The purpose of this study was to determine whether an innovative teaching approach, a student-led simulation, was effective in increasing students’ quality and safety knowledge, skills, and attitudes in the six Quality and Safety Education for Nurses competency areas. The sample included students (N = 141) enrolled in a traditional and accelerated leadership course in the baccalaureate-nursing program at a midwestern public university during the fall 2009 semester. A quasi-experimental pretest and posttest design was used. Paired-samples t tests were used to analyze the data. Overall scores on the self-inventory in the traditional (p < 0.001) and accelerated (p = 0.011) groups significantly increased. Knowledge and safety test scores in both the traditional (knowledge: p < .001; safety: p = 0.028) and accelerated (knowledge: p = 0.027; safety: p = 0.03) groups increased significantly. The innovation significantly improved students’ self-efficacy and knowledge related to the quality and safety competencies.

The past decade has brought a new urgency and focus on quality and safety in delivering patient care. In *To Err is Human*, the Institute of Medicine (IOM) (2000) highlighted that preventable medical errors result in approximately 44,000 to 98,000 deaths per year. In addressing issues of quality and safety, many new standards and educational practices have emerged. There are several national organizations that have highlighted the need for improved quality and safety in clinical care (Institute for Healthcare Improvement, 2010; Institute for Safe Medication Practices, 2010; IOM, 2000, 2001; Leapfrog Group, 2010).

There are pioneers who have led the movement of and have advocated for the integration of quality and safety competencies into baccalaureate nursing curricula. The American Association of Colleges of Nursing (2008), the Quality and Safety Education for Nurses (QSEN) project (2010), and the Institute for Healthcare Improvement (2010) Open School for Health Professionals are three such exemplars that have pushed to have these requisite competencies included into health professional education.

**INTRODUCTION**

Quality and safety education for undergraduate nursing students is imperative if we are to significantly reduce errors and promote a culture of safety and quality in the clinical setting. However, even with data that clearly demonstrate a need for health care providers to deliver safe and quality care, the focus on quality and safety education in baccalaureate nursing programs has been scant and inconsistent (Cronenwett et al., 2007). This leads to a lack of continuity in the implementation and teaching of these competencies. Therefore, students are left with little knowledge or skills related to these competencies, and they are subsequently ill prepared to practice in an environment that has a strong focus on improving quality and safety.

Because nursing education addresses how to teach students to be safe and effective practitioners, quality and safety competencies become an essential subject. Experts in the leadership field strongly support the concept of role modeling, which includes simulation, to create quality cultures and workplaces of value.
(Porter-O’Grady & Malloch, 2003). However, the effectiveness of teaching these competencies as a core skill for enhancing quality and safety remains elusive (Cronenwett et al., 2007).

Purpose

The purpose of this study was to determine whether an innovative teaching approach, a student-led simulation project to integrate the six QSEN competencies into undergraduate nursing curricula, was effective in increasing students’ quality and safety knowledge, skills, and attitudes in the six competency areas. The study was examined from a simulation framework. Simulation was defined as encompassing the creation of the context of the clinical environment. Students are then able to use this environment for the demonstration of procedures, decision making, and critical thinking (Jeffries, 2005; Rauen, 2001). In this study, the students developed a scenario using structured guidelines, created the context of the clinical situation, acted out, digitally recorded the scenario, presented it to their class, and led a debriefing session with the class that was facilitated by the instructor.

This project integrated the six competencies developed by the QSEN project: patient-centered care, teamwork and collaboration, evidenced-based nursing practice, safety, quality improvement, and informatics (QSEN, 2010). The implementation of this content was integrated into the leadership and management courses in the baccalaureate nursing program at a midwestern public university. A quality and safety self-assessment inventory and a quality and safety test were developed to measure students’ perceptions regarding their knowledge, skills, and attitudes related to the six QSEN competencies.

The two hypotheses for this study are that (1) the postinventory mean scores will be significantly higher than the preinventory scores and (2) the posttest mean scores will be significantly higher than the pretest scores.

Theoretical Framework

The current study was guided by Bandura’s (1986) social cognitive theory. The use of simulation as an education strategy to enhance self-efficacy has emerged as an effective method to create safe environments in which students are able to practice desired behaviors. Experiencing real-life health care situations in a controlled environment also serves as a means to provide social support and allows the students to gain confidence. Confident students will be better prepared to address the challenges in the health care environment as professional nurses (Bandura, 1986, 1997). Current research supports the use of simulation in improving students’ self-efficacy, confidence, and communication skills (Bambini, Washburn, & Perkins, 2009; Nishisaki, Keren, & Nadkarni, 2007). Social cognitive theory represents the reciprocal interactions of environmental, behavior, and personal factors in the form of cognitive, affective, and biological events (Bandura, 1986, 1997).

