Integration of Simulation Across the Undergraduate Curriculum: Student and Faculty Perspectives

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Abstract

Background: High-fidelity human simulation provides an innovative teaching method for nursing students. Faculty members face challenges related to the integration of this method of teaching within a curriculum.

Method: The purpose of this study was to implement and integrate the use of high-fidelity human simulation as a teaching and active learning strategy throughout the undergraduate nursing curriculum and evaluate the student and faculty perceptions related to this instructional technology. Kolb’s experiential learning theory and Jeffries’s Nursing Education Simulation Framework provided the framework for this research project. Creative methods for implementation of simulation in various courses are described. A mixed-methods (survey and focus group) research design was used to measure student and faculty perceptions of this process. Following the simulation experience, students (N = 151) completed the simulation evaluation survey, and faculty (N = 6) participated in focus groups to provide insight into the experience.

Results/Conclusions: Student responses related to the experience were overwhelmingly positive, and while faculty agreed that the use of simulation was beneficial to the achievement of learning objectives, many challenges related to the use of the technology were experienced. This study supports the use of simulation in an undergraduate nursing curriculum and offers suggestions for faculty faced with implementing simulation.


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Introduction and Review of Literature

Nurse educators face the challenge of finding optimal opportunities for students to learn the critical thinking skills necessary to care for patients with increased acuity, typical in today’s health care system, without jeopardizing patient safety (Koh, 2002; Ravert, 2002; Weis & Guyton-Simmons, 1998). The current nursing shortage and the increased acuity of patients amplify this problem (Roberts, 2000; Weis & Guyton-Simmons, 1998), resulting in a need for higher level critical thinking skills for practitioners. Schools of nursing are rising to meet these challenges by incorporating...
innovative teaching approaches such as the use of high-fidelity human simulation (HFHS) into their program (American Association of Colleges of Nursing, 2004, 2005; Bareford, 2001; Effken & Doyle, 2001; Ravert, 2004). Simulation has been used in health care settings to, for example, develop new surgical skills, evaluate competencies, and train interdisciplinary teams to respond in crisis situations (Robertson et al., 2009; Undre et al., 2007).

In addition to the nursing shortage, there is a nursing faculty shortage (American Association of Colleges of Nursing, 2005). Current trends indicate that because of lack of faculty, many applicants to baccalaureate nursing programs have been denied admission (American Association of Colleges of Nursing, 2005). Unfortunately, this nursing faculty shortage translates into an increased instructor-to-student ratio on the clinical units. This ratio allows little time for students to develop critical thinking skills and practice clinical decision making with appropriate faculty guidance. Experiential learning theory has been used in education of health professionals to emphasize the importance of clinical practice in the educational process (Kolb, 1984). During this clinical practice, to enhance learning and understanding of concepts, the student has the opportunity to apply abstract concepts learned in the classroom. With today’s changing health care environment, there is no guarantee that the clinical unit will provide the learning opportunities necessary to expose the student to low-incidence but highly critical events (Haskvitz & Koop, 2004). The nursing shortage, nursing faculty shortage, and increased ratio of student nurses to clinical faculty on clinical units can jeopardize patient safety.

Schools of nursing are meeting these challenges by incorporating innovative teaching approaches, increasing enrollment, and adding accelerated BSN (A-BSN) curricular options to their programs (American Association of Colleges of Nursing, 2005, 2006; Bareford, 2001; Effken & Doyle, 2001; Ravert, 2004; Roberts, 2000; Weis & Guyton-Simmons, 1998). Historically in nursing education, the “traditional” nursing student has been 18 years old, indicating the “millennial learner” (Mangold, 2007). The learning environment preferred by millennial learners is one that is fun and interactive, involves teamwork, and integrates technology into the learning environment. The current generation of students aged 18 to 24 represents the millennial generation, whose members are proficient with technology and prefer using it while learning. However, the newly developed accelerated programs are offered to students who hold bachelor’s degrees in fields other than nursing and require, on average, three semesters of concentrated instruction to earn a BSN. The addition of these nontraditional programs has changed the composition of the nursing student body in higher education. This changing student composition has direct implications for nursing faculty regarding appropriate pedagogical techniques (American Association of Colleges of Nursing, 2005). These mature A-BSN students often have multiple commitments to family and jobs, in addition to their educational obligations. Characteristics of adult learners include independence and self-motivation, an eagerness to learn that is related to their daily social and professional roles, a need for immediate application of knowledge gained, and the importance of experience laying the foundation for their continued lifelong learning (Knowles, 1984). Therefore, the adult learner requires a focused curriculum that is relevant and “no-nonsense,” with immediate applicability to their lives (American Association of Colleges of Nursing, 2005). The ability to adapt teaching strategies to accommodate multiple generations of students is a challenge to today’s nursing faculty members.

