional Psychology, 7*(1), 33-41.

Weatherspoon, D. L., & Wyatt, T. H. (2012). Testing computer-based simulation to enhance clinical judgment skills in senior nursing students. *Nursing Clinics of North America*, 47, 481-491.

Westhues, A., Barsen, C., Freymond, N., & Train, P. (2014). An outcome evaluation of a problem-based learning approach with MSW students. *Journal of Social Work Education, 50*, 472-489.

Williams, G., Morris, M. E., Schache, A., & McCrory, P. (2009). Observational gait analysis in traumatic brain injury: Accuracy of clinical judgment. *Gait & Posture, 29*, 454-459.

Wotton, K., Davis, J., Button, D., & Kelton, M. (2010). Third-year undergraduate nursing students' perceptions of high-fidelity simulation. *Journal of Nursing Education, 49*(11), 632-639.

Zwirn, E. E., & Muehlenkord, A. (2009). Using media, multimedia, and technology-rich learning environments. In D. M. Billings & J. A. Halstead (Eds.), *Teaching in nursing: A guide for faculty* (3rd ed., (pp. 335-350). St. Louis, MO: Saunders Elsevier.

Appendix A Demographic Data Collection Form

Instructions: Please provide your identification number below. Your information will be kept confidential. No individual student identifiers will be made public. Completion of this form will be deemed consent to participate in this study.

Identification Number_____

Please provide your answer in the blank.
1. What is your gender? _____

2. What is your age? _____

3. What is your ethnicity? _____

4. At the end of last term, what was your Grade Point Average (GPA) at this institution? (A=4.0, B=3.0, C=2.0) _____

Please mark only one box with an "X" next to the response that best answers the question.
5. On average, how many hours per week do you spend working for pay?

    □ 0

    □ 1-9 hours

    □ 10-16 hours

    □ 17-25 hours

    □ More than 25 hours

6. Is your work associated with health care or nursing? If yes, please indicate your job title next to the yes response.
    □ Yes _____

    □ NO

7. Other than your current college experience, please indicate your highest previous learning experience to date. If you have completed a previous degree, please indicate the field in the blank next to the appropriate degree.
    □ Graduated from high school

    □ Earned a GED

    □ Attended college but did not complete a degree

    □ Completed an Associate's degree in a field other than nursing _____

    □ Completed a Bachelor's degree _____

    □ Completed a Master's degree _____

    □ Completed a Doctoral degree _____

- Patient report should be given using the SBAR format: Situation, Background, Assessment, and Recommendation.

- When changing a sterile dressing, the nurse should the perform the following steps in order:
  - Perform hand hygiene
  - Put on clean gloves
  - Remove the old dressing
  - Place the dressing in a moisture-proof bag
  - Remove the clean gloves
  - Perform hand hygiene
  - Apply sterile gloves
  - Measure the wound using a sterile swab for tunneling
  - Cover the wound with sterile gauze

- Furosemide (Lasix) will ease a client's breathing by promoting excretion of excess fluids, which can lead to pulmonary edema.

- Obtaining a bladder scan will identify the presence of the approximate amount of urine a client's bladder. The bladder scanner transducer should be placed directly over the bladder for an accurate assessment.

- According to the ABC priority setting framework, the client with chest pain takes priority when determining which client to see first.

- A focused assessment if the priority action when a client experiences a change in heart rhythm.

- The nurse on the telemetry floor should notify the rapid response team when a client is experiencing unstable ventricular tachycardia.

- Sodium polystyrene sulfonate (Kayexalate) is indicated for hyperkalemia. It is a resin that allows for sodium and potassium exchange in the gastrointestinal system. Potassium is excreted through feces, not the urine.

- It is important to administer the correct dosage of prescribed medication. If a client is prescribed furosemide 40 mg IV and the medication is available as furosemide 80mg/5mL, the nurse should administer 2.5 mL.

- Providers encourage clients with chronic kidney disease to consume a low-protein diet due to the level of phosphorus it contains. Clients with kidney disease are unable to metabolize the phosphorus in protein.

- If upon assessment, the nurse notices an IV sit that is warm, swollen, and tender to touch, the nurse should remove the IV catheter. This removes the cause of the phlebitis and alleviates the discomfort for the client.

