

Implementation of Simulation Using High Fidelity Manikins: An Intervention to Enhance Learning and Performance for Advance Practice Nurses in Pediatrics

Scholarship of Teaching and Learning Grant Proposal

Marie H Thomas, PhD, FNP-BC, CNE

Kathleen Jordan, DNP, FNP-BC, ENP-BC

Colette Townsend-Chambers, MSN

College of Health and Human Service

School of Nursing

Abstract

The purpose of this project is to evaluate the effectiveness of pediatric simulation scenarios using high-fidelity manikins on student learning outcomes related to assessment skills, clinical knowledge and clinical reasoning/decision-making, and self-efficacy in advance practice nurse (APN) students. The project team proposes to evaluate simulation of common clinical pediatric scenarios as an effective pedagogy and andragogy for advance practice nursing students. This project will augment current student learning by providing the students with an opportunity to advance critical thinking, apply and integrate new knowledge, and practice clinical skills in a safe, nonthreatening environment using case scenarios that simulate commonly encountered conditions in the patient care setting. Each clinical scenario will include changes in physiologic responses based on age, level of development, family dynamics, appropriate laboratory values, and imaging study results as appropriate.

The Jeffries Model for Simulation (2005) will guide the development of this study. This Model supports the use of small student groups to allow time to gather information, diagnose and plan a course of treatment. Simulations will be videotaped to allow for a mechanism to review the scenario and provide opportunities for guided reflection during debriefing. Faculty and peer feedback will be provided to encourage and reinforce performance, knowledge, and decision-making. Students will complete the written hard-copy Student Satisfaction and Self-Confidence Learning Instruments developed by the National League for Nursing (NLN) and Laerdal Medical Company as an evaluation method of the design, importance, learning objectives, satisfaction, and effect on self-confidence (Jeffries & Rizzolo, 2006).

Budget

Budget Request for SOTL Grant Year 2015

Joint Proposal? Y Yes ___ No

Title of Project Implementation of Simulation Using High Fidelity Manikins: An Intervention to Enhance Learning and Performance for Advance Practice

Duration of Project 1 year

Primary Investigator(s) Marie H Thomas, PhD, FNP-BC, CNE , Kathleen Jordan, DNP, FNP-BC, ENP-BC, Colette Townsend-Chambers,MSN,RN LRC Director

Email Address(es) mariehthomas@uncc.edu, ksjorda1@uncc.edu, ctowns12@uncc.edu

UNC Charlotte SOTL Grants Previously Received (please names of project, PIs, and dates) N/A

Allocate operating budget to Department of School of Nursing

		Year One
Account #	Award	January to June
Faculty Stipend	Transferred directly from Academic Affairs to Grantee on May 15	\$ -
911250	Graduate Student Salaries	3000.00
911300	Special Pay (Faculty on UNCC payroll other than Grantee)	
915000	Student Temporary Wages	
915900	Non-student Temporary Wages	

920000	Honorarium (Individual(s) not with UNCC)	
921150	Participant Stipends	250.00
925000	Travel - Domestic	
926000	Travel - Foreign	
928000	Communication and/or Printing	175.00
930000	Supplies	
942000	Computing Equipment	6450.00
944000	Educational Equipment	
951000	Other Current Services	
GRAND TOTAL		\$ 9,875.00

	NOT APPLICABLE	Year Two
Account #	Award	July to June
Faculty Stipend	Transferred directly from Academic Affairs to Grantee on May 15	\$ -
911250	Graduate Student Salaries	
911300	Special Pay (Faculty on UNCC payroll other than Grantee)	

915000	Student Temporary Wages	
915900	Non-student Temporary Wages	
920000	Honorarium (Individual(s) not with UNCC)	
921150	Participant Stipends	
925000	Travel - Domestic	
926000	Travel - Foreign	
928000	Communication and/or Printing	
930000	Supplies	
942000	Computing Equipment	
944000	Educational Equipment	
951000	Other Current Services	
GRAND TOTAL		\$ - n/a One year grant

Attachments:

1. Attach/provide a narrative that explains how the funds requested will be used.(Page follows)

2. Has funding for the project been requested from other sources? ___ Yes No.
If yes, list sources.

Implementation of Simulation Using High Fidelity Manikins: An Intervention to Enhance Learning and Performance for Advance Practice Nurses

Budget Justification Narrative

This proposal seeks a total of \$9,875.00 for Spring 2015. This grant is for one year only and funds will be allocated as followed:

