



Featured Article

# Manikin Versus Web-Based Simulation for Advanced Practice Nursing Students

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## KEYWORDS

simulation;  
nursing;  
advanced practice;  
randomized;  
critical care;  
manikin;  
web-based simulation;  
screen-based simulation

## Abstract

**Background:** Advanced practice nurses (APNs), such as Acute Care Nurse Practitioners and Certified Registered Nurse Anesthetists, work in complex settings. Our aim was to compare Acute Care Nurse Practitioner and Certified Registered Nurse Anesthetist students' level of knowledge, attitude, and skills related to managing acutely ill patients between those participating in manikin versus Web simulation.

**Methods:** A quasi-experimental pre–post test convenience sample design was used. Graduate nursing students were randomized to manikin or Web-based training. Competency was measured by self-assessment and scored by objective evaluators.

**Results:** Manikin group scored greater than Web group in post-training observed performance mean scores, 70% versus 63%,  $p = .02$ . The manikin group had significantly improved scores on self-assessment of their practice ability after training (47% vs. 75%,  $p = .001$ ).

**Conclusions:** These results support the role of simulation as a successful application of technology to educate advanced practice nurses.

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## Introduction

Advanced practice nurses (APNs) such as Acute Care Nurse Practitioners (ACNPs) and Certified Registered Nurse Anesthetists (CRNAs) work in fast-paced, complex

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environments and have been shown to provide safe and effective care (Gershengorn, 2011; Fry, 2011; Kleinpell, 2008; & Matsusaki, 2011). The American Association of Critical Care Nurses (AACN) emphasized the need to define the role of the ACNP, publishing the AACN Scope

and Standards for Acute Care Nurse Practitioner Practice (AACN, 2012).

This document emphasizes the need for providers with “unique knowledge, skills, and abilities to manage a patient’s care across the full continuum of acuity and care services”. ACNPs have similar, and in some cases, more responsibilities than medical residents and fellows. They spend more time on the units than residents and fellows and routinely fill the role of gate-

keeper for acutely ill patients with multiple comorbidities and consulting specialists (Gershengorn et al., 2011). CRNAs have delivered anesthesia care in the United States since the 1800s (Matsusaki and Sakai, 2011). Their role may also include providing acute and chronic pain management, responding to emergencies with airway management, administration of fluids and medications, and use of basic or advanced life support measures (National Board of Certification and Recertification for Nurse Anesthetists, 2013).

Developing effective ways to prepare novice practitioners is a key concern to nurse educators. Simulation can be used to teach and evaluate higher cognitive functions such as critical thinking in contrast with classroom learning that focuses on rote memorization evaluated using multiple-choice testing (Kardong-Edgren, Adamson, & Fitzgerald, 2010a). Simulation methods present the opportunity to teach clinical skills in a safe and efficient learning environment. Previous studies have demonstrated improved performance among students and novice practitioners after simulation training (Stamper, 2008; Naylor, 2009; & Kessler, 2011). There is evidence that using simulation training to augment hospital training time results in improved performance in real clinical settings among undergraduate nursing students (Meyer, 2011). A previously published study of APNs found improvement in posttest scores for both hands-on and online PowerPoint training sessions for mechanical ventilation management. Student preference for hands-on training was significantly higher. Objective evaluation performance was not measured (Corbridge, Robinson, Tiffen, & Corbridge, 2010). Another study of undergraduate nursing students demonstrated a significant improvement in communication skills using virtual simulation training (Foronda, Gattamorta, Snowden, & Bauman, 2013).

### Key Points

- Simulation training is an effective teaching method for advanced practice nursing students.
- Manikin and Web groups both had significantly improved post-training scores.
- Objective performance evaluation was an important feature of this study.

The purpose of this study was to compare the levels of knowledge, attitudes, and skills related to managing critically ill patients between advanced practice nursing students randomized to manikin or Web-based training. The conceptual framework for this study is derived from Ericsson’s theory of expertise. According to Ericsson’s theory, the process of learning should: (a) motivate the learner through improvement in real-life, final performance, (b) take into account the learner’s preexisting knowledge (learning curve), (c) allow repetition of the skills multiple times, (d) be accompanied by immediate feedback, and (e) be varied (mixed) across content areas (Ericsson, 2004, 2008).

## Methods

### Study Design

A quasi-experimental pre–post test design study with convenience sampling was carried out to examine differences between two methods of simulation-based clinical education: manikin and Web-based simulation. The primary outcome was advanced practice nursing student knowledge, attitudes, and skills related to managing critically ill patients. This study was granted exempt status from our institution’s institutional review board because the protocol was deemed educational research.

### Sample and Setting

The study was conducted at a university school of nursing simulation laboratory over three semesters, 2010–2011. Advanced practice nursing students enrolled in either the ACNP (n = 27) or CRNA (n = 5) programs were invited to participate. Of the ACNP students, 16 were enrolled in first semester graduate study and 11 were enrolled in the final semester in the undergraduate section of the BS/MS program. The five CRNA students were enrolled in the third semester (preclinical phase) of the program. None of the participants had begun any advanced practice nursing clinical rotations before participation in the study. [Supplementary Table 1](#) (see online extra available at [www.nursingsimulation.org](http://www.nursingsimulation.org)) summarizes the timeline of the study.

### Case Development and Training

A simulation-based education program focused on adult critical and emergency department care was developed by a team of expert clinicians from four specialties: medical intensive care unit, cardiothoracic intensive care unit, cardiology, and emergency department. Since the principal investigator (PI) was the clinical skills laboratory course director, this presented a potential for bias. We addressed this by excluding the PI from any pre- or post-training sessions or evaluations for either group.

Training consisted of four educational case scenarios preceded and followed by corresponding evaluation

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