Evaluating the Use of Simulation with Beginning Nursing Students

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ABSTRACT

The purpose of this quasi-experimental study was to evaluate and compare the effectiveness of simulation versus a traditional skills laboratory method in promoting self-confidence and satisfaction with learning among beginning nursing students. A single convenience sample of 63 first-semester baccalaureate nursing students learning effective comfort care measures were recruited to compare the two teaching methods. Students participating in the simulation experience were statistically more confident than students participating in the traditional group. There was a slight, nonsignificant difference in satisfaction with learning between the two groups. Bivariate analysis revealed a significant positive relationship between self-confidence and satisfaction. Students in both groups reported higher levels of self-confidence following the learning experiences. Findings may influence the development of simulation experiences for beginning nursing students and encourage the implementation of simulation as a strand from beginning to end in nursing curricula.

Technological advances in health care are revolutionizing the design, delivery, and evaluation of nursing education (Jeffries, 2007). New graduates are expected to quickly adopt information systems, evidence-based practices, and emerging technologies (Fetter, 2009). As a result, faculty are encouraged to include interactive, student-centered approaches to learning while incorporating opportunities to experience realistic clinical scenarios.

With a paradigm shift toward student-centered learning, traditional teaching methods such as lecture and PowerPoint® presentations are no longer desirable (Hawkins, Todd, & Manz, 2008). Nurse educators must develop realistic learning experiences that support student transition to the clinical setting while ensuring safe and competent graduates who are prepared for the technological advances in nursing practice (Oermann & Gaberson, 2006).

The use of simulation in a simulation laboratory setting is one solution to the challenges of incorporating innovative and interactive teaching strategies. Numerous studies document the efficacy of simulation for highly technical and advanced clinical skills with more experienced, more advanced students (Abrahamson, Denson, & Wolf, 1969; Childs & Sepples, 2006; Good, 2003; Ziv, Small, & Wolpe, 2000). However, little research has been conducted to determine the effectiveness of using simulation as a learning strategy for teaching basic nursing skills to beginning students. Nurse educators need to conduct research for the purpose of describing simulation as a learning strategy for beginning nursing students and determining its efficacy within the skills laboratory setting.

Purpose

The purpose of this quasi-experimental research study was to compare the effectiveness of using simulation versus a traditional learning method to promote self-confidence and satisfaction with learning among beginning nursing students learning effective comfort care measures. The research questions for this study were:

● Is there a difference in level of self-confidence between students receiving traditional skills laboratory instruction and students participating in a simulation experience when learning effective comfort care measures?

● Is there a difference in satisfaction with learning between students receiving traditional laboratory instruction and students participating in a simulation experience when learning effective comfort care measures?

- Is there a relationship between student self-confidence and satisfaction with learning following a traditional or simulated skills laboratory experience?
- Is there a change in students' level of self-confidence following a traditional or simulation learning experience compared to their pre-strategy level?

Conceptual Framework

Kolb's Experiential Learning Theory (1984) supported this research to evaluate the effectiveness of simulation as a learning strategy to increase self-confidence and satisfaction among beginning nursing students learning how to deliver effective comfort care measures. Kolb (1984) advocates an instructional program that promotes the development of all types of learners to produce balanced learning styles among students by providing a range of experiences in a variety of learning environments (Laschinger, 1990). Recent studies confirm experiential learning techniques successfully address the cognitive, affective, and psychomotor domains of learning, resulting in deeper learning (Kidd & Kendall, 2007). In addition, Fountain and Alfred (2009) reported, "The use of high-fidelity simulation provides students with different learning styles opportunities to internalize and apply new information" (p. 98).

Literature Review

Being able to link theory to practice is vital for beginning nursing students to provide high-quality nursing care to patients (Morgan, 2006). Nurse educators who use a variety of learning strategies such as demonstration, role-play, and simulation while teaching clinical skills in a controlled learning environment may effectively ease this transition (Johansson & Lally, 1990-1991; Morgan, 2006). Research findings suggest that when using simulation experiences with beginning nursing students, faculty should challenge students at their current level of functioning, highlighting one simple patient problem such as communicating effectively or relieving patient pain (Larew, Lessans, Spunt, Foster, & Covington, 2006; Starkweather & Kardong-Edgren, 2008).