Recent technological advances have enhanced the capability of HFHS to duplicate clinical situations so that students can practice decision-making skills in a controlled environment. Although the use of HFHS has been reported in the literature, the simulators are expensive (Laerdal, n.d.; Medical Education Technologies, n.d.) and can be technologically intimidating to faculty and students, thus impeding their use in schools of nursing (Nehring, Lashley, & Ellis, 2002; Seropian, Brown, Gavilanes, & Driggers, 2004; Ziv, Small, & Wolpe, 2000). Starkweather and Kardong-Edgren (2008) successfully used the diffusion of innovations theory (Rogers, 2003) to guide the implementation of simulation in an undergraduate curriculum. A study conducted by Akhtar-Danesh, Baxter, Valaitis, Stanyon, and Sproul (2009) examined faculty perceptions regarding the implementation of simulation in schools of nursing across Canada and found that although faculty were generally positive regarding this teaching modality, additional support related to time and resources was needed to successfully implement this teaching strategy. Additionally, physical space must be allocated for the storage and operation of the simulator. As academia becomes more learner centered, faculty must begin to examine these new instructional technologies and ensure they meet the learning needs of both their traditional and their nontraditional learners. Although several nursing educators have published about the integration of HFHS into one or two undergraduate courses (Childs & Seppeles, 2006; Kardong-Edgren, Starkweather, & Ward, 2008; Parr & Sweeney, 2006), a paucity of research addresses the integration of simulation across an undergraduate curriculum. The importance of linking scenarios with didactic information, the need for repetition, and the importance of debriefing are
stressed (Kardong-Edgren, Starkweather, & Ward, 2008). Howard, Ross, Mitchell, and Nelson (in press) compared outcomes from simulation with outcomes from the interactive case study approach and found that students in the simulation group had significantly higher knowledge gain than did those in the case study group. Although some research with baccalaureate students has been conducted, more research is needed with respect to the challenges associated with integrating HFHS throughout the nursing curriculum and how students and faculty respond to this new instructional technology (Cioffi, 2001; Ravert, 2002).

For the aforementioned reasons, nursing faculty must begin to explore alternative methods of instruction, including the implementation of innovative technologies to maximize the educational process for nurses. The purpose of this study is to implement the use of HFHS as a teaching and active learning strategy throughout the undergraduate nursing curriculum and evaluate student and faculty perceptions related to this instructional technology. To meet the challenges of nursing education, the Theory of Experiential Learning (Kolb, 1984) and the Simulation Model (Jeffries, 2005) (described below) were utilized to integrate HFHS into the following undergraduate nursing courses: Health Assessment, Management of the Adult I, Management of Adult II, Care of Mothers and Newborns, Mental Health Nursing, and Transition to Professional Practice. Each course requires 84 hours of clinical experience, except for Transition to Professional Practice, which requires 250 hours of clinical experience and Health Assessment, which has a 45-hour lab component. After the initiation of the simulation teaching strategy, student and faculty perceptions were examined to determine whether the cost of implementing this new teaching strategy was justified. Results from this study will inform nurse educators with respect to simulation integration across the curriculum and offer strategies for success.

Theoretical Framework

The ability to transfer theoretical knowledge and apply it in a practice setting leads to the acquisition of knowledge, according to the theory of experiential learning (Kolb, 1984). The traditional methods of teaching in a lecture format, with the instructor sharing facts with the students, is perhaps not the best teaching method for service-learning professions such as nursing (Dewey, 1938; Kolb, 1984). The learners need to be able to apply these abstract classroom concepts during a practical learning experience in order to enhance cognitive development. According to the theory, learning is enhanced when students are actively involved in gaining knowledge through experience with problem solving and decision making, and active reflection is integral to the learning process (Dewey, 1938; Kolb, 1984). Education is a result of experience (Dewey, 1938). The process of reflection is a cognitive process that can be enhanced through a structured learning activity. Kolb’s theory has been used many times in the service learning industry to explain the necessity for the incorporation of practice into the curriculum, such as through nursing students’ clinical experiences. The theory also provides a framework for the use of simulation, in which learners are able to apply their nursing knowledge to the care of a simulated patient within a safe environment, which will lead to the improved acquisition of knowledge. The debriefing experience used with students after the simulation experience directly mirrors the importance of reflection as an integral part of the learning process. During this debriefing experience, learners can cognitively and purposefully think about the experience so that those abstract principles learned in the classroom can become concrete as a result of their application.