- ***Two part- time graduate research assistants at \$3000.00 for the semester:*** We will hire 2 graduate research assistants to work 5 hours per week each on the project during the Spring semester. These graduate research assistants will serve as objective project liaisons as all involved faculty will be actively teaching and grading participating students. A nursing project of this magnitude requires payment of \$15.00 per hour for a Registered Nurse Graduate Assistant as opposed to the usual \$ 9.00 for non-licensed GA's. This totals in the amount of 3,000.00 for the five months of the spring semester. Their responsibilities include coordinating faculty and student schedules for scenarios; coordinating, setting up and operating audiovisual recording; assisting faculty with pre-briefing and debriefing, setting up and prepping high fidelity manikins for the simulation scenarios including dressing and moulage; loading scenarios and lab results into the simulation computer, coordinating the observation schedule, collecting structured observational data, overseeing data entry and analysis and collection of student participant surveys.
- ***Gift Card Incentives for the 25 students to complete project experience feedback tool.*** As incentive for feedback on the project, the students who complete the survey tool will receive a \$10.00 gift card each, totaling \$250.00.
- ***Communication and Printing.*** Printing costs of \$175.00 for printed copies of the National League for Nursing (NLN) Self-Efficacy/Evaluation Tools to be completed pre and post project by student participants.
- ***Computing Equipment.*** We will purchase a high fidelity human patient simulator with sim pad computer, Laerdal Vital Sim Baby® manikin in the amount of \$6,450.00 for use with one of the simulation groups. The other group will utilize the School of Nursing's Pediatric Hal high fidelity manikin.



College of Health and Human Services
School of Nursing
9201 University City Blvd, Charlotte, NC 28223-0001
t/ 704.687.7952 www.nursing.uncc.edu

October 26, 2014

Center for Teaching and Learning
Scholarship of Teaching and Learning
UNC Charlotte, Atkins 149C
Charlotte, NC 28223

RE: Letter of Support for the “Implementation of Simulation Using High Fidelity Manikins: An Intervention to Enhance Learning and Performance for Advance Practice Nurses” proposal

Dear SOTL Grant Selection Committee:

I write to offer my enthusiastic support for the 2014 Scholarship of Teaching and Learning (SOTL) proposal submitted by Dr. Marie Thomas and collaborators in Nursing, Dr. Kathleen Jordan and Professor Colette Townsend-Chambers. This energetic team in the College of Health and Human Services, School of Nursing has a strong commitment in using simulation as a pedagogical strategy to advance the learning and performance of Nurse Practitioner students in our MSN graduate program. Their proposal entitled, “Implementation of Simulation Using High Fidelity Manikins: An Intervention to Enhance Learning and Performance for Advance Practice Nurses, will strengthen the skills of the target population.

Dr. Thomas and collaborators have proposed a project that will increase the use of simulation using high fidelity manikins to educate students in the advanced practice Nurse Practitioner clinical track. The scientific evidence is clear that the use of simulation for teaching/learning encourages active learning and critical thinking, skills that are essential in advancing the health of patients. Their proposal, focused on designing pediatric clinical scenarios for use with simulation technology, also will help students to be able to better make decisions in differential diagnosis and clinical management of patients.

As Associate Dean/Director of the School of Nursing, I believe that this project will also further the work of the School of Nursing in creating a Center of Excellence for our existing Learning Resource Center (LRC). The LRC is focused on providing students with an environment that promotes the learning of safe, culturally competent and personalized care to clients. The environment also exposes students with the latest educational technology and provides students with a climate of enhanced learning through faculty-led and peer-to-peer instructional support. In our lab, students

develop their cognitive, psychomotor, and critical thinking skills, proficiencies that are essential to best practices in promoting positive clinical outcomes for patients.

The proposed project also will further the work of this team as they have already demonstrated a proven track record in simulation technology and instruction. For example, Dr. Marie Thomas has over 20 years of using simulation as an instructional method in teaching undergraduate students, and has recently submitted a manuscript entitled, the “Integration of Simulation in a Concept Based Curriculum: Making Exemplars Come to Life.” Professor Townsend-Chambers has presented her work on “the Effectiveness of the Use of Simulation Manikins of Color in the Nursing Labs on Enhancing the Undergraduate Nursing Students’ Clinical Experience and Diversity Awareness” at professional state and regional meetings, and Dr. Jordan, a well-respected Emergency Medicine Nurse Practitioner has the expertise in developing pediatric clinical scenarios, the focus of the topics to be developed in this proposal. Collectively, I believe this is a strong team that has the expertise and experiences to carry out the proposed project without difficulty.

In closure, I offer my full support to this teaching/learning proposal which supports the mission of the School in preparing nursing professionals to serve as leaders, clinicians and scholars through a wide range of innovative educational programs to meet the healthcare needs of an ever changing culturally diverse society. Let me know if you have questions about Dr. Thomas and her team or this application. I look forward to the continued support of the efforts of these faculty members in the School of Nursing. Many thanks in advance for your attention to this important application.