In health care, the environment directly affects nurses’ ability to develop relationships, create teams, communicate, and collaborate in delivering safe patient care. Strengthening preparation for nursing students to work in today’s health care environment serves to promote quality and safety (Nishisaki et al., 2007). Simulation enhances the future nurses’ behavioral capabilities because students are able to practice the skills they learn in class. Observation learning is apparent during the debriefing of the simulation. This type of experience serves to reinforce and role model the professional behavior desired in clinical practice (Bandura, 1986). Student-designed simulations allow control over the outcomes because the students are responsible for the design, implementation, and debriefing of the simulation. This further enhances self-control, self-efficacy, and confidence while integrating multiple types and levels of knowledge. The cognitive process is reinforced by traditional education methods, such as lecture, assigned readings, and testing.

BACKGROUND

Using Simulation as a Clinical Teaching Method

Use of simulation has expanded into clinical education for several reasons. The lack of available clinical sites and time and faculty constraints have promoted the development of effective simulation methods (Kardong-Edgren, Adamson, & Fitzgerald, 2010; Medley & Horne, 2005). Frequently, scenarios are designed as case studies to supplement lectures or replace clinical hours (Medley & Horne, 2005; Solnick & Weiss, 2005). The high-risk complexity of today’s health care environment limits the time and opportunity for students to be able to deliver care in a safe manner. Actual high-risk patient situations are not an ideal time for students to learn or practice. Simulation assignments and scenarios are commonly designed around clinical situations that are aimed at allowing students to practice applying and implementing nursing knowledge in a safe environment (Medley & Horne, 2005; Sinclair & Ferguson, 2009).

The literature review revealed an increasing body of knowledge in the use of simulation as an effective method for students to gain skills to bridge the gap between academic knowledge and clinical practice. An integrated review of the literature conducted by Solnick and Weiss (2007) reported on six simulation projects that all demonstrated an increase in students’ skills, confidence, time management, and clinical decision making. In addition, other studies have reported that simulation is as effective in clinical knowledge acquisition as traditional clinical experiences (Gonzalez et al., 2008; Medley & Horne, 2005; Reed, Lancaster, & Musser, 2009; Schlairet & Pollock, 2010; Wagner, Bear, & Sander, 2009).

Evaluation of Learning Using Simulation

Simulation is often designed to incorporate the cognitive, psychomotor, and affective teaching domains to promote active learning. Evaluation of learning is a complex process and evaluation of simulation assignments is equally complex (Kardong-Edgren et al., 2010; Medley & Horne, 2005). Kardong-Edgren et al. (2010) reviewed 22 published instruments measuring simulation experiences. These tools were both quantitative and qualitative in nature. The quantitative tools included self-surveys, weighted scoring surveys (scored by faculty), satisfaction surveys, and pretests and posttests designed to measure affective and cognitive knowledge. The qualitative tools used included focus groups and anecdotal case studies. The review revealed that there is a need for reliable and valid evaluation tools (Kardong-Edgren et al., 2010). In light of the expanded
use of simulation in nursing education, the need for standard tools is essential to effectively evaluate any simulation learning (Kardong-Edgren et al., 2010).

Many simulation assignments have been designed around clinical scenarios. Simulation projects based on Bandura’s social cognitive theory have demonstrated significant increases in building self-efficacy (Bambini et al., 2009; Goldenberg, Andrusyszyn, & Iwasiw, 2005; Kameg, Clochesy, Mitchell, & Suresky, 2010; Wagner et al., 2009). Bambini et al. (2009) described a study of a newborn assessment simulation that revealed a significant increase in students’ confidence. Students’ perceptions of communication and clinical decision making also improved (Bambini et al., 2009). Wagner et al. (2009) reported an increase in student confidence in postpartum discharge teaching skills when a simulation was included as part of the learning experience. In another study, communication skills and students’ self-efficacy in a mental health environment significantly improved after the simulation (Kameg et al., 2010). Goldenberg et al. (2005) reported that self-efficacy scores significantly increased in a simulation assignment for health teaching.

