Nursing Students’ Perceptions of the Effect on Critical Thinking, Assessment, and Learner Satisfaction in Simple Versus Complex High-Fidelity Simulation Scenarios

Jacqueline Guhde, MSN, RN, CNS

ABSTRACT
This comparative study with high-fidelity simulation measured students’ perceptions of the learning effectiveness of two different levels of assignments (simple vignettes versus complex scenarios). The assignments were evaluated on critical thinking, assessment, and learner satisfaction with the teaching method. No significant difference was found between the means of the simple versus complex assignments on any of the three variables or the total score. In the qualitative comments, students identified that both simple and complex scenarios can be used to help them learn different aspects of the nursing role. Faculty new to this technology can use simple scenarios to learn how to manage the simulation program and still create an effective learning activity.
Several studies have shown the positive effects of using simulation in a nursing curriculum. One major benefit is that it helps students build self-confidence in dealing with patient problems (Bremner, adudrell, Bennet, & VanGeest, 2006; Brown & Chro- nister, 2009; Jeffries, 2005; National League for Nursing, 2006). Students are also able to practice critical but low-volume cases in a safe environment (Alinier, Hunt, Gordon, & Harwood, 2006; Halstead, 2006). Simulation can be used for knowledge acquisition (Nehring & Lashley, 2004; Rhodes & Curran, 2005), and students are able to practice technical skills in a lifelike situation (Jamison, Hovancsek, & Clochesy, 2006; Rhodes & Curran, 2005). Lasater (2007) concluded that simulation helps to integrate classroom and clinical practice. In relation to the variables in this study, only a few related studies on undergraduate nursing students were found.

Critical Thinking

Horan (2009) used mini-scenarios to study critical thinking. In a self-report tool, 91% of the students (N = 57) thought that using human patient simulation improved their critical thinking skills. Two studies actually measured critical thinking. Ravert (2008) studied the effects on critical thinking with three teaching methods (lecture [N = 15] only versus lecture with either case study [N = 13] or human patient simulation [N = 12]). All of the groups showed gain in the critical thinking scores of disposition and skill, but no statistical difference was found among the groups. The author concluded this may have been due to the small sample size. Brown and Chronister (2009) studied the effect of lecture versus human patient simulation on critical thinking skills related to electrocardiogram concepts. Students in the control group received lecture only, whereas students in the experimental group received a combination of lecture and simulation. The students (N = 140) took a customized computerized test that was designed to measure critical thinking. Scores improved in each group, but no significant difference was found between the groups.

Assessment

Only one study was found that measured students’ awareness of the importance of assessment. Lambton, O’Neill, and Dudum (2008) developed medium-fidelity scenarios for a pediatric course in which students (N = 47) participated in four pediatric scenarios. Survey results about the simulation experience revealed that 97% of the students agreed with the statement, “I am better able to assess a child.”

Learner Satisfaction

Several studies have reported that students rate simulation as a valuable learning experience. Alinier et al. (2006) analyzed qualitative comments following a study in which students participated in a medium-fidelity simulated experience and were tested with an objective structured clinical examination tool. The students (N = 99) reported that they were very much in favor of this teaching technique and enjoyed the roles of both participant and observer. Feingold, Calaluce, and Kallen (2004) administered a 20-item survey on the use of human patient simulation to nursing students (N = 97) in an advanced acute care course. Working alone, each student participated in two simulated scenarios. The majority (69.3%) of students agreed this was a valuable learning experience, and 76.5% agreed it enhanced learning. In a study by Rhodes and Curran (2005), four senior-level students worked together in a complex role-playing human patient simulation scenario. A 13-item survey to measure students’ perception of this activity was administered. All of the students stated they would recommend the use of simulation in undergraduate nursing courses.

In summary, the literature shows inconclusive results on the use of human patient simulation for improving critical thinking. This may be due to the limited number of studies, but it may be linked more to the difficulty in actually defining the concept of critical thinking (Brown & Chronister, 2009; Ravert, 2008). The one self-report study by Horan (2009) showed students perceived that simulation activities improved their critical thinking. Because only one study could be found about the students’ awareness of the importance of assessment, no conclusions could be made. The literature did support the idea that students perceived simulation activities were a good teaching-learning activity. No research studies could be found that measured the same group of students on simple vignettes and complex scenarios. The purpose of this study was to compare simple vignettes with complex scenarios for students’ perceptions of effectiveness in developing critical thinking skills, awareness of the importance of assessment, and learner satisfaction.

