THE DEVELOPMENT OF CLINICAL JUDGMENT THROUGH HIGH FIDELITY SIMULATION: IS MORE FREQUENT SIMULATION BENEFICIAL TO LEARNING?

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ABSTRACT

RESEARCH PAPER: The development of clinical judgment through high fidelity simulation: Is more frequent simulation beneficial to learning?

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The purpose of this paper is to develop an evidence-based approach to curriculum design incorporating the use of high fidelity simulation (HFS) in nursing education. The aim of this work is to determine if biweekly simulation sessions are more effective at developing clinical judgment than monthly sessions. Tanner’s Model of Clinical Judgment (2006) serves as the conceptual framework.

High fidelity simulation is widely used throughout nursing education. Although strides have been made to develop evidence supporting the most effective use of this technology, comprehensive results affirming results are still lacking. For this project, a convenience sample of 60 sophomore baccalaureate nursing students at a medium-sized Midwestern university will be selected and divided into two groups. Clinical judgment will be measured by students and faculty at the beginning and end of the semester using Lasater’s Clinical Judgment Rubric (2007). Based upon the findings, a curriculum plan will be developed to strengthen clinical judgment development. The expected outcome of this project is improved student nurse clinical judgment.
Chapter I

Introduction

Change in the nursing profession is expected. Nurses have no control over change, but they do have control over the circumstances and effects of it (Porter-O’Grady, 2003a). Patient safety and care quality measures, cost containment, advancing technologies, regulatory pressures, healthcare reform implementation, patient expectations, pharmacological breakthroughs, patient acuity, philosophical dispositions of caregivers, staffing shortfalls, and prevailing wages are all factors that influence the nursing profession and the delivery of patient care (Cleary & Wilmoth, 2011; Decola & Riggins, 2010; Huntington et al., 2011; Winquist, 2012). In the midst of this revolution, the registered nurse (RN) has become so much more than a bedside care provider. Never before has so much been expected from the registered nurse. The RN must rely on clinical judgment in order to adequately manage the increasingly complex care environment (Lasater, 2007).

The benefits of sound clinical judgment do not stop at better patient outcomes. Another benefit of thorough nurse preparation is retention. A nurse with well-developed clinical judgment possesses a higher level of job readiness in this high-stakes profession. Many nurses have entered the workforce without necessary skills (Spiers et al., 2010). The stresses inherent in nursing practice are overwhelming to some who feel ill-equipped, and can potentially drive many out of the profession at a time when the nurse shortage threatens to linger yet another decade. As of 2011, there were approximately 2,724,570 nurses actively employed in the United States (Bureau of Labor Statistics, 2012). The median age of a registered nurse is 46, and the nursing shortage that the workforce is currently experiencing is not expected to abate until the year 2020 (American Nurses Association [ANA], 2013). Nurses are an expensive commodity; according to
the ANA it costs over $60,000 to replace a single registered nurse. It is clear that decreasing the rate of nurse turnover is vital to the survival of a healthcare institution. To prevent such turnover, graduate nurses reaching the workforce for the first time must be prepared for the difficulties of the job.

   Duchscher (2009) described transition shock as the reaction of new nurses who have left the protective environment of school and have started professional practice in an environment that is highly dynamic and stressful because of the workload demands. Duchscher identified the fears of incompetence, failure to keep the clients safe, and failure to cope with roles and responsibilities as drivers of transition shock. Clearly the ability to critically think and use reason to form clinical judgment lessens the impact of transition shock. Therefore, it is important to recruit, educate, and train registered nurses who will develop the sound clinical judgment that will sustain them throughout the rigors of an increasingly demanding profession.

   Background and significance

   Nursing education requires transformative approaches toward teaching/learning. In the early days of nursing education, emphasis was placed on regimentation and supervision in an environment of conformity (Walker & Holmes, 2008). Strong emphasis was placed on the carrying out of nursing duties (Alligood, 2010). According to Walker and Holmes, it was not so long ago that the nursing profession was so subjugated to the medical establishment that transformation was not possible. However, in the 1930’s and 1940’s the prevailing paradigm began to shift as a standard nursing curriculum began to guide nursing education (Alligood, 2010). Nursing scholars began to work in earnest with the concept that better-educated nurses were vital to the nation’s interests and nurse education should take place in colleges and universities rather than in hospitals (Lynaugh, 2008). These changes in nursing education
occurred over the span of decades, but the results were worth the effort for a more educated workforce.

The transition to an educational model that embraces active learning principles is no less revolutionary. This is important because the execution of nursing duties in the modern healthcare environment necessitates a higher order of thinking and action than was required in times past (Lasater, 2007; Porter-O’Grady, 2003a; Tanner, 2006). Active learning approaches aid in the development of the necessary skills. The nursing profession as a whole has now embraced a philosophy of care that puts the patient first, relies on relationships and trust, and is grounded in the best evidence that research can provide. This emphasis on evidence-based nursing practice has, in part, influenced the move toward active and cooperative learning pedagogies in nursing education.

Tanner (2006) stated that clinical judgment is essential to the practice of nursing and requires a holistic understanding of the client’s specific needs. Clinical judgment requires more than recognition of the clinical problem. Understanding of the science supporting treatments and interventions, the illness experience for the client and the family unit, the client’s strengths and limitations, and the client’s ability to cope are essential. Tanner (2006) identified a number of common themes as the result of her review of over 200 studies examining clinical judgment. Clinical judgment is influenced by the nurse’s experiences more than objective data. Clinical judgment also rests on knowing the patient and his pattern of responses to care, is framed within the context of the situation on the unit, and uses a range of patterns of reasoning. Improvements in clinical judgment are often achieved by actively reflecting upon breakdowns in judgment.

Critical thinking, or clinical reasoning, can be described as a precursor to clinical judgment (Lasater, 2007; Mann, 2012). Huckabay (2009) discussed the relationship between the
nursing process, critical thinking, and clinical judgment. Huckabay guided the reader through eight steps of critical thinking as framed by the six steps of the nursing process in an effort to explain how one forms clinical reasoned judgment. To think critically, a nurse must have command of the universal standards of clarity, precision, accuracy, relevance, logic, depth, and breadth. In short, the ability to critically think is essential to sound clinical judgment.