- When providing care to a client with a peripherally inserted central catheter (PICC), the nurse should include the following in the plan of care:

  - A 10mL syringe is used for administration of IV medications and flushing. The larger syringe lowers the pressure at the injection site, reducing the risk to the client.
  - A sterile dressing change is completed to prevent infection.
  - Blood pressures should not be taken in the arm with PICC. This may cause added pressure to the catheter and increase the risk of occlusion.
  - The catheter should be measured daily 4 inches above the insertion site to the end of the exposed catheter to verify correct positioning.
  - The catheter tip is changed every 3 to 7 days to prevent infection.

Appendix C Consent Form

Dear Student:

As part of the requirements for the completion of the Doctor of Education in Instructional Leadership at The University of Alabama, I am conducting a research study on the effect of an interactive computer simulation video on clinical judgment.

You were selected as a potential participant for this study because you are currently enrolled in NUR 202: Nursing Through the Lifespan II. You are invited to participate in this study. I will study the impact of this teaching method on clinical judgment. If you agree to participate, you will be asked to complete a demographic data form. You will also be asked to participate in a high-fidelity patient simulation to evaluate your use of clinical judgment. You will be randomly assigned to either a control group or experimental group. As a participant in the experimental group, you will be given access to an ATI Real Life Clinical Reasoning Video. As a participant in the control group, you will be given a paper study guide. All participants will receive access to the ATI Real Life Clinical Reasoning Video at the conclusion of the study.

The risks associated with this study are minimal. I estimate it will take approximately 40 minutes to 1 hour to complete the computer simulation video and approximately 20 minutes to participate in the high-fidelity patient simulation. Your participation in this study is voluntary. You can stop participating at any time. Refusing to participate will not result in any penalty of grade or other benefits you are entitled in this class.

If you agree to participate, you will choose a code that will be used as your research participant identification number on all study related items. The list of participant identification numbers will be kept in a locked filing cabinet in the Nursing department at the school, a locked filing cabinet at the researcher's home, or on a password protected computer. After the research is concluded, all participant information will be shredded and/or permanently deleted.

There is not direct compensation for participation in this research study. However, if you chose to participate, you will be given access to ATI Real Life Clinical Reasoning Videos for 90 days. Furthermore, your participation will benefit future nursing students and will impact efforts to improve clinical judgment in nursing students. The data collected from this study will be analyzed and used in the researcher's dissertation. There is also a possibility of future conference presentation or publication in professional journals. No individual identifiers will be released to the public.

If you have any questions concerning this study, please contact me. You can reach me by email at jmorris12@crimson.ua.edu or phone at 404-374-0381.

_____   _____

Name   Date

Appendix D Lasater Clinical Judgment Rubric

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

	and important data useful for explaining the client's condition	most important data and seeks further relevant information, but also may try to attend to less pertinent data	data and focus on the most important, but also attends to less relevant/useful data	appears not to know which data are most important to the diagnosis; attempts to attend to all available data
Making Sense of Data	Even when facing complex, conflicting or confusing data, is able to (1) note and make sense of patterns in the client's data, (2) compare these with known patterns (from the nursing knowledge base, research, personal experience, and intuition), and (3) develop plans for interventions that can be justified in terms of their likelihood of success	In most situations, interprets the client's data patterns and compares with known patterns to develop an intervention plan and accompanying rationale; the exceptions are rare or complicated cases where it is appropriate to seek the guidance of a specialist or more experienced nurse	In simple or common/familiar situations, is able to compare the client's data patterns with those known and to develop/explain intervention plans; has difficulty, however, with even moderately difficult data/situations that are within the expectations for students, inappropriately requires advice or assistance	Even in simple of familiar/common situations has difficulty interpreting or making sense of data; has trouble distinguishing among competing explanations and appropriate interventions, requiring assistance both in diagnosing the problem and in developing an intervention
Effective RESPONDING involves:			
Calm, Confident Manner	Assumes responsibility: delegates team assignments, assess the client and reassures them and their families	Generally displays leadership and confidence, and is able to control/calm most situations; may show stress in particularly difficult or complex situations	Is tentative in the leader's role; reassures clients/families in routine and relatively simple situations, but becomes stressed and disorganized easily	Except in simple and routine situations, is stressed and disorganized, lacks control, making clients and families anxious/less able to cooperate
Clear Communication	Communicates effectively; explains interventions; calms/reassures clients and families; directs and involves team members, explaining and giving directions; checks for understanding	Generally communicates well; explains carefully to clients, gives clear directions to team; could be more effective in establishing rapport	Shows some communication ability (e.g., giving directions); communication with clients/families/team members is only partly successful; displays caring but not competence	Has difficulty communicating; explanations are confusing, directions are unclear or contradictory, and clients/families are made confused/anxious, not reassured
Well-Planned Intervention/ Flexibility	Interventions are tailored for the individual client; monitors client progress closely and is able to adjust treatment as indicated by the client	Develops interventions based on relevant patient data; monitors progress regularly but does not	Develops interventions based on the most obvious data; monitors progress, but is unable to make adjustments	Focuses on developing a single intervention addressing a likely solution, but it may be vague, confusing, and/or

