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The effect of simulation courseware on critical thinking in undergraduate nursing students: Multi-site pre-post study

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SUMMARY

Background: The use of simulations has been considered as opportunities for students to enhance their critical thinking (CT), but previous studies were limited because they did not provide in-depth information on the working dynamics of simulation or on the effects of the number of simulation exposures on CT.
Objectives: This study examined the effect of an integrated pediatric nursing simulation used in a nursing practicum on students' CT abilities and identified the effects of differing numbers of simulation exposures on CT in a multi-site environment.
Design: The study used a multi-site, pre-test, post-test design.
Participants and settings: A total of 237 nursing students at three universities enrolled in a pediatric practicum participated in this study from February to December 2013.
Methods: All three schools used the same simulation courseware, including the same simulation scenarios, evaluation tools, and simulation equipment. The courseware incorporated high-fidelity simulators and standardized patients. Students at school A completed one simulation session, whereas students at schools B and C completed two and three simulation sessions, respectively. Yoon's Critical Thinking Disposition tool (2008) was used to measure students' CT abilities.
Results: The gains in students' CT scores varied according to their numbers of exposures to the simulation courseware. With a single exposure, there were no statistically significant gains in CT, whereas three exposures to the courseware produced significant gains in CT. In seven subcategories of critical thinking, three exposures to the simulation courseware produced CT gains in the prudence and intellectual eagerness subcategories, and the overall simulation experience produced CT gains in the prudence, systematicity, healthy skepticism, and intellectual eagerness subcategories.
Conclusions: Simulation courseware may produce positive learning outcomes for prudence in nursing education. In addition, the findings from the multi-site comparative study may contribute to greater understanding of how patient simulation experiences impact students' CT abilities.

Introduction

Recent global changes in healthcare require greater levels of nursing competency in order for nurses to respond effectively to complex clinical situations (Institute of Medicine [IOM], 2011). To meet this internationally identified need, more reliable nursing education strategies are required.

As the use of high-fidelity simulation increases in pediatric nursing education, it is important to have comprehensive, integrated nursing simulation scenarios that can serve as supplements to a pediatric clinical practicum. A recent study (Shin and Kim, 2014) reported positive effects of integrated pediatric nursing simulation courseware developed based on the theoretical frameworks of Jeffries (2006) and Tanner (2006) on nursing students' critical thinking (CT) skills.

Considering that CT has been identified as a vital outcome for nursing education (American Association of Colleges of Nursing [AACN], 2008; Korean Accreditation Board of Nursing Education [KABONE], 2012), simulation strategies should be more focused on enhancing the nursing students' CT abilities and its working dynamics. However,

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previous studies on CT-focused simulation were limited because they did not provide in-depth information on the working dynamics of simulation or on the effects of the number of simulation exposures, or "dosing" levels, on CT. Although comparisons of simulation strategies with other teaching methods have shown that simulation was superior to methods such as problem-based learning and interactive case studies (Shinnick and Woo, 2013), further analysis of the effects of simulation on nursing students' CT abilities is warranted.

The purpose of this study was to evaluate the effect of an integrated pediatric nursing simulation used in a pediatric nursing practicum on students' CT and to identify the effects of differing numbers of simulation exposures, or "dosing" levels, on CT in a multi-site environment.

Background/Literature

CT was defined as "purposeful, self-regulatory judgment which results in interpretation, analysis, evaluation and inference, as well as an explanation of the evidential and conceptual, methodological, criteriological, or contextual considerations upon which judgment is based" (Facione, 1990, p. 2). It has been considered to have two dimensions of disposition (a frame of mind or a quest for thinking) and a set of operational cognitive skills (Facione, 1990). In order to assess CT abilities, current instruments generally address either core cognitive skills or CT disposition. Instruments such as the California Critical Thinking Skills Test (CCTST; Insight assessment, 2013a) and Health Sciences Reasoning Test (HSRT; Facione and Facione, 2006) address core cognitive skills, whereas the California Critical Thinking Disposition Inventory (CCTDI; Insight assessment, 2013b) and Yoon's Critical Thinking Disposition (YCTD) instrument (2004) address CT disposition. However, most CT measurement instruments were not considered as effective for use with nursing students (Romeo, 2010; Nair and Stamler, 2013) because researchers have not reached a consensus on how to measure the presence and development of CT in nursing students. Most nursing studies on CT have used the CCTST or CCTDI, but the CCTDI is considered to be the more reliable tool for measuring CT in nursing students (Nair and Stamler, 2013).