Judgment has been described as an activity that uses the model of the nursing process to systematically problem-solve (Huckabay, 2009; Tanner, 2006). Tanner briefly discussed the relationship between the nursing process and clinical judgment, indicating that because of its complexity, clinical judgment has a number of dimensions that are inadequately captured by the nursing process. Tanner went on to describe the concept of clinical reasoning as the cognitive process of realizing and considering alternatives, weighing those alternatives, and determining which action to take.

Statement of problem

Many seasoned nurse educators are still held captive by the inertia of the classroom. Comfort can be found in established routines, and many educators who are practicing in the rut of lecture mode sometimes find change to be difficult. The lecture and hospital clinical experience-based approach to education that formerly served to prepare competent nurses was adequate at a time when nursing was functionally focused on the processes of nursing. However, in recent years it has become clear that educators who rely only on this methodology are failing to fully prepare otherwise qualified candidates for practice in the complex healthcare environment. There is a need to transition to more meaningful learning, and the changes occurring in nursing education are reflective of the ongoing and relentless change occurring in
nursing practice. Porter-O’Grady (2003b) describes this era as “the beginning of the end of nursing care as we have all become accustomed to providing and using it” (p. 61).

There is an increase in the numbers of older, nontraditional students. At the same time, the millennial generation brings a new perspective to learning that is far different than the one held by many nursing educators (Pardue & Morgan, 2008). The diversity present in the classroom necessitates that nurse educators develop new pedagogical approaches that engage all students (Brown, Kirkpatrick, Greer, Matthias, & Swanson, 2009; Cronenwett, 2011). These new approaches are centered upon active learning principles, which are intended to free the student from the constraints of unimaginative thinking (Bradshaw, 2011).

High fidelity simulation (HFS) was first developed in the 1960s but did not find widespread use until 30 years later when the convergence of technological improvements and the realization that high-risk specialties such as anesthesiology benefitted from learning in the no-harm environment (Bailey, Johnson-Russell, & Lupien, 2011). Sophisticated HFS provides a realistic facsimile to live clinical situations by providing working cardiovascular and respiratory systems, bowel sounds, speech, neurologic responses, life-threatening complications, and the ability to accept a number of skilled treatments (Bailey et al., 2011; Campbell, 2010). The no-risk environment available with HFS provides realistic scenarios and reactions to student interventions. HFS permits students to integrate psychomotor skills, communication, critical thinking, and clinical judgment (Campbell, 2010) in situations that are reproducible with predictable results. Furthermore, students learning via HFS develop an increased sense of self-efficacy. Duchscher (2009) found that many new nurses expressed concern about being assigned to clients with problems beyond their experience or comfort level. An increased sense of self-efficacy could generally result in curtailment of the worst emotional effects of transition shock.
HFS appears to be a very good fit with the millennial learner. According to Skiba (2007), millennial learners are very comfortable with multimedia and simulation settings, cooperative learning, guided mentoring, reflective learning, and self-directed learning techniques. HFS offers the flexibility to use a number of different strategies to provide instruction to the many different learning styles that may be represented amongst the students (Campbell, 2010). Garrett, MacPhee, and Jackson (2010) reported that students participating in HFS as a part of their educational experience demonstrate faster skills acquisition and better performance than students who participated in traditional educational settings. Yuan, Williams, and Fang (2012) performed a systematic review of qualitative studies in the literature and found that HFS positively impacted nursing education in the areas of student confidence and competence. Quantitative studies revealed mixed results. In regards to clinical judgment development, Bambini, Washburn, and Perkins (2009) found that when faced with a live scenario that reflected the simulation experience, students reported that they were better prepared for a live clinical situation. One finding all of the aforementioned studies had in common was the need for more research probing the effectiveness of HFS.

Purpose of the project

The purpose of this project is to develop an evidence-based approach to curriculum design incorporating the use of HFS in nursing education. Because the use of good clinical judgment within the structure of the nursing process is foundational to nursing (Huckabay, 2009), the specific aim of this project is to determine if biweekly simulation sessions are more effective at developing clinical judgment than monthly sessions. Tanner’s Model of Clinical Judgment (2006) serves as the conceptual framework.
Research questions

1. When comparing two groups utilizing high fidelity simulation, does more time engaged in HFS activities translate into a significant difference in demonstrated clinical judgment?

2. When comparing two groups utilizing high fidelity simulation, does more time engaged in HFS activities translate into a significant difference in meaningful learning of curriculum content?

Definition of terms

Clinical Judgment: Conceptual.

Tanner (2006) describes clinical judgment as the ability to receive cues from the client and to be able to give those cues meaning and relevance regarding the client’s condition. This is followed by the ability to act appropriately, through interventions or modifications of care, in response to the client’s reactions to care.

Clinical judgment: Operational.

Clinical judgment will be measured by the Lasater Clinical Judgment Rubric (LCJR). Based on Tanner’s Model of Clinical Judgment (2006), the LCJR uses 11 clinical indicators to explore four aspects of clinical judgment as identified by Tanner: noticing, interpreting, responding, and reflecting (Adamson, Sideras, Gubrud, and Lasater, 2012).

Meaningful learning of curriculum content: Conceptual.

Sutton and Koehler (2011) described meaningful learning as the active engagement of the student in a process by which new learning is built upon prior knowledge and results in understanding of the knowledge itself as opposed to the simple knowledge of facts and ideas. Meaningful learning is necessary in the development of clinical judgment.

Meaningful learning of curriculum content: Operational.
Meaningful learning of the content is measured by student performance on a 25-question examination assessing knowledge of the content section and performance in simulation as assessed against the LCJR.

*Theoretical framework*

This project is based on a framework of Tanner’s clinical judgment model, which is representative of the kinds of thinking that occur during complicated clinical situations. Tanner (2006) identified four aspects of clinical judgment. Noticing was described as a function of the expectations that nurses bring to a clinical situation. Interpreting and responding is the process of understanding the significance of the input and intervening in a manner that makes sense given the situation. Reflecting is the process of reassessment of the client’s response to the nursing intervention chosen. Reflection allows the nurse to increase capacity for clinical judgment in the future. The model also shows where there may be breakdowns in logic, which can be helpful as nurses improve the exercise of their clinical judgment skills.

*Limitations*

This project will be limited by sample size. Simulation performance by participants may be influenced by prior learning. This project will be performed at a single location with a fairly homogenous sample.