One of the essential skills for beginning nursing students is delivering comfort care to patients. The advantages of delivering effective comfort care are widely acknowledged; however, providing education in this area that is both meaningful and appropriate presents particular challenges (Donovan, Hutchison, & Kelly, 2003). Beginning nursing students are eager to practice clinical skills but often lack the experience to realize the importance of effective comfort care and interdisciplinary collaboration (Starkweather & Kardong-Edgren, 2008). Although research related to learning effective comfort care measures often involves the use of lecture, laboratory, and role-play, few studies have reported empirical evidence to support high-fidelity simulation as an effective learning strategy for effective comfort care measures.

Traditionally, simulations involving high-fidelity simulators have been reserved for upper level, advanced nursing students enrolled in an acute or critical care course. Simulation experiences for advanced students tend to focus on complex patients with multisystem complications and involve invasive hemodynamic monitoring and emergency interventions.

Using high-fidelity simulators to assist beginning nursing students with basic, beginning level skills such as effective communication and comfort care measures may be a valuable learning strategy that should be explored further. Jeffries (2007) and Schumacher (2004) found simulation effective with beginning nursing students learning foundational skills of effective communication and comfort care. Larew et al. (2006) used simulated patients effectively to assess student performance when teaching comfort care measures to undergraduate baccalaureate nursing students. Simulation, when used as a learning strategy to teach effective communication and comfort care skills, provides a less threatening and controlled learning environment, allowing students to interact realistically with their emotions (Wilson, 2000).

In a recent systematic review of quantitative studies focused on simulation-based learning in nursing education published between 1999 and 2009, Cant and Cooper (2010) examined 12 studies that used experimental or quasi-experimental designs. All 12 of the studies reported simulation as a valid learning strategy. Six of the 12 studies demonstrated additional gains ranging from 7% to 11% in knowledge, critical thinking, satisfaction, or confidence compared with a control group (Cant & Cooper, 2010).

The nursing literature also documents the best learning outcomes occur when simulation is integrated across the curriculum as a thread from beginning to end (Starkweather & Kardong-Edgren, 2008). Henneman and Cunningham (2005) recommended using simulation early in the program with beginning nursing students, matching simulation content with theory and course content.

As a learning strategy, simulation may appeal to technologically savvy students who feel lecture and passive information gathering do not provide full engagement (Aldrich, 2005). Technology-driven learning strategies are often embraced by digital natives, students born between 1980 and 2000, for whom technology is a way of life (Fountain & Alfred, 2009; Hawranik & Thorpe, 2008). Bleich (2009) noted, "As digital natives fill our classrooms, faculties no longer have the luxury of pleading digital naivete" (p. 63). This new generation of students "expects to use technology, as they did even during their primary education, and they embrace it for conducting their social lives" (Fountain & Alfred, 2009, p. 96).

If students enjoy and are successful in the simulation experience, their level of confidence when faced with performing the skill in the clinical setting may improve. Nursing research has documented simulations that equip learners with skills that can be directly transferred to the clinical setting lead to increased self-confidence (Jeffries, 2007; Johnson, Zerwic, & Theis, 1999; Peterson & Bechtel, 2000). Although there are studies linking self-confidence with simulation as a learning strategy in nursing education (Bambini, Washburn, & Perkins, 2009; Brannan, White, & Bezanson, 2008; Smith & Roehrs, 2009), further study is needed to explore the effectiveness of using simulation as a learning strategy. Nurse educators need to recognize perceptions of self-confidence may influence students' actions, effort invested, and perseverance (Brannan et al., 2008).

Method

Permission to conduct the research study was obtained through the school of nursing's center for research and the

university's institutional review board where the data were collected. Confidentiality of the data was maintained using coding by laboratory session and learning strategy only.

The research sample consisted of first-semester baccalaureate nursing students enrolled in a foundation of practice course. For this course, there were six corresponding laboratory sessions with 10 to 14 students in each session.

After arriving for their scheduled laboratory session, students were assigned to one of two groups: the control group received the demonstration method and the experimental group received the simulation method. The laboratory topic during the week of data collection was caring for patients experiencing pain.

