Featured Article

High-fidelity Simulation in Teaching Problem Solving to 1st-Year Nursing Students
A Novel Use of the Nursing Process

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KEYWORDS
technology; high fidelity simulation; problem solving; nursing process; nursing education

Abstract
Background: The efficacy of using high-fidelity simulation to facilitate 1st-year nursing students’ learning of problem-solving skills has not been established.
Method: The authors tested the efficacy of using high-fidelity simulation to facilitate understanding of problem-solving skills among 1st-year nursing students. Knowledge and attitude changes were evaluated using pre- and posttests.
Results/Conclusions: Of students who completed the pre- and postsimulation assessments, 82% showed a significant gain in knowledge. All students (114) showed a significant positive difference for multiple attitudinal items, including critical thinking skills, overall nursing knowledge, confidence, and communication. Facilitating acquisition of problem solving through the use of high-fidelity simulation is effective and welcomed by all participants in this study cohort. More research is needed to determine the long-term effects of this method.

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Introduction

Problem-solving and critical-thinking skills underlie all nursing practice. A key component of students’ competent practice of these skills is the opportunity to rehearse them in a realistic yet safe clinical environment. In addition, in view of the current and projected nursing shortage, interactive courses that can both attract and hold the interest of young students may facilitate such students’ successful completion of nursing school and lead to better preparation on entry and a sustained career in the profession. Based on this understanding of how to best facilitate students’ acquisition of problem-solving skills in a way that meets the needs of young, incoming students who will constitute the future of the nursing profession, we hypothesized that facilitating an understanding of the nursing problem-solving process and critical thinking skills through a hands-on learning approach would help 1st-year undergraduate nursing students acquire a more thorough foundation and higher level of comfort for future clinical placements.

Over the past few decades, baccalaureate nursing education has changed to better prepare students for professional practice in complex real-world settings. Education has been gradually changing its focus to not only include but also
highlight skills such as critical thinking and problem solving (Angel, Duffey, & Belyea, 2000; Jerlock, Falk, & Severinsson, 2003). Problem-solving skills are crucial to all facets of nursing practice (American Association of Colleges of Nursing, 2008; Koch & Speers, 1997; Mason & Attree, 1997). These skills, often taught through application of the nursing process, tend to be a focus of advanced baccalaureate education because research indicates that novice students frequently have difficulty grasping the theoretical elements of this construct in practice (Potter et al., 2004; Salas Iglesias, 2003). Nurses’ acquisition of problem-solving skills is impeded by numerous factors, including the lack of opportunities to practice such skills and the challenges instructors face in teaching such skills in realistic situations (Allen, Rubenfeld, & Scheffer, 2004; Ferguson, Beeman, Eichorn, Jaramillo, & Wright, 2004; Mangena & Chabeli, 2005). However, the centrality of problem-solving skills to nursing practice makes it imperative that nurse educators do everything possible to effectively teach problem-solving and critical thinking as early as possible in a nursing student’s career. The use of high-fidelity simulation in a 1st-year course meets this need.

Problem Solving and Critical Thinking in the Nursing Profession

Problem-solving and critical-thinking skills form the foundation of all nursing practice (Chabeli, 2007) and are essential for safe and competent nursing care (Brown, Alverson, & Pepa, 2001; Chabeli, 2007; Mangena & Chabeli, 2005). These skills are often taught through application of the nursing process model, the scientific basis for nursing research, practice, and theory (Mason & Attree, 1997). The nursing process is a five- or six-step process that typically includes assessment, diagnosis, planning, implementation, and evaluation (ADPIE). Adding communication as a sixth step (ADPIE-C) emphasizes that communication skills are widely recognized as key to safe and effective nursing practice (Leonard, Graham, & Bonacum, 2004; Rosenzweig et al., 2008). The steps of the nursing process are applied in a cyclical manner (see Figure 1) and are designed to teach students to be responsive to new information and challenges that arise during the course of patient care (O’Donnell & Goode, 2008).