Literature indicating that leadership, quality, and safety competencies may be enhanced with simulation is emerging. This has been reported in both quantitative and anecdotal evaluated studies. Solnick and Weiss (2005) noted that an unexpected finding in their study of a clinical simulation was the presence of effective teamwork when supported by faculty coaching. Reed et al. (2009) described a simulation assignment designed for students to gain experience with delegation, prioritization, and time-management skills. Evaluation of this assignment focused on the simulation design and improvement opportunities and not on specific management skills (Reed et al., 2009). However, faculty anecdotal observations of competent decision making and increased confidence by the students were reported (Reed et al., 2009). Further research needs to be conducted to obtain an enhanced understanding of the effect of simulation in improving these competencies.

**METHOD**

**Design and Sample**

The design used in this study was a quasi-experimental pretest and posttest design. A convenience sample of all students enrolled in two leadership and management courses in the baccalaureate nursing program at a midwestern public university was used. The students were enrolled during the fall 2009 semester and had different instructors, and one course was provided online and the other in a traditional, face-to-face setting. The two groups consisted of a traditional class of nursing students enrolled in the 4-year undergraduate bachelor of science in nursing (BSN) program and a 12-month accelerated second-degree BSN program. The two cohorts had a combined sample of 141 participants. The 4-year cohort had a sample size of 97 participants, and the accelerated cohort had a sample size of 44 participants.

**Ethical Considerations**

Institutional review board approval was obtained from the study university. Students were instructed that participation in the study was voluntary and they could indicate they did not wish to participate in the study at any time without penalty. Utmost care was taken regarding the confidentiality of the respondents. All identifying information that could be linked to participants was removed. The coded data were stored in a documented confidential file. A key of the coded data was kept and stored in a separate documented confidential location and file. Only the research team had access to this information.

**Instruments**

Two instruments were developed to test the effectiveness of the simulation project. The first instrument was an 18-statement inventory developed to measure the students’ self-rated knowledge, skills, and attitudes regarding the competency areas. There was one statement for each of the knowledge, skills, and attitudes in each of the competency areas. The inventory was rated on a 7-point Likert-type scale ranging from 7 (strongly agree) to 1 (strongly disagree). An example statement for patient-centered care knowledge is: “I feel I have the necessary knowledge to practice patient-centered nursing care.” The second instrument was a 36-question multiple-choice and true-or-false test that was designed to test the students’ knowledge, skills, and attitudes regarding the six QSEN competency areas. There were two questions for each of the knowledge, skills, and attitudes in each of the competency areas.

Both of the instruments were developed through consensuses by two faculty experts in leadership and management and quality and safety. The two instruments were structured using the six competency areas and by the corresponding category of knowledge, skills, and attitudes. The knowledge test was developed using standardized resources that were used by the students to complete the project. Internal consistency of the inventory and knowledge test was evaluated using Cronbach’s alpha. The coefficients for the overall scores on the inventory were $\alpha = 0.91$ (traditional) and $\alpha = 0.92$ (accelerated). The coefficients for the overall scores on the test were $\alpha = 0.43$ (traditional) and $\alpha = 0.68$ (accelerated). In addition, the Kuder-Richardson Formula 20 was used to evaluate the knowledge test. The Kuder-Richardson Formula 20 reliability coefficients for the knowledge test were 0.47 (traditional) and 0.67 (accelerated). The point biserials for each of the knowledge test questions ranged from –0.06 to 0.88 (traditional) and –0.03 to 0.64 (accelerated). There were two questions with negative point biserials in the traditional group and one question in the accelerated group.

**Procedure**

During the first class meeting, all students were asked to complete both the pretest and preinventory. The students were then given detailed oral and written instructions on the simulation project. Student groups were then randomly assigned a quality of care topic that was to be used to develop their scenario. Examples of the scenario topics included shift-to-shift report, critical team communication, medication error, and charge nurse role. The students developed a script, based on their topic, that was used to film their scenario. The students were required to integrate the six competencies into their script. The students enacted different roles based on the scenario topic. Examples of roles included the registered nurse in charge of a group of
patients, an attending physician, a resident, a nursing assistant, or a pharmacist.

The students then presented their filmed scenario in class. In addition to showing their video, students facilitated and engaged the class in a debriefing of the simulation scenario presented. After all of the presentations had been completed, the students in both groups were asked to take a posttest and postinventory. These were the same two instruments as administered in the pretest and preinventory assessment.