The National League for Nursing, in partnership with the Laerdal Corporation, developed a simulation model (Jeffries, 2005) based on empirical and theoretical literature. This model guides health sciences training and education to assist with designing, implementing, and evaluating simulations used for teaching strategies. The simulation model includes five major components: teacher characteristics, student characteristics, educational practices, design characteristics of the simulation (the educational intervention), and outcomes. Within each component, variables exist that should be addressed when designing simulations. For example, teachers need to be facilitators of learning in this learner-centered environment. In addition, teachers may require support with technology and simulation design. Within the simulation environment, learners are expected to be self-motivated and responsible for their own learning, and their roles within the scenario should be clearly defined. Educational practices consist of promoting active learning; providing appropriate feedback; facilitating learner—faculty interaction; and fostering diverse, collaborative learning. A time frame for each scenario should be established. The simulation design focuses on the level of fidelity, or the ability to re-create a real-life situation. Objectives should be clearly defined; learners receive relatively little information at the start of the scenario, with the opportunity to analyze the situation and ask appropriate questions to gather more data. Jeffries suggested that debriefing may be the most powerful tool used after the simulation experience, allowing students to reflect and analyze their performance critically, and adequate time should be provided for this activity. Finally, the outcomes of a simulated experience should be those of knowledge attainment, improved skill performance, learner satisfaction, and increased self-confidence. This framework can direct the research needed to address the questions related to the outcomes and efficacy of simulation-based education. Based on this framework, a standardized programming form was developed and used in all courses during this study.

Kolb’s experiential learning theory and the simulation model have been combined to provide a sound basis to guide simulation research and training. A conceptual framework should be used when designing simulation experiences and research studies (Kaakinen & Arwood, 2009). The simulation model provides the details necessary for the simulation “experience” to be integrated using Kolb’s framework,
thus maximizing the learning potential. This model and framework served as the foundation for designing and implementing simulation in this nursing curriculum.

**Method**

A mixed-methods research design was used to answer the following research questions: what is the undergraduate student’s overall perception of the HFHS experiences included in the curriculum; what is the student’s perception of the HFHS experience according to course; and what are the faculty perceptions related to the implementation of HFHS across the curriculum?

After we received institutional review board approval, each course implemented HFHS uniquely, based on course objectives, student educational level, and sound educational principles, using a standardized programming form given to the simulation coordinator. The course-specific HFHS procedures and results are described in the article. Following the HFHS experience, students completed the simulation evaluation survey to record their perceptions of the educational intervention they received. This questionnaire was designed by Howard et al. (in press), and internal consistency was reported as Cronbach’s alpha = .87, suggesting that the instrument was reliable. For this study, Cronbach’s alpha = .76, suggesting that the tool remains reliable. A 4-point Likert-type scale was used to obtain the students’ perceptions regarding their HFHS.

A qualitative, focus group interview approach was used to examine faculty perceptions regarding the integration of simulation into their courses. Open-ended questions were used to stimulate discussion of the HFHS process used in their courses. After the focus group, the responses were transcribed and analyzed for recurring themes.

**Sample**

The sample consisted of nursing students enrolled in the accelerated baccalaureate (A-BSN) and traditional baccalaureate (BSN) nursing programs from a private university in western Pennsylvania. In total, 151 student encounters with simulation were analyzed. 94 baccalaureate (BSN) students, 57 accelerated baccalaureate (A-BSN) students. It is important to note that some students experienced simulation in multiple classes. In addition, the faculty participants consisted of 6 faculty teaching at the same private university as the students. Four (66%) had doctoral degrees, and 2 (33%) had master’s degrees. All the faculty participants had more than 10 years’ teaching experience at a university setting.

**Findings**

Responses to the simulation evaluation survey are presented through descriptive statistics. Students used a Likert-type scale to respond to the survey statements. The scale ranged from 1 to 4 (1 = strongly disagree, 2 = disagree, 3 = agree, and 4 = strongly agree). Table 1 summarizes these data.