*Assumptions*

1. HFS is a no patient harm approach to active learning that allows for multiple approaches that serve all styles of learning.
2. HFS aids students in the development of clinical judgment.
3. Students who complete more HFS scenario time have a better total grasp of disease processes than students who perform less practical application of knowledge through HFS.

4. More time in HFS will result in better scores on a written assessment of the content.

Summary

High fidelity simulation is a safe and effective active learning pedagogy that aids in the development of clinical judgment. Now, more than ever, it is important to prepare student nurses for the extremely complex healthcare environment in which they will work. The profession of nursing cannot afford to lose talented new nurses who are overwhelmed by the stresses of the workplace. It is imperative that nurse educators prioritize the development of clinical judgment in order to better prepare new nurses for the job. In this fast-paced world, that means that the state of nursing education must adapt to meet this goal.

More research must be performed to uncover evidence that would guide the best way to use HFS in nurse education. The goal is to maximize the benefits of time spent in simulation without experiencing diminishing returns on time and energy invested. This project is an attempt to fine-tune the amount of simulation required for clinical judgment development and meaningful learning.
Chapter II

Literature Review

Introduction

Good nursing practice requires strong critical thinking and the exercise of clinical judgment. The gap between these expectations and the reality of the novice nurse can be wide (Blum, Borglund, & Parcells, 2010; Dillard et al., 2009; Mann, 2012) and results in less than optimal patient care. One possible solution to this problem is to facilitate meaningful change in outdated instructional pedagogies. The literature suggests that high-fidelity simulation (HFS) can play a role in the development of clinical judgment. HFS can transform clinical classes that foster the development of psychomotor nursing skills, critical thinking, and judgment; it is lauded as a means by which learners are free to practice in a “no human harm” environment. The active learning strategies inherent in a well-crafted simulation scenario provide multidimensional clinical experiences that foster the development of clinical judgment. Selected studies addressing this possibility will be reviewed in this chapter.

Framework

HFS is generally regarded as an acceptable active learning alternative in prelicensure clinical nursing education. HFS reasonably approximates patient care (Lasater, 2007) and is delivered in a low-risk environment that allows for active learning absent human cost. Despite increased use, there has been very little research into the effects of HFS on learning and the development of clinical judgment. Lasater (2007) examined the experience aspect of the development of clinical judgment in students as it is related to clinical exercises utilizing HFS. Lasater’s (2007) work was qualitative in nature and performed within a larger quasi-experimental, quantitative and qualitative study. Lasater designed this study to examine the
experience dimension of clinical judgment, based in part on work in experiential learning by Kolb and Schön (Lasater, 2007). Data were obtained from researcher observations and focus group responses to questions about student simulation experiences. Lasater reviewed the data and extracted significant ideas from the focus group session. This was followed by multiple reviews of the video of the clinical experiences accompanied by detailed note-taking.

A convenience sample of 48 students was selected from junior level students enrolled in the Acutely Ill Adult course at Oregon Health and Science University. Of the 48 students, 47 were female and one was male. No other demographic information was noted in this work. Thirty-nine of the original 48 participants were actively observed throughout the term, and were therefore eligible to be included in the focus group for the study. Out of the 39 students eligible to participate, only 15 students volunteered to be part of the focus group. All 15 were nontraditional students. Although the researcher had planned for two focus groups, there were only enough volunteers for one. The final focus group consisted of eight students who met at a mutually convenient time (Lasater, 2007).

Focus group participants most frequently described HFS as an excellent activity to bring together the theory of the classroom and psychomotor skills of clinical laboratory class. Students praised the realism of HFS, and they reported an appreciation for the instant feedback they received after carrying out interventions. Students also reported that debriefing sessions were valuable learning experiences because these sessions further aided the understanding of concepts that were not grasped by simply reading about them. Another strength reported by the focus group was that HFS allowed for a broad selection of clinical scenarios that may or may not have been available in a traditional clinical setting. Some offered the criticism that HFS scenarios were often extremely challenging, but it was noted that these challenges promoted a greater
awareness of situations that may arise in a clinical setting. Through HFS, the students were able to safely navigate through the decision-making process and choose appropriate interventions. Few limitations to HFS were identified by the focus group, and these focused on the simulator: it always had a female voice, lacked nonverbal communication, was not conducive to certain assessments, could not be cut to simulate a wound, and could not deliver certain physical signs such as skin color changes or swelling (Lasater, 2007).

The focus group also discussed other themes, such as the anxiety produced by the use of simulation while simultaneously developing an awareness of right action. Both lower anxiety levels and awareness of right action were made possible by the no-risk environment that HFS provided. Debriefing was reported to be a tremendous learning experience. Students opined that reflection on the scenario often brought clarity of what action would have been beneficial. Despite making mistakes, students reported learning from them. Students also reported they were eager for more direct feedback from faculty, including realistic assessments of what would have happened had the scenario been an actual patient. Appreciation for the connection with the team was a noted strength of HFS, with students reporting that they learned from their classmates’ experiences (Lasater, 2007).

Investigating the experiential dimension of learning, Lasater (2007) identified 13 significant themes expressed by the participants that were germane to simulation. Lasater concluded that the focus group was a useful method by which to gain insight into students’ perceptions of learning through high-fidelity simulation. This study was limited by a sample that was small, fairly homogenous, and lacking in cultural and ethnic diversity. Despite sample size, the author concluded that the study yielded useful information about the nature of HFS and the development of clinical judgment. Certain challenges in regards to practical application of
learning and development of clinical judgment can be well accommodated through the use of HFS. HFS allows for integration of learning in ways that are not available in a typical traditional clinical environment.

Active learning through HFS

Incorporating HFS in nursing education may lead to better clinical judgment in nursing students. This hypothesis is predicated on the reasonable assumption that achieving good clinical judgment is dependent upon the learner’s ability to master certain skills throughout the learning process. For example, it is well understood that critical thinking is a part of the process that leads to clinical judgment, which is considered to be an essential outcome of nurse education (Mann, 2012). The evidence has indicated that most nursing school graduates are not prepared to meet clinical judgment expectations in their initial practice. The purpose of Mann’s (2012) study was to evaluate the efficacy of a grand rounds approach to developing critical thinking and clinical judgment in baccalaureate nursing students.