Although described as a linear process with discrete phases, application of the nursing process actually involves constant interplay among all the phases and a need to evaluate and reevaluate, using critical thinking skills, during the entire process (Chabeli, 2007). Through learning and applying this process, students can develop the critical-thinking and communication skills necessary to cluster information, form appropriate nursing diagnoses, and make competent nursing decisions (Bowles, 2000; Chabeli, 2007; Koch & Speers, 1997; Mason & Attree, 1997).

Educational Considerations in Teaching Critical Thinking and Problem Solving

Teaching and Learning

Despite an emphasis on critical-thinking and problem-solving skills in nursing education, educators are not conveying these core aspects of nursing practice to students in a way that translates into enduring skills. One study indicated that as many as 65% of new nurses lack the skills needed to make correct clinical decisions when faced with a videotaped patient care scenario (del Bueno, 2005). Although additional research-based studies are needed to establish which methods are most effective in improving knowledge, skills, and attitudes related to critical-thinking and problem-solving skills (Angel et al., 2000; del Bueno, 2005), it is well accepted that experiential learning is the most effective way to teach clinical skills (Rhodes & Curran, 2005; Waldner & Olson, 2007).

This interactive learning can take many forms, but the most often cited method that is both popular with students and effective at transferring skill is hands-on simulation work, individually or in small groups (Howard, 2007; Jeffries & Rizzolo, 2006; Medley & Horne, 2005; Parr &
Sweeney, 2006). Based on this understanding of how students best acquire information and skills, it appears that one of the most effective ways to learn problem solving and critical thinking would be a combination of lecture-based and real-life or simulated experiences that will allow students to practice concepts learned in the classroom.

In addition to the fact that simulation can be an effective adjunct to traditional teaching methods, it is also an interactive learning format that can meet the needs of today’s technologically experienced students (Prensky, 2001). A wealth of information on the “net generation” (i.e., individuals born after 1980) indicates that they tend to feel more comfortable working in groups (Howe & Strauss, 2000); they are experiential learners; they can easily integrate the virtual and physical (Frand, 2000); they expect rapid responses (Prensky, 2001); and they work well with structure (Howe & Strauss, 2000). If educators design learning activities that meet the needs of this generation of students, they can help retain students in nursing programs and, eventually, mitigate nursing workforce shortages. In addition, offering more skill-based learning in an undergraduate nursing program can help better prepare nursing students for real-world practice, thus easing the often difficult transition from student to nurse (Rhodes & Curran, 2005).

Communication Skills

The importance of communication skills in nursing is highlighted in numerous educational practice and competency documents (American Association of Colleges of Nursing, 2005a; 2008; Commission on Collegiate Nursing Education, 2005), featured prominently in the American Association of Critical Care Nurses’ (2005) Standards for Establishing and Sustaining Healthy Work Environments, and associated with increased quality of care and more positive patient outcomes (Institute of Medicine, 2001). In addition, communication often determines patient compliance, satisfaction, and recovery and, as such, plays an important role in the nursing process (Chant, Jenkins, Randle, & Russell, 2002; Chant, Jenkins, Randle, Russell, & Webb, 2002). Yet in current nursing curricula, little education or training is devoted to this topic (Allison, 2007). However, research indicates that communication skills can be effectively acquired by nursing students through the use of role-playing and simulation (Chant, Jenkins, Randle, & Russell, 2002; Chant, Jenkins, Randle, Russell, & Webb, 2002; Holtschneider, 2007).

Simulation

Simulation, including role-playing and other nonpatient forms of interaction, has been a learning method incorporated into nursing education for many decades and is a widely recognized method for facilitating acquisition of thinking skills as applied in reality-based situations (Gordon, Wilkerson, Shaffer, & Armstrong, 2001; Hotchkiss & Mendoza, 2001; Issenberg et al., 1999; O’Donnell & Goode, 2008; Rauen, 2004; Seropian, Brown, Gavilanes, & Driggers, 2004; Wakefield, Cooke, & Boggis, 2003). In addition, the use of simulation technology in education guarantees students a surrogate hands-on clinical experience managing rare or high-risk patient situations (Spunt, Foster, & Adams, 2004), incorporates an opportunity for self-reflection and assessment not available in actual clinical placements (Fontaine & Norton, 2001; Mayne et al., 2004), generates student interest (Feingold, Calaluce, & Kallen, 2004; Reeves, 2008; Schoening, Sittner, & Todd, 2006), and is adaptable to individual student needs (Yaeger et al., 2004). The use of this technology offers educators a high degree of flexibility in teaching clinical skills in that experiences do not have to be designed around the care of real patients. Furthermore, the context is similar to actual clinical experiences (Yaeger et al., 2004), and with careful planning, simulation education can extend faculty resources, thus helping mitigate the nursing faculty shortage (American Association of Colleges of Nursing, 2005b; Curl, Smith, Chisholm, Hamilton, & McGee, 2007; Schoening et al., 2006).

