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Review

Effect of simulation training on the development of nurses and nursing students' critical thinking: A systematic literature review

Mohsen Adib-Hajbaghery [a,*], Najmeh Sharifi [b]

[a] Trauma Nursing Research Center, Faculty of Nursing and Midwifery, Kashan University of Medical Sciences, Kashan, Iran
[b] Department of Nursing, College of Nursing, Falavarjan Branch, Islamic Azad University, Isfahan, Iran

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ABSTRACT

Objective: To gain insight into the existing scientific evidence on the effect of simulation on critical thinking in nursing education.
Design: A systematic literature review of original research publications.
Data Sources: In this systematic review, the papers published in English and Farsi databases of PubMed, Science Direct, ProQuest, ERIC, Google Scholar and Ovid, MagIran and SID, from 1975 to 2015 were reviewed by two independent researchers.
Review Methods: Original research publications were eligible for review when they described simulation program directed on nursing student and nurses; used a control group or a pretest post-test design; and gave information about the effects of simulation on critical thinking. Two reviewers independently assessed the studies for inclusion. Methodological quality of the included studies was also independently assessed by the reviewers, using a checklist developed by Greenhalgh et al. and the checklist of Cochrane Center. Data related to the original publications were extracted by one reviewer and checked by a second reviewer. No statistical pooling of outcomes was performed, due to the large heterogeneity of outcomes.
Results: After screening the titles and abstracts of 787 papers, 16 ones were included in the review according to the inclusion criteria. These used experimental or quasi-experimental designs. The studies used a variety of instruments and a wide range of simulation methods with differences in duration and numbers of exposures to simulation. Eight of the studies reported that simulation training positively affected the critical thinking skills. However, eight studies reported ineffectiveness of simulation on critical thinking.
Conclusion: Studies are conflicting about the effect of simulation on nurses and nursing students' critical thinking. Also, a large heterogeneity exists between the studies in terms of the instruments and the methods used. Thus, more studies with careful designs are needed to produce more credible evidence on the effectiveness of simulation on critical thinking.

1. Introduction

Global changes in health care require nurses with critical thinking skills that can effectively be accountable in complex clinical situations (IOM, 2011). Guidelines of nursing education in the United States (U.S.) have a strong emphasis on the need for critical thinking, so that the American Association of Colleges of Nursing considers critical thinking as an essential outcome of nursing education (AACN, 2008.

Critical thinking is defined as a purposeful and self-regulatory judgment which results in interpretation, analysis, evaluation and inference (Shin, Ma, Park, Sun Ji, & Kim, 2015). Critical thinking in the profession of nursing has been defined as "the process of reflective and reasonable thinking about nursing problems without a single solution and is focused on deciding what to believe and do" (Yildrim & Ozkahraman, 2011, p.257). Nurses and nursing students as health care providers should be creative, self-directed and critical thinkers to be able to make appropriate decisions and solve clinical problems they are encountered (Azizi, Hajibagheri, & Adib, 2015). Given the importance of critical thinking in nursing, nurse educators should use teaching methods that can foster this ability in nursing students (Shin et al., 2015). It is believed that using experiential learning methods such as scenarios and simulation programs can simultaneously provide the students opportunities for training and promoting their critical thinking skills (Ravert, 2008). Simulation, in its many forms, has been a part of nursing education and practice and has appeared in the past 40 years (Nehring & Lashley, 2009). As a method of active learning, human patient simulation provides opportunities for the students to implement

* Corresponding author at: Trauma Nursing Research Center, Faculty of Nursing and Midwifery, Kashan University of Medical Sciences, Kashan, Iran.
E-mail addresses: adib1344@yahoo.com (M. Adib-Hajbaghery), najmehsharifi@gmail.com (N. Sharifi).

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the content of theoretical courses in clinical settings (Cant & Cooper, 2010).

In the current health education system, the demand for clinical placements is increased while the availability of practice supervisors is limited. On the other hand, there are some ethical issues related to patient care and safety such as the need for higher quality healthcare services with lower costs and shorter length of hospital stay. In this condition the students have low chance for active involvement with patient care and opportunities to deal with practice situations have also reduced. Hence, there has been a need to reproduce that experience by some other means (Alinier, Hunt, Gordon, & Colin, 2006; Azizi et al., 2015). Simulation methods enable learners to learn experientially in a safe environment (Cioffi, 2001), and give them the opportunity to discover and follow the patients' problems through practicing clinical reasoning and judgment skills (Shinnick, Woo, Horwich, & Steadman, 2011).