Mann (2012) described an experimental, pre/post test study based on Tanner’s model of clinical judgment. Both the experimental and control groups completed the simulated activity. Intervention groups met two times during the semester to solve a healthcare dilemma in a grand rounds discussion style; the comparison group met once and received the usual educational instruction minus grand rounds. Instruments included a student questionnaire in which student interactions were rated using an ordinal scale developed from Lasater’s Clinical Judgment Rubric (LCJR). A 1 on the scale represented a beginning level of clinical judgment and a 4 was considered exemplary. Interrater reliability was reported at 98.49% (Mann, 2012). Mann also used the Critical Thinking Assessment (CTA) by Assessment Technologies Institute (ATI) to measure students’ critical thinking following the intervention. These scores were compared to
CTA scores obtained from tests taken upon entrance to the nursing program. Reliability of the CTA was not presented. Although the CTA has been standardized to nursing students, its use in research is reported as limited (Mann, 2012). Researcher notes provided qualitative information to promote further understanding of the data.

A convenience sample of 22 participants was selected from volunteers enrolled in the Level II nursing class at a school of nursing located in the Midwest (Mann, 2012). Nineteen of the participants were female and three were male. Each of the volunteers was randomly assigned to one of four intervention groups consisting of three to six members or a comparison group consisting of four members. Ages for the sample ranged from 19 to 50 years ($M = 27$) for the intervention groups and 20 to 33 years ($M = 24.5$) for the comparison group (Mann, 2012). Grade point average ranged from 2.5 to 4.0 on a 4.0 scale for the intervention group and 2.75 to 3.75 for the comparison group (Mann, 2012).

Mann (2012) found that the intervention groups scored significantly higher than the comparison group on the LCJR. Compared to the intervention group, the comparison group had no participants who scored as “accomplished” or “exemplary,” and there was no statistically significant difference between the first CTA and second CTA although the comparison group’s scores decreased between the first and second CTA. Similarly, there was a gain in the intervention groups’ scores on the CTA, although this increase was also not statistically significant.

Interestingly, there was no significant relationship between critical thinking and clinical judgment for the intervention group, although there was a slight positive correlation for the intervention groups and a slight negative correlation for the comparison group (Mann, 2012). In general, as critical thinking ability increased, so did clinical judgment ability. This active
learning method struck a chord with many of the students involved in the grand rounds strategy reporting that the approach was well-liked. In addition to helping one another problem solve, students who were less likely to verbalize in a larger group felt comfortable participating in the smaller forum.

Mann (2012) concluded that cooperative learning is a strategy preferred by many students, and critical thinking and clinical judgment can be developed by problem solving interactions between the students performing the simulations. When applying this approach to curriculum design, it is important to have adequate faculty present to clarify content (Mann, 2012). Reflecting on clinical reasoning in a group setting often strengthens clinical judgment. Due to small sample size, these findings are not generalizable. More study is required to provide evidence for this hypothesis.

A number of conditions must be met for good clinical judgment to develop. One of these is knowledge acquisition. A nurse must be well versed in nursing knowledge before one can exercise good clinical judgment. There are few HFS studies addressing whether knowledge acquisition improves with the use of HFS. The few studies that exist are seriously limited because of the use of convenience sampling and small sample size (Gates, Parr, & Hughen, 2012). Gates et al. (2012) hoped to add to the body of evidence by examining whether HFS improved nursing students’ knowledge acquisition as measured by performance on examination.

Gates et al. (2012) used a pretest/post test experimental design in which students were randomly assigned to one of two scripted HFS scenarios (pulmonary embolus [PE] and gastrointestinal [GI] bleed), followed by a researcher-developed NCLEX-type exam for each scenario. Both students and clinical faculty were blinded to the study’s hypothesis and objective. The students assigned to participate in the GI bleed scenario functioned as the control group for
the PE and vice versa. Previous to the simulations, all students completed classroom activities about both topics. Simulation was followed by a one-hour debriefing. Both scenarios were scheduled the same week, and 10-question examinations on PE and GI bleed were administered to both groups in the next scheduled class. The post-simulation examinations were created by the course coordinator and consisted of NCLEX-style questions that could be answered without having performed the content-related simulation (Gates et al., 2012). Results were compared to the average scores on the classroom exams that were completed prior to the study. Although a specific framework for the study was not described, the authors endorsed radical transformation of pedagogy for nurse education based on recent work by Benner, Sutphen, Leonard, and Day (2010).

A convenience sample ($N = 104$) was obtained from baccalaureate nursing students enrolled in a medical/surgical class. Although participation in the simulation was required as part of the course curriculum, participation in the examination following the simulation was voluntary. Anonymity was maintained through a student-generated identification code. The sample was predominantly female ($87\%$). Ages ranged from 19 to 37 with a mean of 22.34 years. The sample was almost evenly split between GI bleed ($n = 51$) and PE ($n = 53$). The demographic profile of each group was similar to the whole sample. Analysis had sufficient power to show a sample of 104 could capture the effects of HFS participation (Gates et al., 2012).

Gates et al. (2012) found that students assigned to participate in the PE scenario had a mean PE examination score of $6.89 \ (SD = 1.40, \ p < .01)$ which was significantly different from the PE scores for those who were involved in the GI scenario ($M = 6.08; \ SD = 1.41$). In the same
way, the students who performed the GI bleed simulation performed significantly better on their GI bleed examination \((M = 5.78; SD = 1.15, p < .01)\) than those who performed the PE scenario \((M = 4.92; SD = 1.45)\). Reanalysis of the data with the PE variable added showed that simulation raised average examination scores by 0.81 points. Similarly, reanalysis with the GI variable showed that simulation raised average scores by 0.86 points (Gates et al., 2012). The findings in both groups are statistically significant and represent an average rise of a letter grade on a traditional grading scale.

Gates et al. (2012) concluded that this study supported the idea that student participation in HFS has a positive correlation to student knowledge acquisition. Since knowledge acquisition is fundamental to the development of clinical reasoning, this study is part of the growing body of research that supports the use of HFS in nurse education.

Many schools of nursing now openly embrace the use of HFS in clinical education. However, the complexity of the skill sets that faculty must develop to utilize HFS often makes implementation difficult. Making the connection between didactic and clinical experiences is of great concern (Dillard et al., 2009). Dillard et al. (2009) examined student learning that occurred following participation in a simulation. Tanner’s clinical judgment model provided the basis of the framework. Additionally, the authors explored the effectiveness of a professional development workshop designed to help faculty understand the measurement of clinical judgment with the Lasater Clinical Judgment Rubric (LCJR).

