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The impact of high-fidelity human patient simulation on clinical judgment of nursing students: A pilot study

Timothy L. Boyd Jr.
University of New Hampshire, Durham

THE IMPACT OF HIGH-FIDELITY HUMAN PATIENT SIMULATION ON CLINICAL JUDGMENT OF NURSING STUDENTS: A PILOT STUDY

BY

TIMOTHY L. BOYD JR
B.S. University of Maine, 1994

THESIS

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This thesis has been examined and approved.

Susan Fetzer RN PhD MBA

Thesis Director, Susan Fetzer, Ph.D., M.B.A., R.N.,
Associate Professor - Nursing

Paula McWilliam

Paula McWilliam, Ed.D., R.N.,
Assistant Professor - Nursing

Elizabeth Evans

Elizabeth Evans, M.S., R.N.,
Assistant Clinical Professor - Nursing

12/14/09

Date

DEDICATION

I would like to dedicate this thesis to my family. My wife Emily has been more than patient with me during graduate school. She has both supported and pushed me during this process and has believed in my ability to do well. Her love has inspired me to be a better person and has somehow helped me pull through this challenging time in our lives. Also to my mother, who raised me and instilled a work ethic that guides me to this day. To my father, whose spirit will read this thesis somehow and would have been proud of what I accomplished. Also, to my brothers who have both joked with and encouraged me throughout the years, I thank each of you.

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ABSTRACT

THE IMPACT OF HIGH-FIDELITY HUMAN PATIENT SIMULATION ON CLINICAL JUDGMENT OF NURSING STUDENTS: A PILOT STUDY

by

Timothy L. Boyd Jr.

University of New Hampshire, December, 2009

The American Association of Colleges of Nursing is encouraging their constituents to increase clinical judgment of nursing students to meet increased workplace demands and higher patient acuity. The literature suggests that human patient simulation (HPS) may be a teaching pedagogy to promote clinical judgment. However, few quantitative studies exist that measure clinical judgment as an outcome of HPS. A pilot study was conducted using a quasi-experimental design that randomly assigned subjects (n = 11) into one of three groups: control, traditional and experimental. Subjects completed pretests for three dimensions of clinical judgment: knowledge, confidence and skill. Following the intervention which consisted of a lecture, and either written or HPS scenarios, the subjects completed posttests for each dimension. Results found that clinical judgment was not increased as a result of HPS. However, subjects in the experimental group following HPS significantly increased the clinical judgment dimension of skill.

CHAPTER I

PURPOSE

Nurses in general, and graduate nurses specifically, are faced with increased challenges in the workplace. These challenges include a nationwide nursing shortage, an aging nurse workforce, limited amount of new graduate training opportunities, higher acuity patients, and limited clinical sites for students. The onus is upon nurse educators to prepare nursing students to meet some of these challenges. With a shift in the educational focus from teaching to learning over the past few decades, new methods to instruct students have evolved.

The American Association of Colleges of Nursing (AACN) (1998) and the National League for Nursing Accreditation Commission (NLNAC) (2000) have recommended that educators focus on critical thinking and clinical judgment as an outcome of nursing education (AACN, 1998; NLNAC, 2000). However, they have neither fully defined nor established tools to measure these outcomes (Lasater, 2005; Ravert, 2004; Schumacher, 2004)

For the purpose of this study, I used Tanner's (2006) definition of clinical judgment. Tanner defines clinical judgment as "an interpretation or conclusion about a patient's needs, concerns, or health problems, and/or the decision to take action (or not), use or modify standard approaches, or improvise new ones as deemed appropriate by the patient's response" (p. 204).

Not only is there a paucity of a universal definition of clinical judgment; but also a paucity of tools to measurement it. In response, nursing educators to begin to create their own definitions and borrow tools from other disciplines and to develop nursing specific tools. Unfortunately there is still a paucity of such tools and as new teaching strategies such as high-fidelity human patient simulators (HPS) are employed, the research linking the use of simulators to clinical judgment is under-investigated.

One of the most recognized educational theorists, John Dewey (1938), stated that "all education comes about through experience" (p. 25). He also said that all principles are by themselves abstract. "They become concrete only in the consequences which result from their application" (p. 20). Dewey also insisted that students learned best through experience. Traditionally this experience, for nursing students came from participation in clinical practica. However with the diminishing number and access to clinical sites, gaining this experience is becoming restricted. Recently, nursing educational technology has advanced with the development of HPS to help students gain experience in a safe setting (Alinier, Hunt, Gordon, & Harwood, 2006; Cioffi, Purcal, & Arundell, 2005; Feingold, Calaluce, & Kallen, 2004; Lasater, 2005; W.M. Nehring, Ellis, & Lashley, 2001; Radhakrishnan, Roche, & Cunningham, 2007; Rauen, 2001; Schumacher, 2004).

The life-like HPS mannequins are controlled by computers that simulate a patient's physiological responses (pulses, pupil response, lung sounds, blood pressure, voice, abdominal sounds etc.). They are also able to respond to nurses' interventions. These mannequins can assist the student "develop cognitive, affective and psychomotor skills in a low-risk environment" (Lasater, 2005).

Many nursing programs and clinical facilities throughout the United States and abroad are investing large sums of money into high-fidelity human patient simulators. The hope is that these simulators will provide the student with a realistic scenario in which they can not only learn tasks but develop critical thinking and clinical judgment (Lasater, 2005).

Statement of Problem

Today, new nurses thrust into an acute care setting are immediately faced with increasingly complex patients. Del Bueno (2005) warned that only 35 percent of graduate nurses meet the entry expectations of employers for clinical judgment. While the new graduates are able to understand the nursing knowledge gained during their nursing education, the majority cannot translate theory and knowledge into nursing practice (del Bueno, 2005). New graduates are expected to adapt quickly to their new role as a registered nurse and this role is constantly evolving. Employers are expecting these new nurses to have the clinical judgment abilities to meet needs of their patients.

Given the higher patient acuity in the acute care setting, the novice nurse, described by Benner (1984), may lack the experience to notice subtle worsening changes in a patients' condition. Many of these novice nurses have not experienced patients with potentially "life-threatening" conditions. For example, Wilson, Shepard, Kelly and Pitzner (2005) cited several studies that demonstrated that less than 50% of hospital based acute care nurses were able to demonstrate basic life support cardiopulmonary resuscitation using a training mannequin. This finding goes to the core of nursing education where it is not only the nursing students and graduate nurses but even the registered nurses that are unable to perform even the most basic of potentially life-saving

skills - basic life support. Hospital administrators seem to expect the graduate nurse to have the experience to deal with complex patients (Lasater, 2005).

Simulation affords the student nurse with the opportunity to gain experience with complex patient situations that they may not necessarily get during the clinical practica. Gaining the experience to meet the challenge that a deteriorating patient presents can be difficult for the nursing student or new graduate. Thus the responsibility falls to the schools of nursing to prepare the student nurse to handle those complex situations. High-fidelity human patient simulators may be the technology necessary to provide the nursing student with the experience to recognize a patients' potential "life-threatening" cues in an environment that is safe and to develop the clinical judgment to deal with the situation (Lasater, 2005; Schumacher, 2004; Wilson, Shepard, Kelly, & Pitzner, 2005).

The current national nursing shortage and the predicted future nursing shortage due to the aging workforce, limited number of beds, increase in staff to patient ratios, and financial pressures affect patient care and place more demands upon the nurse. If there are limited numbers of nurses in the hospitals this leads to limited numbers of available preceptors for new graduates in the clinical setting (Ravert, 2004). Anectdotal information suggests that new graduate training programs have been either reduced or eliminated at many hospitals. Lack of adequate training places the new graduate in a tenuous position being expected to fully perform at the level of an experienced nurse while not having enough experience and clinical judgment to deal with complex patient conditions (Aiken, Clark, Sloane, Sochalski, & Silber, 2002; del Bueno, 2005; Griggs, 2002; Lasater, 2005; Ravert, 2004; Schumacher, 2004).

Given the mandate by the AACN to promote critical thinking and clinical judgment of nursing students (AACN, 2003) the problem becomes "How can educators increase nursing students' ability to develop their clinical judgment?" Confounding the problem is that there are no specific tools recognized as standard to measure nurses' clinical judgment and critical thinking (Lasater, 2005; Ravert, 2004). The American Association of Colleges of Nursing (AACN) in 1998 and the National League for Nursing Accrediting Commission (NLNAC), in 2000 indicated that clinical judgment is a vital outcome or goal for nursing students. However, little guidance has been provided regarding how to measure students' clinical judgment. The challenge is how to meet the AACN's mandate when nursing educators are faced with no clear definition of clinical judgment, no tools to measure it, and no established teaching pedagogy that has been quantifiably demonstrated to be effective.

Purpose of This Study

The aim of this research is to answer the following question. Does the use of high-fidelity human patient simulators increase the clinical judgment of nursing students?

The study will examine the impact of high-fidelity HPS as a teaching pedagogy using a problem-based learning strategy compared to the more traditional teaching pedagogy where instructors use written case studies and lectures to teach nursing students. Nursing literature supports the use of simulation as a teaching pedagogy. Most HPS studies have focused on self-efficacy, perceptions and the students' experience with simulation (Alinier, et al., 2006; Anderson, 2007; Childs & Sepples, 2006; Eaves & Flagg, 2001; Feingold, et al., 2004; Jeffries & Rizzolo, 2006; Kiat, Mei, Nagammal, & Jonnie, 2007; Lasater, 2007b; McCausland, Curran, & Cataldi, 2004). Due to the paucity

of outcome-based quantitative research, educators are unable to demonstrate that they are meeting the AACN's (1998) call to increase clinical judgment as an outcome of nursing education. Only a few quantitative studies (Lasater, 2005; Ravert, 2004; Schumacher, 2004) have been published that link clinical-judgment as an outcome from the use of simulation within nursing education.

Significance

Nursing literature supports the use of mannequins as a teaching tool but few quantitative studies exist to validate their effectiveness in developing clinical judgment. Clinical judgment is a product of *skill, confidence, aptitude and experience* (Lasater, 2005). The American Association of Colleges of Nursing (AACN) in 1998 indicated that critical thinking is a vital outcome or goal for nursing students. However, little guidance has been provided regarding how to measure students' critical thinking/clinical judgment (AACN, 1998).

The introduction of high-fidelity HPS in nursing education allows students to practice basic nursing skills in the safety of the laboratory. Simulation exposes students to critical and or complex "patients" that they are unable to experience during clinical rotations (Lasater, 2005, Ravert, 2004, Schumacher, 2004). Well-researched and planned high-fidelity scenarios based upon active learning and problem-based learning principles will provide students with the building blocks (*skills, aptitude, confidence* and *experience*) for the development of clinical judgment (Lasater, 2005).

Adequate educational preparation is essential for new nurses to practice safely in the clinical setting and simulation environments are becoming the new centers of teaching excellence (Grenvik, Schaefer, DeVita, & Rogers, 2004).

Kataoka-Yahiro, and Saylor (1994) noted that the nature of nursing was evolving from a more task-oriented role to a more cognitive professional role. Development of clinical judgment among nursing students is placed in the hands of nurse educators and these educators are constantly modifying their teaching methods to enhance learning opportunities for these students (Kataoka-Yahiro & Saylor, 1994). Nursing educators today need to switch from the more traditional focus of "teaching" to that of providing a "learning" experience (Barr & Tagg, 1995; Porter-O'Grady, 2001).

The new graduate nurses today faces higher patient acuity, a nursing shortage, an aging workforce, limited amount of new graduate training opportunities and higher expectations that they possess sound clinical judgment. The responsibility to prepare the nursing student to meet these challenges falls to the educators.

The AACN and NLNAC have mandated that schools of nursing focus on clinical judgment and critical thinking as an outcome of education. Yet they have neither defined these concepts nor provided the tools to measure them. The impetus for developing clinical judgment in recent times is related to the realization that only 35 percent of graduate nurses, regardless of education meet the requisite clinical judgment to practice in the clinical setting (Del Bueno, 2005).

Educators need to seek alternative teaching and learning methods in order for nursing students to develop the clinical judgment to meet the demands. The impetus stems from the following: the national shortage of nursing faculty, the expanding nature of the profession, the changing demographics of nursing students and the competition for nursing clinical sites for learning. (Lasater, 2005; Ravert, 2004)

Alinier, Hunt, Gordon and Harwood (2006) pointed out that many experts in the field of simulation agree that more research is necessary to demonstrate the effectiveness of simulation in the acquisition of skills and whether those skills learned in a controlled environment are transferable to the clinical setting. Nursing educators require evidence to support that the use of HPS are yielding measurable results rather than just a tool that students enjoy (Alinier, et al., 2006).

The results of this study may assist nurse academia and educators by allowing them to assess the value of HPS. It will add quantitative research to the simulation literature where such research is lacking. And it will support nursing education theory related to Tanner's model of Clinical Judgment of Nurses.

CHAPTER II

REVIEW OF LITERATURE

Introduction

Numerous researchers have examined various aspects of the use of high-fidelity human patient simulators (HPS). Most studies involving HPS in the nursing literature are qualitative in nature and measure students' and faculties' experience, self-efficacy, and perceptions using high-fidelity human patient simulators. However, few quantitative studies have investigated clinical judgment as an outcome of high-fidelity human patient simulator education.

This literature review will focus on the major studies and evidence supporting: the theoretical framework of this study, clinical judgment and critical thinking as a result of high-fidelity simulation; nursing education and learning; learning styles; problem-based learning, reflection, critical thinking and clinical judgment, the history of simulation, fidelity, simulation in nursing education, pros and cons of simulation; assessment tools related to critical thinking and clinical judgment; and clinical judgment tools.

Search Criteria

In reviewing the literature regarding the use of simulation as a teaching pedagogy to promote clinical judgment several terms were searched. Databases used were: CINAHL, PUBMED, MEDLINE, ERIC, Google Scholar. Search terms, including combinations of these terms included: Clinical Judgment; clinical judgment nursing, clinical judgment nursing simulation; critical thinking nursing, critical thinking nursing

simulation, nurse simulation, nurses simulation, simulation, manikin, nursing education, nurses problem-based education, nurses, experimental learning, nurses adult learning, nurses critical thinking, nurses clinical judgment, participant learning, Constructivist learning. Articles were limited to those written in English and primarily published within the past 15 years. Although some seminal studies were included that were more than 15 years old. Additionally, references within articles were searched and additional articles were obtained for review and inclusion.

Theoretical Framework

This study uses the Model of Clinical Judgment in Nursing (Figure 1) by Tanner (2000, 2006) as the theoretical framework. Tanner's (2006) model relies on the nurse to have enough knowledge and reasoning to be able to process the data gathered from the patient and decide on a course of action to meet the perceived need for that given situation. Following the action taken, the nurse needs to reflect upon the actions taken. Reflection is grounded in Dewey's (1933) thoughts on reflective thinking (Lasater, 2007a).

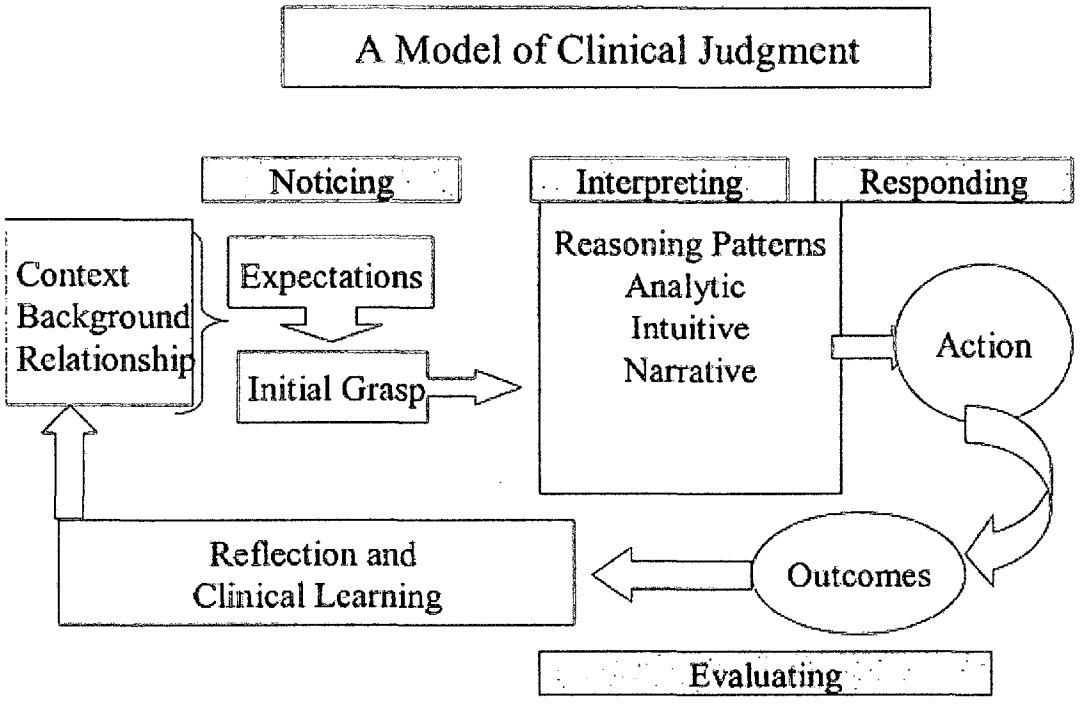

Figure 1: Model of Clinical Judgment. (Messecar & Tanner, 2004; C. A. Tanner, 2000).

Tanner (2006) developed five conclusions regarding clinical judgment based upon a review of almost 200 studies related to clinical judgment and critical thinking of nurses.

1. Clinical judgments are influenced more by what the nurse brings to the situation than objective information available.
2. Clinical judgment comes from knowing the patient and his or her typical responses and his or her concerns.
3. Clinical judgment is influenced by the context of the culture or environment in which nursing care is provided.
4. Clinical judgment results from a variety of reasoning patterns rather than a singular reasoning method.
5. A breakdown in clinical judgment from one situation and subsequent reflection is critical for increasing clinical judgment to be used in future situations. (C. A. Tanner, 2006).

Tanner developed her model based on the above five general conclusions which emphasizes the role of nurses' background, the context of the situation, and nurses' relationship with their patients as central to what nurses notice and how they interpret findings, respond, and reflect on their response (Tanner, 2006).

In practice, the nurse takes in data or cues from the context of the situation,

background information and the relationship with the patient. There are four parts of this model. These are: 1) *Noticing* - a perceptual understanding of the situation at hand. The nurse has expectations based upon the patient data initially presented and recognizes deviations from the patient's baseline, or expected baseline. This is the "noticing" phase. 2) *Interpreting* - here the nurse uses one or more reasoning patterns (analytical, intuitive or narrative) to develop an understanding of the situation based upon the information gathered during noticing phase. 3) *Responding* - the nurse decides on a course of action they deem appropriate for the situation. The nurse may decide not to do anything which could be an appropriate action. 4) *Reflecting* - the nurse reviews the outcome of the action or responding. The nurse then reviews the appropriateness of the preceding aspects. The nurse may evaluate what was noticed, how was it interpreted, and how was the response (Tanner, 2006).