Sincerely,



Dee Baldwin, PhD, RN, FAAN
Professor, and Associate Dean/Director
School of Nursing

Overall Purpose

The purpose of this project is to evaluate the effectiveness of pediatric simulation scenarios using high-fidelity manikins on student learning outcomes related to assessment skills, clinical knowledge and clinical reasoning/decision-making, and self-efficacy in advance practice nurse (APN) students. Guided by best practices in medical and undergraduate nursing curricula, the project team proposes to evaluate simulation of common clinical pediatric scenarios as an effective pedagogy and andragogy for advance practice nursing students. Simulation encourages active learning, critical thinking, integration of clinical reasoning, and development of problem solving skills that translate into clinical practice. The clinically based pediatric simulation scenarios will allow students time to develop a systematic approach to pediatric patient assessment, diagnosis, planning, and treatment including appropriate family interaction and documentation.

A barrier to learning opportunities for advanced practice nurse (APN) students is the limited availability of advanced practice clinical sites. Typically, APN students are paired and mentored by expert practitioners in a variety of primary and acute care clinical settings so that they can acquire the necessary skills and meet the outcomes put forth by the American Association of Colleges of Nursing, *The Essentials of Master's Education of Nursing* (2011). However, there is tremendous competition in the greater Charlotte area with other disciplines, including physician assistants, medical students, and nurse practitioner students from other academic programs for clinical sites, thus limiting available sites for nurse practitioner students. Clinical sites, especially for specialties such as pediatrics or women's health, are also burdened with increasing patient workloads, limited examination rooms, and time required to complete electronic medical records. As a result many APN students get minimal experiences in caring for children and adolescents.

This project will augment current student learning by providing the students with an opportunity to advance critical thinking, apply and integrate new knowledge, and practice clinical skills in a safe, nonthreatening environment using case scenarios that simulate commonly encountered conditions in the patient care setting.

Nurse Practitioner Courses 6260 and 6460 consists of pediatric didactic teaching in a classroom setting and clinical placement in a variety of outpatient settings. Clinical placements may vary from an urgent care setting to a family practice office with the number and acuity of pediatric patients varying by site. Demands on the preceptors in the clinical settings may limit the opportunities for student to complete a pertinent history, focused assessment, and implementation of a treatment plan. Current evidence-based practice guidelines in pediatric care have changed the treatment and diagnostic procedures for several common conditions. Students need the opportunities to develop clinical reasoning skills, practice assessment skills and history taking, and develop a plan of care. The current course format, including the barriers to clinical practice, impedes the ability of APN students to develop clinical reasoning skills and experience opportunities to identify, assess, plan, treat and document common pediatric conditions. As such, faculty have begun to explore alternative experiences to augment the current didactic and sometimes limited clinical experiences for APN students when caring for children and adolescents.

The overall goal of this SOTL project is to evaluate the effectiveness of pediatric simulation scenarios using high-fidelity manikins on student learning outcomes related to assessment skills, clinical knowledge and clinical reasoning/decision-making, and self-efficacy in APN students. Specifically, the aims of this project are to:

1. Develop simulation scenarios for 4 common, clinical pediatric conditions for advance practice nurse practitioner students: 1) a school aged child with an acute exacerbation of chronic asthma; (2) an infant with dehydration secondary to vomiting and diarrhea; 3) a school age child with a skeletal fracture at high risk for neurovascular complications secondary to a fall from playground equipment; and 4) an infant with a skeletal fracture secondary to child maltreatment.
2. Evaluate student learning related to assessment skills, clinical knowledge and reasoning/decision-making skills, and self-efficacy of the simulation scenarios with twenty advance practice nurse practitioner students.
3. Refine all simulation scenarios based on student feedback and faculty observation of student learning.

The National Organization of Nurse Practitioners Faculties Task Force (NONPF, 2010) supports the importance of using and evaluating simulation as an appropriate means of teaching psychomotor skills and developing clinical decision making with graduate students. The faculty seeks to enhance the learning experience of Family Nurse Practitioner students by offering each APN student the chance to participate in these standardized pediatric learning simulation scenarios. This project aligns with the mission and vision of the School of Nursing by providing the highest quality nursing education, scholarship, and practice at the baccalaureate, master's and doctoral levels (UNCC School of Nursing Mission, Vision and Values, 2014).