Several studies have reported that the use of simulations offers opportunities for students to enhance their CT abilities (Shinnick and Woo, 2013). However, a recent systematic review of CT-focused simulation strategies (Norman, 2012) reported inconsistent findings for simulation's effects on students' CT abilities, and several studies reported no effects of simulation on CT (Maneval et al., 2012; Shinnick and Woo, 2013). In addition, lack of pediatric clinical cases appropriate for simulation (Bultas, 2011), limited validity and reliability of simulation measurement tools, and lack of theory-driven simulation coursework (Groom et al., in press) have limited nursing students' learning opportunities.

Methods

Study Design

This study used a multi-site, pre-test, post-test design to evaluate the effect of an integrated pediatric nursing simulation used in a pediatric nursing practicum.

Participants

A convenience sample ($n = 237$) of undergraduate senior nursing students was recruited from three universities in Seoul, Korea. All three schools used the same simulation courseware, including the same simulation scenarios, evaluation tools, and simulation equipment. Under the inclusion criteria, student participants had to be enrolled in a pediatric nursing practicum between February and December 2013 at each school. In the undergraduate nursing curriculum, the pediatric nursing practicum is typically a general pediatric nursing course taken in the third or fourth year of a 4-year nursing program. Overall, 237 of 250 students recruited were considered to have participated in this study; 13 students were excluded due to incomplete questionnaire responses.

Simulation Courseware

The simulation courseware for all the participants at the three schools included a pediatric nursing practicum and any accompanying simulation session with pediatric nursing scenarios within the practicum period. The simulation courseware (Shin et al., 2013) had three major scenarios: rapport-building (interaction among nurse–parent–child), emergency measures for a high-risk newborn with apnea, and febrile infant care. The simulation courseware replaced the part of hours of the regular clinical practicum and the simulation time for each scenario, including the operation, self-analysis, and debriefing time, was about one hour. The high-fidelity simulators and standardized patients were used for the simulation sessions.

The pediatric nursing simulation courseware used in this study was designed to enhance clinical judgment in nursing students based on Tanner's (2006) clinical judgment model. Tanner's interpretive model of clinical judgment suggested areas in which educators could provide feedback and coaching to help students develop insight into their own CT. In this study, the scenarios and assessment tools were developed to enhance students' clinical judgment. For example, the main mechanism of simulation included the elements of noticing, interpreting, responding, and reflecting in the clinical judgment process. Audio-visual equipment was used for the students' individual and group reflections and debriefings to improve students' learning outcomes. Students used assessment tools for self-evaluation as part of the clinical judgment enhancement process. The scenarios required the students to use CT to prioritize care in a specific situation.

During the practicum period in each school, simulation courseware was integrated into the regular pediatric nursing practicum. Each simulation session using the courseware had the following uniform protocol: pre-learning; orientation; simulation operation; situation, background, assessment, and recommendation (SBAR) writing; watching a video-clip of student performance for self-evaluation purposes; and debriefing. The structured debriefing involved SBAR reporting and self-evaluation using Lasater Clinical Judgment Rubric (Lasater, 2007). Learning outcomes were evaluated using the Critical Thinking Disposition (CTD) tool (Yoon, 2008), and Simulation Effectiveness Tool (SET; Elfrink et al., 2012).

Data Collection

Site Preparation

Faculty workshops and staff support were the key elements when preparing for the implementation of the courseware at each school. Faculty members experienced in working with simulations attended workshops on the pediatric nursing simulation courseware. These workshops provided in-depth training in how to operate the simulation and evaluate simulation performance. In the initial week of the practicum period, trained research assistants from the research team supported the implementation of the simulation courseware. Two research assistants also worked as simulation operators and co-evaluators of student performance during the practicum period at each site.

Simulation Operation and Evaluation

Before the actual practicum began at each school, information about the study was introduced to students during a practicum orientation session. After the informed consent process was completed, all the students were asked to complete a pre-CT test and demographic questionnaire. After the regular clinical practicum began, students were divided into groups of 15 to 20 students. Each group was then further divided into six or seven sub-groups for the simulation activity; this