Tanner (2006) stated "the nurses perception of any situation is influenced by the context and strongly shaped by the nurse's practical experience; it is rooted in theoretical knowledge, ethical perspectives and the relationship with the patient" (Lasater, 2007b). This allows for differences in how nurses notice patient situations to set the cycle in motion.

Tanner's (2006) Model of Clinical Judgment provides the framework for this study. Since nursing schools generally don't teach clinical judgment specifically, nurses tend to develop their own versions. By adopting an organized framework, this study strives to provide an opportunity for students to notice, interpret, respond and evaluate their interactions with the case scenarios. By having repeated exposure to different cases using the notice, interpret, respond and evaluate cycle students will be able to increase

their knowledge, confidence and skill which leads to increased clinical judgment.

Clinical Judgment as an Outcome of High-Fidelity Simulation

Few quantitative studies exist that measure clinical judgment or critical thinking as outcomes of high-fidelity simulation education. There have been many other studies that use simulation as an educational tool to measure other outcomes such as: knowledge (Griggs, 2002), self-effacacy (Rockstraw, 2006), performance (Radhakrishnan, et al., 2007), perceptions (Bernson & Wiker, 2005; Feingold, et al., 2004), reactions (Bremner, Aduddell, Bennett, & VanGeest, 2006), and decision-making (Cioffi, et al., 2005). Four studies have related clinical judgment or critical thinking as outcomes of high-fidelity simulation among nursing students.

Lasater (2005) used a mixed (quantitative and qualitative) method design to explore the potential of high-fidelity simulation in the development of clinical judgment of nursing students. The study examined four dimensions of clinical judgment: confidence, aptitude, skill, and experience. Subjects (n=39) took part in simulation experiences over a 10 week time frame and were observed and scored at two points using the researcher developed Lasater Clinical Judgment Practice Survey (LCJPS) to measure confidence and the Lasater Clinical Judgment in Simulation Rubric (LCJSR) to measure skill. An additional quantitative tool, the California Critical Thinking Disposition Inventory (CCTDI), was used to measure aptitude. A qualitative focus group (n=8) was held to measure the experience dimension of the model of clinical judgment (Lasater, 2005)

Using the LCJSR, Lasater observed significant ($p = .05$) increases in *confidence* by subjects with HPS experience compared with those with non-HPS experience.

Aptitude, was not able to be fully evaluated due to missing data. *Skill*, measured, by the LCJSR, was a product of the Notice-Interpret-Respond-Evaluate cycle of the subjects participation in the simulation scenario. No significant differences for *skill* between HPS and Non-HPS subjects were found. The primary focus of her research related to *skill* was tool development. Lastly, student experiences, from the focus groups demonstrated that students did have apprehensions about missing hands-on clinical practica because they were participating in the simulation laboratory. However, during the focus group discussions, Lasater determined that clinical judgment was increased based upon the findings of the students' statements. There was an increase in students' confidence regarding transferring what was learned from the simulation into clinical practica. Lasater concluded by stating that "there is no question that high fidelity simulation has a powerful impact on the development of clinical judgment in nursing students" (Lasater, 2005, p. 168).

Lacking in Lasater's approach was a experimental design testing two cohorts simultaneously to compare treatment results (simulation) with a control. Using a convenience sample as well as a small sample size contributed to the limitations of her study. However, what was important was the development of the LCJPS and LCJSR as tools to aid in the measure clinical judgment. Lasater admits these tools are in the developmental stages still and need to be trialed and modified in the future.

Schumacher (2004) conducted a descriptive, quasi-experimental research study to compare critical thinking abilities and learning outcomes of three groups of students utilizing three different instructional strategies. The subjects (n=36), upon completing a 60-item customized Health Education Systems Inc. (HESI) exam as a pretest, were

randomized into three treatment groups based upon their critical thinking scores. The customized tests were developed by HESI for Schumacher's study. The questions were taken from HESI's proprietary question bank and evaluated subjects' critical thinking ability covering myocardial infarction (20 questions), deep vein thrombosis leading to pulmonary embolism (20 questions), and shock (20 questions).

Randomization occurred through a block rank ordering technique based on the initial critical thinking scores. Each group rotated through three learning activities, which illustrated the nursing care of clients experiencing an emergent cardiovascular or respiratory event. Each subject was exposed to three instructional strategies: 1) traditional didactic classroom; 2) human patient simulator; and 3) combination of human patient simulator and didactic classroom. After the completion of each learning activity, critical thinking abilities and learning outcomes were measured through the administration of a 20-item customized HESI exam which served as the posttest for that scenario.

Following a pretest/posttest evaluation, there were no statistically significant differences between critical thinking abilities or learning outcomes of nursing students when classroom instruction alone was utilized to deliver a learning activity. Posttest HESI exam scores reveled statistically significant differences between critical thinking abilities ($p \leq 0.002$) and learning outcomes ($p \leq 0.001$) of nursing students when simulation or a combination of classroom and simulation was utilized to deliver a learning activity.

Schumacher (2004) concluded that the combination of didactic and simulator learning strategies were more effective in promoting critical thinking outcomes than either strategy alone. Additionally the simulator strategy was more effective than the traditional

didactic strategy. Limitations of the study were described as: confined to subjects from a single institution at a specific point in their nursing education; immediate testing following exposure to the learning activity might not accurately reflect retention of knowledge, and the setting (non-clinical academic setting) may not relate to a professional nursing practice setting (acute care hospitals for example).

Ruggenberg (2008) investigated the effectiveness of a simulated clinical experience on knowledge acquisition, transfer of learning, and promotion of effective learning practices such as active learning, collaboration, and engagement. The study's experimental design used a two-group, pretest-posttest design. Nursing students (n=58) were divided randomly into one of two learning method groups: a comparison group and a simulation group (Ruggenberg, 2008).

Students in the simulation group (n= 30) were provided with a one-hour learning session that included a scenario-based simulation using a human patient simulator, followed by a facilitated discussion. Students in the comparison group (n = 28) were provided with a one-hour learning session using traditional methods of instruction including written material, a video presentation, and group discussion. Following the learning session, students completed posttest instruments providing data for measurement of the dependent variables.

The results found that there was a significant difference ($p < .01$) between the groups on two of the three dependent variables, active learning and engagement, with higher mean scores noted for the simulation group. Additionally the results suggested that simulation might be effective in promoting the transfer of knowledge to the subject.

Ruggenberg (2008) suggested that simulation is an effective learning method nursing students. Furthermore, while there were no significant differences in performance between the groups on measures of cognitive knowledge and transfer, simulation was at least as effective as traditional methods of learning. And there is an indication that simulation may be more effective than traditional methods of learning in promoting transfer of knowledge to the subject. The design of Ruggenberg's study limited subject participation to just 1.5 hours of participation time. Thus students has little time to develop higher order thinking skills. Additionally, sample size, and unknown effectiveness of measurement tools were limitations to this study.

Ravert's (2004) research sought to determine whether measures of critical thinking showed differences between three groups (simulator, non-simulator, control) of nursing students (n = 40) The study examined the learning styles [diverging, assimilating, converging, or accommodating] of the subjects, based upon Kolb (1999), to see if any differences were found between the simulation and non-simulation groups. Subjects were recruited from two cohorts of students with students (n=15) from the second cohort serving as the control group. Students (n=25) from the first cohort were assigned into either the simulator or non-simulator group. Ravert notes that when students were ranked into one of four learning styles they were randomly assigned to either the simulator or non-simulator group. The non-simulator group took part in enrichment activities based upon the same patient scenarios as the simulation group which interacted with the high-fidelity human patient simulator as their experience.

Ravert used several evaluation instruments: the CCTDI, the CCTST, a self-efficacy for nursing skills evaluation tool, a written performance-based evaluation tool for video scenarios, and a use of HPS study tool. The research found all groups experienced a moderate to large effect size in critical thinking scores. When the total gain scores (the difference between pre and post tests ranged from -4 to 24) were analyzed there was a significant ($p = .000$) difference between the simulator and non-simulator groups but not significant for learning style or group.

While Ravert's pilot study was limited in reveling many significant differences due to a small sample size, it concluded that there was value in both group discussion (non-simulator) and simulator teaching methods. Furthermore, Ravert suggested that more research was needed (Ravert, 2004).

A common theme that emerges from the discussion and implications of the literature is that the measurement of clinical judgment or critical thinking is challenging and that larger samples are needed to validate findings. Each researcher also indicated that due to the paucity of research in this arena more studies need to be conducted.

Nursing Education and Learning

The goal of nursing education is to provide the novice nurse a foundation of knowledge and the development of expertise that can be utilized in real-life settings throughout his or her career (Benner, 1984; Benner, Tanner, & Chesla, 1996). Furthermore, nursing education values the relationship of theory and practice and holds that they inform each other in the development of expertise (Benner, et al., 1996). Clinical practica during nursing education allows student to experience real-life patients in acute care settings in order to gain the necessary skills and clinical judgment to

practice upon graduation (Griggs, 2002; Lasater, 2005; Ravert 2004).

Nursing faculty are aging (AACN, 2003) and many of the older faculty are struggling to transition from an instruction-based model to a model of optimal student learning and competence (Porter-O'Grady, 2001). The more contemporary educational pedagogies focus on learning-based models where students bring their experience into the learning process in a constructivist process using active-learning, problem-based learning and other strategies (Savery & Duffy, 1995).

Lasater (2005) paraphrases Porter-O'Grady (2001) and Barr and Tagg (1995) saying that nursing education, like higher education needs, to focus more on learning than instruction. Educators today must change from the traditional role of providing instruction to that of facilitating learning. Furthermore, students must demonstrate learning as a competency (Lasater, 2005).

Problem based learning

Nursing simulation is grounded in experiential and problem-based learning. Problem-based learning (PBL) is a self-directed adult-learning pedagogy where students learn and apply concepts based upon real-life scenarios usually working in small groups (Ehrenberg & Haggblom, 2007; Hwang & Kim, 2006; Ravert, 2004). Students develop hypotheses and seek out information to either support or refute their hypothesis about a given scenario (Rideout & Carpio, 2001; Worrell & Profetto-McGrath, 2007). In recent times, nurse educators are increasingly using a PBL methodology to facilitate active learning (Ravert, 2004).

Barrows (1985) says that problem-based learning is based on the premise that the students must acquire (1) an essential body of knowledge, (2) the ability to use their

knowledge effectively in the evaluation and care of their patients' health problems, and (3) the ability to extend or improve that knowledge and to provide appropriate care for future problems which they may face (Barrows, 1985).

Following his 1985 work, Barrows (1986) expanded his thoughts on PBL. The problem or patient case study should be introduced without prior study or preparation and given as if it were in an actual patient care setting. As the student works with the problem he or she identifies needed information and in the process critical thinking, reasoning, new knowledge and new skills are developed. Once finished with the case study, the learning that has occurred during the experience is integrated into the student's repertoire of knowledge and skills (Barrows, 1986).

Ravert (2004) talks of problem-based learning as a pedagogical method in which problems are presented to a student and through a process of working towards the understanding and subsequent resolution of those problems. As a result of this process, learning results (Ravert, 2004). It requires the learner to be actively involved in the inquiry to discover new concepts and then apply them to solve the problem (Richarson & Trudeau, 2003). Additionally PBL it is set in a constructivist framework (Savery & Duffy, 1995). It builds upon the knowledge and skills that the student already possesses and allows them to seek out gaps in their understanding and to fill them in by seeking the answers to solve the problem. This process of seeking solutions allows students to practice critical thinking skills as they explore case studies (Savery and Duffy, 1995).

Reflection

A great deal of research in the realms of education and nursing has studied the concept of reflection. Most modern academics recognize the work of Dewey (1933), who suggested that reflection alone is educational and the importance of reflection in the

development of clinical judgment and critical thinking (Boud, 1999; Boud & Walker, 1998; Dewey, 1933; Kolb, 1984; Lasater, 2007a, 2007b; Schon, 1987; C. A. Tanner, 2006). Lewin (1951) maintained that concrete experience is the basis for observation and reflection.

The essence of reflection is an active emotional initiative that fosters the learning process by building new knowledge from past experiences. It requires the learner to be open-minded and engaged in the process. Reflection requires effort by the learner (Dewey, 1933).

Kolb (1984) explained that learners rely on reflective observations as a result of a process that takes them from involvement in an experience to thinking about the experience and finally assimilating the knowledge into their repertoire of knowledge to be applied during future actions. (Kolb, 1984). Kuiper and Pesuit (2004) suggested that reflective thinking is necessary for metacognitive skill acquisition and the development of clinical judgment.

Critical Thinking and Clinical Judgment

Critical thinking and clinical judgment have similar attributes. They are both purposeful and informed. Assumptions about a problem are identified and explored, evidence is required to solve the problem and these problems are often presented to the nurse (or nursing student) in a manner that is ill-defined or illogical with no apparent solution. Reflection is an essential element in learning from the situation (Alfaro-LeFevre, 2004; Brookfield, 1987; Dewey, 1933; Lasater, 2005; Messecar & Tanner, 2004; C. A. Tanner, 2000).

Critical thinking

Many definitions of critical thinking appear in the nursing literature (Alfaro-LeFevre, 2004; Facione, 2000; Facione & Facione, 1994; Paul, 1992; Watson & Glaser, 1980) but the definition of this complex concept has no consensus amongst the academics, philosophers and practitioners in nursing or higher education (Kataoka-Yahiro & Saylor, 1994; Lasater, 2005; Worrell & Profetto-McGrath, 2007).

Paul (1992) believes that critical thinking is a learned skill. He describes it a deliberate purposeful activity to be examined by the learner. Later Paul expands his thoughts on critical thinking as the ability to think about one's thinking in such a way as: a) to recognize its strengths and weaknesses and, as a result, b) to recast the thinking in improved form (Paul & Elder, 2002). Such thinking involves the ability to identify the basic elements of thought (purpose, question, information, assumption, interpretation, concepts, implications, point of view) and assess those elements using the universal intellectual criteria and standards of clarity, accuracy, precision, relevance, depth, breadth, and logicalness.

The American Association of Colleges of Nursing (AACN) (1998) advances the belief that critical thinking underlies independent and interdependent decision-making. It includes questioning, analysis, synthesis, interpretation, inference, inductive and deductive reasoning, intuition, application, and creativity.

Facione (1990) at the end of the American philosophical Association's two-year Delphi project developed the following consensus statement on critical thinking. "Critical thinking is purposeful, self-regulatory judgment which results in interpretation, analysis, evaluation, and inference as well as explanation of the evidential, conceptual,

methodological, criteriological, or contextual considerations upon which judgment is based" (p. 2).

Brookfield (1987) believes that critical thinkers must be self-confident about the potential of changing their world.

> Being a critical thinker involves cognitive activities such as logical reasoning or scrutinizing arguments for assertions unsupported by empirical evidence. Thinking critically involves our recognizing the assumptions underlying our beliefs and behaviors. Most important, perhaps, it means we try to judge the rationality of these justifications (p. 13).

Critical thinking can be triggered by both positive and negative events which may cause the learner to challenge their basic assumptions about themselves and their abilities (Campbell, 1998). Critical thinking is both emotional and rational and that anxiety arises when the learner's assumptions are challenged. This anxiety may dissipate and a sense of relief and accomplishment can follow after the thinking process (Brookfield, 1987).

Clinical judgment

King and Kitchener's (1994) identified that most critical thinking descriptions and evaluative processes are deliberative, conscious and analytical. They distinguished critical thinking from clinical judgment. The term 'clinical judgment' is used to encompass problem-solving situations in the clinical setting in which the nurse faces ill-defined problems that are not simply solved by conventional options.

Benner et al. (1996) state that

> Clinical judgment refers to the ways in which nurses come to understand the problems, issues, or concerns of client/patients to attend to salient information and to respond in concerned an involved ways; included in out information and to respond in concerned and involved ways; included in out understanding of the term is both the deliberate, conscious decision-making characteristic of competent performance and the holistic discrimination and intuitive response typical of proficient and expert performance (p. 2).

Clinical judgment may also rest upon 'knowing the patient' and recognizing patterns of patient responses in order to make decisions and interventions (Peden-McAlpine & Clarn, 2003; C. Tanner, Benner, Chesla, & Gordon, 1993).

Benner and Tanner (1987) suggested that clinical judgment is a learned process based upon both knowledge and experience. They found that nurses used pattern recognition, cueing, examining the context of the situation to make decisions rather than using inductive reasoning. They also advanced that cognitive ability and experience are critical factors in effective judgment (Benner & Tanner, 1987).

Tanner (2006) defined clinical judgment as "an interpretation or conclusion about a patient's needs, concerns, or health problems, and/or the decision to either take action (or no action), use or modify standard approaches or improvise new ones as deemed necessary by the patient's response" (Tanner, 2006, p. 204). Clinical judgment is required in complex situations where there is ambiguity, value conflicts and competing interests of thoughts or potential actions (C. A. Tanner, 2006).

Tanner found that clinical judgments are influenced by what the nurse brings to the situation more than the objective data about the situation at hand. The experienced nurse is able to respond to a familiar situation intuitively whereas the novice nurse must reason things through analytically because they are unfamiliar with the situation. This takes time and sometimes time is of the essence. Thus clinical judgment is not the same for both the experienced and novice nurse. One would expect their judgments to differ (Tanner, 2006).

Clinical judgment, according to Lasater (2005), is a product of *skill, confidence, aptitude* and *experience*. It is the thinking and evaluative processes that focus on a

nurse's response to a patient's complex, fluid, and multilayered problems (Lasater 2007b). Clinical judgment is highly contextual. It encompasses the nurse's background, the patient's needs, and takes into consideration the setting in which the nurse practices. Lasater stated that the "nurse must be cognizant of the patient's need through data or evidence, prioritize and make sense of the data surrounding the event, and come to some conclusion about the best course of action and respond to the event" (Lasater, 2007b, p. 497). Furthermore the outcomes of action taken provide the basis for the nurse's reflection on the appropriateness of the response and clinical learning for future practice (Lasater, 2007b).

Critical thinking and clinical judgment have similar attributes. They are both purposeful and informed, assumptions about a problem are identified and explored, evidence is required to solve a problem(Alfaro-Leferve, 2004; Dewey, 1933; Messecar & Tanner, 2004; Tanner, 2000; Brookfield, 1987; Lasater 2005). However, clinical judgment differs from critical thinking in that the person exercising clinical judgment acts when there is an absence of information.

Simulation

Goal of simulation in nursing education is the development and transferability of skills, knowledge, cognition, and clinical judgment from the lab to the patient care setting (Lasater, 2005). The introduction of high-fidelity human patient simulators (HFHPS) allows students to practice basic nursing skills in the safety of the laboratory by exposing them to the critical and/or complex "patients" they are unable to experience during clinical rotations (Cioffi, et al., 2005; Ravert, 2002).