Although simulation offers many educational benefits, the approach has only recently been used to facilitate learning for undergraduate nursing students (Henneman & Cunningham, 2005; Larew, Lessans, Spunt, Foster, & Covington, 2006; Peteani, 2004; Burns, Hoffman, & O’Donnell, 2005). A majority of the literature appears to indicate that simulation technology is used mainly with more advanced students. However, new research indicates that it is likely that the earlier that critical-thinking and problem-solving skills are introduced to students, the better (Burns & Foley, 2005). Taking into account the effectiveness of high-fidelity simulation to facilitate acquisition of nursing students’ problem-solving and critical-thinking skills, we developed an innovative plan to provide 1st-year students with an interactive learning experience. We based our study on the hypothesis that the use of high-fidelity simulation in addition to traditional lecture content would be an effective method to improve the knowledge and attitudes of nursing students in relation to the nursing process. The program described below is one among very few programs (Jeffries & Rizzolo, 2006) demonstrating the effectiveness of high-fidelity simulation in introducing the nursing process at a very early stage in a nursing student’s educational career.

Method

Design and Sample

The School of Nursing faculty developed a high-fidelity simulation exercise as an adjunct to traditional didactic lecture to facilitate understanding of the ADPIE-C problem-solving approach among 1st-year undergraduate nursing students. All 1st-year nursing students enrolled in the
Introduction to Professional Nursing, NUR 0051, course participated in the simulation exercises. Initially, the simulation sessions were pilot tested, and faculty identified a positive impact on students’ knowledge and attitudes. For the next course administration, the faculty obtained institutional review board approval. A pre—post test design was used to test the hypothesis that adding high-fidelity simulation to traditional lecture is an effective method of facilitating 1st-year nursing students’ knowledge of the nursing process. In addition, the authors evaluated the impact of a simulation experience on student nurses’ attitudes toward use of the nursing process. A separate pre—post simulation survey was developed to test for attitudinal changes. The description below of the project design is offered, not as a means for other schools to exactly replicate the program implemented by School of Nursing faculty, but rather to serve as a guideline that other schools can use to develop their own programs that incorporate simulation experiences, because we understand that different schools will have different needs and may use different technologies to provide simulation-based education.

All potential participants (N = 125) were 1st-year undergraduate students in the bachelor of science in nursing (BSN) program. Instructors read a research script explaining risks, benefits, and conditions within the study and allowed students to self-select as to their participation. The students had no previous clinical experience prior to simulation, being in their second semester of study.

Instruments

All data were collected and maintained under strict anonymity through the use of unique alphanumeric identifiers for each student. Knowledge improvement was measured with pre- and posttests composed of multiple-choice items referenced to standardized resources and designed to evaluate students’ knowledge and understanding of the nursing process and specific patient states encountered in the scenarios, such as chest pain, hypothermia, intoxication, traumatic injury, and psychosocial distress. All knowledge test items were developed and selected through consensus of an expert faculty and clinician panel and referenced to the steps and core concepts of the nursing process (ADPIE).²

A 14-item attitude instrument was developed through faculty consensus to evaluate attitudinal change pre- and postsimulation. Items were separated into cognitive, affective, psychomotor, communication, and safety perceptions.

These areas directly relate to domain areas needed in implementing the nursing process as well as in perceptions of the simulation experience. The items and areas were adapted with permission from an attitudinal instrument designated as the Health Professional Simulation Education Assessment Tool first described by O’Donnell, Goode, et al. (2006). This instrument was originally derived with the use of items that had been evaluated by the Office for Measurement and Evaluation at the University of Pittsburgh and the Winter Institute for Simulation Education and Research of the University of Pittsburgh. All responses used a Likert-type scale that ranged from 1 = strongly agree to 5 = strongly disagree.