	response	expect to have to change treatments	based on the patient response	incomplete; some monitoring may occur
Being Skillful	Shows mastery of necessary nursing skills	Displays proficiency in the use of most nursing skills; could improve speed or accuracy	Is hesitant or ineffective in utilizing nursing skills	Is unable to select and/or perform the nursing skills
Effective REFLECTING Involves:				
Evaluation/Self-Analysis	Independently evaluates/analyzes personal clinical performance, noting decision points, elaborating alternatives, and accurately evaluating choices against alternatives	Evaluates/analyzes personal clinical performance with minimal prompting, primarily major events/decisions; key decision points are identified and alternatives are considered	Even when prompted, briefly verbalizes the most obvious evaluations; has difficulty imagining alternative choices; is self-protective in evaluating personal choices	Even prompted evaluations are brief, cursory, and not used to improve performance; justifies personal decisions/choices without evaluating them
Commitment to Improvement	Demonstrates commitment to ongoing improvement: reflects on and critically evaluates nursing experiences; accurately identifies strengths/weaknesses and develops specific plans to eliminate weaknesses	Demonstrates a desire to improve nursing performance: reflects on and evaluates experiences; identifies strengths/weaknesses; could be more systematic in evaluating weaknesses	Demonstrates awareness of the need for ongoing improvement and makes some effort to learn from experience and improve performance but tends to state the obvious, and needs external evaluation	Appears uninterested in improving performance or unable to do so; rarely reflects; is uncritical of him/herself, or overly critical (given level of development); is unable to see flaws or need for improvement

September 2, 2014

Office for Research

Institutional Review Board for the
Protection of Human Subjects

Japonica Morris
College of Education
The University of Alabama
Box 870231

THE UNIVERSITY OF
ALABAMA
R E S E A R C H

Re: IRB # 14-OR-309, "The Effect of an Interactive Computer Simulation
Video on Clinical Judgment"

Dear Ms. Morris:

The University of Alabama Institutional Review Board has granted
approval for your proposed research.

Your application has been given expedited approval according to 45 CFR
part 46. Approval has been given under expedited review category 7 as
outlined below:

*(7) Research on individual or group characteristics or behavior
(including, but not limited to, research on perception, cognition,
motivation, identity, language, communication, cultural beliefs or
practices, and social behavior) or research employing survey, interview,
oral history, focus group, program evaluation, human factors evaluation,
or quality assurance methodologies.*

Your application will expire on September 1, 2015. If your research will
continue beyond this date, please complete the relevant portions of the
IRB Renewal Application. If you wish to modify the application, please
complete the Modification of an Approved Protocol Form. Changes in this
study cannot be initiated without IRB approval, except when necessary to
eliminate apparent immediate hazards to participants. When the study
closes, please complete the Request for Study Closure Form.

Please use reproductions of the IRB approved stamped consent forms to
obtain consent from your participants.

Should you need to submit any further correspondence regarding this
proposal, please include the above application number.

Good luck with your research.

Sincerely,

358 Rose Administration Building
Box 870127
Tuscaloosa, Alabama 35487-0127
(205) 348-8461
FAX (205) 348-7189
TOLL FREE (877) 820-3066

Director & Research Compliance Officer
Office for Research Compliance
The University of Alabama

75