Statistical Analyses

Data were analyzed using PWAS version 18.0 software. The students could choose whether to participate in the study, and as such there were some students who did not take both the preassessment and postassessment. The total number of students who completed both the preinventory and postinventory was 132. Paired scores on the inventory were analyzed using paired-samples t tests. The total number of students who completed both the pretest and posttest was 131. Paired scores on this test were analyzed using paired-samples t tests. The alpha value for all analyses was set at $p \leq 0.05$.

RESULTS

Demographic Characteristics

The two cohorts ($N = 141$) consisted of all students registered in the leadership and management courses in the traditional and the accelerated BSN programs during the fall 2009 semester. The mean student age was 25.7 years ($SD = 6.45$) in the traditional group and 32.1 years ($SD = 7.3$) in the accelerated group. There were 87 (89.7%) female and 10 (10.3%) male students in the traditional group and 39 (88.6%) female and 5 (11.4%) male students in the accelerated group. The mean self-reported grade point average was 3.34 ($SD = 0.22$) on a 4-point scale in the traditional group and 3.51 ($SD = 0.16$) on a 4-point scale in the accelerated group.

Inventory Mean Scores

Traditional Cohort. Paired-samples $t$ tests (Table 1) were conducted to evaluate the effect of the simulation on the traditional students’ mean inventory scores overall and in regard to knowledge, skills, and attitudes, and the six competency areas. The mean scores increased in all of the competency areas. There was a statistically significant increase in the students’ overall scores ($p < 0.001$), knowledge ($p < 0.001$), skills ($p < 0.001$), and attitude scores ($p = 0.017$), and in the students’ patient-centered care ($p < 0.001$), teamwork and collaboration ($p < 0.001$), evidenced-based practice ($p < 0.001$), quality improvement ($p < 0.001$), safety ($p = 0.001$), and informatics scores ($p < 0.001$).

Accelerated Cohort. Paired-samples $t$ tests (Table 2) were conducted to evaluate the effect of the simulation on the accelerated students’ mean inventory scores overall and in regard to knowledge, skills, and attitudes, and the six QSEN competency areas. The mean scores increased in all of the competency areas. There was a statistically significant increase in the students’ overall scores ($p = 0.011$), knowledge ($p = 0.014$) and skills scores ($p = 0.013$), and in the students’ teamwork and collaboration ($p = 0.043$), quality improvement ($p = 0.003$), and safety scores ($p = 0.017$).

Quality and Safety Test Mean Scores

Traditional Cohort. Paired-samples $t$ tests (Table 3) were conducted to evaluate the effect of the simulation on the traditional students’ mean test scores overall and in regard to knowledge, skills, and attitudes, and the six QSEN competency ar-

### Table 1

<table>
<thead>
<tr>
<th>Score</th>
<th>Time 1</th>
<th>Time 2</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>SD</td>
<td>Mean</td>
</tr>
<tr>
<td>Overall</td>
<td>5.52</td>
<td>0.56</td>
<td>5.99</td>
</tr>
<tr>
<td>Knowledge</td>
<td>5.28</td>
<td>0.67</td>
<td>5.92</td>
</tr>
<tr>
<td>Skills</td>
<td>5.26</td>
<td>0.71</td>
<td>5.85</td>
</tr>
<tr>
<td>Attitudes</td>
<td>6.03</td>
<td>0.58</td>
<td>6.21</td>
</tr>
<tr>
<td>Patient-centered care</td>
<td>5.64</td>
<td>0.71</td>
<td>6.12</td>
</tr>
<tr>
<td>Teamwork and collaboration</td>
<td>5.71</td>
<td>0.64</td>
<td>6.09</td>
</tr>
<tr>
<td>Evidenced-based practice</td>
<td>5.15</td>
<td>0.75</td>
<td>5.73</td>
</tr>
<tr>
<td>Quality improvement</td>
<td>5.16</td>
<td>1.01</td>
<td>5.81</td>
</tr>
<tr>
<td>Safety</td>
<td>5.97</td>
<td>0.66</td>
<td>6.23</td>
</tr>
<tr>
<td>Informatics</td>
<td>5.49</td>
<td>0.83</td>
<td>5.96</td>
</tr>
</tbody>
</table>

*Note. CI = confidence interval; LL = lower limit; UL = upper limit.