**Overall Student Perceptions (Research Question 1)**

The sample of nursing students (N = 151) responded positively that the simulations helped them better understand concepts (M = 3.68), were a valuable learning experience (M = 3.71), helped to stimulate critical thinking (M = 3.67), and were realistic (M = 3.14). The respondents also felt that the knowledge gained from simulations can be transferred to the clinical setting (M = 3.72) and that the simulations should be included in undergraduate education (M = 3.70). However, although the mean scores indicate agreement with the statement that they experienced nervousness during the simulation (M = 2.96) and that because of the simulation experiences, they will be less nervous in the clinical setting when caring for similar patients (M = 2.99), these mean scores are lower than those for the other items. Finally, students did not agree with the statement that simulations can substitute for actual clinical experiences (M = 2.26).

A one-way ANOVA was performed to determine differences between groups related to the responses on the simulation evaluation survey and the specific nursing course. Significant differences were found between groups with respect to the statements that simulation: helped me understand nursing concepts F(5,145) = 4.18, p = .001; was a valuable learning experience F(5,145) = 4.68; p = .001; stimulated critical thinking abilities F(5,145) = 9.30; p = .000; and was realistic F(5,145) = 5.86; p = .000; should be included in undergraduate education F(5,145) = 2.54; p = .031. In addition, significant differences between groups were identified with respect to the statements: knowledge learned during simulation can be transferred to the clinical setting F(5,145) = 5.11; p = .000 and I was nervous during the simulation experience F(5,145) = 8.00; p = .000. However, no significant differences were found related to “being less nervous in the clinical setting following simulation” and that “simulation can substitute for a clinical experience.” Further description of the course-specific data analyses will be discussed. Table 2 provides detailed representation of the data.

**Description of Course HFHS Integration and Student Perceptions (Research Question 2)**

**Health Assessment**

HFHS was implemented as a teaching strategy in the sophomore-level Nursing Assessment and Health Promotion course. The didactic component of the Nursing Assessment and Health Promotion course is complemented with a laboratory component, affording students an opportunity to practice physical examination and assessment
techniques on fellow lab partners. Although this real-life human interaction is an important component of learning the elements of physical examination, the student population is predominantly young and healthy, which limits the students’ exposure to abnormal assessment findings. Through HFHS, the entry-level students are afforded opportunities to assess and identify abnormal physical findings.

Prior to the simulation activity, students were given a standardized 15-minute orientation to the simulator functions. During the Health Assessment lab, the sophomore students were required to complete the following assessments on the simulator: (a) obtain a set of vital signs, (b) auscultate and identify heart sounds, and (c) auscultate and identify lung sounds. During the vital signs activity, students were instructed to obtain vital signs and determine if the measurements were within normal limits for an adult patient. In an effort to introduce particular concepts and stimulate higher level thinking, the simulator was programmed to include either bradycardia or tachycardia and hypotension or hypertension. Finally, the instructor shared the actual programmed vital signs with each student, offering immediate feedback as to whether the student’s assessment findings were correct. If inaccurate vital signs were obtained, students were afforded additional attempts to demonstrate competency.

During the heart sound activity, students first assessed their lab partners by auscultating over the four valvular areas of the precordium to recognize the s1 and s2 sounds. Students were also taught to correctly assess an apical pulse on their lab partners. The simulator was then used to introduce students to additional heart sounds (such as s3 and s4) and murmurs (both systolic and diastolic). At this level, the students were not expected to diagnose; the goal of the simulation activity was to introduce students to abnormal sounds and teach the students how abnormal sounds differ from normal. The simulator was also programmed to have an irregular heart rhythm, and although the students were not expected to identify the rhythm on the monitor, they were expected to recognize additional sounds and their relationship to s1 and s2.

Similar to the heart sound simulation activity, students were encouraged to differentiate between normal lung sounds and adventitious sounds programmed into the simulator. Students began the activity by identifying normal lung sounds on the simulator. Additionally, students were given time to assess classmates to appreciate anatomical differences. The simulator provided an opportunity to review adventitious sounds. As students identified the adventitious sounds, they were encouraged to describe the underlying mechanism and provide a clinical example for each sound. The simulator provided the basis for improving their overall knowledge base.

The sample for the Nursing Assessment and Health Promotion course (n = 25) included both BSN (n = 12) and A-BSN (n = 13) students enrolled in a 10-week summer session course. Of the 25 sophomore-level students, the majority were women (n = 20) between the ages of 18 and 28 (n = 23). On average, students reported that the simulation experience increased their understanding of concepts (M = 3.56), stimulated critical thinking (M = 3.36), and was a valuable learning experience (M = 3.52). Students were not nervous during the simulation experience (M = 2.16) and revealed that the simulation experience might lessen their anxiety in the clinical setting (M = 2.96). The students agreed that simulation should remain a part of the undergraduate curriculum (M = 3.72); this group in particular reported an appreciation for the opportunity
to identify abnormal heart and lung sounds, as their real-life experience was limited to classmates.