History of simulation

Modern simulation has its origins in the aviation industry with mechanical flight trainers which progressed to today's full-scale computerized simulators (Waltman, 2000). Within the medical field, the first human patient simulator appeared in 1969 but did not become widely available until the late 1980's. These simulators were used primarily to train anesthesiologists (Griggs, 2002). Since the 1980's most of the simulation research that began to surface in the literature concerned medical students and most of these studies demonstrated increased learning by those students (Chopra, Gesink, De Jong, Bovill, Spierdijk, & Brand, 1994; Gordon, 2000; Morgan & Cleave-Hogg, 1999; Steadman, Olyesola, Levin, Miller, & Llarson, 1999). The use of HPS in nursing education began sporadically in the late 1980's (Ravert, 2002).

Ravert's (2004) definition of simulation is "the reenactment of a condition or situation by using another system" (p. 11). The definition of a human patient simulator according to Henrich (1999) is a computer driven, life-size mannequin that attempts to reproduce the phenomena of illness and responds to medical treatment delivered by the participant. The mannequin is connected to monitors where it displays its response to treatment in a physiologically, pharmacologically, and hemodynamically accurate method through changes in the mannequin's condition (Henrichs, 1999).

Fidelity

In medical simulation, including nursing applications, simulators or mannequins are categorized into three degrees of fidelity: low, medium, and high. Low fidelity simulators are typically static and lack detail and the vitality of a living situation. These may include "parts trainers" such as an arm used for practicing injections or genitalia

used for practicing urinary catheterizations. These are useful for practicing specific psychomotor skills. However, they lack any 'patient' feedback or response to the skill practices (Ravert, 2004).

Medium fidelity simulations offer practitioners additional things such as breath sounds, heart beats and Kortokoff sounds to emulate blood pressure. However they lack such attributes as eye and chest movement. They do allow students, for example, to practice listening for heart and lung and abdominal sounds in anatomically correct positions (Alinier, et al., 2006).

High-fidelity human patient simulations provide the most realistic patient situations for the practitioner. Various models range in cost, system requirements and ability. The most often used manikins are produced by Laerdal and Medical Education Technologies Inc. (METI). The manikins are controlled by computer programs and allow students to visually observe not only the manikin's physiological responses such as chest rise and eye movements but are also able to observe those physiological responses on a bedside monitor as one may indeed see in the acute care setting. Such monitors display patients' vital signs such as pulse, respirations, cardiac rhythms, oxygen saturation and temperature etc. This is indeed similar to what a nurse, depending on the type of patient care unit, would encounter. Some of these high-fidelity manikins have the ability to talk and make sounds or, through microphones and speakers, 'talk" with the patient with a facilitator speaking as if they were the patient (Alinier,et al., 2006; Ravert, 2008; Schumacher, 2004, Lasater, 2005; Griggs, 2002).

Simulation in nursing education

Ravert's (2002) literature review of simulation education among health

professionals and students found nine quantitative studies none including nursing students. Seven of the studies showed positive effects of simulators on the acquisition skill and knowledge (Ravert, 2002). Ravert's (2004) dissertation compared two groups of nursing students. The first group discussed patient scenarios in a classroom setting and the second group utilized those same scenarios but performed the tasks on the high-fidelity manikins. Both groups experienced a gain in critical thinking skills while those students in the simulation group were more enthused in learning and expressed a desire for further sessions (Ravert, 2004). Despite being a pilot study with only 25 subjects, a control group taking the pre and posttests would have made the research stronger.

Jeffries and Rizzolo (2006) conducted a large multi-site study ($n = 403$) sponsored by the National League of Nursing which compared high-fidelity simulation with paper /pencil case studies low static mannequin simulation. Students who participated in the HPS had a greater sense of learning. Additionally the study found that the HPS students perceived the active learning exercises and feedback as being more significant (Jeffries & Rizzolo, 2006). While this study was comprehensive and tools were developed to rate students' perceptions from participating it did not address learning outcomes such as clinical judgment.

Not all nursing HPS research supported significant gains in confidence and perceptions. Aliner, et al. (2006) found that nursing student perceptions ($n = 99$) of their self-confidence and anxiety did not statistically improve with exposure to simulation despite the improvement in performance. The finding was consistent with other researchers (Graham & Scollon, 2002; Morgan & Cleave-Hogg, 2002). However, Lasater

(2005) reported significant increases in confidence between subjects engaged in HPS compared to those who didn't have the HPS experience. These researchers used a pre-post test Objective Structured Clinical Exam (OSCE) as their measure of performance and a pre-post test questionnaire to measure the students' perceptions (Aliner, et al., 2006). Feingold et al., (2004) found during their study that fewer than half of the nursing student study participants (n=65) felt that participation in simulation increased clinical competence or self-confidence. The study participants in this study had only two simulation experiences (Feingold et al., 2004). In contrast to these findings, Lasater (2007a) suggests that repeated exposure to simulation increased these perceptions.

In another study Radhakrishnan, Roche, and Cunningham (2007) found no significant differences in critical thinking, delegation or communication skills compared to a control group. But there were significant differences in patient identification and vital sign assessment. The major limitation of this pilot study was the small sample size (n=12) (Radhakrishnan, et al., 2007).

High-fidelity human patient simulation might be one of only a few learning strategies, other than real-life patient care that helps nursing students fully address the complexity of patient problems or responses (Lasater, 2007b.) The interactive nature of simulation motivates student's willingness to participate and learn. It is consistent with cogitative learning theory because it is interactive, builds on prior knowledge and relates to clinical problems that are realistic. Active participation in these realistic clinical simulations may promote clinical judgment in students and increase their level of comfort with the patient condition so the, patient, not the technology, becomes the focus of care

(Feingold, et al., 2004).

Pros and cons of simulation

The use of simulation in nursing education has many advantages. These include: learning in a risk-free environment; interactive learning; repeated practice of skills, and immediate faculty or tutor feedback. Students can practice problem solving with faculty support in a safe environment (Cioffi, 2001; Ravert, 2002). The educator also has ability to develop and control the parameters of the simulation for a high degree of control over the student nurses' simulation experience (Long, 2005). Additionally, students tend to have the perception that simulated patient encounters may prevent future errors (Abrahamson et al., 2004; Henrichs et al., 2002; Lasater 2007; McCausland et al., 2004).

Debriefing following a simulation exercise allows the learner time to reflect upon the simulation session and to discuss their actions, thought processes, and review any mistakes that may have been made (Jeffries & Rizzolo, 2006). In many of the high-fidelity mannequins; the computer records the events and times and the patient's physiological responses to interventions and printouts of these responses are used during the review/debriefing session (Abrahamson, Canzian, & Brunet, 2006; Ackermann, Ackermann, Kenny, & Walker, 2007; Baldwin, 2007; Bernson & Wiker, 2005; Childs & Sepples, 2006; Feingold, et al., 2004; Henrichs, Rule, Grady, & Ellis, 2002; Long, 2005; McCausland, et al., 2004; Rhodes & Curran, 2005; Schoening, Sittner, & Todd, 2006).

Disadvantages of simulation have also been reported in the literature. Anticipation that the mannequin is going to have a declining physiologic condition is common among students. This can produce anxiety and may contribute to the perception of an unrealistic

setting (Lasater, 2005). Yet that anxiety is often decreased after repeated exposure to simulation exercises (Hoffman, O'Donnell, & Kim, 2007). Some students were embarrassed during debriefings especially if mistakes were made and felt that the debriefings were not useful (Henrichs et al., 2002; Lasater, 2007).

The static mannequin and, if used, the computerized voice responses from the mannequin, added to the "unrealistic" atmosphere the students faced. This did not help to increase communication skills. To alleviate this challenge, the use of individuals in the role of a family member or physician etc, and the use of an instructor to respond as the voice of the mannequin/patient allowed for better communication skills and added to the realism of the scenario (Kiat, et al., 2007). Additionally, the use of simulation is also time intensive from a faculty perspective (Abrahamson, et al., 2006; Lathrop, Winningham, & VandeVusse, 2007; W. M. Nehring & Lashley, 2004). Additionally, the costs to purchase the mannequin, supplies, software and space modifications can range from $30,000 to 250,000 (Rauen, 2004; McCausland, Curran & Cataldi, 2004, Schumacher, 2004).

Summary

Simulation has been used in many industries including nursing education. Nurse educators have used simulators to help students learn cognitive and psychomotor skills and to develop their confidence in performing nursing interventions in a safe environment. The high-fidelity human patient simulator provides the student the opportunity to learn, practice, and increase higher order cognitive processes such as clinical judgment. Clinical judgment is essential to successful nursing education and practice. The review of the literature demonstrates that there is no consensus on the

definition of clinical judgment. Nursing education researchers believe that problem-based learning through simulation may increase clinical judgment but the research does not yet support this belief due to the paucity of research in this area. The few quantitative studies that do exist tend to have small sample sizes. While clinical judgment is a complex phenomenon, it is also essential for graduate nurses to possess in today's professional workplace. Demands of new nurses to possess clinical judgment are high because acute care patients seem to have higher acuity.

From the literature, the question that needs to be answered is do nursing students who use HPS increase clinical judgment compared to students who do not? To answer the question the following hypotheses require investigation.

Hypothesis 1) Nursing students who engage in the high-fidelity human patient simulator scenarios will have a higher increase in knowledge test scores than nursing students in the control and traditional groups.

Hypothesis 2) Nursing students who engage in the high-fidelity human patient simulator scenarios will have a higher increase in confidence test scores than nursing students in the control and traditional groups.

Hypothesis 3) Nursing students who engage in the high-fidelity human patient simulator scenarios will have higher increase in skill test scores than nursing students in the traditional group.

CHAPTER III

METHODS

A quasi-experimental study examined clinical judgment of nursing students as an outcome of three instructional methods. The design is quasi-experimental in nature because the methodology randomized subjects into one of three groups so that students had equal opportunity to be assigned into one of three treatment options. The control group (lecture only) represents a didactic teaching pedagogy that has been utilized for many years in nursing education. A traditional group; lecture and written case studies, represents a teaching pedagogy that many nursing programs utilize when teaching clinical judgment and critical thinking. The experimental group, lecture and high-fidelity human patient simulator, was hypothesized as a method to increase clinical judgment.

Sample

A convenience sample of nursing students from a Northeastern United States university baccalaureate nursing program enrolled in a basic techniques of clinical nursing were recruited for this study. The enrolled course teaches students, within a simulation laboratory setting, the fundamentals of nursing assessments (obtaining vital signs), delivery of medicine (oral, intramuscular and intravenous), and basic procedures (inserting urinary catheters, suctioning, etc.).

Students enrolled in this course are in their first semester of nursing clinical practica. The target group was selected because students have little or no prior nursing/healthcare experience with little exposure to patients experiencing critical

situations. Additionally these students, have been taught the basics of nursing assessments, pharmacology/pathophysiology, and have a grasp of the fundamentals of the scenarios used for this study. All students were at least 18-years-old and have current Healthcare Basic Life Support certification as required by the university's Nursing Department as a condition of enrollment. Students in beginning nursing courses without additional clinical experience will have not started to develop or refine their nursing clinical judgment. Upper-class students were excluded from the study because they have more experience with patient situations than the first-semester nursing students and would have already began to form their own clinical judgment skills. This study required subjects with little to no experience so that evaluation of their clinical judgment would not be influenced by decisions and judgments from previous patient encounters.

A total of 11 subjects completed the study. The sample size of each of the three groups are as follows: control ($n = 3$), traditional ($n = 4$), and experimental ($n = 4$).

Setting

This study took place on the campus of a baccalaureate nursing school in the Northeastern United States. A classroom was used for all meetings and was bright and adequately heated. Subjects assigned to the experimental group met in the university's nursing simulation laboratory. The laboratory is located in the Department of Nursing and has three adult Laerdal SimMan high-fidelity human patient simulators. The lighting was bright and the temperature is adequate for learning.

The mannequin used during the study by the experimental group was positioned in a hospital bed in the laboratory. The controlling laptop computer and patient vital sign and cardiac monitor were located at the bedside. There was adequate space for subjects to

interact with the mannequin. Additionally, equipment similar to that used in hospitals is present in the laboratory.

Measurement instruments

Demographic survey

A researcher developed 11-question survey was administered to gather basic demographic information about the subjects (Appendix A). This survey also asked for the last 4 digits of the subjects' student identification number in order to match and compare data from the pre and post tests.

Knowledge test

A researcher developed 20-item test (Appendix B) measured subjects' changes in knowledge as a result of the intervention. The multiple-choice test items had four possible responses designed to determine subjects' general medical/surgical nursing knowledge. The same questions were used for both the pre and post-tests. The test is scored on a scale of zero to one hundred percent.

Practice Survey

The Lasater Clinical Judgment in Practice Survey (LCJPS) was designed to measure students' self-reported development by assessing their *confidence* in the application of clinical judgment into their practice (Appendix C). It consists of 30 questions and respondents rate their sentiments along a 4-point Likert scale as "1" strongly disagree, "2" somewhat disagree, "3" somewhat agree, and "4" strongly agree. For the post-test, all items were reverse coded in order to compare subjects' responses from the pre test. The range of scores is between 30 and 120.

The LCJPS was designed by utilized critical thinking dimensions from the Delphi Study by Scheffer and Rubenfeld (2000) that identified two categories of critical thinking - habits of the mind and habits of skill - which comprised 17 dimensions that were specific to nursing practice. Evaluating students' responses to questions along these dimensions determines their confidence in nursing practice (Lasater, 2005).

The Lasater Clinical Judgment in Simulation Rubric (LCJSR)

The Lasater Clinical Judgment in Simulation Rubric (Appendix D) was used to measure the skill of subjects in the traditional and experimental groups. Lasater (2005) developed this rubric based upon Tanner's (2000) Model of Nursing Judgment's notice-interpret-respond-evaluate cycle. The rubric was used in this study to address students' clinical judgment skill. The focus is to identify behaviors and verbalizations that would indicate a student's level of comprehension and ability.

The design of this rubric evaluates and scores student's clinical judgment across four levels of ability: 1) novice; 2) progressing novice; 3) competent; and 4) accomplished. There are four main components to the rubric (noticing, interpreting, responding and evaluating) and a total of 11 sub-categories within the components (Appendix C) (Lasater, 2005).

To score the rubric, an evaluator observes the students' actions using the high-fidelity human patient simulator and compares their actions with each of the 11 sub-categories with the expected level of ability. A score of "1" is assigned to novice, "2" for progressing novice, "3" for competent, and "4" for accomplished with each of the 11 sub-categories. A subjects' score is between 11 and 44.

Lasater (2005) acknowledged that the sample size of her research was not large enough to confirm reliability of the rubric and expressed the need for further refinement and study to confirm or refute the tool's reliability (Lasater, 2005). The rubric was used because this is the only tool that has been developed. The author of this study observed and evaluated the subjects using the LCJSR to evaluate the subjects' skill. Furthermore data gathered will be forwarded to Dr. Lasater to further evaluate the tool (K. Lasater, personal communication, December 19, 2007).

Intervention

Subjects in all three groups received a Powerpoint lecture (Appendix E). The lecture was a researcher-designed presentation that focused upon four potentially critical care situations that nurses may encounter with their patients. The situations included: asthma exacerbation; pulmonary embolism; anaphylactic reaction; and opioid overdose. The topics were chosen because all involved airway complications.

The pre-programmed high-fidelity human paitent simulator Laerdal SimMan computer-based software standardized scenarios were designed in cooperation with the National League for Nursing (NLN) to represent a accurate patient situation. The software package, sold as an adjunct to the Laderal SimMan system, contains 10 surgical and 10 medical preconfigured scenarios that include both core and complex conditions that are designed to challenge nursing students at all levels. The three HPS scenarios used for this study were from this software package (Appendix F). The scenarios chosen were: the Acute Asthma Exacerbation (Scenario A), Postoperative Hemicolectomy - Pulmonary Embolism (Scenario B), and Pneumonia - Severe reaction to Antibiotics (Scenario C).

The opioid overdose (Scenario D) was included for students in the control or traditional groups who wished to use the HPS following the study.

The written scenarios were derived and modified by the researcher from the Laderal/NLN SimMan scenarios (A, B, and C as above) so that students assigned to the traditional group were completing the same scenario as the experimental group (Appendix G). They described the same "patient's" name, history, condition, vital signs, actions, and response to treatment as the computer software except that these were in written form for the subjects in the traditional group. Subjects provided written responses to the questions about the patient's condition, vital signs, symptoms, and interventions.

Assumptions

For the purpose of this study, the concepts of "clinical judgment" and "critical thinking" are synonymous. Both clinical judgment and critical thinking are higher thought processes and each is linked to the other. Both clinical judgment and critical thinking require the subject to use higher thought processes, including having the ability to notice, interpret, respond and to reflect upon a given situation. It is also assumed that subjects did not discuss any of the tests and case scenarios with each other.

Procedure

Recruitment

A convenience sample of two cohorts of second semester sophomores (n=64) enrolled in a introductory to clinical nursing laboratory course in the Spring semester 2009 were recruited. An e-mail invitation (Appendix H) was sent to students in the Monday cohort and an oral presentation describing the study by the researcher was given on the first Monday following the e-mail to students. A $40 gift card, redeemable at the

university bookstore or Barnes and Noble Bookstores, was offered as an incentive to participate only upon completion of the study.

A sign up sheet was passed around during the oral presentation and students interested in participating were asked to provide their name and e-mail address. The recruitment effort was limited to 20 students and was halted following the presentation to the Monday cohort as 19 students expressed an interest in participating. A total of 11 participants were able to complete with the study.

Group assignment

A week following the recruitment of subjects; participants attended the first session. During the first session, all participants completed the demographic information survey, the Knowledge test, the LCJPS and were given a Powerpoint lecture on patient complications. At the end of the first session the subjects were randomly assigned to one of the three groups. Twelve pieces of paper were numbered with an equal number of "1", "2", or "3" were folded and placed into a cup from which students drew their assigned group. Group 1 was the control group who received a lecture only. Group 2 was the traditional group and received a lecture and written case scenarios. Group 3 was the experimental group and received a lecture and high-fidelity human patient simulator scenarios.

Control group

During the first session, the control group completed the demographic information survey, the Knowledge test, and the LCJPS. Afterwards, they received a one-hour PowerPoint presentation on patient complications, which represented the lecture-only didactic pedagogy then randomly assigned to their group. The control group met two

weeks later and completed the post tests for the LCJPS and the Knowledge test. Upon completion, the participants received a $40 gift card for their participation.

Traditional group

During the first session, subjects in the traditional group completed the demographic information survey the Knowledge test, and the LCJPS. Afterwards, they received a one-hour PowerPoint presentation on patient complications and were randomly assigned to their group. One week later, subjects in the traditional group met with the researcher and were administered two written case studies - Scenario A and B. Subjects worked in pairs to complete the case studies. Each case study had a narrative description of the patient situation and vital signs. Subjects had to notice, interpret, respond and evaluate the patient condition as the scenario progressed based upon the questions about the patient and additional narratives updating his or her condition.

During Scenario A subjects worked on the case study in pairs and were observed and evaluated by the researcher using the LCJSR as they verbalized and coordinated their answers. The subjects were encouraged to use their reference material such as: the written PowerPoint presentation given to the students, any drug reference guides, medical dictionary, or medical-surgical textbook and to ask the researcher questions about how the patient might be reacting to interventions they choose as there was no way to physically observe the patient due to the written format. They were also evaluated as they expressed their thoughts and rationalizations while reflecting on the case during the debriefing.