Procedure

During the Introduction to Professional Nursing course, all students received a 2-hour lecture on the nursing process. No other formal preparation materials were provided prior to the simulation experience.

One week after the lecture, students completed an unannounced 10-item multiple-choice pretest to assess knowledge and understanding of the nursing process. This assessment was administered under standard testing conditions but did not count toward the summative course grade. Following the pretest, students participated in a 3-hour simulation experience in the School of Nursing Simulation Laboratory (SimLab). The simulation used a high-fidelity simulation manikin as the patient. Two faculty at the School of Nursing acted as chief facilitators of the simulation experience. One professor directed the simulation scenarios and the audiovisual feed from the SimLab control room while the other facilitated the classroom activities and debriefing sessions. Because of their limited experience in providing care and using the nursing process, 1st-year students were guided through the simulation experience by graduate nursing students. Prior to the simulation experiences, the primary faculty member for the course delivered a 1-hour briefing to participating graduate students to orient them to the simulation scenarios and exactly what would be expected of them in their role as facilitators throughout the simulation exercises. During the simulation events, one graduate student remained in the classroom with the students and assisted the faculty member in facilitating discussion of the observed scenarios. On scenario completion, the faculty conducted a structured debriefing. One graduate student was positioned in the control room to support the faculty member acting as the scenario director. This student provided the voice of the patient and was responsible for controlling manikin responses. Another graduate student was stationed in the SimLab itself to assist the student groups during the scenarios, and the remaining graduate students escorted students between the classroom and SimLab and briefed each group before the group members entered the lab.

¹ All students were required to participate in the simulation experience, but only students who filled out the attitudinal surveys and knowledge test results were considered participants in the study.
² The communication aspect of the six-step nursing process, ADPIE-C, was evaluated during simulation and incorporated into the attitudinal survey.
Faculty developed a total of 12 evolving patient scenarios based on two patient cases. For the first case, caring for an intoxicated trauma patient, the SimLab was set up as a room in an emergency department. For the second case, a postoperative patient experiencing a myocardial infarction, the SimLab environment resembled a medical—surgical patient room. School of Nursing faculty intentionally employed complex scenarios that would not typically be used with 1st-year students so that the students would have an opportunity to observe and experience the complexity of applying the nursing process and thus gain a greater understanding of the process at the earliest stage in their nursing education. Scenarios were introduced using a brief patient history with chief complaint.

To maximize learning, the simulated patient condition was changed for each student group. The two patient cases were altered six times, for a total of 12 unique opportunities to apply the steps of the nursing process. For example, although students initially assessed one patient as intoxicated, secondary assessment would lead to the discovery of a fractured arm. When the students administered pain medication for the arm, the patient (a man) became too sedated, and the students had to resuscitate him. These 12 assessment and care opportunities were used to demonstrate the need for constant reevaluation and application of the nursing process. Each assessment and care opportunity took approximately 5 minutes to complete. Students were divided into groups of six, and each group handled one assessment and care opportunity while their classmates observed from a remote classroom linked with full audiovisual connectivity to the SimLab via a camera—microphone system. Each student group was initiated into the simulation experience with a brief description of the change in events.

During the scenarios, the graduate student in the SimLab received information via headset from the scenario director in the SimLab control room as needed. The graduate students in the SimLab then guided the undergraduate students through the ADPIE-C steps. Facilitation included use of cues and prompts to help the undergraduate students in the use of the process. The ADPIE-C construct was also used as the programming template within the human simulator software. The director of the scenario coded each group’s performance according to the template, and a debriefing log was automatically generated within the program. For example, assessment started with the basics, A-airway, B-breathing, and C-circulation. Students were instructed to develop a nursing diagnosis in the manner of “nursing diagnosis… related to… as evidenced by…” in order to validate the diagnosis and related plan of care. Students demonstrated their knowledge and use of proper communication techniques through telephone communications with a graduate student in the role of a physician as well as face-to-face contacts with family members and the patient. As a reference, students were supplied with pocket cards outlining the steps of the nursing process used in the simulation experience. Participating faculty chose the specific care goals and priorities that were incorporated into the scenarios. Although students had a chance to demonstrate use of problem-solving skills, the main focus of the simulation exercise was to introduce students to the concept of the nursing process. Therefore, students were not evaluated on their skill in applying each step of the process itself.