Management of Adult I

Students in this beginning Medical—Surgical Nursing course participated in two simulations during the semester: Care of the patient with heart failure (HF) was offered midsemester, and care of the patient experiencing hypoglycemia was offered at the end of the semester, after students had received the content in class. Students were scheduled for a 1-hour simulation session, with three students in each session, and were informed of the diagnosis of the simulated patient prior to their arrival. On arrival at the simulation lab, the students received another orientation to the lab because time had elapsed since their experiences with health assessment. Following the orientation, the students blindly chose index cards to determine the role they would play in the scenario: primary nurse, secondary nurse, or nursing assistant. After receiving a verbal patient report from the instructor, students began caring for the simulated patient. To document a patient history, students asked the manikin questions, performed a head-to-toe assessment, analyzed the data, and intervened with the simulated patient. A phone call to the primary care provider was necessary to obtain orders, and clear concise communication using the Situation-Background-Assessment-Recommendation (Leonard, Graham, & Bonacum, 2004) format was emphasized. Following the scenario, which lasted approximately 15 minutes, the instructor held a debriefing session with students, during which a recording of the simulation experience was reviewed.

The sample for this course (N = 43) consisted of BSN students (n = 28) and A-BSN students (n = 15). Results of the simulation evaluation survey revealed that, on average, students in this course responded more positively on all items than did the group as a whole, with the exception of the item that the simulation experience would decrease their nervousness when caring for patients in the clinical setting. This suggests that these junior-level students felt that, overall, the simulation was a positive experience.

Management of Adult II

Students in this advanced medical—surgical nursing course participated in the simulation experience with their clinical group of 7 to 8 students. Students first viewed a 10-minute presentation reviewing the care of the patient with acute coronary syndrome and cerebrovascular accident. After this, the students received a brief orientation to the simulation room, with the addition of the crash cart and the cardiac monitor. After this, students were divided into groups of four, and they blindly chose index cards to determine the role they would play in the scenario: primary nurse, secondary nurse, family member, and nursing assistant. The remaining students observed the experience via a live video feed to the skills lab. The instructor gave the students a verbal patient report, and the students began “caring for” the simulated patient. Students asked the simulator questions to document a patient history, performed a head-to-toe assessment, analyzed these data, and intervened with the critically ill patient. The family member was given a script with general questions to ask during

### Table 2

<table>
<thead>
<tr>
<th>Simulation Survey Item</th>
<th>Source of Variance</th>
<th>df</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Helped me better understand concepts</td>
<td>Between Groups</td>
<td>5</td>
<td>4.18 **</td>
</tr>
<tr>
<td></td>
<td>Within Groups</td>
<td>145</td>
<td></td>
</tr>
<tr>
<td>Was a valuable learning experience</td>
<td>Between Groups</td>
<td>5</td>
<td>4.68 **</td>
</tr>
<tr>
<td></td>
<td>Within Groups</td>
<td>145</td>
<td></td>
</tr>
<tr>
<td>Helped to stimulate critical thinking</td>
<td>Between Groups</td>
<td>5</td>
<td>9.30 **</td>
</tr>
<tr>
<td></td>
<td>Within Groups</td>
<td>145</td>
<td></td>
</tr>
<tr>
<td>Was realistic</td>
<td>Between Groups</td>
<td>5</td>
<td>5.86 **</td>
</tr>
<tr>
<td></td>
<td>Within Groups</td>
<td>145</td>
<td></td>
</tr>
<tr>
<td>Knowledge gained can be transferred to the clinical setting</td>
<td>Between Groups</td>
<td>5</td>
<td>5.10 **</td>
</tr>
<tr>
<td></td>
<td>Within Groups</td>
<td>145</td>
<td></td>
</tr>
<tr>
<td>Experienced nervousness during sim</td>
<td>Between Groups</td>
<td>5</td>
<td>8.09 **</td>
</tr>
<tr>
<td></td>
<td>Within Groups</td>
<td>145</td>
<td></td>
</tr>
<tr>
<td>Because of sim, I will be less nervous in the clinical setting when providing care for similar patients</td>
<td>Between Groups</td>
<td>5</td>
<td>0.81</td>
</tr>
<tr>
<td></td>
<td>Within Groups</td>
<td>145</td>
<td></td>
</tr>
<tr>
<td>Can substitute for clinical experiences</td>
<td>Between Groups</td>
<td>5</td>
<td>2.06</td>
</tr>
<tr>
<td></td>
<td>Within Groups</td>
<td>145</td>
<td></td>
</tr>
<tr>
<td>Should be included in undergraduate education</td>
<td>Between Groups</td>
<td>5</td>
<td>2.54 *</td>
</tr>
<tr>
<td></td>
<td>Within Groups</td>
<td>145</td>
<td></td>
</tr>
</tbody>
</table>

