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# Using High-fidelity Simulation to Teach Acute Care Pediatric Nurse Practitioner Students

Catherine Haut, DNP, CPNP-AC/PC, Mary K. Fey, PhD, RN, Bimbola Akintade, PhD, ACNP, and Meredith Klepper, MS, RN

**ABSTRACT**

Acute care nurse practitioner students do not have the opportunity to practice independent clinical decision making in serious situations in student clinical rotations, and learning this skill is critical to successful role transition. High-fidelity simulation can provide an opportunity for practicing these skills. A pilot study comparing students' knowledge before and after participation in a high-fidelity simulation as compared with traditional learning is presented. The difference between the 2 modes of teaching was not statistically significant. However, these pediatric acute care nurse practitioner students reported satisfaction, enthusiasm, and enjoyment reflected through participation in a structured debriefing process.

**Keywords:** advanced practice, comparison of high-fidelity with traditional learning, high-fidelity simulation, nurse practitioner education, pediatric nurse practitioner education



High-fidelity simulation (HFS) is being used extensively in undergraduate nursing education but has only recently become popular in teaching advanced practice nursing students. Historically, low-fidelity simulation was used in nurse practitioner (NP) programs to teach psychomotor skills such as intubation, central line insertion, and lumbar punctures. Offering HFS scenarios for students to practice clinical decision making in situations that are considered high acuity in a risk-free environment allows acute care NP students practice in managing patients who experience complex or rapidly changing conditions. HFS also provides opportunity for faculty evaluation of student competency using both formative and summative processes. The objective of the formative evaluation involves coaching learners to improve performance, whereas summative evaluation can provide a grading system to acknowledge competency. HFS provides a real-life situation in which students can be in charge but in a safe, protected venue. Unfortunately, there is a paucity of evidence supporting the use of HFS within NP education, acknowledging the need for scientific documentation of the value of inclusion of this experience.

The National Organization of Nurse Practitioner Faculties (NONPF) revised and published core NP competencies that outline skills of the acute care pediatric NP (ACPNP). These competencies include (1) applying advanced assessment skills to determine appropriate management in the care of children with a single or multisystem organ dysfunction; (2) responding to children with complex acute, critical, and chronic problems to address rapidly changing conditions, including the recognition and management of emerging health crises and organ dysfunction using both physiologically and technology derived data; (3) developing differential diagnosis; and (4) appropriately ordering and performing interventions to monitor, sustain, and restore stability in children with deteriorating conditions.[1] Teaching these skills in a classroom setting is challenging and does not provide faculty the opportunity to evaluate the students' ability to apply theoretical knowledge to the clinical setting.

Developed as a pilot study to evaluate the feasibility of using HFS as a teaching modality within the ACPNP program and to evaluate students based on NONPF ACPNP competencies, this project

attempted to compare learning in the traditional classroom environment with that of HFS in the simulation laboratory. A formative evaluation of competency using an outlined, published methodology and assessment of student satisfaction with the learning experience was completed. The goal of the pilot was to answer the following question: Is HFS a feasible educational strategy to teach ACPNPs to care for a child with sepsis compared with learning this care in a traditional classroom lecture?

## BRIEF REVIEW OF THE LITERATURE

HFS is used to train and provide practice for nurses, physicians, and now interprofessional teams, but there is little documented literature describing the use of HFS within NP education. There is also a lack of robust research in relation to learning outcomes of HFS compared with other methods of teaching. Studies have attempted to evaluate the impact of HFS on learning outcomes, satisfaction, confidence, and skill acquisition as a result of HFS, but inconclusive evidence exists within NP education.

Examples of the use of HFS in NP training do exist in the literature. Beauchesne and Douglas,[2] using HFS for pediatric NP students, determined that simulation was more effective when roles were clearly defined, scenarios were complex, and thorough debriefing with faculty occurred. Bruce et al[3] evaluated knowledge and confidence scores among adult and acute care NP students in a cardiac arrest, high-acuity simulation. Knowledge scores increased significantly, but confidence scores did not consistently increase with practice.[3] In a systematic review of over 400 randomized controlled trials and studies, simulation-based learning increased confidence and competence, provided opportunities for student engagement, and provided a risk-free environment in which students could incorporate cognitive, psychomotor, and affective skill acquisition and autonomy and develop analytical and critical thinking ability, but these findings reflected many studies with small sample sizes.[4]

Online learning, case studies, and other types of teaching strategies have been compared with HFS in health care education. One such study reported statistically significant improvements in knowledge, skill, critical thinking ability, and confidence when HFS was used.[5] However, there was no difference in knowledge acquisition when online learning was compared with simulation for learning mechanical ventilation principles by acute care NP students.[6] Schwartz et al[7] compared case-based learning and patient simulation in fourth-year medical students and found no differences in student performance on a structured clinical examination. The literature provides a conflicted view of the benefits of HFS, but despite positive student reviews, authors discuss the need for additional research or better designed studies to validate the process.

In acute or critical care practice, NP students are most often just observers in high-acuity scenarios, and their clinical decision making skills cannot be evaluated by faculty or preceptors. Standardized patient experiences provide an authentic assessment opportunity for NP students when practicing history taking and physical examination as well as communication; simulation also has useful value in high-risk technical skill acquisition, but studies could not be identified that document performance testing in clinical skill acquisition for acute care NP students.

## DESIGN AND METHODS

This pilot study used a nonexperimental, 1-group, pretest and posttest design comparing students' knowledge acquired during classroom lecture compared with participation in HFS. Application to the institutional review board through university protocols determined an exempt status for the project. Thirteen students enrolled in the second-year diagnosis and management course in an ACPNP program within a large university were invited and consented to participate in the study. The ACPNP student population represents about half of the entire pediatric NP program and is typically a small cohort. Student characteristics included female sex and an age range from 25 to 35 years with representation of different areas of pediatric nursing practice. Years of experience ranged from 2 to 14, with a mean of 6.3 and a median of 5.5 years. Students were excited to participate in the simulation but were not penalized if they did not take the quiz and no grade was assigned to the project.

The simulation case and accompanying behavioral assessment tool were designed using the SMARTER