Students learned the ADPIE-C problem-solving method through direct participation in 1 of the 12 scenarios. This learning was supplemented by the students’ observing the other students participate in each of the remaining 11 scenarios through a remote classroom audiovisual feed, by answering questions about the events via audience response technology, and by participating in a discussion facilitated by a faculty member and a graduate student. Important points were documented on flip charts positioned throughout the classroom.

Following each assessment and care opportunity, the six-student team joined their peers in the remote classroom for a short debriefing session. The ADPIE-C debriefing log from the SimLab was used to guide the debriefing session, and students were also instructed to describe their experience according to the ADPIE-C elements. Reflection on appropriate steps of the nursing process was emphasized. Questions were used to provoke critical analysis depending on student reactions and included, as needed, What information is missing? What is your main priority? What should you do next? How would you evaluate your interventions? Finally, a PowerPoint presentation corresponding to the steps of the nursing process for each scenario was shown at the end of each debriefing to reemphasize the key steps.

The week following the simulation experience, an unannounced, 10-question multiple-choice posttest was administered to evaluate student understanding, postsimulation, of the ADPIE-C problem-solving approach to care.

**Statistical Analysis**

Data analysis was performed using SPSS 11.0. A total of 84 students completed both the pre- and posttest measuring knowledge. Paired knowledge scores were analyzed using the nonparametric Wilcoxon’s signed rank test because the data were not normally distributed. A total of 114 students completed the pre- and posttest attitudinal survey. These scores were analyzed using a paired samples t test.

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3 There were 125 students enrolled in the Introduction to Nursing course. Only 84 students completed both pre- and posttest assessments for purposes of analysis. Only 114 students completed the pre and post attitude assessments. In accordance with the IRB approval, students were not required to participate.
Results

The class \((N = 125)\), consisted of all students enrolled in Introduction to Professional Nursing, NUR 0051. The composition of the class was 115 (92%) Caucasian and female, 9 (7%) Caucasian and male, and 1 (1%) African American and male. All students but one were between 18 and 22 years of age.

Knowledge

The student cohort \((n = 84)\) knowledge attainment was significant \((z = -6.602, p < .001)\), with 69 students gaining in knowledge, 8 decreasing in knowledge, and 7 maintaining pretest knowledge levels. This supports the hypothesis that using high-fidelity simulation in addition to traditional lecture is an effective method of facilitating student knowledge acquisition of the ADPIE-C problem-solving approach.

Attitude

Students \((n = 114)\) demonstrated an improvement on 6 of the 14 survey items as measured by a paired samples \(t\) test \((p < .05; \text{Table 1})\). These items were critical-thinking skills for use in patient care \((p < .0001)\), overall nursing knowledge \((p = .002)\), specific skills in caring for patients \((p = .0003)\), confidence in nursing skills \((p < .0001)\), communication with patients \((p = .04)\), and communication with other team members \((p < .0001)\). There were no changes on the pre- and postattitude scores on the questions regarding understanding of each step of the nursing process, understanding of how each step of the nursing process is applied, anxiety about being observed by peers, and anxiety about being observed by faculty. The lack of change on the pre- to postattitude tool regarding knowledge of the nursing process is not unexpected because students took the presimulation attitude assessment immediately after they received a lecture orienting them to the steps of the nursing process. The remaining three questions were neutral issues and, as expected, also showed no change from pre- to posttest. These items included whether the objectives of the exercise were met, whether the scenarios seemed realistic, and whether the scenarios seemed similar to actual clinical situations.