* significant p<.05 level
** significant p<.01 level
the scenario. These questions related to the rationale for all of the interventions that were performed during the scenario. For example, the family member would ask, “Why are you giving that nitroglycerin?” or “Why is my husband receiving oxygen?” These questions were meant to stimulate critical thinking by the students and give them an opportunity to practice therapeutic communication skills with the family member and patient. Following the scenario, which lasted approximately 15 minutes, the students and instructor reviewed the videotape, stopping frequently to reinforce important concepts and clarify difficult issues. This debriefing period could last up to 45 minutes, depending on the student performance. After this period, the students were given a 5-minute break, then once again were assigned roles by choosing index cards, and the simulation experience was repeated with the cerebrovascular accident scenario. If the student observed in the first scenario, they were assigned a role in the second. Therefore, students had the opportunity to both observe and participate in the scenarios. Both simulation experiences lasted approximately 2.5 hours.

A-BSN (n = 18) students participated in the simulations, and survey data revealed mean scores higher than the entire group with respect to the following statements: “simulation helped to stimulate critical thinking” (M = 3.72), “can substitute for clinical experiences” (M = 2.33), and “I experienced nervousness with the simulation” (M = 3.28). However, most scores for this group were lower than the reported mean scores for the entire group, which suggests that this group did not respond as favorably to the simulation experience as others did.

Care of Mothers and Newborns
In lieu of a single clinical postconference, students were required to participate in a 60-minute HFHS experience with three students in each group. The objective for this simulation experience was to provide interventions for a postpartum patient experiencing magnesium sulfate toxicity. For the scenarios, the simulator was presented as a postpartum woman. A blonde wig was applied, the breast models were placed in the chest, and a fundus from a low-fidelity simulator was placed in the lower abdominal area and padded with small towels to increase realism. Mesh underwear and a peripad with moderate lochia rubra (dark red colored water) were applied. The “patient” had an IV running via pump with two solutions, including Lactated Ringers and magnesium sulfate. A Foley catheter was in place, with dark urine in the drainage bag. Calcium gluconate and hydralazine were available in the nearby medication cart. Vital signs were set to represent a patient experiencing magnesium toxicity.

Students were given roles to play, including primary nurse, patient’s spouse, and nursing assistant. The scenario began at the change of shift report at 7 a.m. Background information was given in report, and the students began the scenario. In addition, the student playing the role of spouse was given a list of questions to ask the primary nurse which were meant to stimulate critical thinking. The course instructor played the roles of patient (speaking through the simulator microphone) and physician and lab personnel via phone. Following the experience, a debriefing session was held.

Student evaluations of this simulation experience were very similar to those for the other courses. The sample group (N = 21) included A-BSN (n = 11) and BSN (n = 10) students. Students found it a valuable learning experience (M = 3.62) that helped them understand concepts (M = 3.57) and stimulated critical thinking (M = 3.67). These mean scores were all lower than or equal to those of the group as a whole. The lowest means, though still in the mildly positive range, were found for realism (M = 3.00), which possibly reflects the male simulator presenting as a female patient. The responses related to the opinion that simulation can substitute for clinical experiences (M = 2.48) was significantly higher than the group results. The strongest positive feedback was in terms of helping to transfer knowledge to the clinical setting (M = 3.76), comparable to the group results.

Mental Health
Prior to beginning the mental health nursing clinical rotation, students were provided with a 1-hour lecture on communication skills, emphasizing communicating with a patient diagnosed with a mental illness. Students were then given an orientation to HFHS and a clinical report of the “patient’s” status that included patient’s age, date of admission, admitting diagnosis, past psychiatric history, pertinent medical history, and nursing report from the previous shift. There were two HFHS scenarios: one patient experiencing symptoms of depression and suicidal thoughts and the other patient admitted with anxiety and possible substance use problems. During the HFHS educational intervention, the instructor assumed the role of the patient. Each student was assigned the role of the nurse and engaged in therapeutic communication with the simulator based on the information that was provided to the student during the communication skills lecture. Each student interaction was videotaped, and then after completion of all interactions, the students and the instructor reviewed and discussed the videotaped interactions. This provided the students an opportunity to reflect and receive feedback on their performance as well as their peers’ performances.