*p < 0.05.
The mean scores increased in all competency areas except skills, teamwork and collaboration, and quality improvement. The mean scores in these three areas decreased postsimulation. There was a statistically significant increase in the students’ knowledge ($p < 0.001$) and safety ($p = 0.028$) scores. However, there was a statistically significant decrease in the students’ skills scores ($p = 0.015$).

**Accelerated Cohort.** Paired-samples $t$ tests (Table 4) were conducted to evaluate the effect of the simulation on the accelerated students’ mean test scores overall and in regard to knowledge, skills, and attitudes, and the six QSEN competency areas. The mean scores increased in all competency areas except skills, evidenced-based practice, and quality improvement. The mean skill scores remained the same, and the evidenced-based practice and quality improvement scores decreased postsimulation. There was a statistically significant

### Table 2

<table>
<thead>
<tr>
<th>Score</th>
<th>Time 1 Mean (SD)</th>
<th>Time 2 Mean (SD)</th>
<th>95% CI</th>
<th>t</th>
<th>df</th>
<th>p</th>
<th>Cohen’s d</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall</td>
<td>5.97 (0.47)</td>
<td>6.17 (0.50)</td>
<td>–0.35 –0.05 –2.66</td>
<td>39</td>
<td>0.011*</td>
<td>0.16</td>
<td></td>
</tr>
<tr>
<td>Knowledge</td>
<td>5.81 (0.59)</td>
<td>6.04 (0.58)</td>
<td>–0.41 –0.05 –2.59</td>
<td>39</td>
<td>0.014*</td>
<td>0.15</td>
<td></td>
</tr>
<tr>
<td>Skills</td>
<td>5.75 (0.51)</td>
<td>5.96 (0.56)</td>
<td>–0.37 –0.05 –2.59</td>
<td>39</td>
<td>0.013*</td>
<td>0.15</td>
<td></td>
</tr>
<tr>
<td>Attitudes</td>
<td>6.35 (0.48)</td>
<td>6.51 (0.55)</td>
<td>–0.32 0.01 –1.95</td>
<td>39</td>
<td>0.059</td>
<td>0.09</td>
<td></td>
</tr>
<tr>
<td>Patient-centered care</td>
<td>6.10 (0.53)</td>
<td>6.18 (0.63)</td>
<td>–0.27 0.13 –0.72</td>
<td>39</td>
<td>0.477</td>
<td>0.01</td>
<td></td>
</tr>
<tr>
<td>Teamwork and collaboration</td>
<td>6.13 (0.64)</td>
<td>6.33 (0.59)</td>
<td>–0.38 –0.01 –2.09</td>
<td>39</td>
<td>0.043*</td>
<td>0.10</td>
<td></td>
</tr>
<tr>
<td>Evidenced-based practice</td>
<td>5.84 (0.49)</td>
<td>5.98 (0.70)</td>
<td>–0.33 0.06 –1.39</td>
<td>39</td>
<td>0.173</td>
<td>0.05</td>
<td></td>
</tr>
<tr>
<td>Quality improvement</td>
<td>5.70 (0.77)</td>
<td>6.08 (0.64)</td>
<td>–0.63 –0.14 –3.17</td>
<td>39</td>
<td>0.003*</td>
<td>0.21</td>
<td></td>
</tr>
<tr>
<td>Safety</td>
<td>6.08 (0.44)</td>
<td>6.30 (0.55)</td>
<td>–0.40 –0.04 –2.49</td>
<td>38</td>
<td>0.017*</td>
<td>0.14</td>
<td></td>
</tr>
<tr>
<td>Informatics</td>
<td>6.02 (0.60)</td>
<td>6.17 (0.56)</td>
<td>–0.35 0.05 –1.56</td>
<td>38</td>
<td>0.127</td>
<td>0.06</td>
<td></td>
</tr>
</tbody>
</table>

*Note. CI = confidence interval; LL = lower limit; UL = upper limit.  
*p < 0.05.

