Assessment of APRN Student Competency Using Simulation: A Pilot Study
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Abstract
Assessment and evaluation of competency for advanced practice registered nurses (APRNs) is a challenge facing educators, regulators, and consumers of health care. The purpose of this study was to determine the effectiveness of using simulation to assess and evaluate APRN student competence in managing complex cases. Students were videotaped in the simulation laboratory at four separate intervals; two independent reviewers used the APRN Competency Evaluation Tool to review the simulation. Results showed statistically significant improvement in all categories of evaluation following increased exposure to simulation of complex cases. Student competence increased for managing complex patients, use of evidence-based guidelines, patient safety, leadership, prioritization, delegation, collaboration, communication, and professionalism.

Defining competency and competency-based education for an advanced practice registered nurse (APRN) is a challenge facing educators, regulators, and consumers of health care. In the health care professional literature, competency is defined as “an observable ability of a health professional, integrating multiple components such as knowledge, skills, values, and attitudes” (Frank et al., 2010, p. 641). How to assess and measure competency is an issue facing all the health professions.

One educational strategy to address this challenge is the use of high-fidelity patient simulation (HFPS), which allows APRN students to develop critical thinking skills with a wide variety of patient scenarios, including low-frequency and complex clinical emergency situations, without risk for student or patient. A major contribution of this article is the demonstration of the effectiveness and feasibility of using the simulation of complex cases to assess and evaluate competencies of APRN students.

LITERATURE REVIEW
The National Council of State Boards of Nursing (NCSBN) National Simulation Study (Hayden, Smiley, Alexander, Kardong-Edgren, & Jeffries, 2014) focused on pre-licensure programs and demonstrated that the use of up to 50 percent simulation in lieu of traditional clinical experiences showed no significant impact on NCLEX-RN® pass rates, clinical competency, and nursing knowledge. The American Board of Medical Specialties (ABMS) and the Accreditation Council for Graduate Medical Education (ACGME & ABMS, 2015) have recognized simulation as a feasible and suitable option for determining competency. A review of the literature found a wide variety of instructional methods, variable and few methods to assess competence, a lack of diverse evaluation tools, and few studies that specifically examined APRN assessment, management, and leadership skills in managing complex cases. Of particular concern is the lack of standardized assessment and measurement for APRN competency.

Objective Structured Clinical Examination (OSCE) with patient actors has been used to test clinical skill performance and competence in clinical examination, history taking, interpretation of lab results, patient management, and communication in medicine, nursing, pharmacy, physical therapy, and other health sciences. However, the management of urgent or emergent events that require setting priorities, leading teams, and lifesaving skills cannot be evaluated solely through the use of OSCE. High-fidelity simulation provides a safe environment in which to practice response to high-acuity events without harm to patients. High-stakes events that occur with low frequency lend themselves to the use of high-fidelity simulation training and the opportunity for competency assessment.

An integrative literature review conducted by Merchant (2012) demonstrated the feasibility of using high-fidelity, scenario-based simulation as an effective method for learning and practicing teamwork and organizational skills in a variety of critical medical scenarios. Aggregate results from Merchant’s review demonstrated significant improvements in the times it took teams to complete simulated tasks. Decker, Hutterback, Thomas, Mitchell, and Sportsman (2011) reviewed the literature of continuing competence and recommended themes for nursing to address when developing guidelines and assessment tools that included strategies, analysis of data on which to base actions, the need for multidisciplinary learning teams, collaborative care, and effective communication.

METHOD
The purpose of this repeated measures pilot study was to determine the effectiveness of using simulation to assess and evaluate APRN student competence in managing simulated complex case scenarios. For the purposes of the study, a complex case scenario is defined as a case presentation with an urgent or emergent event that requires rapid intervention to stabilize the patient. Evaluation of leadership skills,
prioritization, communication, collaboration, and professionalism were the focus of the study. It was posited that increased exposure to HFPS of complex cases would increase competence of the APRN student. It was hypothesized that students would demonstrate competence, as evidenced by scores on the APRN Competency Evaluation Tool (APRN EVAL Tool), when they complete four complex case management events over time.

The study was conducted using a comparison of participant APRN EVAL Tool scores on complex case management simulations. Simulations were recorded and saved on DVD for review. Approval to conduct the study was obtained from the university’s institutional review board.

**Sample**
Students enrolled in the acute care graduate program who were baccalaureate-prepared licensed RNs with a minimum of two years of acute care experience were recruited for the study. Two independent nurse researchers, master’s-prepared board-certified practicing APRNs, who were not in a faculty role and took no part in grading the students, recruited participants for the study, obtained informed consent, and evaluated the participants’ performance using the APRN EVAL Tool.

**Instrument**
The APRN EVAL Tool was developed by expert faculty and pilot tested prior to this study. Inter-rater reliability was established using Cohen’s kappa (kappa = 0.857, p < 0.001). Content validity was established by consultation with the literature, reference to the science, reference to assessment tools used in other disciplines, and consultation with expert faculty. (The APRN EVAL Tool is available upon request from Dr. Kesten.)

**Procedure**
The simulation center was equipped with three high-fidelity adult simulators. Center staff consisted of a biomedical engineer and four graduate nursing faculty experienced in teaching with HFPS.

APRN students participated in HFPS exercises requiring complex case management at four intervals over a period of six months. Students participated in each case scenario at each exposure concurrently and did so in groups of four. There was little opportunity for students to talk about the scenario with one another; students were instructed not to share information.