This quasi-experimental, quantitative and qualitative study was a joint effort between faculty members from two schools of nursing in different regions of the United States. The final convenience sample of 25 was selected from a cohort of 68 students who were enrolled in a junior-level adult health course. No other selection criteria were discussed by the authors.
Instruments for this study included two questionnaires. The first was a self-assessment to be completed by the students. The second assessment was designed for faculty and it addressed faculty experiences with HFS over the course of the study. The student questionnaire consisted of 40 questions divided into 6 subscales using a 5-point Likert scale. The reliability data were not reported. Faculty observation was incorporated with the self-assessments in order to determine students’ understanding of the objectives of the exercise. The sessions were video recorded for further review. The last stage of the study consisted of a simulation experience with each student \( (n = 25) \), after which each student wrote a guided reflection on the experience. The LCJR was used to evaluate clinical judgment (Dillard et al., 2009).

Dillard et al. (2009) found that the faculty workshop facilitated understanding and skill acquisition. The authors also found value in the active engagement of learners to support learning, but development of an HFS program for nursing students requires ongoing effort and a specific skill set on the part of faculty. The active learning in HFS helped students develop understanding of the concepts (Dillard et al, 2009). Faculty could identify clinical judgment ability from assigned reflections. Dillard et al. (2009) concluded that HFS allows for approaches to learning that are tailored to the students’ specific needs in the development of clinical judgment.

High fidelity simulation can improve clinical judgment in regards to age related competencies. According to Johnson et al. (2012), a burgeoning geriatric population is going to pose a challenge to nursing. Comorbidities and suboptimal physiological systems make nursing care more difficult as clients get older. Therefore, it is essential that nurse educators equip learners with sound clinical judgment specific to the needs of
this particular population. Johnson et al. conducted a quasi-experimental, multisite study involving five schools: four schools in the United States, and one in the United Kingdom. The purpose was to determine how role modeling affected students’ clinical judgment in a specific geriatric care scenario. This study utilized theories by Bandura and Tanner as the framework (Johnson et al., 2012).

A convenience sample of 275 nursing students in attendance at one of five nursing programs in the United States and the United Kingdom was obtained. These students were enrolled in their first clinical course with content that was consistent with the content of the simulation. There was diversity amongst the schools, with variation in type of preparation, funding source, and location. Based on students’ simulation laboratory schedule, students were divided into treatment and control groups. The simulation assignment and nursing role were randomly assigned by card draw (Johnson, et al., 2012).

Students provided quantitative data using a researcher developed instrument that evaluated student satisfaction with pre-simulation learning activities and with the simulation itself (Johnson et al., 2012). Clinical judgment was one of the areas addressed in this questionnaire. Responses were reported on a Likert scale with scores ranging from 1 (strongly disagree) to 5 (strongly agree) or 1 (very unhelpful) to 5 (very helpful). The other instrument used by researchers was the Lasater Clinical Judgment Rubric (LCJR). Each dimension is scored on a 4-point scale from 1 (beginning) to 4 (exemplary). This instrument was found to be both reliable and valid ($r = .57$ to $.96$) across three prior studies.

Johnson et al. (2012) found that students in the United States (intervention and comparison groups) agreed that simulation was helpful in the following areas: learning to notice and respond, relating learning to practice, and improving confidence. US students also found pre-
simulation activities helpful. Findings were different in regards to the students in the United Kingdom, however, where there were highly statistically significant differences \((p = .000)\) in satisfaction between the two groups in most pre-simulation activities. The exception was in regards to confidence in the care for the delirious patient \((p = .41)\), where members of both groups reported feeling “not confident” after the simulation experience (Johnson et al., 2012). In the UK, a highly significant difference \((p = .000)\) between the control and treatment groups existed for provision of skills to provide care for the elderly. The British treatment group felt more strongly than the control that they were provided the needed skills.

There were highly significant differences \((p = .000)\) between the control and treatment groups at all schools in regards to student clinical judgment in the areas of noticing, interpreting, and responding (Johnson et al., 2012). There was not a statistically significant difference for mean reflecting scores, except in the UK where the difference between the two groups was significant \((p = .001)\). It appeared that observation and role modeling improved some aspects of clinical judgment in the treatment groups.

Johnson et al. (2012) concluded that this study provided evidence that simulation is effective as a teaching strategy for situations pertaining to the geriatric population. The findings suggest that role modeling should be incorporated into simulations because of its effectiveness at helping foster clinical judgment in geriatric patient care.

Wood and Toronto (2012) describe critical thinking disposition as an internal drive or pattern of thinking that is used when one encounters problems that require focused decision making. An attitude of acceptance of change in innovation and lifelong learning are valuable personal attributes of the professional nurse, and are vital for the ongoing acquisition of knowledge. These qualities along with a strong disposition toward focused thinking are
necessary for good clinical judgment development. Even though HFS is widely used to teach critical thinking and clinical judgment, almost no research has been performed to study how HFS affects critical thinking disposition. Wood and Toronto (2012) examined how HFS affects undergraduate students’ critical thinking dispositions.

Wood and Toronto (2012) designed a quasi-experimental, pretest/posttest study in which participants were randomly assigned to either an experimental group or a control group. Affective critical thinking dispositions, identified by the American Psychological Association Delphi Research Project as one of the dimensions of critical thinking, served as the guiding principle of this study (Wood & Toronto, 2012). The California Critical Thinking Disposition Inventory (CCTDI), an instrument derived from the Delphi project, was chosen as the key instrument for the Wood and Toronto study. The CCTDI has acceptable reliability as indicated by an overall Cronbach alpha score of .91 and alpha scores of .71 to .80 on the subscales. A researcher developed survey captured demographic and descriptive data.

Before the study, the participants completed a descriptive and demographic survey. After completing the survey and the California Critical Thinking Disposition Inventory (CCTDI), students in the experimental group were assigned to small groups for two hours of practice on a high fidelity simulation manikin. The first hour consisted of skills practice and the second hour consisted of scripted scenarios performed by each of the small groups and observed by peers from other groups. These activities were followed by instructor-led debriefing. The control group practiced skills and critical assessment using traditional laboratory practice methods. The course competency examination was given to both groups, followed by a retaking of the CCTDI.

