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Implementation and outcome evaluation of high-fidelity simulation scenarios to integrate cognitive and psychomotor skills for Korean nursing students

Heejung Ahn [a,1], Hyun-Young Kim [b,*]

[a] Medical Research Collaborating Center, Seoul National University Hospital, 101 Daehak-ro, Jongno-gu, Seoul 110-744, Republic of Korea
[b] College of Nursing, Eulji University, 77 Gyoryong-ro, 771 Beon-gil, Jung-gu, Daejeon 301-746, Republic of Korea

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SUMMARY

Objectives: This study is involved in designing high-fidelity simulations reflecting the Korean nursing education environment. In addition, it evaluated the simulations by nursing students' learning outcomes and perceptions of the simulation design features.
Design: A quantitative design was used in two separate phases.
Settings and participants: For the first phase, five nursing experts participated in verifying the appropriateness of two simulation scenarios that reflected the intended learning objectives. For the second phase, 69 nursing students in the third year of a bachelor's degree at a nursing school participated in evaluating the simulations and were randomized according to their previous course grades.
Methods: The first phase verified the two simulation scenarios using a questionnaire. The second phase evaluated students' perceptions of the simulation design, self-confidence, and critical thinking skills using a quasi-experimental post-test design. ANCOVA was used to compare the experimental and control groups, and correlation coefficient analysis was used to determine the correlation among them.
Results: We created 2 simulation scenarios to integrate cognitive and psychomotor skills according to the learning objectives and clinical environment in Korea. The experimental group had significantly higher scores on self-confidence in the first scenario. The positive correlations between perceptions of the simulation design features, self-confidence, and critical thinking skill scores were statistically significant.
Conclusions: Students with a more positive perception of the design features of the simulations had better learning outcomes. Based on this result, simulations need to be designed and implemented with more differentiation in order to be perceived more appropriately by students.

Introduction

Nursing education puts emphasis on knowledge, skills, and attitudes. Nursing educators are responsible for improving nursing education while addressing changes in the medical environment, which stresses patient safety and quality of care (Brady, 2011; Handwerker, 2012). Because competent nurses are skilled at properly dealing with unexpected risks to patients (Whyte et al., 2012), nursing students must develop the abilities to incorporate cognitive skills, skilled practical knowledge, and ethical awareness into clinical practice during their professional nursing apprenticeships.

The clinical practicum at clinical sites is intended to provide care to real patients and is a critical element in nursing education methods, as it is the process by which knowledge, skills, and attitudes are integrated. However, the limited number of clinical sites is a significant issue to be resolved in nursing education (Landeen and Nielson, 2008), particularly in Korean nursing education. The reason is that while many new nursing colleges have been established recently in Korea, the number of hospitals offering clinical education has not changed, so the opportunity for each student to participate in clinical practice has steadily decreased.

Simulation-based learning is learner-centered and is based on constructivism to stimulate lively discussions on clinical practice. Students maximize the effects of their learning by experiencing mistakes and self-reflection on their own actions in a non-threatening environment (Benner et al., 2010; Handwerker, 2012). Prior studies showed that simulation-based learning resulted in nursing students' improvement in clinical judgment, self-efficacy, clinical abilities, and self-confidence. Furthermore, studies demonstrate that simulation can potentially resolve the issue of the limited number of clinical sites for clinical practice (Akhu-Zaheya et al., 2013; Khalaila, 2014; Weatherspoon and Wyatt, 2012).

* Corresponding author. Tel.: +82 42 259 1716; fax: +82 42 259 1709.
E-mail addresses: insight09@snuh.org (H. Ahn), flowhykim@gmail.com (H.-Y. Kim).
[1] Tel.: +82 2 740 8934; fax: +82 2 766 8172.

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Two factors can be considered in the evaluation of simulation-based learning: The first factor that can be examined is learning outcomes that show how effective the simulation was for students, such as critical thinking with regard to the ability to integrate cognitive and psychomotor skills and self-confidence. The other factor is the simulation activity itself (Adamson and Rojers, 2012; Wilson and Klein, 2012). In simulation learning, higher student satisfaction results in better learning outcomes, and the design features of a simulation influence its learning outcomes (Smith and Roehrs, 2009), thus, that students' evaluation results reflect their education is essential.

This study is a follow-up to a study determining the learning topics and objectives for simulation-based learning aiming to combine nursing knowledge and clinical skills in Korean nursing education (Kim and Min, 2013). In this study, we designed a simulation incorporating simulation design characteristics (Jeffries and Rogers, 2012), and examined its learning effects. We also analyzed the correlation between students' perception of the high-fidelity simulation design and their learning outcomes, following suggestions about the need to analyze the effect of students' experience with simulation in their learning outcomes (Khalaila, 2014; Zulkosky, 2012).