The sample for this course (N = 38) consisted entirely of BSN students. Implementation of HFHS in the mental health nursing course is difficult, primarily related to the inability of the simulator to display nonverbal communication. Per the results of the survey, students in the mental health course had the lowest Likert score (M = 2.84), compared with the other courses, in relation to the realism of the simulation. Despite the lack of realism, students still saw value in the other areas of the simulation. Students...
responded favorably to the simulation experience, with the highest item being that they viewed the simulation as a valuable learning experience ($M = 3.63$). They also felt that simulation should be included in the curriculum ($M = 3.58$) and that the knowledge gained from the simulation can be transferred to the clinical setting ($M = 3.58$). The item that the students disagreed on was that simulation can be a substitute for experience in the hospital ($M = 1.92$).

**Transition to Professional Practice**

Six senior-level A-BSN nursing students participated in a scenario involving a patient experiencing a pulmonary embolus following left knee arthroplasty. This experience was voluntary for the students and contributed to their clinical hours for their senior capstone transitions experience. Prior to the students’ arrival, the manikin’s left knee was bandaged, and the vital signs were programmed with tachypnea, hypertension, and tachycardia. Students chose the role of primary nurse, nursing assistant, or family member and were given a brief report of the patient’s condition, with the understanding that the patient was initially stable. The family member was given a script that outlined specific questions to ask during the course of the scenario and that were meant to stimulate critical thinking. The nursing assistant was to perform within their scope of practice, and the primary nurse was to delegate specific tasks for the nursing assistant to perform during the course of the scenario. On the students’ entering the room, the simulator exclaimed, “I suddenly feel like I can’t breathe. It hurts to take in a deep breath.” Students obtained a full set of vital signs, including oxygen saturation and pain scale, performed a focused assessment, elevated the head of the bed, applied oxygen via face mask, then planned care accordingly in consultation with the physician, who was available via telephone. The physician then ordered a dose of heparin that was weight based. The students were expected to calculate the dose of heparin to be given via a bolus dose, then calculate the intravenous drip rate based on the concentration of heparin available. All these interventions were performed while the students continued to assess vital signs and support the patient’s oxygenation. Following the scenario, which lasted approximately 15 minutes, the students reviewed a digital recording of their performance during the debriefing process, and their performance was both peer reviewed and instructor critiqued. The nursing students’ performance related to steps in the nursing process was evaluated, in addition to the skills related to communication with both the family member and the nursing assistant and appropriate delegation of tasks to the nursing assistant.

The sample size for this course ($N = 6$) consisted entirely of A-BSN students. Data analysis revealed higher mean scores when compared with the group as a whole with respect to the following statements: “Simulation helped me to better understand concepts” ($M = 3.83$), “was a valuable learning experience” ($M = 3.83$), “helped to stimulate critical thinking” ($M = 3.83$), “was realistic” ($M = 3.67$), “can substitute for clinical experiences” ($M = 3.00$), and “should be included in undergraduate education” ($M = 4.00$). These students also felt that because of the simulation experience, they would feel less nervous in the clinical setting when caring for similar patients ($M = 3.50$), even though the mean scores for experiencing nervousness during the simulation ($M = 2.82$) were lower than those of the group as a whole. However, the small sample size limits the generalizability of these findings. Because these were graduating senior students, these findings suggest that perhaps their previous experience with simulation as a learning environment within the curriculum may have contributed to their decreased level of anxiety during the scenarios, compared with the group as a whole.

**Faculty Perceptions (Research Question 3)**

Following the completion of simulations for all the courses, the four faculty involved in the project participated in a focus group discussion. Two other faculty members, who had participated in simulation within the year, were surveyed via e-mail because they were unable to attend the focus group.

Questions were asked regarding perceptions of simulation, challenges faced, what worked well, and suggestions for improvement. Positive perceptions included the following: The experience was standardized for all students; the use of one programming form ensured consistency across the curriculum; scenarios could match course content and enhance learning of the material; scenarios could be used to allow students the opportunity to intervene in high-risk but low-occurrence situations in the acute care setting; and communication skills with peers, health care providers, and family members could be practiced. Common challenges that emerged included inexperience with technology, time constraints with learning the technology, time constraints for scheduling students, inadequate space to implement HFHS, difficulties related to realism, and the appropriate pairing of students in groups to enhance learning.