Following Scenario A, subjects completed Scenario B. Subjects were not evaluated during this scenario as this scenario was intended to give students additional

experience with the written case study format. Upon completion of Scenario B subjects participated in a debriefing where they were able to reflect on their answers and reactions to the case study.

One week later, subjects were evaluated using the LCJSR during Scenario C. Immediately following completion of this case study, the subjects were administered the LCJPS and Knowledge post-tests. After completion, the subjects received a $40 gift card.

Experimental group

During the first session, subjects in the experimental group completed the demographic information survey, the Knowledge test, and the LCJPS. Afterwards, they received a one-hour PowerPoint presentation on patient complications and were randomly assigned to their group. One week later, subjects were given 20 to 30 minutes of instruction on how to physically assess and interact with the high-fidelity human patient simulator. Students were told that they could ask the patient questions and that the researcher would be responding as the voice of the mannequin. They could physically assess the patient with some limitations such as skin color, mobility, capillary refill etc. Following simulator instruction, subjects were presented with the Scenario A using the SimMan high-fidelity human patient mannequin. The students actively participated in the care of the "patient" while the mannequin exhibited the signs and symptoms of a patient experiencing an asthma exacerbation. During the scenario and the debriefing subjects were evaluated by the researcher using the LCJSR. Subjects were encouraged to speak aloud and ask questions when performing tasks such as administering medications and assessing skin color. The subjects were encouraged to use reference material such as the

written PowerPoint presentation given to the students following the first session, any drug reference guides, medical dictionary, or medical-surgical textbook.

One week later, subjects completed Scenarios B and C using the HPS. Subjects were not evaluated during Scenario B because it was intended to give students additional experience with the high-fidelity human patient simulator format. Upon completion of Scenario B subjects participated in a debriefing where they were able to reflect on their answers and reactions to the case study.

During Scenario C, subjects were evaluated by the researcher using the LCJSR. After completing the two scenarios, the students took the LCJPS and the Knowledge post-tests. Upon completion of the post tests, the subjects received a $40 gift card.

Human Subjects Protection

The study was approved by the university's institutional review board (Appendix I). Subjects who attended the first oral presentaion meeting provided written consent (Appendix J). It was explained that participation was voluntary and that they could withdraw at any point during the study until the final post-test data was collected.

Data analysis

To maintain confidentiality, subjects were identified by using the last four digits of their school identification number to match pre and post test scores.

Demographic characteristics of the groups were compared using descriptive statistics. ANOVA was used to compare group means for the clinical judgment domains of *confidence, knowledge and skill*. Independent sample two-tailed t-test analyses were used to compare Groups 2 and 3 with regards to measurement of *skill* using the LCJSR.

Statistical analyses used Statistical Package for the Social Sciences (SPSS) version 13. (SPSS, 2006). Significance was placed at the $p < 0.5$ level.

CHAPTER IV

RESULTS

Sample

Sixty-two undergraduate nursing students were eligible to participate in the study. Subjects were recruited during March, 2009. Nineteen subjects expressed an interest in participating and signed up to attend the first session. Thirteen attended the first session and 12 signed the consent forms. One subject withdrew from the study citing time and scheduling constraints. Eleven subjects completed the study.

Demographics

All subjects ($n = 11$) were female, in their first semester of nursing clinical paractica, were Caucasian, between the ages of 18-22, seeking their first baccalaureate degree, speaking English as a first language. Two participants reported having previous healthcare experience. One served as a medical assistant at a nursing home (two years experience) and the other as a unit coordinator at a hospital (four years experience). None of the subjects had cared for a patient with an asthma exacerbation, an opoid overdose, a pulmonary embolism, or an anaphylactic reaction to a medication.

Knowledge

Hypothesis: Nursing students who engage in the high-fidelity human patient simulator scenarios will have higher increase in Knowledge test scores than nursing students in the control and traditional groups?

A one-way Analysis of Variance (ANOVA) was conducted to examine the relationship between group assignment and pretest knowledge of medical-surgical knowledge to determine the baseline mean of the subjects and to test for homogeneity of the random group assignment. The randomized subjects in the three groups scored similarly on the pre Knowledge test which indicates that subjects had similar levels of medical surgical knowledge prior to the interventions.

A paired Samples t-test was conducted to compare the Knowledge test scores within subjects before and after participation in the study. There was no significant difference in the scores for the Knowledge test from the pre test and the post test.

A repeated measures ANOVA was conducted to examine the change in pre and post test knowledge scores between groups. Descriptive statistics are presented in Table 1. The total gain scores of across the subjects ($N = 11$) on the post test compared to the pre test ranged from -20 to 15. The dependent variable is the score difference between the pre and post knowledge tests and the independent variable is the group assignments. Subjects' Knowledge test scores decreased (62.7 to 61.8) following the intervention but not significantly.

Table 1
Knowledge test descriptive statistics

Group	Pre Knowledge test		Post Knowledge test	
	M	SD	M	SD
Control (n = 3)	58.33	2.89	55.30	12.58
Traditional (n = 4)	67.50	11.90	68.75	4.97
Experimental (n = 4)	61.25	11.09	61.25	10.31
Total (n = 11)	62.73	9.84	61.82	10.55

Confidence

Hypothesis: Nursing students who engage in the high-fidelity human patient simulator scenarios will have higher increase in confidence test scores than nursing students in the control and traditional groups?

A one-way ANOVA for the pre test and post test LCJPS scores was conducted to test for homogeneity of the random group assignment. There was no significant difference among groups.

A paired t-test was conducted to compare the pre and post test LCJPS scores (n = 11). There was a significant difference in the mean scores for the LCJPS from the pre test (M = 70, SD = 3.90) and the post test (M = 89.55, SD = 5.96) scores t (10) = -5.84, $p <$ .001.

A repeated measures ANOVA was conducted to examine any differences in pre and post test LCJPS scores among groups. The mean and standard deviation for each of the groups' pre and post intervention scores are found in Table 11. There were no significant differences among groups found.

Table 2
LCJPS descriptive statistics

Group	Pre test LCJPS		Post test LCJPS	
	M	SD	M	SD
Control (n = 3)	79	3	88.33	10.69
Traditional (n = 4)	80	2.45	88.75	4.99
Experimental (n = 4)	78	6	91.25	3.30
Total (n = 11)	70	3.90	89.55	5.96

Analyses of the gains in students' confidence were shown to be significant between pre and post tests. However, no significant differences were found for any

specific group over time despite the experimental group's higher gain scores in confidence (M = 13.25, SD = 6.7) than either of the other two groups.

Skill

Hypothesis: Nursing students who engage in the high-fidelity human patient simulator scenarios will have higher increase in skill test scores than nursing students in the traditional group?

An independent t-test was conducted between the traditional and the experimental group to determine if any difference existed on the pre test LCJSR with no significant difference identified. Following the intervention there was a significant difference between the two groups (t (6) = -2.53, p = .045) on the post test. Students engaged in high-fidelity human patient simulation scenarios significantly increased their skill compared to students in the traditional (written case study) group.

Anectdotal information from subjects in the experimental group during the debriefings after each scenario (although it was not a focus of the study) indicated that they liked the idea of "actually practicing" on a patient. They felt that this learning technique causes them "to have to think quickly or face the consequences". All of the subjects in the experimental group expressed a desire to have more experience with HPS.

Summary of findings

Following analysis of the data, students engaged in HPS did not improve clinical judgment which is a product of nurses' knowledge, confidence and skill. To accept that clinical judgment was improved all three research hypotheses needed to be accepted.

Hypothesis 1 is rejected. Nursing students who engage in the high-fidelity human patient simulator scenarios did not have a higher increase in knowledge test scores than nursing students in the control and traditional groups.

Hypothesis 2 is rejected. Nursing students who engage in the high-fidelity human patient simulator scenarios did not have a higher increase in confidence test scores than nursing students in the control and traditional groups.

Hypothesis 3 is accepted. Nursing students who engage in the high-fidelity human patient simulator scenarios will have higher increase in skill test scores than nursing students in the traditional group.

CHAPTER V

DISCUSSION

This pilot study examined clinical judgment as an outcome of simulation as an instructional pedagogy. Nursing has been charged with insuring that critical thinking and clinical judgment (AACN, 1998, 2003) are outcomes of baccalaureate nursing education. If students are able to increase clinical judgment then that would equip them to meet the demands of nursing.

Unfortunately, there is a paucity of research that examines the relationship between clinical judgment and high-fidelity human patient simulation. Perhaps the two greatest reasons for this gap in the research are that: 1) there is no consensus as to how to define clinical judgment, and 2) there is no consensus on how to measure it.

The Lasater Model of Clinical Judgment (2005), which served as the basis for this study, examines clinical judgment along four dimensions: aptitude, confidence, skill, and experience. Aptitude, according to Lasater (2005), was measured by the California Critical Thinking Disposition Inventory (CCDTI). This tool is not specific to nursing. Thus knowledge was used in place of aptitude and was measured by a Knowledge test.

Impact of High-Fidelity Human Patient Simulation (HPS)

Knowledge

The results show that subjects' knowledge either remained the same or decreased following the treatment. Subjects in the experimental group had no change in knowledge, the traditional subjects had a small loss (-1.25) and the control group lost the most loss (-

5). This could be interpreted that simulation helps subjects retain knowledge over time. While the mean scores demonstrated an effect, results were not significantly different.

An unexpected finding from the Knowledge test is that the mean total decreased from pre-test ($M = 62.73$, $SD = 9.84$) to post test ($M = 61.82$, $SD = 10.55$). There was no manipulation of the questions on Knowledge test the pre to post test. The test was the same for both.

Confidence

Subjects' confidence as a whole was significantly increased between the pre test and post test. However, no significant increases in the means were discovered among groups. Subjects in the experimental group tended to have the largest increase in confidence ($M = 13.25$, $SD = 6.7$) than the other two groups.

Brahnam, White and Bezanosm (2008) found that while students did not significantly increase confidence, confidence scores were increased in their sample. These results are similar to the finding of this study. However, Childes and Sepples (2006), Lasater (2005),and Rockstraw (2007) found that confidence amongst their subjects was significantly increased following HPS.

Skill

Results show that subjects in the experimental group significantly increased skill compared to the traditional group. That the experimental groups' skill increase was significant is perhaps not surprising because the subjects actively participated in the care of the "patient". The subjects' responses are performed under real-time and in a realistic setting as opposed to the imagined settings of written case scenarios and lectures. This hands-on experiential learning allows subjects' transfer of knowledge from what is

known about the patient as well as treatments to administering the treatments in a safe environment (Paige & Daley, 2009).

Other researchers have found significant increases in the acquisition of skills following HPS. Ackerman (2007) found that the addition of HPS increased ability and retention of CPR skills. Aliner, et. al (2006) found that using medium-fidelity HPS technical and communication skills were increased post test when evaluated using the OSCE evaluation method. Radhhakrishnan et. al (2007) found that following HPS exposure nursing students had significantly higher skills in patient identification, and vital sign assessment.

Limitations

Limitations of the study include timing, sample size, tool availability and focusing only quantifiable measurements.

As the target population was students in their first semester of their clinical practica, little time was available between their acquisition of assessment skills and the end of the semester. Time also limited the ability to evaluate the control group using the LCJPS.

The number of subjects for this study was limited to a maximum of 20 students to accommodate to time and scheduling constraints. Accommodating subjects' schedules, laboratory time, and meeting room availability was difficult. Due to the small sample size ($n = 11$), results obtained may not be generalized to nursing students as a whole. A study with a larger sample would be more representative.

Testing subjects soon after the intervention may not be a true reflection of learning or the measurement of clinical judgment as these occur over time. Not accounted

for during this study was the learning style of the subjects. Since individuals learn differently, teaching strategies that focus on an individual's preferred learning style could be more effective. The use of the HPS may not be appropriate for didactic learners but may be preferred for active kinesthetic learners.

Subject motivation for participation is unknown. A prior attempt to recruit yielded only three subjects. Recruitment was considerably more successful when a financial incentive in the form of a $40 gift card to the university bookstore was offered. The message, timing of recruitment and delivery were similar the only difference was the gift card. Perhaps if the financial incentive was the only motivation, subjects' efforts may not have been optimal.

I focused on quantitative measures and felt that knowledge is a component to clinical judgment because knowledge serves as the foundation for judgments. Lasater's (2005) last dimension, *experience*, was measured qualitatively. As this research focused on quantitative measurements, experience was excluded as a dimension of clinical judgment. The Knowledge test measurement tool took questions from general medical surgical knowledge. It was not specific to the critical care situations presented in the lecture or the scenarios. The knowledge test may have been too simple and for many subjects there was little potential for improvement. This test was designed to evaluate subjects' prioritization and choices from various options regarding patient care. Had the test been modeled upon the scenarios then the scope of the knowledge would have been too narrow. Additional development of a knowledge test could be conducted using psychometrically tested general medical surgical questions from organizations such as HESI.

The LCJPS was an unwieldy tool to accurately measure confidence. Furthermore, time between pre and post tests was perhaps too short a time (two weeks) for any meaningful change to be detected.

The LCJSR is a subjective evaluation tool in that the evaluator must make judgments as to the score awarded to each subject based upon how they feel the subject performs within each sub-domain. While the rubric is specific in its description of each sub-domain there is still a question of inter-rater reliability. This tool has not been widely tested. Additional use by other researchers would add to its reliability and validity.

Summary

While this pilot study was limited by a small sample size ($n = 11$) and was of short duration; results demonstrated the potential of HPS. It explored the impact of high-fidelity human patient simulation on the phenomenon of clinical judgment and examined the interaction of high-fidelity simulation on three dimensions of clinical judgment - knowledge, confidence and skill. The results of this study demonstrated that high-fidelity simulation as a teaching strategy does not increase clinical judgment as a whole compared to a traditional or control group. Although students who engaged in HPS did significantly increase *skill.*

The findings are consistent with other researchers for confidence and skill. Brahnam, et. al (2008), too, reported increases in confidence of nursing students pre and post HPS but not significantly. The results of this study related to skill acquisition are are consistent with other researchers (Ackermann, 2007; Alinier, et al., 2006; Radhakrishnan, et al., 2007). With regards to clinical judgment, this study is consistent with the majority of the literature whose findings show gains in the scores of various dimensions of clinical

judgment. The finding of this study show gains in confidence and skill but no increase in knowledge. Thus because there was not significant increased for each of the three dimensions of clinical judgment (knowledge, confidence and skill) the findings do not support an increase in clinical judgment of nursing students following HPS. It is difficult to compare this study with others as many researchers report that there are increases in clinical judgment in as much as that there are many others that report no increases in clinical judgment. The difficulty in comparison is due to inconsistent definitions of clinical judgment. This study is consistent with others in that it demonstrates partial gains.

CHAPTER VI

RECOMMENDATIONS

Implications for Nursing

This study demonstrates that high-fidelity simulation has an impact on the development of clinical judgment. Nursing students who participated in the simulation teaching strategy scored better that those students in the traditional or control groups in the *confidence* and *skill* dimensions of clinical judgment. This finding suggests the value of HPS as a teaching strategy. The HPS learning strategy, allows students to notice, interpret, respond and evaluate the actions of the mannequin in real-time with the knowledge that this is a safe environment and the "patient" does not get harmed if mistakes are made.

Using simulation as a learning strategy would reach students who are more active and kinesthetic learners. During clinical practica, students rarely see, let alone care for, patients with life-threatening conditions. Yet as soon as they become graduate nurses they are expected to be able to recognize and respond to patients in their charge who may possess these conditions. HPS allows students to safely practice nursing care and gain experience in the academic setting prior to entering the profession.

Schools of nursing should consider "open lab" time for students to be able to interact with the mannequins using various scenarios, staffed by qualified instructors. Perhaps extra credit could be given for participation in open lab. Bearnson and Wicker (2005) found that replacing one day of clinical practica with a day of simulation

increased students' knowledge, confidence, and ability. While many schools of nursing are increasingly incorporating HPS into their curricula, cost, resources and time are the limiting factors for implementation.

Further Research

Over time, students gain experience which fits with Benner's novice to expert (Benner 1984) and Tanner's Model of Clinical Judgment of Nurses (Tanner, 2006). Judgment too increases over time (Schumacher, 2005). A longitudinal study over an entire semester or over the entire program of study should be conducted. A larger, more diverse sample, over several sites is needed. Given the sample size ($n = 11$) in this study, it would be beneficial to replicate the study. The inclusion of associate degree nursing students and second-degree nursing students would be of interest.

Future research is needed in the development of clinical judgment tools. According to the Lasater interactive Model of Clinical Judgment (Lasater, 2005) aptitude is measured by the CCTDI. This tool is widely utilized not only by nursing but many other disciplines. However, it is not nursing or even healthcare specific. Thus research into the development of a nursing specific critical thinking dispositions inventory would be beneficial. Research looking for relationships between clinical judgment and simulation needs to be conducted to expand knowledge in this area as there is a paucity of research linking clinical judgment as an outcome from learning by high-fidelity human patient simulators.

A Delphi project reached a consensus on the definition of Critical Thinking (Facione, 1990). A similar project could be undertaken by nursing academics to reach a consensus on the definition of clinical judgment. This would help schools of nursing and

researchers have a clear definition as to this phenomenon of interest.

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APPENDICIES

APPENDIX A

DEMOGRAPHIC SURVEY

Demographic information

Please answer EACH question by circling the ONE most appropriate answer for the question:

1. Gender: male female

2. Age: 18 - 21 21-24 25-29 30-34 35 and over

3. In which clinical course are you enrolled currently?

Nursing 514 Nursing 813

4. What is your class standing?

Freshman Sophomore Junior Senior DEMN Graduate

5. How much healthcare-related work/volunteer experience did you have BEFORE you began your nursing education?

None less than 1 year 1-3 years 4-6 years more than 6 years

6. In what capacity? None Direct care Health education Support services

7. Have you earned a previous bachelor's degree in another major? no yes

8. Were you raised in the United States? no yes

9. Is English your first language? no yes

10. In which racial/ethnic group do you place yourself?

Caucasian Hispanic African/American

Native American Pacific Islander Asian Other

11. Last four digits of your social security number: ___ ___ ___ ___

APPENDIX B

KNOWLEDGE TEST

Management of the Medical-surgical patient quiz

General Instructions

This quiz has twenty questions. The test is to be completed in 30 minutes. It is important not to spend too much time per question. Please use either a pen or pencil and circle your answer on the score sheet. Please enter the last four digits of your student ID# (SSN) on the score sheet.

1. Mr. Darapack is due for his pain medications. The doctors orders lists that he may have morphine 20 - 40 mg IV every 3-4 hours as needed for pain. Mr Darapack has not yet had a bowel movement since his surgery 36 hours ago and says his pain level is 3/10. What would be an appropriate amount to give him?

a) 40mg
b) 30mg
c) None
d) 20mg

2. Mr. Townsen says that his right buttock feels wet following his appendectomy 8 hours ago. His vital signs are as follows: T-99.0 P=80 BP=136/81 R=14 O2 sat=99% on room air. What is the most appropriate action to take next?

a) Call the surgeon and the operating room team immediately.
b) Roll patient onto left side to obtain a sample of the fluid for lab analysis.
c) Place the patient is trendelemberg (head lower that feet) position immediately.
d) Examine the bandage.