All students were asked to complete a three-item data sheet that listed their semester in nursing school and length of prior health care experience. In addition, students were asked to rate their level of confidence caring for a patient experiencing pain on a 5-point scale ranging from 1 (*not confident*) to 5 (*very confident*).

Control Group

Students in the control group were then given a 10-minute demonstration and explanation of nursing interventions appropriate for caring for patients experiencing pain. Interventions included positioning for comfort, heat and cold therapy, elevating the involved extremity, limiting visitors, dimming the lights, diversion, guided imagery, and relaxation.

Following the demonstration, the control group was given 15 minutes to practice and return the demonstration on low-fidelity manikins. After the return-demonstration, the graduate teaching assistant led an informal 10-minute discussion to answer questions, clarify concerns, and offer feedback on students' performance.

Experimental Group

In comparison, the experimental group was given a brief introduction to the simulation experience, which included viewing a 5-minute faculty-produced video portraying a hospitalized patient experiencing pain 3 days after total knee replacement surgery. After the video, students were randomly assigned the roles of the patient's wife, nursing student, or observer for the simulation experience.

Students were given 15 minutes to role-play the comfort care scenario interacting with their patient played by SimMan™, a high-fidelity, interactive, patient simulator. The graduate teaching assistant prompted students as needed to assess and deliver effective comfort care measures to their patient experiencing pain. SimMan was programmed to verbalize complaints of pain; answer students' questions; and display a heart rate, respiratory rate, and blood pressure on a bedside monitor.

After the simulation session, the graduate teaching assistant conducted a structured 10-minute debriefing session providing immediate feedback to the students on their knowledge, skill performance, and clinical reasoning. The debriefing session aimed to answer questions, clarify concerns, and elicit feedback on the interaction.

Sample

A single convenience sample of 63 first-semester baccalaureate nursing students was used for this study. Thirty-four students (54%) comprised the traditional demonstration group, and 29 students (46%) comprised the simulation group.

Demographics for the sample were obtained through the office of student admissions. The sample included 52 female (82.5%) and 11 male (17.5%) participants. Ethnic background was varied, with the sample having 76.2% white, 7.9% African American, 12.7% Asian, and 3.2% Latino students. Participants ranged in age from 18 to 27, with 58.7% of participants being age 18; 36.5%, age 19; 3.2%, age 20; and 1.6%, age 27.

Measures

The National League for Nursing's (2005) Student Satisfaction and Self-Confidence in Learning questionnaire was used to evaluate self-confidence and satisfaction. The instrument was divided into two subscales: satisfaction with current learning (items 1 to 5) and self-confidence in learning (items 6 to 13). All of the items were rated using a Likert-type scale ranging from 1 to 5; total scores had a possible range from 13 to 65.

Jeffries (2005) reported reliability for the questionnaire, with Cronbach's alpha coefficients of 0.94 and 0.87 for the satisfaction with current learning and self-confidence in learning subscales, respectively. Written permission to use this tool was obtained from the National League for Nursing.

Results
Level of Self-Confidence

For the first research question evaluating self-confidence, an independent samples t test for equality of means was used to determine whether there was a statistically significant difference between the two independent sample means. Students participating in the simulation experience were statistically, $t(61) = -2.00$, $p = 0.05$, more self-confident ($M = 32.48$, $SD = 3.83$) than students participating in the traditional group ($M = 30.74$, $SD = 3.10$).

Using GPower3, the effect size for the group was $d = 0.59$, which according to Cohen (1992) is a medium effect size. The nursing literature also documents higher levels of self-confidence following simulation experiences (Bambini et al., 2009; Childs & Sepples, 2006; Goldenberg, Andrusyszyn, & Iwasiw, 2005; Jeffries, 2007; Johnson et al., 1999; Peterson & Bechtel, 2000; Smith, 2008). Although the studies cited used higher level content with students at a higher level of development, findings from this study are consistent with those reported in the nursing literature.