METHOD

Design

This study compared two types of learning activities. The data were obtained from an anonymous survey in which students were asked to rank the effectiveness of two different levels of simulation experiences. Appropriate Institutional Review Board approval was obtained for the study.

Sample

Students were in their junior year of a 4-year baccalaureate program. The junior year is divided into four clinical courses, and the students rotate through each of these 7.5-week courses. The data collected were from the medical-surgical rotation and included all of the students (N = 134) who rotated through this course during 1 academic year. Each week, the course had 4 hours of lecture, a 2-hour laboratory experience that included simulation, and 12 hours of clinical experience in an acute care hospital. The total time in simulation for each student was 4 hours, which included 30 minutes for each of the four simple vignettes (total of 2 hours) and 1 hour for each of the two complex scenarios (total of 2 hours).

null

null
Procedure

Students participated in one human patient simulation scenario per week for 6 weeks. During the first 4 weeks, students were presented with a simple one-event scenario (simple vignette) (Figure 1). The four scenarios included a fluid overload problem, blood transfusion reaction, an aspiration, and an evisceration. During the last 2 weeks, the students participated in a complex role playing scenario (obesity and overdose) (Figure 2).

Simple Vignettes. The human patient simulator was used, and the patient and environment were set up realistically with appropriate props (e.g., intravenous lines and dressings). Four to five students were able to conduct a focused assessment on the manikin at the same time. Students received a short case study describing the patient, situation, and baseline information. The scenario started with a critical event, such as a blood transfusion reaction. On the manikin, the vital signs and lung sounds were set to what would normally be seen in this type of event. Students were told to conduct their own assessment and were not allowed to talk to other students. After the students completed the assessment, they independently wrote out the answers to the following three questions:

- What should you do first?
- What problems do you identify?
- What nursing actions would be appropriate?

Students then chose a partner and gave a nurse-to-doctor report about the incident. These activities required approximately 20 minutes. Because 2 manikins were available, 10 students completed this assignment at a time. The instructor then debriefed the group of 10 students, which took 10 to 15 minutes. In a 2-hour laboratory session, 30 students were rotated through this experience. These scenarios required only one set of simple programming and did not require the instructor to run the manikin during the scenario.

Complex Scenarios. In the final 2 weeks of the course, students role-played a complex patient problem using the human patient simulator. The roles in the simulation were primary nurse, second nurse, nurse aide, family member, and respiratory therapist. Each student was given specific instructions on how to play his or her role. The instructor played the roles of other health care providers who could be called on a provided cell phone. The first scenario involved a gastric-bypass patient who became hypovolemic and also had an asthma attack. The second scenario was a patient with a hip fracture who overdosed with patient-controlled analgesia secondary to renal failure. The simulations used five students as role-players and five as observers.

The students were given a case study that included doctor’s orders, a medication record, intake and output sheets, and laboratory data. Students were also provided with an equipment room that contained medications, oxygen supplies, a glucometer, and intravenous solutions. The five observers were given specific areas to focus on as they watched the scenario. These included: assessment of the patient; communication with patient, family, and team; priority setting; leadership; and emotional climate. These scenarios required complex planning in terms of creating the more complex scenarios, props, and instructions for the students. The manikin was programmed to change its status based on the responses of the students during the role-playing. For example, in a scenario where the manikin had a narcotic overdose, if the students administered Narcan® (naloxone), the manikin improved. If they did not give the Narcan, the manikin continued to get worse. The operator advanced the scenario as the role-playing was occurring.

Instrument

Faculty developed a three-question survey based on outcomes defined in the nursing education simulation framework (Jeffries, 2005; Jeffries & Rodgers, 2007). Each item addressed one of the outcome measures, and students were asked to evaluate these on a 5-point Likert scale (5 = strongly agree and 1 = strongly disagree). The items were:

- The assignment used critical thinking skills to analyze a patient’s condition (variable: thinking).
- The assignment enhanced my awareness of the importance of assessment of a patient (variable: assessment).
- The assignment was a good learning exercise and should be kept in this course (variable: learner satisfaction).

Students were asked to complete three separate surveys. They evaluated the four simple vignettes together as one level of assignment after the fourth vignette in week 5. The complex assignments were each evaluated separately at the end of that laboratory (bariatric in week 6 and overdose in week 7). A to-

Figure 1. Simple scenario.