3. Mr. Dwyer complains of postoperative nausea. His dietary status is NPO. The nurse, obtaining a physician's order for Zofran (ondansetron), anticipates which of the following routes will be ordered for administration?

a) Transdermal,
b) Intravenous
c) Oral
d) Subcutaneous

4. A patient with a large abdominal wound requiring frequent dressing changes is starting to develop skin irritation in the area where the dressing tape is applied to the skin. The nurse interprets that the client will benefit most from:

a) Obtaining a would culture
b) Cleaning the irritated area with providone-iodine
c) The use of Montgmery Straps
d) The use of hypoallergenic tape

5. The nurse urges Mrs. Amendola to cough and deep breath following her nephrectomy. Mrs. Smith tells the nurse "That's easy for you to say! You don't have to do this." The nurse interprets her statement is most likely a result of:

a) A stress response to the ordeal of surgery.
b) A latent fear of needing dialysis if the surgery is unsuccessful
c) Effects of circulating metabolites that have not been excreted by the remaining kidney
d) Pain that is intensified due to the location of the incision near the diaphragm.

6. A postoperative appendectomy patient, with a history of narcotic abuse, is suspected to have an overdose reaction to the ordered narcotic pain medication. He has been given a dose of Narcan (naloxone) to counter this reaction. A short while later he patient becomes restless, complains of stomach cramps, nausea and starts to vomit. His blood pressure increases from 114/68 to 164/94 mm Hg. The nurse provides emotional support and reassurance to the patient because she/he knows that:

a) The effects will last only a few moments
b) These are signs of opioid withdrawal
c) The patient may sign out against medical advice
d) The patient may become suicidal

7. Mrs. Pellett is three days post-op following a total knee replacement. At the beginning of your shift her vital signs were temp 99.1 orally, pulse 68, respirations 16, and blood pressure 122/72. Four hours later you notice her Temperature is 103.6. Which of the following respiratory rates would you anticipate Mrs. Pellett to have in response to her condition?

a) 22
b) 10
c) 16
d) 18

8. Mr. Marriner is 4 hours post-op following a laproscopic Cholecystectomy with minimal blood loss according to the OR report. What assessment measurement would provide you with the earliest indication that he may be experiencing significant internal bleeding?

a) Crackles heard in the lungs
b) Presence of swelling in the extremities
c) Blood pressure
d) Pulse rate

9. Mrs. Senter had a hip replacement four days ago. You noticed that in yesterday's nurses report she complained of left calf stiffness but no real pain. Today you notice that she is difficult to wake up, she complains of chest pain, feels like she is short of breath, she is tachycardic, tachypneic with cyanotic extremities. What complication do you most likely suspect she his having?

a) Myocardial infarction
b) Septic shock
c) Pulmonary embolism
d) Severe pain from surgery

10. Mr. Page is recovering from abdominal surgery 24 hours ago and is recovering well. Half-way into your shift he complains of severe diffuse abdominal pain with nausea. He rates his pain at 8/10. Which of the following medications, assuming that there is an appropriate physician order for Mr. Page, would be most appropriate to give?

a) Asprin 81 mg PO
b) Morphine 3-6 mg IV
c) Tylenol (acetaminophen) 325 mg PO
d) Phenegran (promethazine) 25 mg IM

11. Turning, ambulating, deep breathing, coughing, and using an incentive spirometer following surgery will help prevent what type of postoperative complications?

a) Cardiovascular
b) Urinary
c) Gastrointestinal
d) Respiratory

12. Mrs. Ouelette, a diabetic, is 4 days postop following a below the knee amputation. Her urine output in her indwelling foley catheter bag for during the past 6 hours since you last emptied it is 150 ml. You notice that she is oriented to person only. Her vital signs are: Temperature 100.1, pulse 92, blood pressure 138/90, respirations 20 and her O2 saturation is 98 percent on room air. Her lungs are clear to auscultation and she has positive bowel sounds in all 4 quadrants. You anticipate that you may do the following:

a) Administer Tylenol (acetaminophen) as ordered, notify physician and obtain urine sample
b) Place patient on 2L of oxygen by nasal cannula, contact nursing supervisor, monitor next urination
c) Take out the indwelling foley catheter, place patient in high fowlers position
d) Obtain order for Pyridium, clamp indwelling foley catheter, Increase fluid intake

13. You notice that Mr. Bukaty is bent over holding his stomach after his first walk of the day following his abdominal surgery five days ago. He says "It felt my stomach just unzipped". You immediately get him into a wheelchair and back to his bed. His bandage is bloody and has fallen from his abdomen. You notice that the wound edges are not together and there appears to be a coil of his small bowel protruding from the wound. Knowing that this is an evisceration, your most appropriate intervention would be to:

a) Using a sterile glove push the bowl back into the cavity, tape the would to prevent further tearing of wound and notify physician immediately
b) Place patient in low fowlers with knees bent, cover with sterile normal saline dressing, contact physician immediately
c) Place patient in high fowlers position, cover with dry sterile dressing, notify physician immediately

d) Administer high-flow oxygen, leave wound alone, contact physician immediately

14. Mrs. Talbot, is experiencing internal hemorrhaging as noted by her increased, pulse, cool, clammy skin, weak rapid pulse, restlessness and tachypnea following hip surgery 5 hours ago. You know that you will perform all of the following tasks except:

a) Administer IV fluids as prescribed
b) Encourage patient to cough and deep breath
c) Administer Oxygen as prescribed
d) Elevate the legs

15. Thirty-six hours after surgery Mr. Wellenbach has developed decreased lung sounds to both bases, fine crackles to the right middle lobe, respiratory rate of 24, Oxygen saturation of 91 percent on room air, pulse of 98, non-productive cough and a temperature of 99.6. What is the most likely cause of his condition?

a) Pulmonary embolism
b) Atelectasis
c) Deep vein thrombosis (DVT)
d) Acute respiratory distress syndrome (ARDS)

16. Mrs. Cole has not had a bowel movement in the 76 hours since her surgery. She complains of nausea and abdominal pain. What focused nursing assessment(s)/interventions would be appropriate for you to conduct.

a) Observe quality of respirations, blood pressure and oxygen saturation and prepare Mrs. Cole for fleets enema
b) Assess oxygen saturation, level of consciousness, range of motion, bowel sounds
c) Assess bowel sounds, determine if abdomen is distended, obtain information regarding bowel and urinary output.
d) Conduct preoperative assessments for surgery, check gag reflex, set up equipment for nasogastric tube insertion, and provide patient with soft food diet.

17. Mr. Savoia underwent a transurethral resection of the prostate (TURP) for a diagnosis of benign prostatic hyperplasis (BPH). Five hours following surgery you take his vital signs and empty his urinary catheter bag. Which of the following assessment findings would indicate the need to contact the physician?

a) Bloody red colored urine
b) Pain from bladder spasms
c) Blood pressure of 100/50 pulse 130
d) Urinary output of 200ml more than patient input

18. Mrs. Sikes was admitted to the operating room from the emergency department and with an open fracture of the left radius an ulna following a motor vehicle crash. She has a history of atrial fibrillation (A-fib). Preoperatively she had a normal sinus rhythm and was therapeutic with her Coumadin (warfarin) medication. Following her surgery she complains of pain in her left shoulder. You notice that she is A+OX3, her pulse is 79 and irregular, blood pressure is 138/88, respirations 18, oxygen saturation 98% on 2L nasal cannula. She only speak in 3-4 word sentences. What would be your most appropriate action to take?

a) Call the cardiac code team immediately
b) Assess the surgical site of the left arm including range of motion of the left arm
c) Obtain electrocardiogram
d) Administer Mrs. Sikes' Coumadin (warfarin) immediately

19. Your patient, Mr. Krupa, is an 18-year-old post-op patient following a tonsillectomy 28 hours ago. He has not eaten or drank anything since his surgery. His Temp is 103, respirations 24 oxygen saturation 99% on room air. He alternates between restlessness and agitation, he is A+O to person only, short term memory impairment and disturbed consciousness. Before surgery, he was not displaying any of these symptoms. Your client is most likely experiencing:

a) TIA
b) Delirium
c) An overdose of anesthetic medication
d) Dementia

20. During report at the beginning of your shift the previous nurse tells you of two patients. Mr. Ake is 48 hours postop following a strangulated bowel hernia repair his incision site has been bleeding trace amounts of blood all day although the wound is not dehisced and he is pale and has cool hands. His pulse and blood pressure has been changing from a pulse of 72 BP of156/94 at the beginning of the previous shift to pulse of 126 BP of 108/74 just prior to the report you just received. Another patient, Mrs. Childs, 56-years-old, 56 hours postop for a hysterectomy, she has purplish fingers, a temp 97.7, difficulty completing sentences, a new pain in her chest of 4/10 and mild cramping of her right leg. Which of the two patients will you see immediately and why?

a) Mr. Ake because he may be developing internal bleeding and shock
b) Mrs. Childs because she may be developing a pulmonary embolis
c) Mr. Ake because he may be developing a myocardial infarction
d) Mrs. Childs because she may be developing atelectasis

APPENDIX C

LCJPS PRE TEST AND POST TEST

Practice Survey
Pre-test

General Instructions

The attached sheet contains some questions designed to measure your opinions, beliefs, and behavior about your current clinical experience. Please answer the questions as honestly as possible, in a way that shows your current state AT THIS TIME, **not how you would like to be, or how you think you should be.** The first answer that pops into your head is what is needed.

Using a pen or pencil, please indicate the ONE best answer to each question. This should take no more than 20 minutes to complete.

Last four digits of your social security number: ___ ___ ___ ___ ___

Using the scale provided, decide how much you either agree or disagree with each statement. Next to each statement, write the umber that BEST indicates how you feel.

1	2	3	4
strongly disagree	**somewhat disagree**	**somewhat agree**	**strongly agree**

1) ___When I find an inconsistency between patient care and my knowledge, I take the time to get the answer.

2) ___ Reflection has very little to do with critical thinking.

3) ___ Even if I have complete assessment information, I find it difficult to choose an appropriate intervention.

4) ___ I pride myself on thinking "outside the box" in the clinical setting.

5) ___ When something negative happens in the clinical area, I try to forget about it.

6) ___ I am confident about the rationale for my choice of nursing interventions when caring for patients.

7) ___ If I have adequate patient assessment information, I can choose an appropriate nursing intervention.

8) ___ When I know I'm right about a patient issue, I don't care what other team members think.

9) ___ When I get new information, I carefully evaluate the reliability of the source.

10) ___ I don't have trouble prioritizing the needs of my patients.

11) ___ If a nurse with more experience says I should do something, I do it, even if I'm not sure why.

12) ___ I know the strengths and limitations of my clinical practice.

13) ___ The only thing I focus on in the clinical area is the patient's physical condition.

14) ___ I don't mind putting in extra effort to be sure I'm giving safe care.

15) ___ I routinely look for new information that I can use in the clinical setting.

Last four digits of your social security number: ___ ___ ___ ___ ____

1	2	3	4
strongly disagree	**somewhat disagree**	**somewhat agree**	**strongly agree**

16) ___ It's important to me to support my conclusions about patients with data.

17) ___ I set goals to address my areas for improvement in the clinical setting.

18) ___ When I learn something new, I share it with team members and peers.

19) ___ I like to consider alternative solutions to difficult patient problems.

20) ___ I am willing to change my viewpoint if there is evidence to support a different one.

21) ___ I frequently get a gut feeling about my patients.

22) ___ I use both subjective and objective information to make judgments about patient care.

23) ___ I would rather learn about the care of my patients on my own than from other nurses.

24) ___ For each complex patient situation, there is a right and a wrong way to deal with it.

25) ___ When I make a mistake in the clinical area, I find it helpful to talk it over with someone who has more nursing experience that I trust.

26) ___ When something goes wrong with my patient, my first intervention is to call the physician.

27) ___ As long as I am working with other team members, I feel quite confident in my ability to care for my patients.

28) ___ I can set priorities in the midst of a patient crisis.

29) ___ My past life experiences help me to provide good patient care.

30) ___ As a new graduate nurse, I expect to function independently in patient care.

Practice Survey
Post-test

General Instructions

The attached sheet contains some questions designed to measure your opinions, beliefs, and behavior about your current clinical experience. Please answer the questions as honestly as possible, in a way that shows your current state AT THIS TIME, **not how you would like to be, or how you think you should be.** The first answer that pops into your head is what is needed.

Using a pen or pencil, please indicate the ONE best answer to each question. This should take no more than 20 minutes to complete.

Last four digits of your social security number: ___ ___ ___ ___ ___

Using the scale provided, decide how much you either agree or disagree with each statement. Next to each statement, write the umber that BEST indicates how you feel.

1	2	3	4
strongly disagree	**somewhat disagree**	**somewhat agree**	**strongly agree**

1) ___When I find an inconsistency between patient care and my knowledge, I don't take the time to get the answer.

2) ___ Reflection has a lot to do with critical thinking.

3) ___ Even if I have complete assessment information, I find it easy to choose an appropriate intervention.

4) ___ I pride myself on thinking within the normal scope of nurse practices in the clinical setting.

5) ___ When something positive happens in the clinical area, I try to forget it.

6) ___ I am not usually confident about the rationale for my choice of nursing interventions when caring for patients.

7) ___ If I don't have adequate patient assessment information, I can choose an appropriate nursing intervention.

8) ___ When I know I'm wrong about a patient issue, I don'tcare what other team members think.

9) ___ When I get new information, I seldom evaluate the reliability of the source.

10) ___ I have trouble prioritizing the needs of my patients.

11) ___ If a nurse with more experience says I should do something, I don't do it, if I'm not sure why.

12) ___ I don't know the strengths and limitations of my clinical practice.

13) ___ I focus on many more things in the clinical area is the patient's physical condition.

14) ___ I don't like to put in extra effort to be sure I'm giving safe care.

15) ___ I seldom look for new information that I can use in the clinical setting.

Last four digits of your social security number: ___ ___ ___ ___ ___

1	2	3	4
strongly disagree	**somewhat disagree**	**somewhat agree**	**strongly agree**

16) ___ It's not important to me to support my conclusions about patients with data.

17) ___ I don't set goals to address my areas for improvement in the clinical setting.

18) ___ When I learn something new, I don't share it with team members and peers.

19) ___ I don't like to consider alternative solutions to difficult patient problems.

20) ___ I am not willing to change my viewpoint if there is evidence to support a different one.

21) ___ I seldom get a gut feeling about my patients.

22) ___ I don't use either subjective and objective information to make judgments about patient care.

23) ___ I would rather learn about the care of my patients from other nurses than by myself.

24) ___ For each complex patient situation, there is more than just a right and wrong way to deal with it.

25) ___ When I make a mistake in the clinical area, I don't find it helpful to talk it over with someone who has more nursing experience that I trust.

26) ___ When something goes wrong with my patient, my first intervention is attempt to solve the problem before I call the physician.

27) ___ When I am working with other team members, I don't feel confident in my ability to care for my patients.

28) ___ I can't set priorities in the midst of a patient crisis.

29) ___ My past life experiences cannot help me to provide good patient care.

30) ___ As a new graduate nurse, I cannot expect to function independently in patient care.

APPENDIX D

LCJSR

Lasater Clinical Judgment in Simulation Rubric (LCJSR)
Noticing and Interpreting

Clinical Judgment Component	4: Accomplished	3: Competent	2: Progressing Novice	1: Novice
Effective NOTICING involves: • Focused observation • Recognizing deviations from expected patterns • Information seeking	• Focuses observations appropriately; regularly observes and monitors a wide variety of objective and subjective data to uncover any useful information • Recognizes subtle patterns and deviations from expected patterns in data and uses these to guide assessments • Aggressively seeks information to plan intervention: carefully collects useful subjective data from observing the client and from interacting with the client and family	• Regularly observes/monitors a variety of data, including both subjective and objective; most useful information is noticed, may miss the most subtle signs • Recognizes most obvious patterns and deviations in data and uses these to continually assess • Actively seeks subjective information about the client's situation from the client and family to support planning interventions; occasionally does not pursue important leads	• 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 important information • Identifies obvious patterns and deviations from expectations, missing some important information; unsure how to continue the assessment • Makes limited efforts to see additional information form the client/family; often seems not to know what information to seek and/or pursues unrelated 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 • Focuses on one thing at a time and misses most patterns/deviations from expectations;; misses opportunities to refine the assessment • Is ineffective in seeking information; has difficulty interacting with the client and family and fails to collect important subjective data
Effective INTERPRETING Involves: • Prioritizing data • Making sense of data	• Focuses on the most relevant and important data useful for explaining the clients condition • 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 intervention(s) that can be justified in terms of likelihood of success	• Generally focuses well on the most important data, and seeks further relevant information, but also tries to attend to less pertinent data • 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.	• Makes an effort to prioritize data and focuses on the most important, but also attends to less relevant data • In simple or common/familiar situations, is able to compare the client's data patterns with those know and to develop/explain intervention plans; has difficulty however, with even moderately difficult data/situations that are within the expectations for students, inappropriately requires advise or assistance.	• Has difficulty focusing and appears not to know which data is most important to the diagnosis; attempts to attend to all available data • Even in simple or familiar/common situations has difficulty interpreting or making sense of data; has trouble distinguishing among competing expectations and appropriate interventions, requiring assistance both in diagnosing the problem and developing an intervention

Lasater Clinical Judgment in Simulation Rubric (LCJSR)
Responding and Evaluating

Clinical Judgment Component	4: Accomplished	3: Competent	2: Progressing Novice	1: Novice
Effective RESPONDING involves: • Calm, Confident Manner • Clear Communication • Well-Planned Intervention/Flexibility • Being Skillful	• Assumes responsibility: delegates team assignments, assesses the client and reassures them and their families • Communicates effectively: explains interventions; calms/reassures clients and families; directs and involves team members, explaining and giving directions; checks for understanding • Interventions are tailored for the individual client; monitors client progress closely and is able to adjust treatment as indicated by the client response • Show mastery of necessary nursing skills	• Generally displays leadership and confidence, and is able to control/calm most situations; may show stress in particularly difficult or complex situations • Generally communicates well: explains carefully to clients, gives clear directions to team; could be more effective in establishing rapport • Develops interventions based on relevant patient data; monitors progress regularly but does not expect to have to change treatments • Displays proficiency in the use of most nursing skills; could improve speed or accuracy	• Is tentative in the leader's role; reassures clients/families in routine and relatively simple situations, but becomes stressed and disorganized easily • Shows some communication ability (e.g., giving directions); communicates with clients/families/team members is only partly successful; displays caring but not competence • Develops interventions based on the most obvious data; monitors progress, but is unable to make adjustments based on the patient response • Is hesitant or ineffective in utilizing nursing skills	• Except in simple and routine situations, is stressed and disorganized, lacks control, making clients and families anxious/less able to cooperate • Has difficulty communicating; explanations are confusing, directions are unclear or contradictory, and clients/families are made confused/anxious, not reassured • Focuses on developing a single intervention addressing a likely solution, but it may be vague, confusing, and/or incomplete; some monitoring may occur • Is unable to select and/or perform the nursing skills
Effective EVALUATING Involves: • Reflection/Self-Analysis • Commitment to Improvement	• Independently reflects on/analyzes personal clinical performance, noting decision points, elaborating alternatives and accurately evaluating choices against alternatives • Demonstrates commitment to ongoing improvement: reflects on and critically evaluates nursing experiences; accurately identifies strengths/weaknesses and develops specific plans to eliminate weaknesses	• Reflects on/analyzes personal clinical performance with minimal prompting, primarily major events/decisions; key decision points are identified and alternatives are considered • Demonstrates a desire to improve nursing performance: reflects on and evaluates experiences; identifies strengths/weaknesses; could be more systematic in evaluating weaknesses	• Even when prompted, briefly verbalizes the most obvious reflections; has difficulty imagining altemative choices; is self-protective in valuating personal choices • Demonstrates awareness of the need for ongoing improvement and makes some effort to learn from experience and to improve performance but tends to state the obvious, and needs external evaluation	• Even prompted reflections are brief, cursory, and not used to improve performance; justifies personal decisions/choices without evaluating them • 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

Lasater Clinical Judgment in Simulation Rubric (LCJSR)
Score sheet

Student Name/ID #					Observation Date/Time:	Scenario #:
Clinical Judgment Components					**Observation Notes**	
Noticing:						
Focused Observation:	4	3	2	1		
Recognizing Deviations from Expected	4	3	2	1		
Patterns:	4	3	2	1		
Information Seeking:	4	3	2	1		
Interpreting:						
Prioritizing Data:	4	3	2	1		
Making Sense of Data:	4	3	2	1		
Responding:						
Calm, Confident Manner:	4	3	2	1		
Clear Communication:	4	3	2	1		
Well-Planned Intervention/Flexibility:	4	3	2	1		
Being Skillful:	4	3	2	1		
Evaluating:						
Reflection/Self Analysis:	4	3	2	1		
Commitment to Improvement:	4	3	2	1		
Summary Comments:						

APPENDIX E

POWERPOINT LECTURE ON PATIENT COMPLICATIONS

Clinical Judgment Research

Tim Boyd, RN MS(cand.)