A convenience sample \((N = 85)\) of novice nursing students taking a health assessment skills class was obtained. All were in the second year of the nursing program. Participation was
voluntary. The sample consisted mostly of Caucasian (87%) females (96%). The mean age of all participants was 19.4 years and the grade point average of the group was 3.38 on a 4 point scale. The sample was divided nearly in half with 42 participants in the experimental group and 43 in the control (Wood & Toronto, 2012).

Although there were no significant between-group differences for either the total CCTDI or the subscales scores, a trend toward increased critical thinking was seen in the mean total scores of the experimental group. Mean total post-test scores (M = 311.3) for the experimental group increased over the mean pre-test scores (M = 304.5). The mean total pre-test scores for the control group (M = 303.2) increased by only one point at post-test measurement (M = 304.2). This trend was not found for the CCTDI subscales (Wood & Toronto, 2012). Wood and Toronto also examined within group differences. Paired sample t-tests of the experimental group revealed higher mean scores on the posttest when compared with the pretest (mean difference = 6.54, $t = 2.26, df = 38, p < .05$). The most significant gains were in the subscales of truthseeking and judiciousness or maturity of judgment. The control group saw no significant differences between pretest to posttest on any of the areas measured.

Wood and Toronto (2012) concluded that much of the gain experienced by the experimental group might be explained by the debriefing step that raises the students’ awareness and pushes them to think purposefully about the HFS experience. The authors also concluded that the independent variable, two hours of HFS, was not sufficient to significantly affect disposition score differences between the experimental and control groups. All disposition scores for participants were within a range expected for a student at this stage of the curriculum. The findings were not generalizable and the sample was small (Wood & Toronto, 2012). However,
these small gains suggest that HFS may contribute to the development of critical thinking disposition. The authors recommended additional study to further understand outcomes of HFS.

*Counterpoint*

When making decisions that affect curricula, it is important that faculty consider results from well-designed research. Not all studies overwhelmingly favor HFS. As Wood and Toronto (2012) pointed out, sometimes the results of research in this area are positive but not statistically significant.

The complexity of the modern healthcare environment presents difficult clinical challenges to novice nursing students (Blum et al., 2010). The novice nurse is expected to do more than was formerly required of a recent graduate, and the ability to make sound choices in patient care is important. For this reason, nursing programs have begun to utilize learning strategies that are believed to foster the development of better clinical judgment. Self-confidence and competence have been identified as two of the dimensions that influence clinical judgment (Blum et al., 2010). This study examined the relationship between HFS and learner self-confidence and competence.

Blum et al. (2010) based this quasi-experimental study on Tanner’s clinical judgment model. Lasater’s Clinical Judgment Rubric (LCJR) was used to quantify the development of clinical judgment. The LCJR was reported by the authors to have high internal consistency reliability ($\alpha = .87$) and adequate validity based on previous studies. For this study, the authors identified four items as indicators of student confidence ($\alpha = .81$) and four items as indicators of student clinical competence ($\alpha = .88$). Internal consistency for the four Lasater items measuring self-confidence was .810 as measured with Cronbach’s alpha.
Blum et al. (2010) obtained a convenience sample of 59 third-year students at a Southeastern university. The participants were enrolled in their first clinical practice course. After exclusions, the final sample consisted of 53 students. Random assignment of participants was approximated through the process of student registration for the clinical laboratory sections. The overall sample was described as Caucasian ($n = 36$) and female ($n = 47$), with a mean age of 30 ($SD = 9.63$). Over half ($n = 30, 56.6\%$) had no experience in healthcare, and two-thirds ($n = 35, 66\%$) were not in the workplace at the time of the study (Blum et al., 2010). Students participating in the study enrolled in one of three clinical laboratory classes. Two classes were experimental groups (HFS-based competency) and one was a control (traditional skill competency). Both faculty and students in all three sections completed the LCJR during the midterm and final weeks of instruction.

In terms of the overall sample ($N = 53$), Blum et al. (2010) found a positive correlation that was significantly different between student midterm and final confidence ratings ($r = .483, p = .001$), ($t = 5.100, df = 52, p = .000$). Over half of the students ($n = 27$) reported highest levels of self-confidence the final week as compared to midterm ($n = 16$). Student clinical competence was rated by faculty, and had high internal consistency ($\alpha = .884$). There was a positive correlation between midterm and final competence ratings ($r = .386, p = .004$). The two ratings were significantly different ($t = 7.236, df = 52, p = .000$).

When examining the experimental and control group results, Blum et al. (2010) found that there was marginal improvement in self-confidence scores for both groups. There were no statistically significant differences between mean self-confidence scores of either group. The traditional laboratory group (control) showed a greater positive change than the simulation group, although this change was not statistically significant. Similarly, faculty assessment of
competence showed the traditional laboratory group experienced greater positive gain than the simulation group. Again, this change was not statistically significant.

Blum et al. (2010) found that the results did not support their initial hypothesis. Thinking that students in the experimental group (simulation) would report greater self-confidence and competence than traditional learners, the authors were surprised to find that entry-level students progressed equally regardless of approach. Despite the study’s limitations, Blum et al. (2010) concluded that the results suggest that continued use of traditional laboratory instruction for entry-level nursing students is indicated.

Like knowledge acquisition, critical thinking is also an essential component of clinical judgment. It is widely believed that HFS is helpful to students in the development of critical thinking and correct decision making. HFS is utilized in clinical instruction with the belief that active learning practiced in a controlled situation will result in good management of a real-life situation (Ravert, 2008). Most of the literature supporting the use of HFS has generally focused on dimensions of learning such as student perceptions of satisfaction, self-efficacy, and usefulness (Ravert, 2008). These studies do not address the importance of clinical judgment and how HFS affects it. The primary purpose of this study was to determine whether measures of critical thinking show differences between three groups of baccalaureate nursing students exposed to various laboratory conditions including HFS. The researchers also wanted to examine how learning style may affect critical thinking during the enrichment activities (Ravert, 2008).