### Table 3

<table>
<thead>
<tr>
<th>Score</th>
<th>Time 1 Mean (SD)</th>
<th>Time 2 Mean (SD)</th>
<th>95% CI</th>
<th>t</th>
<th>df</th>
<th>p</th>
<th>Cohen’s d</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall</td>
<td>70.83 (8.09)</td>
<td>72.31 (9.65)</td>
<td>–3.22 0.26 –1.69</td>
<td>91</td>
<td>0.094</td>
<td>0.03</td>
<td></td>
</tr>
<tr>
<td>Knowledge</td>
<td>59.78 (12.02)</td>
<td>66.12 (12.28)</td>
<td>–8.89 –3.79 –4.94</td>
<td>91</td>
<td>0.000*</td>
<td>0.21</td>
<td></td>
</tr>
<tr>
<td>Skills</td>
<td>75.18 (10.84)</td>
<td>71.92 (12.64)</td>
<td>0.65 5.87 2.48</td>
<td>91</td>
<td>0.015*</td>
<td>0.06</td>
<td></td>
</tr>
<tr>
<td>Attitudes</td>
<td>77.54 (11.37)</td>
<td>78.89 (11.75)</td>
<td>–3.79 1.07 –1.11</td>
<td>91</td>
<td>0.270</td>
<td>0.01</td>
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</tr>
<tr>
<td>Patient-centered care</td>
<td>77.90 (16.78)</td>
<td>81.34 (19.11)</td>
<td>–7.04 0.16 –1.90</td>
<td>91</td>
<td>0.061</td>
<td>0.04</td>
<td></td>
</tr>
<tr>
<td>Teamwork and collaboration</td>
<td>75.54 (15.52)</td>
<td>74.82 (18.24)</td>
<td>–3.33 4.78 0.36</td>
<td>91</td>
<td>0.724</td>
<td>0.00</td>
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<tr>
<td>Evidenced-based practice</td>
<td>53.44 (12.49)</td>
<td>53.80 (12.38)</td>
<td>–4.02 3.29 –0.20</td>
<td>91</td>
<td>0.844</td>
<td>0.00</td>
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</tr>
<tr>
<td>Quality improvement</td>
<td>75.18 (18.41)</td>
<td>74.46 (17.02)</td>
<td>–3.61 5.06 0.33</td>
<td>91</td>
<td>0.741</td>
<td>0.00</td>
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</tr>
<tr>
<td>Safety</td>
<td>62.32 (15.99)</td>
<td>66.67 (18.32)</td>
<td>–8.21 –0.49 –2.24</td>
<td>91</td>
<td>0.028*</td>
<td>0.05</td>
<td></td>
</tr>
<tr>
<td>Informatics</td>
<td>80.62 (15.87)</td>
<td>82.79 (14.92)</td>
<td>–5.69 1.34 –1.23</td>
<td>91</td>
<td>0.223</td>
<td>0.02</td>
<td></td>
</tr>
</tbody>
</table>

*Note. CI = confidence interval; LL = lower limit; UL = upper limit.  
*p < 0.05.
increase in the students’ knowledge \((p = 0.027)\) and safety \((p = 0.03)\) scores.

**DISCUSSION**

**Limitations**

There are several limitations of this study. First, the study was completed with two different classes of students at a single university. Including a more diverse population of students at multiple universities could improve the strength and generalization of the results. Second, a control group was not used. The use of a control group with a randomized sample would have guarded the results against threats to internal validity. Third, the reliability coefficients of the knowledge test were below 0.70. This raises concerns that there is an issue with internal consistency of the knowledge test. Further revision of the knowledge test is needed to ensure reliability.

**Hypothesis Testing Related to Self-Inventory**

The results supported the first hypothesis, that the simulation project was effective in improving students’ overall self-rated quality and safety competencies in both groups. Specifically, improvement in traditional students’ self-rated knowledge, skills, and attitudes related to the six QSEN competency areas was significant. The accelerated students’ mean self-rated scores improved in all areas but were not statistically significant related to their attitude scores and patient-centered care, evidenced-based practice, and informatics competency scores.

These findings suggest that both groups of students have greater confidence in their abilities. Therefore, this study supports that practicing quality and safety skills in a simulated environment is effective in increasing self-confidence and self-efficacy. These findings are consistent with and similar to those of other studies that have reported an increase in self-confidence or self-efficacy postsimulation (Bambini et al., 2009; Goldenberg et al., 2010; Kameg et al., 2010; Wagner et al., 2009).

The differences between the traditional and accelerated students regarding some of the competencies may be attributed to the fact that the accelerated students have had more acute care clinical hours. The accelerated students are in the last semester of their program and thus have completed all of their acute care clinical rotations. This is in contrast to the traditional students, who are in the second semester of their junior year. Many still have not had all of their acute care clinical rotations. Therefore, these students may be less confident because they may not have encountered a quality and safety issue in the clinical setting. In addition, the students in the accelerated group have already completed one undergraduate degree and consequently may have more confidence related to life experience. Also, their baseline mean scores on the inventory were higher than those of the traditional students, indicating a stronger confidence in their abilities.