A wide range of low to high-fidelity simulation methods are available in nursing education (Cant & Cooper, 2010) that their effectiveness is confirmed by the National Council of State Boards of Nursing (2005), nurse educators (Hammond, 2004; Henneman & Cunningham, 2005) and nursing students (Reilly & Spratt, 2007; Lasater, 2007, 12). In a recent study, Maneval et al. (2012) reported that simulation using human-like mannequins is a good strategy to promote the critical thinking and clinical decision-making skills of new graduate nurses.

In another study, Nehring and Lashley (2004) reported that human patient simulators could improve the nursing students' critical thinking skills and helped them to implement theory in clinical practice. Although a number of researchers reported that using simulation methods in education and particularly the human patient simulation (HPS) are associated with gains in knowledge (Shinnick et al., 2011), gains in self-efficacy (Brown & Chronister, 2009), skill attainment (Alinier et al., 2006) and gains in problem solving skills (Steadman et al., 2006). However, inconsistencies exist not only about the effects of clinical simulators on learning, but also about their effects on nursing students' critical thinking skills. Nonetheless, proponents of simulation strongly believe that this approach has positive effects on nurses' critical thinking and clinical skills (Shinnick & Woo, 2013). In spite of this, some of the studies have produced conflicting results regarding the effects of simulation programs on the students' critical thinking skills (Maneval et al., 2012; Shinnick & Woo, 2013). Thus, the question still comes to mind whether using simulation is more effective on the development of nursing students' critical thinking skills than traditional methods? To answer this question, an effort was made to systematically review and summarize the results of published studies on the effectiveness of simulation on nursing students' and nurses' critical thinking skills. The main objective of our literature review is to provide a systematic and contemporary review of researches on the effects of simulation training on nurses' and nursing students' critical thinking. In this review we appraised the methodological quality of the studies reviewed, without imposing restrictions regarding countries, health care settings or time periods. The main question is whether in nursing students and nurses, dose simulation-based training is better than usual teaching methods in development of critical thinking skills? To respond this question, we reviewed the characteristics of simulation methods (i.e. the type of simulation methods, its duration and number of sessions) in relevant studies, the quality of studies, and the effectiveness of these methods on nursing students' and nurses' critical thinking skills.

2. Method

2.1. Inclusion Criteria

The following inclusion criteria were used for the selection of studies for this review:

1. The study has to relate to simulation methods only directed on nurses and nursing student.
2. The study has to concern empirical research with a comparative design in which simulation is compared with the routine teaching methods or another interventions. Randomized or non-randomized control group designs and one-group pre-test post-test designs are considered.
3. The study has to give information about the effects of simulation on nurses` or nursing students` critical thinking.
4. The full text of study has to be available in English or Farsi languages.
5. Excluded were non-original publications such as letters to the editor, abstracts only, and editorials.

2.2. Searching in Databases

The papers published in English international databases, Science Direct, ProQuest, ERIC, Google Scholar and Ovid and Farsi databases of MagIran and SID from January 1975 to June 2015 were extracted by two independent researchers. The titles and abstracts of papers stored in international databases were searched using different combination of keywords including simulation, human patient simulation, simulated patient, simulation training, critical thinking, nurse or nursing education, that were combined with search operators (AND, OR). Since Iranian databases are not sensitive to search operators (AND, OR), they were searched the Farsi equivalent of the main keyword.

2.3. Selection

Initially, 787 studies were retrieved. After screening of titles and abstracts, 767 studies were excluded as they were not appropriate according to the inclusion criteria. The full texts of the 20 remaining studies were then examined and four studies that were not in English language were discarded. Finally 16 research studies remained in the review (Fig. 1). The characteristics of the 16 included studies are presented in Table 2.

2.4. Assessment of Methodological Quality

The quality of all the reviewed studies was independently evaluated by the two authors. Experimental studies were evaluated using the Cochrane checklist whereas quasi-experimental studies were evaluated using the checklist developed by Greenhalgh, Robert, and Bate (2004). Accordingly, the scores 2 or 1 were respectively given to a study if a criterion was fully or partially covered. However, the score zero was given if the concerned criteria were not covered or did not mention in a study (Table 1).

2.5. Data Extraction and Synthesis

Next, one reviewer extracted and descriptively analyzed the characteristics of the simulation method of the included studies, as well as the research methods and outcomes (Table 2). Then, the second reviewer checked the data extraction process through critical reading of the studies. No statistical pooling of outcomes was performed, because there was considerable heterogeneity between the 16 studies.

3. Results

The main focus of this systematic literature review is on the effects of simulation on nurses' and nursing students' critical thinking (research question). However, to optimize the interpretation of these effects, we will first clarify the methodological quality and characteristics of the studies, as well as the characteristics of the simulation methods under review.