Feedback on end-of-course evaluations indicated that students were very satisfied with the simulation experience. One student noted that she believed “the simulation was very helpful—gave us an idea of what’s to come.” Another student felt that the simulation experience helped him better prepare for the educational experiences in which he would participate during his 2nd year (of a 4-year program). Other student comments included the following: “I felt that the simulation exercise gave me a good understanding of what it will be like in clinicals.” “It gave a hands-on approach to my learning.” “I loved the simulation. It got me excited about clinicals.” Many of the comments regarding the simulation were positive, but not all students appreciated all aspects of the simulation experience in its entirety. Specifically, one student noted, “I didn’t think I learned by watching other students,” and another student commented that during the simulation she was “a little scared.”

Limitations

This study was a prospective design incorporating pre- and postsimulation measurement of 1st-year undergraduate nursing student knowledge and attitudes. No comparison group was used; students served as their own controls. No head-to-head comparison was made between the simulation intervention and alternative educational approaches.

Table 1  Change between Pre- and Postsimulation Attitude Scores on the Health Professional Simulation Education Assessment Tool \((N = 114)\)

<table>
<thead>
<tr>
<th>Items</th>
<th>M</th>
<th>SD</th>
<th>95% Confidence Interval of the Difference</th>
<th>t</th>
<th>P (two-tailed)</th>
</tr>
</thead>
<tbody>
<tr>
<td>The simulation modules helped me to develop critical thinking skills for use in patient care.</td>
<td>0.68</td>
<td>1.09</td>
<td>0.47 - 0.88</td>
<td>6.60</td>
<td>&lt;.01</td>
</tr>
<tr>
<td>The simulation modules improved my overall nursing knowledge base.</td>
<td>0.35</td>
<td>1.18</td>
<td>0.13 - 0.57</td>
<td>3.17</td>
<td>0.00</td>
</tr>
<tr>
<td>I gained specific skills in caring for patients during the simulation modules.</td>
<td>0.47</td>
<td>1.34</td>
<td>0.22 - 0.71</td>
<td>3.71</td>
<td>&lt;.01</td>
</tr>
<tr>
<td>I feel more confident in my nursing skills after participating in the simulation modules.</td>
<td>0.58</td>
<td>1.20</td>
<td>0.35 - 0.80</td>
<td>5.05</td>
<td>&lt;.01</td>
</tr>
<tr>
<td>My communication with patients improved after participating in the simulation modules.</td>
<td>0.25</td>
<td>1.28</td>
<td>0.01 - 0.49</td>
<td>2.06</td>
<td>0.04</td>
</tr>
<tr>
<td>My communication with other team members improved after participating in the simulation modules.</td>
<td>0.68</td>
<td>1.1</td>
<td>0.48 - 0.89</td>
<td>6.64</td>
<td>&lt;.01</td>
</tr>
</tbody>
</table>
Discussion

Use of a realistic context incorporating high-fidelity simulation manikins is a recent advancement in undergraduate nursing education (Jeffries & Rizzolo, 2006). In contrast to traditional didactic lectures in which students learn passively, this form of simulation allows a student to actively learn and practice all aspects of a problem-solving process, in this case ADPIE-C. Active learning that engages the students is especially important in today’s nursing education environment of “net generation” students who need to prepare for an increasingly complex work environment with limited skill-based opportunities to do so (Rhodes & Curran, 2005). Course evaluations completed by students indicated high satisfaction with this educational method, showing that the simulation experience was both appropriate to and appreciated by these net generation learners. Researchers have found that undergraduate students who use high-fidelity simulation are more satisfied with their learning experience than students using a static manikin or paper-and-pencil case studies (Jeffries & Rizzolo, 2006). Additionally, more interactive learning experiences designed for early-career students can help ensure that students later in their student careers will not feel anxiety about clinical experiences, which might keep them from effectively learning higher-order skills and information (Haffner & Raingrubber, 1998; White, 2003). And of course, effective learning of higher-order skills and information can eventually affect students’ ultimate preparedness for and success in the workplace—both important aspects in mitigating the current workforce shortage.

In addition to the fact that interactive learning experiences will appeal to a majority of current students and may have implications for future success, both academic and job-related, the use of this educational approach provides students with clinical experiences that they otherwise might not get. Because of both a nursing faculty shortage (American Association of Colleges of Nursing, 2005b) and a nursing workforce shortage, and therefore limited human resources for actual clinical practice experiences, simulated experiences may constitute a large portion of clinical time in which a student may be able to participate before any off-site clinical requirements.