**Hypothesis Testing Related to Quality and Safety Test**

The findings did not fully support the second hypothesis that the simulation project was effective in improving the students’ overall quality and safety test scores. This finding was true for both the traditional and accelerated students. However, the simulation project was effective in improving both the traditional and accelerated students’ knowledge and safety scores. This indicates that the simulation was effective in improving the students’ knowledge related to the quality and safety competency areas. In addition, there was a spurious result: the traditional students scores significantly decreased in the competency area of skills.

The literature of simulation related to the measurement of knowledge attainment is scant. We located two studies that...
reported similar results regarding a knowledge test (Burns, O’Donnell, & Artman, 2010; Shepherd, McCunnis, Brown, & Mario, 2010). Shepherd et al. (2010) reported that cognitive improvement was not significant, and that the students had poor knowledge scores postsimulation. Burns et al. (2010) reported that student scores on the posttest area regarding knowledge of the nursing process were not significant, but they did improve in several other areas. Another study conducted by Corbridge, Robinson, Tiffen, and Corbridge (2010) examined knowledge acquisition and satisfaction using simulation and reported that although the knowledge scores were higher, they were not significantly different between the two groups.

The results from the knowledge test were not ideal. There are several explanations that are offered as potential interpretations of these results. First, the knowledge test for this study was designed from a general and broad perspective. Each student group was assigned a specific quality of care scenario. The students’ focus on content was in regard to that specific scenario. The students were not tested on their specific scenarios’ content, but rather on overall safety and quality knowledge. Rodgers, Bhanji, and McKee (2010) reported that there was little to no correlation between the written and practical skills of a simulation experience. In the study, the written evaluation was not a predictor of how the participants performed in the simulation (Rodgers et al., 2010). Rodgers et al. (2010) continued that the practical test had a narrow portion of content, where the written tests contained broader knowledge. Elfrink, Kirkpatrick, Nininger, and Schubert (2010) reported increased knowledge, but this was measured using two test questions that were integrated into a general class examination. In addition, the students received the same simulation content and experience (Elfrink et al., 2010).

An additional explanation of the results is that all of the students received the same number of class points for completing the posttest regardless of the result. This meant that the students were not required to study for the test material past completing the simulation. Simulation may be most effective when used in addition to lecture and not solely as a standalone method to increase knowledge (Howard, Ross, Mitchell, & Nelson, 2010; Sinclair & Ferguson, 2009). Students should be expected to study and be tested on the simulation content in addition to actually performing and participating in the simulation exercise.

Practical Implications

An important implication from this study is that simulation is a means to improve students’ confidence regarding quality and safety competencies. In clinically applied professions such as nursing, it is imperative for all students to have confidence in their abilities. An additional implication of this study is that careful planning and implementation of evaluation methods are imperative to measure the effectiveness of simulation. The simulation contains content specific to the context of that simulation. Expecting that students will gain additional knowledge not presented or that they are required to understand on their own, may not be the most effective way to aid the students in knowledge acquisition. Faculty need to keep in mind that the material of the test should be specific to the context of the simulation scenario and must not be broad or general in nature.

CONCLUSIONS

This study clearly supports that student-led simulation was effective in improving the students’ quality and safety self-efficacy and their knowledge. Simulation may be better suited as an adjunct to traditional teaching methods that are designed to increase students’ knowledge rather than as a standalone tool. Traditional teaching methods may provide the content of expected learning, whereas the simulation may provide the context of expected learning. Combined, these two methods become more powerful than they would be separately. When developing methods to measure an increase in student knowledge, faculty need to take into account the type of simulation used (instructor led versus student led) and the topics to which the students are exposed. Because simulation continues to be included in baccalaureate education, nursing faculty will need new tools and tests to evaluate successful learning.

Regarding future research directions, more studies are needed to demonstrate that simulation is an effective teaching method than can improve students’ quality and safety knowledge. The availability of valid and reliable instruments to measure students’ knowledge gained from participating in simulation is limited. In addition, future research needs to include sample randomization and control to guard against threats to internal validity. Finally, both of the instruments developed in this study need be psychometrically evaluated for construct validity. These instruments need to be further validated with a larger sample and a more diverse group of students. A multisite study would also improve the generalization of future research findings using these instruments.

REFERENCES


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