The scenarios were created by graduate nurse faculty from their clinical experience. The scenarios were developed, refined, and implemented over a period of six years, with cohorts of students at the same level each year. Faculty noted skill progression of students in the previous cohorts of students but did not conduct a formal assessment. Experience with previous cohorts served to inform the faculty in developing the tool.

Each exposure to the HFPS provided the APRN student with 30 minutes of complex case management and a 20-minute debriefing with faculty upon completion. Simulations were designed with the simulated patient presenting with a chief complaint and deteriorating into an urgent or emergent event during the last 10 minutes of the scenario. The APRN student was given 20 minutes to gather subjective and objective data, request diagnostic testing, interpret the diagnostic test results, and develop a list of differential diagnoses. After consultation and collaboration with the team, the APRN student determined interventions and directed the team in the response to the event at the patient’s condition continued to deteriorate. The scenario concluded with disposition of the patient and hand-off communication.

Faculty stayed in the control room without intervening in the case. When the 30-minute time limit was reached, the simulation ended and the participants joined the faculty for a 20-minute guided debriefing session. APRN students provided peer feedback on their performance, with faculty facilitating the discussion. Student performance was assessed by trained independent researchers using the APRN EVAL Tool while observing the DVD recordings. Comparisons were made of individual students when the student assumed the team leader role. No comparison of student groups occurred and no group of students received a repeat scenario.

**Data Analysis**
To determine whether exposure to HFPS cases increased competence of the APRN student to assess and manage complex patients, mean scores were evaluated using a paired t-test at each sampling interval. A longitudinal model of total scores was calculated using p-values to determine statistical significance. To determine whether APRN students demonstrated competence upon completion of four complex case management events, an evaluation of the mean score on the tool was conducted and frequencies were analyzed. Further comparisons of the subcategory scores were made to determine students’ performance in the subcategories; p-values from Friedman test and Wilcoxon signed rank test for subscores were utilized to compare mean scores in subcategories.

**FINDINGS**
A minimum score of 32/38 was established as the threshold of competence based upon the previous experience of the researchers. By Test 2 the mean score of all participants had reached the minimum competency value of 33.22, which was statistically significant (p < .0001). Participants continued to demonstrate competence in Test 3 (mean score = 32.67) and Test 4 (mean score = 33.17). Using the p-values from Friedman test and Wilcoxon signed rank test for subcategory scores on the APRN EVAL Tool, the findings demonstrate that subjects showed statistically significant improvement in all six categories on the tool between Test 1 and Test 4. The only statistically significant improvement between Test 3 and Test 4 was in the subcategories of Approach to the Patient and Leadership, Prioritization, Delegation, Collaboration, and Professionalism.

**DISCUSSION**
This study reinforces the ABMS and the ACGME statements, which recognize simulation as a feasible and suitable option for determining competency (ACGME & ABMS, 2015). The study also supports the literature review demonstrating the feasibility of using high-fidelity, scenario-based simulation as an effective method for learning and
practicing teamwork and organizational skills (Andreatta, Saxton, Thompson, & Annich, 2011; Merchant, 2012; Messmer, 2008).

This study found that increased exposure to complex cases increased competence of the APRN student at assessing and managing complex patients. Four exposures to complex, urgent events were required for significant improvement in leadership skills such as approach to patient, prioritization, delegation, collaboration, and professionalism. Improvement in scores in the first three phases of the evaluation may reflect continued growth in the APRN role as the academic and clinical course progresses and familiarity with evidence-based protocols increases.

Closer examination of APRN student performance in the sub-categories reveals real growth on the part of the students with regard to approach to the patient, leadership, and professional issues between the third and fourth case exposures. There was significant improvement in leadership skills as the student assumed responsibility for patient care decisions, directing the team, interfacing with family, and collaborating with providers. For this reason alone, exposure to four separate case scenarios over the six-month period of time is warranted.

Limitations in this study include the small sample size, the lack of standardization of evaluation tools available for use in this APRN population, and the challenge of creating scenarios of equal complexity for each participant exposure. Familiarity with the HFPS setting and routine and evidence-based protocols may have decreased performance anxiety and allowed participants to perform at higher levels on subsequent evaluations. No previous assessment was performed prior to the exposure to complex cases to ensure that basic foundational nursing skills for noncomplex cases were achieved. Another limitation was the ongoing clinical learning that occurred throughout the six-month time frame, which may have contributed to the improved performance of the participant.

IMPLICATIONS

The need to evaluate competency in the care and management of complex patients by APRNs has been well established by stakeholders such as regulators, educators, and consumers of health care. For protection of the consumer, and in view of findings by the Institute of Medicine (2011) and the Robert Wood Johnson Foundation, the American Association of Colleges of Nursing (AACN) master’s and doctor of nursing practice essentials (AACN, 2006, 2011), and the Institute for Healthcare Improvement Triple Aim Initiative (2015), it has become even more significant that we, as health educators, develop ways to assess and measure competency in the acquisition of knowledge and skills for APRN students.

This study was designed to make a significant contribution by providing evidence of the feasibility of using simulation to assess and evaluate competence of APRNs in assessment, management, stabilization, and leadership of a team in caring for patients in complex case scenarios. This study could serve to inform future education, training, and research studies in the best method to evaluate and ensure competence of APRN student nurses.

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KEY WORDS

Advanced Practice Registered Nurse – Competency – Simulation – Complex Case Scenario

REFERENCES


