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Review Article

# Effectiveness of High-Fidelity Patient Simulation in Teaching Clinical Reasoning Skills

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## KEYWORDS

patient simulator;  
patient simulation;  
high-fidelity patient  
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clinical reasoning;  
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systematic review

## Abstract

**Background:** High-fidelity patient simulation (HFPS) has been increasingly used in nursing education more than the last two decades. Yet, minimal studies have been done to investigate its effectiveness in teaching clinical reasoning skills to undergraduate nursing students.

**Method:** This study evaluated the effectiveness of using HFPS in teaching clinical reasoning skills to undergraduate nursing students and a comparison with other teaching methods. Keyword searches were conducted in six databases for randomized and quasi-randomized controlled studies. Two independent reviewers assessed the eligibility and methodological quality of the studies and performed data extraction.

**Results:** Of the 11 studies included in this review, 7 investigated the effectiveness of using HFPS on knowledge acquisition, 4 examined skill performance and 2 investigated critical thinking. The results indicated a lack of statistically significant difference in the learning outcomes from HFPS versus traditional modalities and low-fidelity simulation.

**Conclusion:** This systematic review reveals a lack of support for the hypothesis that the use of HFPS is more effective than other teaching methods in teaching clinical reasoning skills to undergraduate nursing students.

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## Introduction

Clinical reasoning is a crucial element of nursing competence (Banning, 2008). It determines whether nurses are able to provide safe and quality health care; therefore, nurses must develop sound clinical reasoning to make professional judgments. Clinical reasoning is frequently used

synonymously with clinical judgment and critical thinking. Nursing literature, however, has conceptualized clinical reasoning and suggested that it has a direct association with nurses' cognitive process (Jones, 1988; Kuiper & Pesut, 2004). Clinical reasoning involves the synthesis of experience and knowledge and applies critical thinking to clinical situations (Banning, 2008; Jones, 1988). Effective clinical reasoning skills allow nurses to use both past experience and previously acquired knowledge to make decisions for different patient conditions and provide safe

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care (Aiken, Clarke, Cheung, Sloane, & Silber, 2003; Simmons, 2009; Tanner, 2006).

The acquisition of clinical reasoning skills has long been an important goal of nursing education, but current didactic teaching methods are unable to help students develop an

### Key Points

- Provide evidence for strategy to teach clinical reasoning skills to undergraduate nursing students.
- Evaluate the effectiveness of using high-fidelity patient simulation in teaching clinical reasoning skills.
- The comparison of high-fidelity patient simulation use with other teaching methods.

essential level of clinical reasoning skills (Lapkin, Levett-Jones, Bellchambers, & Fernandez, 2010). According to the research conducted by del Bueno (2005) in the United States, more than 65% of newly graduated nurses were shown to have an insufficient level of clinical judgment ability. Another study undertaken in Australia also reported that junior nurses were unable to recognize and respond to deteriorating patient conditions (Cioffi, Salter, Wilkes, Vonu-Boriceanu, & Scott, 2006).

Both studies pointed out

that patients' adverse events were often related to poor clinical reasoning skills. The alarming level of poor clinical reasoning skills and its negative impact on patient outcomes call for an effective teaching method.

Effective teaching methods enable nursing students to assimilate knowledge and skills about clinical situations. Various methods and technologies used in nursing education and the use of patient simulation have become increasingly commonplace (McAllister et al., 2013; Wilson, Shepherd, Kelly, & Pitzner, 2005). Simulation aims to mimic real-life situations and may take various forms from simple role-playing to computerized high-fidelity manikins (Decker, Sportsman, Puetz, & Billings, 2008). However, using computerized high-fidelity patient simulation (HFPS) demands a substantial financial commitment (Alinier, Hunt, & Gordon, 2006). It is worth conducting a systematic review to explore the effectiveness of using HFPS in teaching clinical reasoning skills to undergraduate nursing students. In addition, this systematic review would include an update of the relevant research and a larger sample size and further validate the efficacy of the use of HFPS in teaching clinical reasoning skills.

### Significance of the Study

This review can provide evidence for a strategy to teach clinical reasoning skills to undergraduate bachelor of science in nursing (BSN) students. If HFPS is established as an effective means to teach clinical reasoning (Hayden, Smiley, Alexander, Kardong-Edgren, & Jeffries, 2014;

Lewis, Strachan, & Smith, 2012), this method of teaching should be advocated more strongly as it allows students to practice without endangering a real patient's life.

### Objective

The objective of this systematic review was to evaluate the effectiveness of using HFPS in teaching clinical reasoning skills to undergraduate BSN students and the comparison of its use with other teaching methods.

### Research Question

This review was undertaken to answer the following question: is the use of HFPS more effective than other teaching methods in teaching clinical reasoning skills to undergraduate BSN students?

### Methods and Materials

This systematic review examined the relationship between two components, namely, student performance and simulation design characteristics (Jeffries, 2005; Lioce et al., 2015). Student demographics in this review were undergraduate students from baccalaureate nursing programs using HFPS. This review would provide the evidence related to three outcomes, which include learning (knowledge), skill performance, and critical thinking as these are the attributes of clinical reasoning (Lapkin et al., 2010).

### Inclusion and Exclusion Criteria

This study considered all randomized controlled trials and quasi-randomized controlled trials, irrespective of blinding and publication status. Case-control studies and cohort studies were excluded. Dissertations were considered if sufficient details and outcome data were available. Only articles with full-text were included. Studies that recruited undergraduate students from baccalaureate nursing programs as participants were included in this review. As the skills and abilities in baccalaureate nursing students differ from those in associate degree and diploma nursing students (Kovner & Schore, 1998), trials that included students from diploma or associate degree nursing programs were excluded. This review also excluded studies where students were from other health care disciplines such as physiotherapy, medicine, and midwifery. Studies were included if trials comparing the use of HFPS with any other teaching methods including lectures, case studies, role-playing, videotaped vignettes, self-learning packages, and the use of low- or medium-fidelity patient simulators. Trials that solely compared pre- with post-simulation and had no comparison groups were excluded. Because knowledge,

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