Ravert (2008) used a pretest/post test experimental design in her study. Students were recruited from one of two cohorts in a Medical/Surgical I course attending a baccalaureate nursing program. Volunteers from the first cohort were randomly assigned to one of two experimental groups: the first was a non-HFS enrichment group and the other used HFS
enrichment. Participants from the second cohort served as a control and received no additional enrichment. Critical thinking was assessed twice; once at the beginning of the study and once after completion of the enrichment programs. Ravert measured three variables: critical thinking skill and critical thinking disposition, both of which are important to clinical judgment, and preferred learning style. Participants in the experimental groups also submitted to audio taped interviews after the enrichment sessions were completed. The framework of this study was built on the work of the American Philosophical Association’s Delphi Project definition of critical thinking and Kolb’s Experiential Learning Theory (Ravert, 2008).

Two instruments used in this study included the CCTDI and the California Critical Thinking Skills Test (CCTST), both of which were developed to assess critical thinking in college students. Ravert (2008) also used Kolb’s Learning Style Inventory (LSI) to assess learning style preference theorizing that experiential learners will benefit more from the simulation sessions than reflective learners. Internal consistency of the CCTDI as reflected by Cronbach’s alpha was reported as .91 for the instrument and .71 to .80 for the subscales. Reliability of the CCTST was reported as a KR-20 range of .68 to .80. Cronbach’s alpha for the LSI was reported as between .73 and .88 for each scaled item (Ravert, 2008).

Twenty-eight participants were initially recruited from the first cohort of 64 students. After the exclusion of three students, the remaining 25 were divided into a simulation group (n = 12) and a non-simulation enrichment group (n = 13). The volunteers from the second cohort formed the control group (n = 15) and received no enrichment. Ravert (2008) reported that the sample was 98% female and the ages ranged from 20 to 27 (M = 21.25). Grade point average as reported by the participants was 3.65 on a 4.0 scale.
Ravert (2008) found that the areas of critical thinking skills and disposition increased across all groups, but none of the increases were significant. Scores did not increase as the result of learning style (disposition/ \( p = .83 \); skills/ \( p = .421 \)). Ravert (2008) noted a number of weaknesses with the study including small sample size, alternative explanations for inconclusive results, and inability to measure attention priorities in the experimental groups. Limitations discussed included small sample size, homogeneity of sample, high GPA of participants, unaccounted-for personal attention to the experimental groups, and applicability of the instruments to nursing students.

Ravert (2008) concluded that results did not support the hypotheses. There was no significant difference in critical thinking amongst the groups. Ravert suggested that a choice of enrichment opportunities that address the different learning styles could be of value. However, students commented that they could not be relied upon to attend enrichment offerings unless required. Ravert (2008) also concluded that a larger study with a less homogenous sample studying measurable outcomes such as NCLEX pass-rate might be beneficial.

**Synthesis of the reviewed literature**

Almost all of the studies cited explored high fidelity simulation as the independent variable. Either clinical judgment or those attributes that are part of the whole known as clinical judgment (critical thinking, knowledge acquisition, and critical thinking disposition) were studied as the dependent variable in all examples cited. In almost all examples, the purpose of the study was to examine the direct effects of HFS on the dependent variable in question. In one example the effect of grand rounds post-HFS was explored, providing evidence to the value of cooperative learning (Mann, 2010).
A few common sources for the frameworks were identified. Tanner’s clinical judgment model (Blum et al., 2010; Dillard et al., 2009; Johnson et al., 2012; Mann, 2012) was robustly represented. Other theories used for frameworks included Kolb’s experiential learning (Lasater, 2007) and Bandura’s social learning theory (Johnson et al., 2012). Other studies were structured around the idea of remaking nursing education through radical transformation by Benner, Sutphin, Leonard, and Day (Gates et al., 2012) and the American Philosophical Association’s Delphi project (Ravert, 2008; Wood & Toronto, 2012).

In all of the studies that were reviewed, researchers used convenience sampling. It is common in nurse education research to use convenience sampling to take advantage of the ready availability of potential subjects. This availability allows the researchers to study topics that are relevant to a specialized group for whom probability sampling would not result in a viable sample. Researchers attempt to make up for these weaknesses that are inherent in a convenience sample by accounting for them within a well-designed study (Burns & Grove, 2009). Most of the researchers attempted some degree of randomization after the volunteers were selected. The practice of recruiting from nursing students resulted in overwhelmingly young, female, Caucasian samples that are not characteristic of the population and under-represents male, nontraditional, and minority nursing students.

Most of the studies were of quasi-experimental design, two had an experimental design, and one study was the qualitative part of a larger study. Six studies had a pretest/posttest element. Many had a qualitative component. Because of the limitations with sample size and origin and the efforts to measure something difficult to objectively quantify, the level of evidence for most of these studies would most likely be Level 3. In a Level 3 study, evidence
results from a well-designed controlled trial without randomization (Alaska Medical Library, n.d.).

The single most frequently used instrument was the Lasater Clinical Judgment Rubric (LCJR). Four studies used the rubric to capture data, either alone or in tandem with other instruments. A fifth study described some of the qualitative research that led to the development of the LCJR (Lasater, 2007). It must be noted that the LCJR has been found to be both reliable and valid across numerous studies, as has the CCTDI and CCTST. Other instruments and qualitative data sources used in this review consisted of: researcher developed surveys and questionnaires, observation notes, guided reflection writings, researcher developed NCLEX-style exam questions, and a critical competency exam.

Five of the studies found that there is a statistically significant positive correlation between HFS and the dependent variable of the study, supporting the use of HFS in the development of clinical judgment. One study reported small gains with no statistical significance in the area of critical thinking disposition (Wood & Toronto, 2012), an area that can arguably be considered an innate strength for many. Two studies found that the results did not support the hypothesis. Blum et al. (2010) found that new learners progressed in self confidence and competence equally regardless of exposure to HFS, and Ravert (2008) found that skills and disposition increased for all learners, although this increase was not significant.

Of note is the small sample size for all studies included in this review. In general, the results of the research in this literature review affirm that the use of HFS in nurse education has a positive effect on the development of clinical judgment or one of the attributes thereof, such as critical thinking, knowledge acquisition, or critical thinking disposition. In regards to the studies that resulted in no statistically significant correlation, the small but measurable gains could
arguably lead one to conclude that HFS causes no harm in the development of clinical judgment. However, the variety of the results prove that there is still room for discussion on this matter, and more research is required to better understand this relationship.
Chapter III

Methodology

Introduction

In recent years a number of studies have been published that examine the effect of high fidelity simulation on both clinical judgment and the components that make up clinical judgment. As demonstrated in the literature review, the studies are often limited and the results do not consistently reveal that the relationship between HFS and better clinical judgment is a strong one. One of the specific objectives of this project is to examine differences in clinical judgment development given unequal access to HFS between two groups. Another objective of the project is to examine how the arranged simulation schedules impact meaningful learning and mastery of curriculum content. Content mastery through meaningful learning and clinical judgment development are critical outcomes of the course. Findings from this project will be used to determine an appropriate number of simulation hours to meet these outcomes. This project is based on a framework of Tanner’s clinical judgment model.