Figure 2. Complex scenario.
tal of 134 students evaluated these assignments. Because all of the responses were anonymous, how a particular student scored each of the assignments could not be determined. In addition, students were asked to respond to the following question in the evaluation: What were the most useful or meaningful things you learned from this scenario?

**RESULTS**

The means for the three variables (thinking, assessment, and learner satisfaction) for the different assignments (simple vignettes, complex scenario-bariatric, and complex scenario-overdose) are shown in Table 1. Overall, the students’ responses showed a high mean for all of the assignments on all of the variables, with no mean <4.63 on the 5-point scale. The means were slightly higher on the complex scenarios across all three of the variables compared to the simple vignettes. The means of the three variables as well as the total score (combination of the three variables) were compared using univariate analysis of variance. No significant difference was found (p > 0.05) for the three variables and the total score (Table 3).

The qualitative comments on the question regarding the most useful or meaningful things learned from this scenario were analyzed for a recurrent theme. Although the students did not name this specifically, their comments grouped under the theme of the many “roles of the nurse.” In the simple vignettes, the students identified specific functions of the primary nurse, such as calling the doctor or conducting a focused assessment. In the complex scenarios, the students’ learning shifted to the roles of team members and delegating, communication within the team, the nurse’s role with the family, and the interrelationship of problems. With both types of assignments, the students identified improved awareness of the significance of assessment skills and critical thinking about clinical problems as important. Many students responded that these simulations should be used in all courses. These statements would suggest support for the fact that the outcome of both types of assignments achieved the primary objectives of the scenarios. Table 4 summarizes the comments on the different levels of assignments.

**DISCUSSION**

Both levels of assignments were viewed as positive experiences by the students. In addition, there were no significant differences for any variable between types of assignments. Students reported that both types of assignments helped improve their awareness of the importance of assessment skills, critical thinking, priority setting, and awareness of the nurse’s role.

Students did respond that the simple vignettes were beneficial because every student in the class could experience what it feels like to be a primary nurse. Students also could assess their own decision making skills. One essential component was not allowing discussion during the assessment or initial answering of questions. This forced each student to actually think through what was occurring and how he or she would respond. Requiring the students to give a nurse-to-doctor report also exposed them to an experience that they would rarely get in the clinical setting. During debriefing, the discussion helped clarify misconceptions and reinforced important concepts. At this time,

---

**TABLE 1**

<table>
<thead>
<tr>
<th>Type of Assignment</th>
<th>Thinking Mean (SD)</th>
<th>Assessment Mean (SD)</th>
<th>Satisfaction Mean (SD)</th>
<th>Total Mean (SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bariatric (complex) (N = 134)</td>
<td>4.73 (0.54)</td>
<td>4.78 (0.44)</td>
<td>4.78 (0.50)</td>
<td>14.31 (1.33)</td>
</tr>
<tr>
<td>Overdose (complex) (N = 132)</td>
<td>4.71 (0.49)</td>
<td>4.78 (0.43)</td>
<td>4.75 (0.53)</td>
<td>14.27 (1.24)</td>
</tr>
<tr>
<td>Four simple vignettes (N = 133)</td>
<td>4.63 (0.57)</td>
<td>4.69 (0.57)</td>
<td>4.68 (0.57)</td>
<td>14.03 (1.42)</td>
</tr>
<tr>
<td>Total (for all types) (N = 399)</td>
<td>4.69 (0.53)</td>
<td>4.75 (0.49)</td>
<td>4.74 (0.53)</td>
<td>14.20 (1.34)</td>
</tr>
</tbody>
</table>

**TABLE 2**

<table>
<thead>
<tr>
<th>Dependent Variable</th>
<th>Source</th>
<th>df</th>
<th>F</th>
<th>Mean Square*</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thinking</td>
<td>Type</td>
<td>393</td>
<td>1.42</td>
<td>0.39 (0.28)</td>
<td>0.24</td>
</tr>
<tr>
<td>Assessment</td>
<td>Type</td>
<td>393</td>
<td>1.70</td>
<td>0.40 (0.23)</td>
<td>0.18</td>
</tr>
<tr>
<td>Satisfaction</td>
<td>Type</td>
<td>393</td>
<td>1.47</td>
<td>0.41 (0.28)</td>
<td>0.23</td>
</tr>
<tr>
<td>Total (all 3 variables)</td>
<td>Type</td>
<td>393</td>
<td>1.73</td>
<td>3.03 (1.75)</td>
<td>0.18</td>
</tr>
</tbody>
</table>

*Values in parentheses represent mean square errors.
The faculty also role-modeled a nurse-to-doctor report. The students reported that hearing an actual report several times was helpful in learning how to communicate with the doctor. The limitation with the simple vignette was that it did not address all of the other aspects of the primary nurse role, such as delegating, working with other team members, and communicating with families. These scenarios also did not address the interrelationship of other medical problems that an actual patient may exhibit.