Satisfaction with Learning

For the second research question evaluating satisfaction with learning, an independent samples t test for equality of means was used to determine whether there was a statistically significant difference between the two independent sample means. The difference in mean scores between students participating in the simulation learning experience ($M = 20.83$, $SD = 3.38$) and students participating in the traditional learning experience ($M = 19.44$, $SD = 2.34$) was not significant, $t(61) = -1.92$, $p > 0.05$. The observed power for the two-tailed hypothesis was 0.51.

This finding may be explained by the possibility students in both the simulation and demonstration groups were actively involved in the learning experience, were given ample opportunity

to practice comfort care measures, ask questions, and receive feedback from their graduate teaching assistant. Feedback is essential in providing synergy, strengthening, and transfer of learning (Dreifuerst, 2009). In this study, both groups of students rated their level of satisfaction higher after the learning experience.

Relationship Between Satisfaction and Self-Confidence

For the third research question evaluating the relationship between satisfaction and self-confidence in learning, bivariate analysis revealed a significant positive relationship between self-confidence and satisfaction (Pearson $r = 0.70$, $p < 0.01$). The pair-wise comparison showed students with higher levels of self-confidence had higher levels of satisfaction with learning and those with lower levels of self-confidence had lower levels of satisfaction with learning.

The magnitude or strength of the correlation coefficient ($r = 0.70$) indicated self-confidence and satisfaction have a strong effect and positive correlation. The coefficient of determination was $r^2 = 0.49$. Therefore, the variance shared between self-confidence and satisfaction, the predictable portion of the total variability, was 49%.

This study reflects the nursing literature by demonstrating a positive relationship between self-confidence and satisfaction in learning. Skills laboratory faculty should continually aim to build and evaluate student self-confidence and satisfaction with learning by fostering an environment that challenges students in a respectful manner.

Change in Level of Self-Confidence

For the fourth research question comparing self-confidence levels before and after the learning strategy, an independent samples t test determined whether there was a statistically significant difference between the two independent sample means. Students participating in the demonstration group were statistically, $t(33) = 3.70$, $p < 0.01$, more self-confident after the demonstration ($M = 3.15$, $SD = 0.74$) than prior to the experience ($M = 2.65$, $SD = 0.74$). Using GPower3, the effect size for the group was $d = 0.69$, which according to Cohen (1992) is a medium effect size.

Similarly, students participating in the simulation group were statistically, $t(28) = 3.29$, $p < 0.01$, more self-confident following the simulation ($M = 3.76$, $SD = 0.83$) than before the experience ($M = 3.14$, $SD = 1.22$). The difference was significant at the $p < 0.01$ level. Using GPower3, the effect size for the group was $d = 0.60$, which according to Cohen (1992) is a medium effect size. These findings suggest if students are given the opportunity to participate in a level-appropriate laboratory experience, traditional or simulated, their level of self-confidence may increase due to active participation and the ability to practice the new skill in a supportive environment with feedback from their instructor.

Limitations and Suggestions for Further Study

A limitation of the study was that only student self-confidence and satisfaction with learning were measured, which may not necessarily translate to performance outcomes. As suggested by Brannan et al. (2008), using a larger sample and a repeated-

measures model, results would be strengthened if confidence levels were measured a third time when students actually care for patients in the clinical setting.

Future studies also should involve clinical faculty to observe and quantify students' effectiveness in delivering comfort care to patients after the simulation experience. Findings would help to clarify whether what was learned in the simulation laboratory was actually transferred to the patient's bedside.

Conclusion

Traditional baccalaureate students are part of a generation that embraces technology and active learning. This research broadens the base of existing simulation research beyond the focus of highly technical and advanced clinical skills by exploring the effectiveness of simulation with beginning nursing students. Results from this study support the use of simulation experiences with beginning students as well as the need to provide a multitude of interactive learning methods that challenge students at their current competency level.

Faculty are encouraged to consider simulation as a learning strategy for beginning nursing students learning effective comfort care measures. With technological advances in health care, it is even more important that faculty incorporate diverse learning methods to optimize students' adaptability to an ever-changing, complex clinical environment (Jeffries, 2009; Oermann & Gaberson, 2006; Starkweather & Kardong-Edgren, 2008). In the end, nursing faculty want students to be satisfied with their learning, but even more important, they want students to be effective with their patients.

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