Setting, Population, and Sample

This project will be conducted at a medium-sized Midwestern school of nursing that features baccalaureate (BSN) preparation for registered nurses. A convenience sample will be obtained from the population of approximately 100 nursing students enrolled in the first medical-surgical course of the program of study for BSN.

Approximately 60 to 70 participants in the final sample are anticipated. Students will be divided into two project groups of approximately 30 subjects based on the clinical sections in which they are enrolled, with each section containing 10 students that meet two times a week. Inclusion criteria will be students’ enrollment in the required course. As part of their required
coursework, students will participate in all activities related to the project including simulation, examination, live clinical activities, and survey. Data from students who are repeating the course, have prior healthcare experience, or have participated or observed the selected simulations prior to the study will be excluded from the analysis.

Method

The proposed project will be a quasi-experimental pretest and posttest design consisting of two experimental groups for comparison. Randomization will be achieved only to the extent of section selection by students at registration. Teams of three and four students within each group will be assigned by card draw.

Permissions

Permission for the project will be obtained from both the director of the school of nursing and the lead instructor for the course. Permission for the use of the Lasater Clinical Judgment Rubric will also be requested from the author of the rubric. After these permissions are obtained, the project will be submitted for approval to the Program Director of the Office of Institutional Research and the Institutional Review Board (IRB) of the university.

Protections of human subjects

Ethical principles will be strictly adhered to over the course of this project. Once permission to proceed is granted, the researcher will obtain voluntary informed consent before commencing with this project. Although participation in the project is expected as part of the usual course activities, students may opt-out of having their data used in any dissemination of the project. Participants will receive a detailed project description, data use agreement, description of risks and benefits, and assurance of confidentiality. Participants will be informed on an ongoing basis that they have the right to withhold information, have the right to fair treatment, and the
right to protection from discomfort and harm. Participants will maintain autonomy and will be allowed to withdraw from the project at any time. Project volunteers must comprehend the information shared in the disclosure process. Participants will sign consent forms which will be kept separately on file in a locked cabinet at the university in the health professions complex.

For the purposes of maintaining anonymity during participation of this project, identifying information will be redacted and each subject assigned a number. Examinations, video recorded sessions, and researcher assessments of performance will be maintained separately on a password-protected laptop with a dedicated password-protected external hard drive for backup purposes.

Procedure

Prior to commencement of the project, the project director and faculty will participate in a training session to gain familiarity with the selected scenarios and to review the project design and the clinical instructors’ roles. Faculty will practice the simulations to decrease variability in the delivery of each simulation. Researcher bias will be limited by the researcher delegating the performance of the simulation to qualified instructors who have completed the training. Further inconsistency is limited through the use of SimMan by Laerdal’s pre-installed scenarios.

The didactic portion of the program will be presented first, and both simulation groups will receive study materials and detailed information about two preselected nursing scenarios. Students will also be given information on how to appropriately care for the client. Prior to the simulation portion, students will complete a demographic survey. In addition, students will complete a 25-item NCLEX-style pretest over the content that was presented in class. At the end of the four-week project, the same 25-item test will be readministered to all participants.
Students will be divided into two teams. Each team will have opportunity to engage in simulation. The simulation period will last four weeks, during which the first group will participate once every two weeks in a two-hour simulation related to curriculum content. Weeks one and three, the scheduled simulation weeks for this group, will each feature one of the two preselected scenarios. There will be 15 to 20 minutes of debriefing for each practiced simulation. During non-simulation weeks, this group will engage in regularly scheduled clinical assignments. Both scheduled simulation sessions for this group will be video recorded to allow the researcher to review and rate student clinical judgment per the LCJR. The second group will participate in two hours of HFS every week for four weeks. Weeks one and three will follow the same schedule as the first group, but the scenarios will each be repeated the following week, making a total of four weeks of simulation. As with the first group, each simulation session will be followed by 15 to 20 minutes of debriefing. Sessions one and four will be video recorded to allow the researcher to review and rate student clinical judgment. The project design results in missed learning opportunities for participants of both groups. To facilitate balance, faculty will schedule time for students to make up the live clinical or HFS experiences that each group lacked.

Evaluation of outcomes

The LCJR is used extensively for nursing research purposes (Adamson et al., 2012; Blum et al., 2010; Dillard et al., 2009; Johnson et al., 2012; Lasater, 2007; Mann, 2010). The LCJR has been shown across studies to have high interrater reliability (Blum et al., 2010; Dillard et al., 2009; Mann, 2010). Adamson et al. (2012) found that this was true when comparing a variety of statistical analyses. Interrater reliability, calculated using intraclass correlation coefficient (2,1), was equal to .889. Percent agreement assessment resulted in interrater reliability in a range from 92% to 96%. Analysis for level of agreement for reliability resulted 57% to 100%.
To determine the impact of amount of simulation on meaningful learning of material, pre- and post-test scores will be analyzed using paired t-tests. Differences between group outcomes, if any, will be determined using an independent t-test. The influence of hours of simulation on student clinical judgment will be determined using the ordinal scale described in the LCJR. Bivariate correlational analysis using Pearson’s coefficient will reveal the relationship, if any, between the amount of simulation time and level of clinical judgment. Data will be analyzed using Microsoft’s Statistical Package for the Social Sciences (SPSS) 20.0.

Summary

This project will be conducted in an effort to add to the existing body of nursing knowledge about HFS and the development of clinical judgment in baccalaureate nursing students. Lasater’s Clinical Judgment Rubric and faculty developed content examination are the instruments of this project. The project’s design is quasi-experimental, involving pretest/posttest and researcher observation and rating. The findings will determine if more frequent HFS practice is better in the development of clinical judgment, and will aid in curriculum design planning as programs are embracing HFS as an approach to clinical education.
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