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How can nurse educators perform patient simulation efficiently?[1,2]

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Abstract
Simulation use in nursing programs has increased dramatically, and the benefits of simulation have now been demonstrated in multiple studies. However, simulation is a time-consuming teaching method. This article provides recommendations for performing simulation activities efficiently, including faculty training and support, in-class simulation, scenario and manikin choice, equipment organization, simulation mapping in the curriculum, and preprogrammed scenario use. Implementing these recommendations may help faculty members use simulation both effectively and efficiently.

Evidence is accumulating that patient simulation is a teaching methodology that is both effective and popular among both students and faculty members. As a result, nursing faculty members are using simulation with increasing frequency. However, faculty frequently state concerns about the time investment required to create and implement these simulations. In some settings, the time needed to carry out simulation could be a barrier to faculty using simulation. This article will provide an overview of simulator use and its effectiveness and then provide recommendations for implementing simulation activities within nursing curricula in a time-efficient manner.

1. How Do Nursing Programs Use Simulation?

The use of simulators in nursing schools has been steadily increasing and has typically focused on high-fidelity patient simulators (HFPSs). An HFPS is considered to be a computerized full-body manikin that provides real-time physiological changes (Nehring & Lashley, 2010). A medium-fidelity simulator is a full-body manikin that may allow students to perform procedures or hear breath sounds but lacks the ability for the chest to rise (Nehring & Lashley, 2010). In addition, many schools use low-fidelity simulators, also known as *task trainers*, to help students learn to perform nursing skills. An example of a task trainer is a disjointed arm for learning venipuncture.

Anecdotal descriptions of HFPS use in nursing programs began appearing in the nursing literature in 2001 (Nehring, Ellis, & Lashley, 2001), and studies reported rapid adoption of the technology. A 2007 study of 78 nursing programs revealed that 60 of those schools used simulators in core nursing classes, and 24 used HFPS (Katz, Peifer, & Armstrong, 2010). This study also found that of the schools not using HFPS, approximately 70% planned to purchase high-fidelity simulators.

Later studies continued to document increased simulator use in nursing programs. A large representative study conducted in 2010 of 1,060 nursing programs indicated

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that 87% of the programs used medium- or high-fidelity simulation, and the majority of programs reported that simulation was used in five or more courses (Hayden, 2010). The author concluded that these data signified both an overall growth in HFPS as well as diffusion of simulation throughout the curriculum. In a recent survey of 139 nursing programs, 126 of the respondents indicated that simulation was used in the nursing curriculum, with the majority (94 respondents) indicating that simulation was used to replace traditional clinical hours (Davis, Kimble, & Gunby, 2014). These data clearly demonstrate the rapid growth of HFPS over the last 15 years.

Although simulator use has increased over time, there appears to be wide variation in how extensively these simulators are used within the curriculum, with some schools using them fairly minimally and others using them extensively. For example, Hayden (2010) noted the median number of simulations in a program as 13, with a range of 1 to 233. In that study, HFPS was used most often in foundations courses and medical/surgical nursing courses.

2. Is Simulation Effective?

Evidence of the effectiveness of simulation as a teaching modality is increasing. A recent meta-analysis of 20 studies of simulation in nursing education found that participants who received simulation had better learning outcomes than the control groups (Shin, Park, & Kim, 2015). Specifically, simulation was most effective in meeting identified learning objectives when the learners were evaluated during the simulation, when psychomotor skills were included, when the simulations emphasized clinical situations, and when the simulators were high fidelity rather than low fidelity (Shin et al., 2015).

Some nursing faculty members have questioned whether simulation can effectively substitute for traditional clinical education in the acute care setting (Miller & Bull, 2013). Recently the National Council for State Boards of Nursing released their findings from a 2-year multisite longitudinal study that was designed to determine if a percentage of clinical hours could be replaced effectively by simulation (Hayden, Smiley, Alexander, Kardong-Edgren, & Jeffries, 2014). Three groups of students were studied: a control group that received no more than 10% of clinical time in simulation, an intervention group that spent 25% of clinical time in simulation, and another intervention group that spent 50% of clinical time in simulation. Outcome measures included nursing knowledge assessed through standardized Assessment Technologies, Inc. examinations, clinical competency with an evaluation rubric, and National Council Licensure Examination, Registered Nurse (NCLEX-RN®) pass rates (Hayden et al., 2014). The study found equivalent outcomes in all three groups, indicating that up to 50% of simulation time could be effectively substituted for traditional clinical experiences (Hayden et al., 2014).

However, nursing faculty members need to be aware that very specific conditions were used to achieve these results. In the study, a dedicated team of nursing faculty members who were trained in simulation methods led the simulations, while clinical faculty members attended the simulations with their clinical groups to serve as content experts (Zulkosky, Husson, Kamerer, & Fetter, 2014). Faculty members were trained to use an educationally sound debriefing model, Debriefing for Meaningful Learning, and had their debriefing skills evaluated during the study (Hayden et al., 2014). In short, best practices in simulation were used in order to achieve these results. In an editorial, Kardong-Edgren (2015) points out that many nursing programs lack the conditions in their own simulation programs to match those used in the National Council for State Boards of Nursing study.

In addition to the conditions described in the study, nursing faculty members can refer to the International Nursing Association for Clinical Simulation in Learning's Standards of Best Practice when considering how to most effectively carry out simulation. For example, the recently released standard about simulation design provides an overview of how to design a simulation from conception to evaluation (Lioce et al., 2015). It is also a useful reference for faculty members needing to demonstrate the complexity of incorporating simulation into a nursing program.

In response to these accumulating studies, the National League for Nursing recently issued a vision statement for teaching with simulation (National League for Nursing, 2015). This document calls on nursing faculty members to integrate simulation into the curriculum using the best simulation practices. In addition, leaders of nursing schools are called upon to provide budgetary support for simulation equipment, facilities, and faculty development in simulation.

3. What Are Common Barriers to Simulation Use?

Although HFPS use has increased dramatically, many barriers remain. The initial costs of purchasing high-fidelity simulators are considerable, with some models costing as much as $60,000 (Nehring & Lashley, 2010). Additional costs such as maintenance contracts, repair costs, beds for the manikins, and computer equipment can escalate the cost of simulation (Brost, Thiemann, & Dunn, 2008). If the school is converting classroom space into a simulation laboratory, there may be additional construction costs such as installing headwalls, sinks, and medical gases. In addition, schools must have space to store the simulator and the funds to purchase consumable supplies.

Nursing faculty members have identified barriers of integrating HFPS as a lack of time for simulation development, lack of support, and lack of appropriate equipment for specific simulation goals (Adamson, 2010). Specifically, many schools spend significant amounts of money on the initial investment for a simulation program but comparatively little money for faculty support and development (Adamson, 2010). Other studies have found that, until recently, faculty members have been reticent to adopt HFPS because there has not been strong evidence that it provides