Faculty offered several suggestions for improvement in the implementation of simulation across the curriculum. All agreed that a full-time coordinator would be ideal. The coordinator would examine the curriculum, identify appropriate simulations to be used, and assist with running the simulations. This coordinator could also be responsible for teaching new faculty members how to use the technology and how to incorporate simulation in their courses. Dedicated technical support was viewed as imperative, as was adequate space set apart from the classrooms and labs. One-way mirrors around the simulation area would allow viewing of the entire simulation without disruption of the experience. In this way, many more students could benefit from simulation without actually participating in the scenario. Web-based scheduling programs could assist in scheduling the facilities, decreasing the number of hours the faculty member spent in coordinating experiences.
Faculty members also suggested the use of simulation to provide alternative clinical experiences when actual clinical placement is difficult and also for evaluation of practical performance, but they agreed that adequate personnel would be necessary to implement these suggestions. All agreed that the standardized programming form assisted with the implementation.

Implications for Nursing Education and Research

Schools of nursing nationwide are reporting difficulty securing clinical placements for nursing students; consequently, schools are looking for alternative experiences for student nurses, including simulation. Course-related survey results were used to make changes to the scenarios as needed. Additionally, the learning environment preferred by different generations of learners can create a challenge for faculty members. Nearly 90% (n = 133) of the students who participated in the study were millennial learners (i.e., between 18 and 24 years old). HFHS involves all the components of a learner-centered environment preferred by millennial learners. This may explain why students responded so positively to the simulation evaluation survey and recommended that HFHS be included in other courses. Nurse educators are challenged to incorporate this type of learning experience in other clinical courses in order to meet the needs of future students. The needs and learning styles of different generations of learners should be considered when you implement any instructional strategy within your curriculum. As higher education becomes more learner focused, the results of this study support the use of HFHS in our curriculum, as evidenced by the simulation evaluation survey. The majority of students reported high levels of satisfaction related to the HFHS experience and felt that the learning that occurred could be transferred to the clinical setting.

Incorporating simulation across the curriculum has important administrative implications as well, which were supported by the results of the faculty focus groups. Faculty members need time for training to learn this technology. Training time may be given in the form of reimbursing faculty for attending simulation conferences or in workload reduction so that faculty can develop simulation scenarios. There are also costs related to purchasing and maintaining simulation equipment, as well as space constraints, particularly in smaller institutions. In addition, funds are needed to purchase additional supplies, which could increase the realism of the scenarios, including theatrical supplies, moulage, and health care environmental supplies. Funding sources can be in the form of grants, lab fees, administrative line items, or donors. The results of the faculty focus group support the suggestions of previous researchers regarding administrative support (Seropian et al., 2004).

Student nervousness during the simulation activity was one area that was identified in all nursing courses. Faculty conducting the simulations should clearly explain the objectives of the simulation experience and whether the objectives are strictly an educational intervention or an evaluative measure. Students in this study were assured that the objective was strictly an educational experience and that they were not being graded on their performance during the simulation. Additionally, students were given positive reinforcement during the debriefing process and allowed to share their feelings and concerns regarding the simulation experience. The results revealed a decrease in nervousness as the students progressed throughout the curriculum, suggesting that implementing simulation early in a curriculum may be of benefit.

Conclusions

The results of this study support the integration of HFHS experiences throughout the curriculum, as evidenced by positive responses from students through the simulation evaluation survey. Although students felt positively that simulation should be included in the curriculum, they did not feel it should totally substitute for all clinical experiences, and students appeared to become more comfortable with simulation as they experienced more scenarios in the curriculum. In addition, faculty viewed the HFHS experiences as positive but offered suggestions for improvement. The following should be included when schools implement simulation across the curriculum: a dedicated simulation coordinator or champion, technological support, adequate facilities, standardized programming forms, funds for supplies that enhance realism, and workload release time for faculty to gain understanding related to the use of this innovative yet highly technical teaching technique. More research is needed to document actual learning outcomes, best practices related to implementation of simulation, and differences in student perceptions related to their age and type of curriculum. With appropriate faculty support, both financial and developmental, and a standardized framework, HFHS can be implemented successfully within nursing education programs.

References