The literature identifies many aspects of the simulation experience that are generally beneficial in nursing education. Simulation provides an interactive live application of the nursing process and therefore demonstrates the effectiveness of theoretical knowledge in practice (Mason & Attree, 1997; Weller, 2004). Simulation participants learn to be systematic in their approaches to care by using a problem-solving process and to work as part of a team, an essential element of nursing practice. Such active learning opportunities not only foster the development of critical-thinking skills (Holtschneider, 2007; Lasater, 2007; Long, 2005; Reilly & Spratt, 2007; Roberson, Neil, & Bryant, 2008; Yaeger et al., 2004) but also offer students instant feedback on clinical decisions, which helps students make the link between treatment decisions and patient outcomes (Baldwin, 2007; Baxter & Boblin, 2008; O’Brien, Mooney, & Glacken, 2008). One multisite, multimethod study specifically noted that students who learned problem solving through high-fidelity simulation “reported a greater sense of being involved in diverse ways of learning than did students [who used a static manikin or paper-and-pencil case studies], and they valued this educational practice more than did students [using other methods]” (Jeffries & Rizzolo, 2006). Similarly, taking part in group discussions, as in the simulation debriefing, leads to critical thinking because students reflect on their own decisions, synthesize information, and reconstruct concepts (Koch & Speers, 1997).

Another benefit of the simulation experience is the opportunity to practice realistic patient interaction. Because students at this level have limited interprofessional communication skills and experience with patient interaction, simulation provides the student with an opportunity to practice these vital skills. Most important, simulation, unique among methods of teaching, allows introductory nursing students to work together to explore the nursing process in a controlled and low-stress learning environment (Hotchkiss & Mendoza, 2001; Nehring & Lashley, 2004; Peteani, 2004).

One of the unique components of this project included using high-fidelity simulation technology to teach 1st-year nursing students. There was little to no information available or published research relating to implementation of high-fidelity simulation so early in nursing education programs. However, with the increasing demands placed on newly graduated RNs and the complex nature of the current nursing workplace, it makes sense for nursing students to begin practicing vital skills as early as possible. Based this study and other promising studies, it is argued that high-fidelity simulation is an effective educational strategy to introduce the fundamentals of theoretical concepts such as the nursing process and critical thinking. Further studies are needed to determine the long-term effects of using the simulation experience at this early stage and the impact of such early skills-based learning on other factors affected by use of a specific problem-solving approach such as patient safety and communication.

Despite these positive results, this teaching strategy may not be possible for all educators and institutions. Because of initial and ongoing costs of simulation educational equipment, combined with the labor intensiveness of conducting a simulation session, it may be too expensive to implement widely. This underscores the value of exploring shared efforts with faculty and students from a variety of disciplines. In the interim, more research is needed to determine the true cost of adopting simulation across different educational programs. In the case described above, factoring in human resources and technology costs...
needed to conduct a simulation experience for a large class, the learning methodology was more cost-effective than an actual clinical experience. In addition, although student feedback did indicate a higher level of understanding of and comfort with the nursing process, as posited in an initial hypothesis, students anecdotally expressed anxiety about future clinicals and being observed during clinicals by peers and instructors.

Based on the positive results from this study and the promising studies on the use of high-fidelity simulation in undergraduate nursing education, it would be beneficial for educators to explore the use of simulation for more complex applications. Although there is a growing amount of literature regarding the use of simulation as an adjunct to nursing education, further exploration is needed to determine the validity of simulation as a learning tool among different types of nursing education programs, diverse student bodies, and other factors that can affect both learning and patient care outcomes.

Notes

1. All students were required to participate in the simulation experience, but only students who filled out the attitudinal surveys and knowledge test results were considered participants in the study.
2. The communication aspect of the six-step nursing process, ADPIE-C, was evaluated during simulation and incorporated into the attitudinal survey.
3. There were 125 students enrolled in the Introduction to Nursing course. Only 84 students completed both pre- and post—knowledge tests for purposes of analysis. Only 114 students completed the pre- and post—attitude assessments. In accordance with the internal review board’s approval, students were not required to participate.

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