UNH DEMN student

tboyd1@mindspring.com
(603) 868-5911

Simulation study

- The aim of this research is to answer the following question:
  - **Does the use of high-fidelity manikins increase the clinical judgment of nursing students?**

Definitions

- **Critical thinking** - the purposeful, self-regulatory judgment which results in interpretation, analysis, evaluation and inference as well as explanation of the evidential, conceptual, methodological, criteriological, or contextual considerations upon which judgment is based (Facione, 1990, p. 2)

Definition

- **Clinical judgment** - "an interpretation or conclusion about a patient's needs, concerns, or health problems and/or the decision to take action (or not), use or modify standard approaches, or improvise new ones as deemed appropriate by the patient's response" (*Tanner, 2006 p. 204*).

Methodology

- Research subjects will be divided into three groups. Each group is vital to the research.
  1. Control group (lecture only)
  2. Traditional group (written scenarios)
  3. Experimental group (SimMan)

Methodology (cont)

- You will have been assigned to a particular group
- The control will take another test in a few weeks
- The traditional group will meet next week in small groups and answer questions on a few case studies. The following week you will have a final case study and will take the post-tests

Methodology (cont)

- The experimental group will meet in small groups and will work on the same medical/surgical scenario as the traditional group using SimMan. Later you will have a final SimMan scenario and the post-tests

Please Please Please

- In order to preserve the integrity of the study, please do not discuss the tests or the scenarios with other students
- When the study is complete feel free to discuss anything you wish.
- I will make myself available to answer questions to the test after the study

After you complete the study

- You will receive the $40 gift card and either the "RN notes" or the "Emergency & Critical Care Pocket Guide".
- You will have the opportunity to review your test answers on the knowledge quiz and you will have the opportunity to work with SimMan if you were in the first two groups. (Need to make time and day arrangements with Tim)

Patient complications

- There are many complications that patients may develop while in the hospital
- Most of the dangerous complications are respiratory in nature. For example:
  - Pneumonia
  - Pulmonary edema
  - Atelectasis
  - Hypoxia
  - Pneumothorax
  - Asthma exacerbation
  - COPD exacerbation
  - Congestive heart failure

Patient complications (cont)

- Other common problems are
  - Post-operative nausea and vomiting
  - Pain is another problem
    - Opioid delerium and overdose
  - Fever
  - Constipation
  - Infection (septicaemia)
  - Anaphalaxis
  - Deep vein thrombosis
  - Acute myocardial infarction
  - Hypovolemia (internal bleeding)
  - Wound dehiscence
  - Respiratory tract infection

What we will focus on during this lecture

1. Pulmonary embolus
2. Hypovolemic shock
3. Anaphylactic Shock
4. Asthma exacerbation
5. Opioid overdose

Pulmonary embolus

Pathophysiology

- Clot formation in deep venous system
- Embolizes to pulmonary vascular system
  - Embolism: 80-90% from lower extremity
  - 20% of clots below the popliteal vein propagate/embolize
- Predisposing factors
  - Virchow's triad
    - Venous stasis, hypercoagulability, vessel wall injury

Pathophysiology (cont)

- Occlusion of pulmonary vasculature by thrombus
  - Large clots lodge in pulmonary artery bifurcation result in a massive PE
  - Small clots lodge more distally in lungs
  - Cause pleuritic chest pain
  - Inflammatory response by pleura
  - Most emboli multiple
  - Lower lobes hit more often than upper lobes

Pathophysiology

- Obstruction causes
  - Pulmonary effects
    - Pulmonary vasoconstriction: wheezing
    - Over-ventilation of lung units: increases dead-space ventilation, dilutes EtCO2
    - Hypoxemia (not universal)
    - Hyperventilation
  - Cardiac effects
    - Strain on right side of heart
    - Acute cor pulmonale (right ventricle failure)

Pathophysiology (cont)

- Massive PE
  - PE with
    - BP < 90 mmHg (or > 40 mmHg drop) for > 15 min
  - Not explained by hypovolemia, arrhythmia, sepsis
  - Usually catastrophic
  - Acute right ventricle failure & death
  - Generally not found until autopsy
  - Usually about 75% of pulmonary vascular bed occluded
  - Often a saddle embolus
  - Obstructs pulmonary outflow

Risks

- Risk Factors (80-90% w/1 or more risk factors)
  - Prior history of DVT/PE
  - Age > 40, obese
  - Recent trauma/ burn/ surgery
  - Gyn, ortho, GU, postpartum within 12 wk (40%)
  - Immobilization
  - Cancer (may be undiagnosed)

Risks (cont)

- Hormone replacement therapy, oral contraceptives
  - Risk proportional to estrogen content
- Stroke
- Hx of CHF, myocardial infarction, A-Fib, cardiomyopathy
- PE after long plane/car rides
  - Economy-class syndrome
  - Ride can be as short as 2 hr
- Hypercoag states: Protein C/S def
  - Factor V Leiden
  - Antithrombin III
  - Heparin-induced thrombocytopenia

Epidemiology

- Most common preventable cause of hospital death
- 650,000 cases/yr in US; 200,000 deaths
- Third leading cause of death in US
- Most deaths within first hour, especially w/saddle emboli
- Survivors have increased risk of repeat PE, pulmonary hypertension, cor pulmonale

Diagnosis

1. Diagnosis commonly missed (especially in elderly)
   - Many patients asymptomatic
   - Most have atypical symptoms
   - 12% have no risk factors
2. Four classes of presentation:
   - Massive PE
   - Acute pulmonary infarction (10%)
   - PE without infarction
   - Multiple PEs

Massive PE

- Pale, diaphoretic, weak
- Hypotension : impaired mentation, may be oliguric
- Circulatory collapse

Acute pulmonary infarction (10%)

- Acute dyspnea, pleuritic chest pain, hemoptysis
- May mimic MI: no ECG changes, no response to nitroglycerin

PE without infarction

- Dyspnea (unexplained)
- Substernal discomfort (nonspecific)

Multiple PEs

- Documented prior PEs (over years)
  - Symptoms of pulmonary HTN/cor pulmonale
- No previously documented Pes
  - Widespread pulmonary circulatory obstruction
  - Progressive dyspnea
  - Exertional chest pain (intermittent)
  - Eventual symptoms of pulmonary HTN/cor pulmonale

Symptoms

1. Classic triad (< 20%)
   - Pleuritic chest pain
   - Dyspnea
   - Hemoptysis
2. Common symptoms
   - Dyspnea (73%)
   - Pleuritic chest pain (66%)
   - Especially if no clear history of trauma
   - Cough (37%)
   - Hemoptysis (13%)

Atypical symptoms

- Seizures
- Syncope
- Fever
- Wheezing
- productive cough
- abdominal pain
- decreasing level of consciousness
- pleuritic chest pain

Physical Exam

General findings:
1. Tachypnea (70%)
2. Tachycardia (30%)
3. Diaphoresis
4. Fever
   - Temp > 37.8 C (100.4 F) in 43%
   - Temp > 39.5 C (103.1 F) not from PE
5. Rales (51%)
6. S3 or S4 gallop (34%)

General finding (cont)

6. Signs of DVT: phlebitis, edema
7. Kussmaul's sign: pleural friction rub, parasternal heave
8. Chest wall tenderness may be only sign

Massive PE

1. Shock, very unstable vitals
2. Signs of pulmonary HTN
3. RV S3 gallop
4. Loud P2
5. *Tricuspid regurgitation and murmur*

Testing

1. ABG's (arterial blood gasses)
   - PaO2 limited utility
     - Does not rule out PE: Low PaO2 minimally useful. PaO2 often > 80 mmHg (25%); > 80 mmHg (5%)
     - Most useful if high risk for PE, low risk for other pulmonary diseases
     - Pulse ox. to assess PaO2: very unreliable
     - Massive PE usually does show significant hypoxemia
2. CBC: WBC count normal to 20,000
3. PT/PTT: usually normal
4. Chem-7: usually normal

Testing (cont)

5. D-dimer testing
   - Role still controversial
   - Cannot alone be used to r/o PE
     - ELISA tests more sensitive
     - Still rules 10% of patients with PE
   - May rule out PE
     - Patient with low pre-test probability AND
     - Negative quantitative D-dimer OR
   - Need further imaging if
     - D-dimer positive
   - D-dimer useless if malignancy or recent surgery

Other Testing

1. ECG
   - Normal in 13%
   - Abnormalities
     - Sinus tachycardia (most common)
     - Nonspecific ST-T segment changes
     - New RBBB RBBB in 16%
     - New Afib

Other Testing (cont)

2. Ultrasound
   - Positive U/S proves PE
   - Lower extremity venous doppler
     - 10-60% of those w/PE have normal doppler study
   - Echocardiogram
     - Visualize clots
       - Visualize right ventricular strain
       - Tricuspid regurgitation
       - Increased right ventricular end-diastolic volume
   - Transesophageal echocardiography (TEE)
     - Sensitivity: up to 90%; specificity: 100% in massive PE

Other Testing (cont)

3. EtCO2
   - *Determine alveolar dead space* w/arterial blood gas

Acute Treatment

1. ABCs
   - IV, O2, monitor
   - Intubation if necessary
2. If in cardiac arrest
   - CPR/ACLS unlikely to help
     - Pulmonary circuit obstructed
     - No oxygenated blood reaches circulation
   - Emergency cardiopulmonary bypass (if available)
   - Emergency thoracotomy with pulmonary vessel massage
     - May dislodge a saddle embolus

Acute Treatment (cont)

3. If very unstable-
   - Fluid resuscitation
     - Small boluses, assess response
     - May help or hurt
     - If blood pressure normalizes, pt. still hemodynamically unstable
   - Pressor support
     - Norepinephrine
     - Dopamine Epinephrine
       - Tachycardia may limit use
     - Epinephrine
     - Dobutamine
   - Strongly consider fibrinolysis
   - Consider surgical therapy

Acute Treatment (cont.)

4. Hemodynamically stable patients
   - Anticoagulation
     - Initiate immediately in all patients suspected for PE
   - Unfractionated heparin: 120-140 U/kg IV; then 20 U/kg/hr IV
   - Low molecular-weight heparing (LMWH)
   - Enoxaparin(Lovenox):1 mg/kg SQ q12hr (1.5 mg/kg SQ q24hr)
   - Warfarin (Coumadin) 15 mg PO

Acute Treatment (cont.)

5. Fibrinolysis
   - Should be considered for severely unstable patients
   - Still controversial
     - May reduce mortality 50%
   - tPA: 100 mg IV over 2hr
   - Urokinase: 2000 U/lb over 10 min. load, 2000 U/lb/hr for 12-24 hr
   - Streptokinase: 250,000 U IV over 30 min load, 100,000 U/hr x 24 hr
   - Can start unfractionated heparin
     - (no loading dose) once infusion complete

Acute Treatment (cont.)

6. Surgical therapy
   - Thrombectomy (removal of clot): acutely unstable pts.
     - Usually with catheter-directed thrombolysis
     - May save up to 70% pts. w/massive PE
     - Mortality 30-60%
   - IVC (Inferior Vena Cava) filter placement
     - Rarely of benefit acutely

Nursing considerations

1. Provide much reassurance
2. Constant vigilance; status may change rapidly
3. Have crash cart nearby
4. Teach pts S/S to observe for and report
5. Warn about risks of hormone replacement therapy, oral contraceptives, tobacco use
6. Reduce risk factors

Nursing considerations

7. May need to instruct pt/caregiver in A/A/SE of anticoagulants; include schedule for f/u lab work
8. Be cautious of complications related to thrombolytic tx
   - Avoid IM injections
   - Check frequently for s/s of bleeding
   - Minimize number of times skin is punctured
   - Hold pressure at site of blood draw to avoid oozing
   - Avoid continual use of noninvasive BP cuff

Nursing considerations

9. Prevention: identify high risk pt
   - Prophylactic anticoagulation in pts. w/risk factors in hospital
   - Enoxaspring (Lovenox) 40 mg SQ qD OR Unfractionated heparin 5000 IU SQ q8hr
   - Compression stockings: TEDs or pneumatic compression boots
   - Ambulate frequently on long car/ plane trips

Anaphylaxis

Pathophysiology

- Exaggerated immune response to antigens
- Common antigens include:
  - Drugs (PCN, Bactrim, ASA, NSAID's)
  - Eggs & egg-based vaccines, nuts, shellfish, MSG & foods w/ nitrates
  - Bee stings, molds, detergents, perfumes, iodinated contrast materials, blood transfusions & tetanus toxoid
  - Protein agents, e.g. latex

Diagnosis

1. Early phase / anaphylaxis
   - Warm, flushed +/- fever (from vasodilation)
   - Tachypnea
   - High Cardiac Output

Diagnosis (cont)

2. Late phase / anaphylactic shock (form of distributive shock)
   - Cool, clammy, cyanotic (from vasoconstriction)
   - Tachycardia
   - Severe hypotension
   - Low Cardiac Output
   - Decreased urine output
   - Resp. distress, +/- ARDS
   - Restlessness to lethargy to comatose

Diagnosis (cont)

- End result
  - vasodilation
  - capillary leakage
  - cellular shock
  - Hypotension
  - decreased systemic vascular resistance and cardiac output
  - Disseminated intravascular coagulation (DIC) & acute respiratory distress syndrome (ARDS)

Treatment

- ABC's
  - O2, IVF (RL) via lg-bore (14-16g) catheter & cardiac monitor
- Epinephrine
  - Mild reaction - 0.3-0.5cc of 1:1000 SC q5-20min x 3
  - Moderate reaction (BP >90mmHg) - 0.3-0.5cc 1:1000 IM q5-20min x 3
  - Severe reaction (BP <90) - 3-5cc 1:10,000 IV over 5min then IV drip 1mg in 250ccD5W at 1-4 mcg/min

Treatment (cont)

- Diphenhydramine (Benadryl)
  - Mild reaction - 25-50mg PO or IM q4-6hrs PRN
  - Moderate reaction - 50-100mg IM q4-6hrs PRN
  - Severe reaction - 50-100mg IVP
- Steroids
  - For moderate or severe reactions or if laryngeal edema/bronchospasm present
  - Solu-medrol 125-250mg IVP q6hrs

Treatment (cont)

- Cimetidine (Tagamet) 300mg IV q6hrs
- Bronchodilators
  - Racemic Epinephrine 0.5cc of 2.25% by nebulizer
  - Albuterol 0.5cc by nebulizer
  - Atrovent by nebulizer
- Legs elevated, ensure airway control, pneumatic antishock garment per local protocol
- Narcan 0.4-0.8mg IV for hypotension

Treatment (Cont)

- Nasal or oral intubation for laryngeal edema, stridor or resp. distress
- Glucagon 1-2mg IV over 1min for resistant or beta- blocker induced hypotension
- Dopamine drip as needed
- Sedation is CONTRAINDICATED!