Background

The basic principal of simulation-based learning is to be student-centered and outcome-focused. Students construct meaning from what they do for their own learning, and educators plan learning activities according to learning outcomes. Previous research shows that educators need to share learning objectives with students to maximize the effect of simulation-based learning, and they should determine simulation scenarios suitable to the students' level and learning objectives (Akhu-Zaheya et al., 2013; Handwerker, 2012).

Simulation design features includes objectives/information, support/cues, complexity of problem-solving, guided reflection/debriefing, and fidelity to reality (Jeffries and Rogers, 2012). In addition, a scenario includes events that are triggered to solve a nursing problem according to the learning objectives of the level of previous knowledge and skill of the learner. The designer documents decisions and concerns related as to how to trigger problem-solving that would need to be answered within the case scenario (Waxman, 2010; Wilson and Klein, 2012). Therefore, examination of the content validity of the scenarios described is crucial. Expert examination on whether the scenarios are accurate and valid for learning objectives needs to be done, and revisions according to the feedback need to be made as necessary (Cioffi, 2001; Waxman, 2010).

One of the core elements for consideration when designing a simulation is the level of student support by educators with consideration of students' levels. Student support is given by means of the cues provided during the simulation as well as facilitation of guided reflection on their simulation activity during debriefing (Dubose et al., 2010). During the simulation experience, students and educators can interact with each other in various ways including student-driven, partially instructor-driven, or instructor-driven types of simulations, depending on the students' experience with classroom learning, clinical practice, and simulation-based learning (Dubose et al., 2010). Prior studies have suggested the need for additional research on how different design types and experiences change learning outcomes, reflecting such features (Khalaila, 2014; Zulkosky, 2012).

In prior research, evaluations of learning outcomes have been common, while evaluations of the students' perception are rare. Therefore, we need to evaluate the simulation activity itself in simulation-based education and analyze the correlation between the quality of education and learning outcomes. One of the tools for evaluating a simulation activity itself is the Simulation Design Scale (SDS) developed by the National League for Nursing (NLN) based on Jeffries' Simulation Framework. It is a useful tool for evaluating students' perception of simulation design (Adamson and Rojers, 2012; Wilson and Klein, 2012).

Study Aim

The ultimate aim of this study was to implement two high-fidelity simulations in order to help nursing students integrate their cognitive and psychomotor skills. We first verified the appropriateness of simulation scenarios reflecting intended learning objectives for the third year nursing students pursuing a bachelor's degree. In addition, we intended to evaluate the students' simulation experience using the SDS and learning outcomes (self-confidence and critical thinking skills) by applying the simulation scenarios developed in this study. We also planned to analyze the correlation between students' simulation experience and these learning outcomes.

Methods

Study Design

This study used a quantitative design in two separate phases. The first phase was to examine the validity of two scenarios developed in this study for designing a high-fidelity simulation. The second phase had a quasi-experimental, randomized comparison group using a post-test design in order to evaluate students' perceptions of simulation design and learning outcomes (Fig. 1).

Sample characteristics

To examine the validity of the scenarios in the first phase, convenience sampling was used. Five nursing experts from different hospitals, each with over ten years of clinical expertise in the adult nursing field, took part in this study.

Using prior studies as a reference (Kerr et al., 2013; Zulkosky, 2012), with an effect size of 0.70, power of .80, and significance level (α) of .05, we needed 34 subjects in each group for the second phase. Convenience

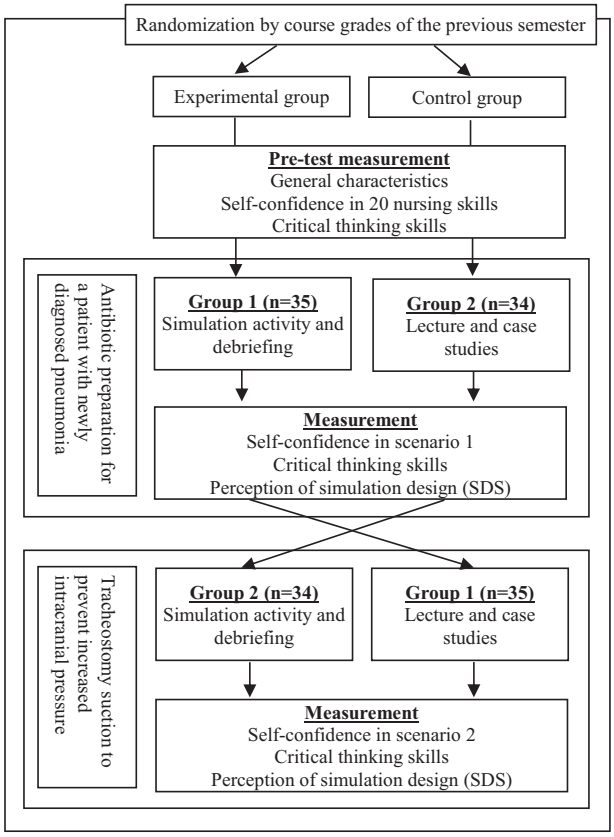

Fig. 1. Process of the second phase.