The complex scenarios exposed students to the larger role of the primary nurse. Students learned about delegation, teamwork, and the importance of communication. The role of the family member was changed between scenarios. For example, in one scenario, the family member was passive, and in the next scenario, the family member was disruptive. This led to a discussion regarding how to interact with family members. The complex scenarios also showed the interrelationship of medical problems. Many students reported they never thought about the fact that patients may have more than one problem (i.e., a gastric bypass patient with a history of asthma or a hip surgery patient with a renal problem). Several students wrote that they would have liked to have been the primary nurse. The limitation of this assignment was that only one student could be the primary nurse. Faculty now stress in the simple vignettes that each student is acting as a primary nurse and that this is their opportunity to experience what that feels like and how one should respond to a patient situation.

Findings in this study are largely congruent with the findings in earlier studies that used a self-report tool. These include the Horan (2009) study on critical thinking and the Lambton et al. (2008) study on awareness of the importance of assessment. This study also supports the finding that students view simulation as a positive teaching method (Alinier et al., 2006; Feingold et al., 2004; Rhodes & Curran, 2005).

Finally, this study suggests that simple vignettes may be as effective as more complex scenarios. If faculty have never used a high-fidelity simulator, it is recommended that they start with simple one-event scenarios. These scenarios are easy to develop and require few props, and only minimal knowledge of programming the manikin is necessary. If faculty are currently only using more complex role-playing scenarios, they may want to consider adding some simple scenarios, which may meet a specific learning objective more effectively.

**LIMITATIONS**

A limitation of this study was that it was conducted within the confines of the existing time in the course. This may have impacted more on the small vignettes because one faculty member was interacting with 30 students within a 2-hour laboratory experience. In the simple vignettes, the students had to be more independent in their learning than in the complex scenarios, which were larger group activities. Another student issue was that this study was being conducted concurrently with actual clinical time. Some students may have been exposed to more situations that enhanced their learning in the areas that were being assessed. Another major limitation of this study was that it was self-report and only addressed perceptions of the students and did not look at actual cognitive or behavioral changes.
Another limitation was using the terminology of critical thinking. This concept is hard to measure (Brown & Chronister, 2009; Ravert, 2008). A better evaluation item may have been, “The assignment enhanced my ability to make clinical decisions.” The researcher would also change the last survey item to, “The assignment was a good learning exercise.” By including “should be kept in this course,” students were being asked to evaluate two items as one. Adding more items for measurement of each variable or using an already existing tool may also have been helpful in determining whether there is an actual difference in these types of scenarios.

RECOMMENDATIONS

In general, this article describes different points on the continuum of levels of assignments with the simple vignettes (one learner/one event) at one end and the complex scenarios (multi-learners/multi-event) on the other. In between these two types of assignments are many other possibilities. In applying the nursing education simulation framework, the design of the simulation will be dependent on the level of the learner, the objectives, and the desired outcome. Research is needed on whether different levels of assignments are more appropriate for different levels of learners. For example, are simple vignettes better in a foundations course and complex scenarios in the last medical-surgical course? Future research is also needed to measure cognitive or behavioral changes of students who participate in simulated experiences and not just their perceptions. In addition, researchers need to clearly delineate the level of simulation and include enough details for readers to fully understand what students are experiencing in the simulation. This will allow for types of assignments to be compared with each other. This pilot study is a first step in that direction.

CONCLUSION

This study suggests support of the use of different levels of assignments within a nursing curriculum. Different types of scenarios can address the diverse learning needs of students and help them develop the ability to make clinical decisions. By using a combination of different levels of simulation, students may be exposed to the many complex roles of a practicing nurse. This may help bridge the gap between student and graduate nurse. More important, it gives students a realistic look into the future and may act as a wake-up call about what they need to learn.

REFERENCES