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# Effects of an integrated simulation-based resuscitation skills training with clinical practicum on mastery learning and self-efficacy in nursing students



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## KEYWORDS

Cardiopulmonary resuscitation;  
Knowledge;  
Patient simulation;  
Psychomotor performance;  
Self-efficacy

## Summary

**Background:** This study evaluates the effectiveness of integrated simulation-based resuscitation skills training combined with a clinical practicum by assessing nursing students' knowledge, psychomotor skills, and self-efficacy.

**Methods:** In a pretest–posttest design, 255 second-year nursing students participated in an emergency nursing clinical course consisting of a two-hour simulation-based resuscitation skills training component along with an 80-hour clinical placement in an emergency department. Knowledge, self-efficacy, and psychomotor skill errors were measured. Analyses of pre- and post-test data were performed on three subgroups: the simulation-only group, the simulation with clinical observation group, and the simulation with clinical performance group. Students were divided into these groups based on resuscitation experiences during their clinical practicum in the emergency department.

**Results:** Mean scores of knowledge ( $z = -13.879$ ,  $p < .001$ ) and self-efficacy ( $z = -10.969$ ,  $p < .001$ ) significantly improved after the clinical practicum compared to baseline. Knowledge ( $F = .502$ ,  $p = .606$ ), psychomotor skill error ( $F = 1.587$ ,  $p = .207$ ), and self-efficacy ( $F = .481$ ,  $p = .619$ ) did not significantly differ among the three subgroups after controlling for two covariates (age, Basic Life Support certification) in the analysis of covariance models.

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*Conclusion:* Integrated simulation-based resuscitation skills training combined with a clinical practicum might be beneficial for enhancing mastery learning and self-efficacy in nursing students through learner engagement and feedback.

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## 1. Background

Cardiopulmonary resuscitation (CPR) is an essential skill required by nursing students for clinical practice, as nurses are frequently first responders in hospital code situations (Kardong-Edgren, Oermann, Odom-Maryon, & Ha, 2010). Studies document that CPR skills among nursing students are lacking (Mäkinen et al., 2010; Oermann, Kardong-Edgren, & Odom-Maryon, 2011). Regardless of how nursing students received their Basic Life Support (BLS) training, their CPR psychomotor skills begin to decline within a few weeks after instruction (Madden, 2006).

Research indicates that nursing students can acquire additional CPR knowledge and skill following instructor-led training (Madden, 2006). Some studies demonstrate that practicing CPR skills only 6 min a month helps students maintain or improve their CPR skills over a 12-month period (Kardong-Edgren et al., 2010; Oermann et al., 2011).

Simulation-based resuscitation training is an appealing technique for enhancing clinical experience, maximizing learning, and limiting the frequency and impact of medical errors (Weinstock et al., 2005). Some authors believe that simulation should be used alongside clinical practice (Kneebone, Scott, Darzi, & Horrocks, 2004), and that medical simulation complements educational activities based on real patient-care experiences (McGaghie, Siddall, Mazmanian, & Myers, 2009). However, a recent meta-analytic review demonstrated that simulation-based medical education with deliberate practice is superior to traditional clinical medical education for learning specific clinical skills (McGaghie, Issenberg, Cohen, Barsuk, & Wayne, 2011). In a study by Watson et al. (2012), the clinical competencies achieved by physiotherapy students were just as high in the simulated learning environments as in the traditional clinical immersion. A growing body of evidence indicates that simulation-based medical education is superior to traditional clinical education for learning advanced cardiac life-support skills (Wayne et al., 2005, 2006). However, there is little evidence to support simulation as an alternative to traditional real-life clinical practice.

Effective medical learning stems from deliberate practice with clinical problems and devices in simulated settings, in addition to patient care experiences (Issenberg, McGaghie, Petrusa, Lee Gordon, & Scalese, 2005). Since 2011, our school has developed and implemented an integrated simulation-based resuscitation curriculum combined with a clinical practicum in the emergency department. In order to develop a better resuscitation curriculum, it is necessary to evaluate the integrated curriculum by measuring the learning outcomes of nursing students. In addition, how to best configure a learning simulation within clinical immersion is unknown; however, since no studies have been conducted with nursing students, there is a need for further research.

## 2. Purpose

The purpose of this study was to evaluate the effectiveness of integrated simulation-based resuscitation skills training combined with a clinical practicum in an emergency department by assessing mastery learning and self-efficacy in nursing students.

## 3. Methods

### 3.1. Design

A single-group pre-and post-test design was used for this study. Due to the different experiences of students in their practicum, three distinct groups emerged, resulting in a between group analysis (simulation-only group, simulation with clinical observation group, and simulation with clinical performance group) (Fig. 1).

### 3.2. Setting and participants

For the sample size, it was estimated that 66 participants were required to maintain an effect size ( $d = .5$ ) with 95% power and a significance level of .05 for ANOVA using G\*Power 3 (Faul, Erdfelder, Lang, & Buchner, 2007). The effect size was derived based on a pooled effect size of .62 for multiple learning strategies found in a systematic review and meta-analysis of the comparative effectiveness of instructional design features in simulation-based education (Cook et al., 2013). A non-random convenience sample of second year nursing students enrolled in a clinical placement course in the second semester of 2011 ( $n = 124$ ) and the first semester of 2012 ( $n = 143$ ) were invited to participate in the study. We selected participants from naturally occurring groups (20–24 students) that rotated through the emergency department clinical placement every two weeks. After the exclusion of 12 questionnaires due to incomplete data, 255 (96%) questionnaires were used in the final analysis.

### 3.3. Procedure

The Ethics Committee of the College of Nursing granted ethical approval for the study. All students agreed to participate in the study and signed the informed consent form, which promised confidentiality, prior to participation. Although, subject anonymity was not possible due to matching the subject's self-reported questionnaire score with their CPR psychomotor skills performance, subject confidentiality was maintained.

We conducted the study from September 2011 to May 2012. All simulation sessions took place in a Nursing

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