Nursing considerations

1. Cool mist O2
2. Have intubation equip & meds at bedside
3. Allow pt to assume comfortable position (i.e. upright w/ feet over edge of bed) when possible
4. Pt teaching plan should include careful identification and avoidance of offending agent and
   - Anaphylaxis kit/epi education
   - Medic Alert tag advice
   - Development of an emergency plan w/pt and family

Asthma

Pathophysiology

- Definition
  - Chronic inflammatory disorder of airways
  - Usually associated with variable airflow obstruction and bronchospasm
- Inflammation leads to recurrent wheezing, breathlessness, chest tightness, and cough
  - Variable degrees of bronchial airway constriction, hyper-reactivity, mucous production/plugging, airway edema, remodeling

Diagnosis

1. Wheezing, chest tightness, cough, SOB, sputum production
2. Chronic cough + recurrent pneumonia + recurrent bronchitis or wheezing suggests asthma
   - May vary from mild to severe, acute, subacute, chronic

Diagnosis (cont)

3. Key historical features
   - Triggers
     - URIs, GERD, exercise, allergies, smoke, pollution, strong emotions, menses, occupational exposure
   - Symptoms
     - Consider pattern of symptoms, onset/duration/frequency/intensity, psychosocial history
   - Previous/current asthma medication use
     - Type, frequency, efficacy
   - Prior
     - Steroid use, hospitalizations, ICU admissions, intubation

Physical exam

1. Vital signs
   - Tachypnea
   - Tachycardia
   - Elevated blood pressure
2. Upper respiratory tract
   - Allergic rhinitis
   - Sinusitis
3. Chest
   - Quality/ease of respiration
   - Prolonged expiration, wheezing, accessory muscle use
   - Persistent cough most common (may be only finding)

Physical exam (cont)

4. Critical signs
   - Pulsus paradoxus: indicates severe obstruction
   - Quiet chest: may indicate minimal air movement
   - Mental status changes: hypoxemia or increased CO2
   - Difficulty speaking: impending respiratory failure

Diagnostic tests

1. Peak flow
   - Reduced from baseline when asthma is active
   - May precede cough
     - Baseline peak flow measurements for pts best as norms
   - Differs by race/ethnicity
   - Technique is important: effort dependent

Diagnostic tests (cont)

2. Spirometry
   - Consider at time of initial diagnosis and then annually
   - FEV1 < 80% (predicted) aids in diagnosis
   - Post beta-agonist testing may assess degree of reactive airway component
   - Methacholine challenge testing may be done to aid in diagnosis
   - Full PFTs with diffusion capacity not necessary unless there is a question of chronic obstructive pulmonary disease

Diagnostic tests (cont)

3. Pulse ox: admit if hypoxic
4. ABGs
   - Not routinely indicated
   - Usually show respiratory alkalosis early or acidosis if severe
5. CXR
   - Not routinely indicated
   - May assist in determining foreign body, pneumonia, failing therapy (pneumothorax or pneumomediastinum)

Severity classification

- Step 1: mild, intermittent
  - Symptoms: = or < 2/wk, asymptomatic and normal peak expiratory flow between exacerbations, exacerbations brief (hours to few days)
  - Nighttime symptoms: = or < 2/mo
  - Lung function: FEV1 or peak expiratory flow > or = 80% predicted with little variability

Severity classification (cont)

- Step 2: mild, persistent
  - Symptoms: > 2/wk, but < 1/day; exacerbations may affect activity
  - Nighttime symptoms: > 2/mo
  - Lung function: FEV1 or peak expiratory flow > or = 80%

Severity Classificaiton (cont)

- Step 3: moderate, persistent
  - Symptoms: daily (with daily use of short-acting beta-agonist), exacerbations affect activity
  - Nighttime symptoms: > 1/wk
  - Lung function: *FEV1* or peak expiratory flow 60-80% of predicted; variability > 30%

Severity classification (cont)

- Step 4: severe, persistent
  - Symptoms: continual, limited physical activity, frequent exacerbations
  - Nighttime symptoms: frequent
  - Lung function: *FEV1* or peak expiratory flow = or < 60% predicted; variability > 30%

Emergency treatment

- Therapy is directed at:
  - Increasing B2 adrenergic stimulation
  - Decreasing cholinergic stimulation Decreasing intracellular calcium (decreases smooth muscle constriction)
  - *Theophylline -> decr cAMP* degradation

Emergency treatment (cont)

- O2 to keep sats > 93% (Note: mild transient hypoxemia common even in mild/moderate asthma, esp during initial tx
- Intubation & mechanical ventilation
  - *If* must intubate, use largest tube possible (decr resistance)
  - Mechanical ventilation

Medications

1. Inhaled beta-agonists
   - Albuterol nebs (Ventolin or Proventil 0.83 mg/mL) 1.25-5.0 mg in saline (2-4mL)
   - 3 txs q 20-30 min in 1st 60-90 min by aerosol nebulization (most pts) or continuous neb (10 mg) over 30-60 min
   - Titrate to severity: continuous for severe attacks, spaced out as pt responds to bronchodilations
   - *For miner/moderate attacks 4 puffs (90 mcg/puff)* from metered dose inhaler w/spacer (Aerochamber) equivalent to 2.5 mg neb.

Medications (cont)

2. Anticholinergic/parasympatholytic agents:
   - Ipratropium bromide (Atrovent): adjunct (not replacement) to beta-agonist therapy in moderate/severe asthma
     - Neb: 0.25-0.5 mg q30 min x 3 doses , then q2-4hr PRN
     - Ipratropium MDI: 4-6 puffs q6-8hr
   - Atropine use limited 2ndary to systemic side effects

Medications (cont)

3. Corticosteroids: consider early administration unless dramatic improvement after 1-2 breathing tx; no clinical difference between IV& PO, onset of effect at 4hr
   - Prednisone 1 mg/kg PO (usual adult dose 40-80 mg PO) or
   - Methylprednisolone (Solumedrol) 1-2 mg/kg IV (usual adult dose 125 mg IV)
   - *No role yet for inhaled corticosteroids in* acute mgmt

Medications (cont)

4. Systemic beta-agonists:
   - Epinephrine 1:1000 soln: 0.01 mg/kg SQ up to 0.5 mg; may repeat q15-20 min up to 3 doses
   - Terbutaline 0.02 mg/kg SQ up to 0.25 mg q20 min up to three doses, then q6-8hr
5. Other adjunctive therapy:
   - Magnesium sulfate IV (2 g over 5-20 min) controversial, but may have some benefit in severe asthma
   - Heliox (80:20 Helium:Oxygen) may reduce airway resistance & obviate intubation in severe asthma

Medications (cont)

6. Maintenance meds: Cromolyn (Intal), mast cell modifier, no role in acute asthma
7. Leukotriene modifiers: zafirlukast (Accolate), Montelukast (Singulair) taken PO effective at reducing beta-agonist dependence in outpts. No current role in emergency mgmt
8. IV Abxs if bacterial infection

Nursing considerations

1. Stay calm and talk to pt in a calm manner (this is critical)
2. Close monitoring, including Serial measurements of lung fxn (eg. peak expiratory flow)
3. Put pt in a sitting position and make as comfortable as possible
4. Know and recognize S/S of severe asthma to ind some or all (Loud wheezing, chest tightness, and sometimes coughing, difficulty speaking more than a few words or inability to speak because of wheezing or breathlessness, rapid breathing w/endrewing of neck and chest muscles

Nursing considerations (cont)

5. Admin various protocols exist
6. Albuterol nebulization
7. Albuterol MDI w/spacer
8. If O2 is available, administer O2@6-8 L per/min through a face-mask to keep sats > 93%
9. Teach what triggers asthma attacks and how to avoid or decr exposure to these triggers

Nursing considerations (cont)

10. Teach A/A/SE of all medications
11. Create written instructions or asthma plan of action
12. Teach use of peak flow meter
13. Encourage wearing of medical alert tag

Opioid overdose

Pathophysiology

1. Opiates bind to mu, kappa, sigma CNS receptors
   - Mu: analgesia, resp. depression, euphoria, constipation
   - Kappa: sedation, analgesia, miosis
   - Sigma: dysphoria, hallucinations
2. Risk factors for toxicity
   - Other CNS depressants, MAOI's, cimetidine, TCA's, EtOH, cisapride
   - Renal insufficiency, hepatic disease
3. Kinetics
   - Toxicity highly variable; tolerant individuals require higher doses

Diagnosis

- Symptoms
  - Decr mental status, urinary retention, constipation, dyspnea
  - N/V, histamine release, coma

Physical exam

- Muscle flaccidity, hyporeflexia, hypotension, ileus
- Non-cardiogenic pulmonary edema, hypothermia, needle tracks
- Serotonin syndrome (meperidine + MAOi), decr. mental status
- Miosis (except meperidine, lomotil, baclofen, methadone)
- Dysrhythmias, pneumonitis, seizures, tremors

Diagnostic Labs

- O2 sat
- Fingerstick glucose
- Lytes, BUN/Cr: renal function (ATN, glomerulonephritis), rhabdo
- CBC: leukocytosis
- CK, myoglobin: rhabdomyolysis

Diagnostic labs (cont)

- Toxicologic screen
  - Urine qualitative test (will miss fentanyl, methadone, oxycodone, hydrocodone)
  - Monoacetylmorphine (6-MAM) is *associated w/heroin use*
  - Rule out other coingestions/additives if indicated

Other diagnostic labs

- Radiologic
  - CXR: hypoxia, non-cardiogenic pulmonary edema, abdominal x-ray if possible body packer
- Other diagnostic testing
  - ECG: dysrhythmias

Treatment

- ABC's, IV, O2, monitor (Most important)
- Antidote: Naloxone (Narcan)
  - Adult: 0.4-2.0 mg IV/IM repeat q20-60min as needed.Onset effect: 1-3 min Max effect: 5-10 min
  - Repeat dose if partial effect
  - If stable, titrate 0.4 mg q1-2min, to try to avoid withdrawal
- May cause acute withdrawal, seizures, severe agitation/anger
- Narcan t1/2 shorter than most opiates; may need repeat dosing/continuous infusion

Treatment (cont)

- Decrease absorption
  - Gastric lavage <1 hr from ingestion
  - Activated charcoal: large ingestions, coingestions
  - Whole bowel irrigation if body packing suspected
- Seizure: Benzodiazapines

APPENDIX F

HPS SCENARIOS

Estimated Scenario time: 20 - 30 minutes
Guided Reflection time: 30 minutes

Target Groups: Nurses
Complex Case

Brief Summary:
This case presents a patient in acute respiratory distress. The patient has a history of asthma. The student will be expected to quickly recognize acute respiratory distress with impending respiratory arrest. The student needs to communicate effectively, and promptly initiate a coordinated team approach to patient management and care.

Learning Objectives:
- ☐ Identifies the primary nursing diagnosis
- ☐ Implements patient safety measures
- ☐ Evaluates patient assessment information including vital signs
- ☐ Implements therapeutic communication
- ☐ Implements direct communication with multidisciplinary team members
- ☐ Demonstrates effective teamwork
- ☐ Prioritizes and implements Physician Orders appropriately

Scenario Specific:
- ☐ Recalls indications, contraindications, and potential adverse effects of prescribed medications.
- ☐ Implements the "5 rights" of medication administration
- ☐ Implements a focused respiratory assessment
- ☐ Recalls indications and contraindications for oxygen therapy
- ☐ Recognizes signs and symptoms of respiratory distress
- ☐ Initiates relevant cardiac and respiratory monitoring
- ☐ Implements correct treatment of respiratory distress in a timely manner

Time: 11:00 p.m.
Jennifer Hoffman is a 33-year-old female brought to Emergency Department by ambulance. She has a history of asthma with multiple emergency visits within the last year. She appears to be in severe respiratory distress, struggling to breathe. She is unable to speak other than simple one word statements. EMS services has started an IV of Normal Saline at a keep open rate.

Clinical signs immediately visible:
- Alert and pale
- Extremely anxious
- Profusely diaphoretic
- Using accessory muscles to breathe

Patient data:	Female – Age 33 years. Weight 99 pounds (45 kg). Height 61 Inches (1.55 meter)
DOB:	1/31/XX
MR#:	PCS13100
Allergies:	Seasonal hay fever
Prior medical history:	History of asthma since childhood with multiple emergency visits within the past year. Medications used at home include Beclovent, Intal, Serevent, and Proventil inhaler.
Recent medical history:	Recent upper respiratory infection.

Proposed correct treatment (outline):

☐ Wash hands
☐ Introduce self
☐ Identify the patient (name, ID band, DOB, MR#)
☐ Obtain BP, pulse, respiratory rate, temperature, SpO_2
☐ Perform respiratory assessment
☐ Attach ECG monitor leads
☐ Give oxygen
☐ Monitor level of consciousness
☐ Recognize severe respiratory distress
☐ Call for help
☐ Administer emergency medications per order
☐ Maintain cardiovascular and respiratory stability

Ineffective airway clearance related to thick tenacious secretions, fatigue and weak cough force secondary to asthma

Defining characteristics:

- Dyspnea
- Orthopnea
- Adventitious breath sounds
- Sputum production
- Changes in respiratory rate and rhythm

Impaired gas exchange related to alveolar-capillary membrane changes

Defining characteristics:

- Tachycardia
- Hypercapnia
- Hypoxia
- Dyspnea
- Abnormal skin color
- Abnormal rate, rhythm, depth of breathing
- Diaphoresis

Anxiety related to threat of death

Defining characteristics:

- Fearful
- Anxious
- Increased pulse, respirations, and blood pressure

Airway and breathing are the most important initial concerns of this patient. Priority in this patient's management is addressing the ABC's. An important goal of initial assessment is to recognize that an asthma attack is severe and administer effective treatment. This patient should be placed on a cardiac monitor with automated blood pressure measurement, establishment of IV access, and continuous pulse oximetry. Humidified oxygen by either non-rebreather mask or nasal cannula is administered to keep SpO_2 above 92%.

Commonly used medications to treat severe asthma exacerbations include adrenergic agonists, anticholinergic agents, and corticosteroids. Methylxanthines are no longer recommended because they appear to add no benefit to optimal inhaled β2- agonist therapy and may increase adverse effects. The use of antibiotics in the treatment of exacerbations of asthma is not established.

Arterial blood gas (ABG) measurement provides important information in acute asthma. This test may reveal dangerous levels of hypoxemia or hypercarbia secondary to hypoventilation; typically, results are consistent with respiratory alkalosis. Because of the accuracy and utility of pulse oximetry, only patients whose oxygenation is not restored to over 90% with oxygen therapy require an ABG.

Postoperative Hemicolectomy – Pulmonary Embolism

National League for Nursing

Vernon Watkins

Estimated Scenario time: 20 minutes
Guided Reflection time: 20 minutes

Target Groups: Nurses
Complex Case

Brief Summary:
This case presents a postoperative patient that has been noncompliant with ambulation and incentive spirometry use. This patient unexpectedly experiences respiratory complications associated with pulmonary embolism. The student will be expected to provide postoperative care recognizing and managing critical respiratory complications.

Learning Objectives:

- ☐ Identifies the primary nursing diagnosis
- ☐ Implements patient safety measures
- ☐ Evaluates patient assessment information including vital signs
- ☐ Implements therapeutic communication
- ☐ Implements direct communication with multidisciplinary team members
- ☐ Demonstrates effective teamwork
- ☐ Prioritizes and implements Physician Orders appropriately

Scenario Specific:

- ☐ Recalls indications, contraindications, and potential adverse effects of prescribed medications
- ☐ Implements the "5 rights" of medication administration
- ☐ Implements a focused respiratory assessment
- ☐ Recalls indications and contraindications for oxygen therapy
- ☐ Recalls postoperative complications associated with immobility
- ☐ Recognizes symptoms of pulmonary embolism as a life threatening complication.
- ☐ Initiates relevant cardiac and respiratory monitoring
- ☐ Implements correct treatment for respiratory distress in a timely manner

Time: 09:15 a.m.

Mr. Watkins is a 69-year-old Caucasian male who underwent a hemicolectomy 5 days ago. He has a midline abdominal incision without redness, swelling, or drainage. He is tolerating a soft diet without nausea or vomiting. Bowel sounds are present in all four abdominal quadrants. He had a bowel movement yesterday. He is voiding quantity 400 mL. He is reluctant to use the incentive spirometry but his wife incourages him to do his deep breathing. Abdominal pain has been controlled with Percocet. He has refused to ambulate this morning because of fatigue and a sore leg. He is ringing the call light requesting to see his nurse.

Clinical signs immediately visible:

- Alert and responsive
- Appears generally tired
- Denies specific pain other than a "sore leg"

Patient data:	Male – Age 69 years old. Weight 176 pounds (80 kg). Height 72 inches (1.82 meters)
DOB:	4/9/XX
MR#:	PCS40900
Allergies:	Penicillin (hives)
Prior medical history:	History of cataracts, controlled hypertension, smokes ½ pack filtered cigarettes/day, walks 3 miles/day
Recent medical history:	Presented to Emergency Department 5 days ago with complaints of nausea, vomiting, and severe abdominal pain. He was admitted for emergent surgery for bowel perforation.

Proposed correct treatment (outline):

☐ Wash hands
☐ Introduce self
☐ Identify the patient (name, ID band, DOB, MR#)
☐ Obtain BP, pulse, respiratory rate, temperature, SpO_2
☐ Assess IV site
☐ Auscultate lung sounds
☐ Attach ECG monitor leads
☐ Give oxygen
☐ Place patient in Semi-Fowler's position
☐ Notify physician
☐ Prioritize Orders
☐ Administer Heparin drip
☐ Relieve anxiety

Ineffective Tissue Perfusion (cardiopulmonary, peripheral) related to interruption of venous flow

Defining characteristics:

- Dyspnea
- Hypoxia
- Hypoxemia
- Chest pain
- Edema
- Positive homan's sign
- Weak or absent pulses

Acute Pain related to physical injury (surgery)

Defining characteristics:

- Verbal report
- Guarding
- Autonomic responses (change in vital signs)
- Expressive behavior (moaning)

Impaired Physical Mobility related to discomfort, decreased strength and endurance, and reluctance to initiate activity

Defining characteristics:

- Difficulty turning
- Slowed-movement

Postoperative patients are at risk for complications such as atelectasis, pneumonia, deep vein thrombosis, pulmonary embolism, constipation, paralytic ileus, and wound infection.

This patient has a pulmonary embolism (PE) which can be a result of a deep vein thrombosis related to surgery and decreased mobility. PE is a common disorder often associated with trauma, surgery (orthopedic, major abdominal, pelvic, gynecologic), pregnancy, heart failure, age older than 50, hypercoagulable states, and prolonged immobility. In this case the PE originates from a deep vein thrombosis in right lower leg because of immobilization.

PE is a life threatening medical emergency. The immediate objective is to stabilize the cardiopulmonary system. A sudden rise in pulmonary resistance increases the work of the right ventricle, which can cause acute right-sided heart failure with cardiogenic shock. Most patients who die of massive PE do so in the first 1 to 2 hours after the embolic event.

Emergency Management of PE:

- Supplemental O_2 given to correct hypoxia, relieve the pulmonary vascular vasoconstriction, and reduce pulmonary hypertension.
- Airway management (BiPAP or CPAP, intubation if needed)
- IV infusion lines are started to establish routes for medication and fluids
- Anticoagulation – start treatment if probability of PE is high
- Spiral CT-scan, chest X-ray, 12 lead ECG, hemodynamic measurements, and arterial blood gases

National League for Nursing

Pneumonia – Severe Reaction to Antibiotic

Kenneth Bronson

Estimated Scenario time: 20 - 30 minutes
Guided Reflection time: 30 minutes

Target Groups: Nurses
Complex Case

Brief Summary:
This case presents a patient that has known allergies to Penicillin. The patient will have a severe anaphylactic reaction to IV Ceftriaxone (Rocephin) that has been ordered to treat pneumonia. The student will be expected to provide the basic standard of care with regard to administration of the IVPB medication as well as evaluation and recognition of signs and symptoms of a severe allergic response with prompt notification to primary care provider and rapid emergency treatment.

Learning Objectives:
- ☐ Identifies the primary nursing diagnosis
- ☐ Implements patient safety measures
- ☐ Evaluates patient assessment information including vital signs
- ☐ Implements therapeutic communication
- ☐ Implements direct communication with multidisciplinary team members
- ☐ Demonstrates effective teamwork
- ☐ Prioritizes and implements Physician Orders appropriately

Scenario Specific:
- ☐ Recalls indications, contraindications, and potential adverse effects of prescribed medication
- ☐ Implements the "5 rights" of medication administration
- ☐ Recognizes signs and symptoms of an adverse reaction
- ☐ Implements emergency treatment of anaphylaxis in a timely manner
- ☐ Implements a focused respiratory assessment
- ☐ Recalls indications and contraindications for oxygen therapy
- ☐ Recognizes signs and symptoms of respiratory distress
- ☐ Implements correct treatment of respiratory distress in a timely manner
- ☐ Initiates relevant cardiac and respiratory monitoring

Time: 11:00 a.m.

Kenneth Bronson is a 27-year-old male that was just admitted to the Medical Unit from the Emergency Department. He presented to the Emergency Department with cough, chest pain and fever two hours ago. Chest X-ray revealed Left Lower Lobe pneumonia. IV was started of LR at 75 mL per hour. He is receiving oxygen at 2 L/min per nasal cannula. SpO2 on room air was 90% which increased to 93% with supplemental oxygen. He had a temp of 102.6 and was given tylenol 1000 mg in the Emergency Department. Pharmacy just delivered the Rocephin IVPB which is due to be given.

Clinical signs immediately visible:

- Alert
- Diaphoretic

Patient data:	Male – Age 27 years. Weight 163 pounds (74 kg). Height: 72 inches (1.8 meter)
DOB:	10/5/XX
MR#:	PCS10500
Allergies:	Penicillin
Prior medical history:	Healthy, was seen in office 6 months ago with strep throat, received penicillin in which he had an allergic reaction (itching). He smokes 2 packs cigarettes a day for the past 10 years.
Recent medical history:	Has had general fatigue, fever, and productive cough for about a week. Started to have chest tightness and difficulty breathing which brought him in to the Emergency Department.

Proposed correct treatment (outline):

- ☐ Wash hands
- ☐ Introduce self
- ☐ Identify the patient (name, ID band, DOB, MR#)
- ☐ Obtain BP, pulse, respiratory rate, temperature, SpO_2
- ☐ Check medical records and ask for known allergies
- ☐ Administer IVPB medication using the "5 rights"
- ☐ Stop infusion
- ☐ Keep IV open with Normal Saline
- ☐ Call for help
- ☐ Attach ECG monitor leads
- ☐ Perform respiratory assessment
- ☐ Give oxygen 10 L/min by mask
- ☐ Administer emergency medications per order
- ☐ Maintain cardiovascular and respiratory stability

Ineffective airway clearance related to allergic response

Defining characteristics:

- Dyspnea,
- Adventitious breath sounds
- Changes in respiratory rate and rhythm
- Difficulty vocalizing
- Sense of impending doom

Anxiety related to situational crises

Defining characteristics:

- Uncertainty
- Increased respiration
- Increased pulse

Roughly 10% of the people who have had a reaction to penicillin will have a reaction to cephalosporins.

Anaphylactic reactions may be categorized as mild, moderate, and severe systemic reactions.

- Mild systemic reaction: Peripheral tingling and a sensation of warmth, possibly accompanied by fullness in the mouth and throat, nasal congestion, periorbital swelling, pruritus, sneezing, and tearing of the eyes.
- Moderate systemic reaction: All of the above and including flushing, warmth, urticaria, anxiety, itching, bronchospasm, edema of airway or larynx with dyspnea, cough, and wheezing.
- Severe systemic reaction: Abrupt onset with all of the above to include rapid progress to bronchospasm, laryngeal edema, severe dyspnea, cyanosis, and hypotension. Dysphagia, abdominal cramping, vomiting, diarrhea, and seizures with cardiac arrest and coma may follow.

In most cases symptoms peak within 30 minutes, and complete recovery with proper treatment within hours is the rule. Early recognition and rapid treatment is critical.

Common errors in the care and treatment of severe systemic anaphylaxis:

- Failure to recognize the symptoms of anaphylaxis
- Underestimating the severity of laryngeal edema and failure to secure the airway early
- Reluctance to administer Epinephrine early
- Forgetting to remove the allergen (IV drip)
- Lack of appropriate patient education (prevention of future exposures)

APPENDIX G

WRITTEN SCENARIOS

ASTHMA EXACERBATION
WRITTEN SCENARIO

Jennifer Hoffman: Asthma exacerbation

Jennifer Hoffman is a 33-year-old female brought to the emergency department by ambulance. She has a history of asthma with multiple emergency visits within the last year. She appears to be in severe respiratory distress, struggling to breath. She is unable to speak other than simple one word statements. EMS services has started an IV of Normal Saline at a keep open rate. VS: RR= 36; HR=110; BP=140/90; SpO2= 78% on room air; T= 98.8 F. You auscultated wheezes bilaterally. She is alert and oriented X3, pale, diaphoretic and using accessory muscles to breath. She calls out "CAN'T… BREATHE"

Patient data:
Female - Age 33 years.
Weight - 45 kg
Height - 5'1"
Date of birth 1/31/XX
MR # - PCS13100

Allergies - seasonal drug allergies

Prior medical history
History of asthma since childhood with multiple ER visits within the past year.

Patient's usual medicaions
- Belclovent
- Intal
- Serevent
- Proventil MDI

Recent medical history: Upper Respiratory Infection last week

Describe what you do in the first 5 minutes when you first inter the patient's room?

What are the patient's vital signs?

What signs, if any are abnormal?

What do you want to do about these abnormal signs?

What should you do to the patient?

What should you do you do now?

Jennifer's vital signs are now: RR=40; HR=130; BP=80/60; SpO2=58% She gasps for air as she says "Please....help...me..."

What do you need to do that you haven't already done?

The physician arrives and hands you some orders.

What physician orders are available?

What meds will help with this condition?

What non-pharmacological interventions exist?

How do you administer the meds and/or describe what do you do to the patient? What is the intended use for this medication in this situation? Is the medication order proper?

After the interventions what do you do next?

Jennifer's vital signs are now RR =18; HR=92; BP=124/70; SpO2=94% She still has wheezes.

What do the vital signs show now?

Are the vital signs stable? Is the patient improving or getting worse?

What is your next step?

Physician writes orders the following: SoluMedrol 125mg IV bolus now

How do you administer the meds? What is the intended use for this medication in this situation? List 1 major side effects? Is the medication order proper?

What do you do now?

This question is important. What questions you would like to ask about the scenario? What would you like to know about the patient?

PULMONARY EMBOLISM
WRITTEN SCENARIO

Vernon Watkins - Post-op hemicolectomy

Patient Data: Mr. Vernon Watkins
- Male
- Age 69
- Weight 80 Kg
- Height 6'0"

DOB - 4/9/XX

Allergies - Penicillin (hives)

Regular medication: Hydrochlorothiazide 25mg po daily

Prior medical history: history of cataracts, controlled hypertension, smokes ½ pack filtered cigarettes/day, walks 3 miles/day

Recent medical history: Presented to the ED 5 days ago with complaints of nausea, vomiting and severe abdominal pain. He was admitted for emergent surgery for bowel perforation.

Report from previous shift:
Mr. Watkins is a 69-year-old Caucasian male who underwent a hemicolectomy (partial colon removal) 5 days ago. He has a midline abdominal incision without redness, swelling or drainage. He is tolerating a soft diet without nausea or vomiting. Bowel sounds are present in all four abdominal quadrants. He had a bowel movement yesterday. He is voiding quantity 400ml. He is reluctant to use the incentive spirometry but his wife encourages him to do his deep breathing. Abdominal pain has been controlled with Percocet. The nurse giving you report tells you his last set of vital signs (30 minutes ago) were: P=110, BP=130/85, R=22, SPO2=96% on room air. He has refused to ambulate this morning because of fatigue and a sore leg. He is ringing the call light requesting to see his nurse.

Describe what you do in the first 5 minutes when you first inter the patient's room?

What do you want to know about the patient's condition?

Upon entering the room you immediately notice that he is alert and responsive, appears tired and a little short of breath. He tells you "I don't feel well. My leg has felt sore all night. I can's seem to catch my breath and it hurts to breath". You listen to his lungs and hear crackles bilaterally. The vital signs are: P=120, BP=130/85' R=28, SPO2=89% on RA.

What are the patient's vital signs?

What signs, if any are abnormal?

What are some possible reasons/causes of the abnormal vital signs?

Name three things you should you do immediately?

After you contact the doctor, she gives you stat orders.

What meds has the physician ordered? What do you think they are for?

How should you administer these meds? At what rate/route? Why?

What do you do after you administer the meds and when?

After your assessment, his VS are: P=88; BP=124/74; R= 18, SpO2=94 on 4LNC.

Are the vital signs stable? Is the patient improving or getting worse?

What are the tests that are ordered for Mr. Watkins and briefly what do you think they would be able to tell about the patient?

Any suggestions for the patient?

This question is important. What questions you would like to ask about the scenario? What would you like to know about the patient?

ANAPHYLAXIS
WRITTEN SCENARIO

Kenneth Bronson - Administration of Antibiotics

Kenneth Bronson is a 27-year-old male that was just admitted to the medical unit from the ED. He presented to the ED with a cough, chest pain and fever two hour ago. A chest X-ray revealed a left lower lobe pneumonia. An IV was started with lactated ringers at 75ml/hr. He is receiving O2 at 2L/min per nasal cannula. His SpO2 on room air was 90% which increased to 93% with the O2. His Temperature was 102.6 and was given 1gm Tylenol in the ED. The pharmacy just delivered 1 gm Rocephin (ceftriaxone) to be administered. Mr. Bronson is alert and diaphotetic. VS: RR=20; HR=72; BP=130/76; SpO2 93%' T=101.2 F. He is alert, diaphoretic and has crackles in left side. Right side of lungs are clear.

Patient Data

Male
Age 27
Weight 74 Kg
Height 6'0"

DOB - 10/5/XX

Currently taking no regular meds

Allergies - Penicillin

Prior medical history: Healthy was seen in physician's office 6 months ago with strep throat, received Penicillin and had an allergic reaction (itching). He smokes 2 packs of cigarettes per day for the past 10 years.

Recent medical history: has had general fatigue, fever, productive cough for about a week. Started to have chest tightness and difficulty breathing which brought him into the ED.

Describe what you do in the first 5 minutes when you first inter the patient's room?

What are the patient's vital signs?

What signs, if any are abnormal?

What are some possible reasons/causes of the abnormal vital signs?

What do you want to do about these abnormal signs?

What meds has the physician ordered?

How should you administer these meds? At what rate?

What do you do after you administer the meds and when?

You go to check the patient to make sure the antibiotics are not infiltrating and notice that Mr. Bronson's arm has hives, his tongue is edemous and has laryngospasms, lung sounds are striderous. Patient states "Are you sure that wasn't penicillin? I think my throat is swelling. I can't breathe, please help me." His VS are: RR=36 HR=130; BP=140/90; SpO2=90 on 2LNC.

What is your first step?

What should you do to the patient?

What is happening?

What is your next step?

The attending physician was actually a couple of rooms down the hall and came to write some orders for Mr. Bronson. He gives some stat orders

What meds did the physician order?

What meds will help with this condition?

What non-pharmacological interventions exist?

How do you administer the meds?

What is the intended use for these medications in this situation?

Are the medication orders proper?

After the interventions what do you do next?

Ten to15 minutes after the medications are administered you observe that Mr. Bronson's tongue edema is subsiding, as are the laryngospasms. Lung sounds indicate wheezes on right and crackles on left. RR=16; HR=97; BP=118/68; SpO2 97%.

Are the vital signs stable? Is the patient improving or getting worse?

Any suggestions for the patient?

This question is important. What questions you would like to ask about the scenario? What would you like to know about the patient?

APPENDIX H

E-MAIL RECRUITMENT LETTER

Dear Student:

I am a nursing graduate student at UNH. I am conducting a research study to explore the effects of high-fidelity manikins on learning of nursing students. I am writing to ask you if you would be interested in participating in this study. You will be one of approximately 30 40 students selected for this study. You are asked to participate because you are enrolled in NURS 514 or NURS 813.

If you choose to participate you will first be asked to complete two written tests (about 70 minutes total time), attend a high-fidelity manikin introduction session (about 30 minutes) and participate in a pre-test simulator scenario (about 30 minutes). Following these pre-intervention tests you will be randomly assigned to one of three groups. All three groups will attend a lecture with PowerPoint presentation on nursing responsibilities of post-operative patients (60 minutes). All meetings will be held in Hewitt Hall.

The first group will retake the post-test simulator scenario and the written tests in 3 weeks. The second group will meet to discuss post-operative case studies then take the post test simulation scenario and the written tests. The last group will meet to practice scenarios with the manikins then take the post test scenario and the written tests. Students in the first group will have about 4.5 total hours of time commitment, the second and third groups will have a total time commitment of about 7 hours.

Once the number of participants is known there will be a sign up sheet with available times to meet for each group. Starting next week April 7th participants will attend the first session where you will sign the consent and take the written pre tests. A variety of times will be available to accommodate your schedules.

By participating in this study, you will have the opportunity to increase knowledge of post-operative nursing skills, increased opportunity to recognize post-operative complications in a safe environment without potential harm to any patient, develop clinical judgment, and gain experience with high-fidelity manikins.

Upon completion of the study you may obtain and discuss your test scores by contacting the researcher. Also, participants who did not have the opportunity to use the manikins can contact me and we can go over the same scenarios if you want to practice.

Participation is strictly on a voluntary basis and you are able to withdraw at any time until the final scenario is completed. Afterwards your scores will be aggregated and not retraceable. Participation or non-participation in this study will not affect your grades or class standing in any manner. Confidentiality of all data and records associated with this research study will be maintained. Data will be kept in a locked file and will be used only by the researcher.

If you are interested please respond to this e-mail with your name and e-mail address. And, if you have questions about any part of this research or your participation in it please contact me at tboyd1@mindspring.com or by phone at (603) 868-5911.
Sincerely,

Tim Boyd, RN
UNH graduate student

APPENDIX I

IRB APPROVAL LETTERS

University *of* New Hampshire

Research Conduct and Compliance Services, Office of Sponsored Research
Service Building, 51 College Road, Durham, NH 03824-3585
Fax: 603-862-3564

28-Mar-2008

Boyd, Tim
Nursing, Hewitt Hall
7 Forest Street
Dover, NH 03820

IRB #: 4254
Study: The impact of high-fidelity simulation on the clinical judgment of nursing students
Approval Date: 27-Mar-2008

The Institutional Review Board for the Protection of Human Subjects in Research (IRB) has reviewed and approved the protocol for your study as Exempt as described in Title 45, Code of Federal Regulations (CFR), Part 46, Subsection 101(b). Approval is granted to conduct your study as described in your protocol.

Researchers who conduct studies involving human subjects have responsibilities as outlined in the attached document, *Responsibilities of Directors of Research Studies Involving Human Subjects.* (This document is also available at http://www.unh.edu/osr/compliance/irb.html.) Please read this document carefully before commencing your work involving human subjects.

Upon completion of your study, please complete the enclosed pink Exempt Study Final Report form and return it to this office along with a report of your findings.

If you have questions or concerns about your study or this approval, please feel free to contact me at 603-862-2003 or Julie.simpson@unh.edu. Please refer to the IRB # above in all correspondence related to this study. The IRB wishes you success with your research.

For the IRB,

Julie F. Simpson
Manager

cc: File
Fetzer, Susan

University *of* New Hampshire

Research Integrity Services, Office of Sponsored Research
Service Building, 51 College Road, Durham, NH 03824-3585
Fax: 603-862-3564

24-Feb-2009

Boyd, Tim
Nursing, Hewitt Hall
7 Forest Street
Dover, NH 03820

IRB #: 4254
Study: The impact of high-fidelity simulation on the clinical judgment of nursing students
Study Approval Date: 27-Mar-2008
Modification Approval Date: 23-Feb-2009
Modification: Changes per 2/18/09 email

The Institutional Review Board for the Protection of Human Subjects in Research (IRB) has reviewed and approved your modification to this study, as indicated above. Further changes in your study must be submitted to the IRB for review and approval prior to implementation.

Researchers who conduct studies involving human subjects have responsibilities as outlined in the document, *Responsibilities of Directors of Research Studies Involving Human Subjects.* This document is available at http://www.unh.edu/osr/compliance/irb.html or from me.

If you have questions or concerns about your study or this approval, please feel free to contact me at 603-862-2003 or Julie.simpson@unh.edu. Please refer to the IRB # above in all correspondence related to this study. The IRB wishes you success with your research.

For the IRB,

Julie F. Simpson
Manager

cc: File
Fetzer, Susan

APPENDIX J

WRITTEN CONSENT FORM

INFORMED CONSENT LETTER FOR ADULT SUBJECTS
FROM: Tim Boyd, RN UNH graduate student

Dear Student:

I am a nursing graduate student at UNH. I am conducting a research study to explore the effects of high-fidelity manikins on the clinical judgment of nursing students. I am inviting you to participate in this study. You will be one of approximately 15 - 30 students selected for this study. You are invited to participate because you are 18 years of age or older, able to read, write and speak English are in your first semester of nursing clinical experiences enrolled in NURS 514 or NURS 813; possess a valid Basic Life Support Card and have the physical ability to perform CPR.

If you choose to participate you will first be asked to complete demographic information and two written tests (about 70 minutes total time). Following these pre-intervention tests you will be randomly assigned to one of three groups and all will attend a lecture with PowerPoint presentation on nursing responsibilities of post-operative patients (60 minutes). Participants in the first group (the control group) will not receive any additional information or practice and will retake the tests at the end of the study. Those in the second group will meet for about 45-60 minutes once each week for 3 weeks and will, in small groups, discuss a case scenario, answer questions about it and discuss your answers with the researcher. At the end you will also take the final tests (70 minutes) and high-fidelity simulator scenario (30 minutes). The third group will meet for about 45 - 60 minutes once each week for 3 weeks and will practice a scenario using a high-fidelity manikin and discuss the outcomes with the researcher following the session. Afterwards you will be given the final tests (90 minutes) and simulator scenario (30 minutes). Total maximum time commitment of the study will be about 9.5 hours.

Benefits of this study would include opportunity to increase knowledge of post-operative nursing skills, increased opportunity to recognize post-operative complications in a safe environment without potential harm to any patient, potentially develop clinical judgment, and gain experience with high-fidelity manikins. Additionally, participants who complete the study will receive a $40 gift card what can be used at the UNH bookstore or Barnes and Noble bookstores to thank you for your time.

Potential risks include, providing personal demographic data, test anxiety, physical interaction with manikins, issues of beliefs, values, behavior and opinions will be explored during some tests and a time commitment of approximately 9.5 hours maximum.

It is the researcher's belief that the benefits of participation outweigh the risks of involvement.

Participation is strictly on a voluntary basis and you are able to withdraw at any time. Participation or non-participation in this study will not affect your grades or class standing in any manner.

Confidentiality of all data and records associated with this research study will be maintained. Data, will be kept in a locked file and will be used only by the researcher. Upon completion of the study, if you desire, you may obtain your test scores.

If you have questions about any part of this research or your participation in it please contact me at tboyd1@mindspring.com or by phone at (603) 868-5911. If you have questions about your rights as a research subject you may contact Julie Simpson in the UNH Office of Sponsored Research at (603) 862-2003 to discuss them in confidence.

Nurses rely on evidence-based studies to guide their practice. Nursing research relies on willing subjects. Your participation will assist nursing educators evaluate teaching strategies and high-fidelity manikin usage to increase the clinical judgment of nursing students and will be deeply appreciated.

Thanks for your consideration.

Tim Boyd, RN UNH graduate student

Having read the information regarding the research:

Yes, I do consent/agree to participate in this research study

Print name _____ Signature _____ Date _____

No, I do not consent/agree to participate in this research study.

Print name _____ Signature _____ Date _____