Literature Review

The advanced practice registered nurse is a designation for nurse practitioners (NP)'s certified nurse midwives (CNM), certified registered nurse anesthetists (CRNA), and clinical nurse specialists (CNS). According to the American Academy of Nurse Practitioners National Nurse

Practitioner Survey in 2010, 79.7% of NPs practice in a community based setting such as a private office, urgent care, outpatient clinic, community or rural health center care for both adults and children. While clinical practice is the optimal experience for developing the needed psychomotor skills and clinical reasoning/decision-making skills, simulation is an increasingly viable pedagogy for the APN student and has been used for undergraduate nursing and medical students. Recent literature supports using clinical simulation to enhance knowledge, skills, and attitudes that are needed by nurse practitioner students in a clinical setting (Harder, 2010; Mompoint-Williams, Brooks, Lee, Watts & Moss, 2014; Rutherford-Hemming & Jennrich, 2013; Walton-Moss, O'Neill, Holland, Hull & Marineau, 2012). Mompoint-Williams and colleagues (2014) reported that the use of simulation increased student confidence and allowed the opportunity for self-reflection while also letting faculty assess student knowledge and skills.

The need for primary health care providers is increasing, particularly in underserved areas and with populations having more complex and chronic health problems (Starkweather & Kardong-Edgren, 2008), and with the implementation of the Affordable Care Act (Jacobson & Jazowski, 2011). Approximately 56,00 nurse practitioners were working in primary care in 2010 (AHRQ, 2011). Pediatrics is a specialty area, and as such, many APN students may not have had much prior clinical experience. Simulation scenarios are evidence-based, offer opportunities for collaborative practice and communication, improve clinical skills and attitudes, and improve student nurse practitioner clinical reasoning and overall performance (Rutherford-Hemming & Jennrich, 2013; Phillippi et al., 2013). Additionally, previous research has shown that student participation in simulation scenarios provides a way to decrease medical errors and increase patient safety (Starkweather & Kardong-Edgren, 2008).

Enhancing current didactic and clinical experiences with pediatric simulation activities offers APN students additional opportunities to work collaboratively, assess, diagnose, plan a course of treatment, and document care of children and adolescents. Further, family-centered care will be emphasized with a focus on evidence-based practice and the most up-to-date treatment algorithms for common pediatric problems. Culturally competent care will also be emphasized with elements including communicating with the child and family in a clinical setting. May and Cole (2014) found that using simulation to teach the care of children and adolescents allowed APN students an opportunity to improve clinical judgment and achieve mastery of nursing skills while increasing confidence when caring for the pediatric patient and their family.

Methods

The Jeffries Model for Simulation (2005) will guide the development of four pediatric clinical simulations of commonly encountered health care situations by advanced practice nurses and will represent situations commonly encountered by primary health care providers as identified by the Agency for Healthcare Research and Quality (Weir, Hao & Owens, 2013). The project team has extensive expertise with simulation design and implementation as well as advanced practice in the nursing care of children and adolescents. The simulation scenarios will incorporate active learning, requiring student engagement in assessment, diagnosis, planning a course of treatment, interacting with family, and documentation of the patient encounter during the scenario. All clinical scenarios will include changes in physiologic responses based on age, level of development, family dynamics, appropriate laboratory values, and imaging study results (if appropriate). Students will be expected to complete the scenario within a specified time frame and articulate and reflect on why decisions were made.

An example of expected student learning outcomes for each pediatric simulation scenario includes:

1. Identify age and level of developmentally appropriate, family-centered and culturally competent care
2. Complete focused history relevant to chief complaint and identify significant clinical history
3. Perform physical assessment and complete appropriate review of systems related to chief complaint
4. Develop differential diagnosis
5. Develop plan of treatment and patient education; use Motivational Interviewing to obtain family and child/adolescent buy-in regarding treatment plan
6. Document assessment (subjective and objective) and treatment plan using the appropriate format.

The four pediatric simulation scenarios will be provided to students in a small group format allowing for focused assessment, pertinent history taking, identification of diagnosis, development of appropriate treatment plan, and documentation. The Jeffries model (2005) supports the use of small student groups to allow time to gather information, diagnose, and plan a course of treatment. Eight clinical hours will be devoted to the 4 different pediatric simulation scenarios permitting each student at least two opportunities to participate in the simulated clinical office visits. Other students in the group will observe the family-centered interaction and collaborate with the APN student conducting the assessment to develop the plan of care.

Participation in the simulation scenarios will be required and will be counted as part of the APN student's designated clinical hours for NUNP 6260. Both faculty and student evaluation of the scenarios and the student experience during the simulated office visit will be collected to allow for future refinement and modification of the process.

Simulations will be videotaped allowing a mechanism to review the scenario and provide opportunities for guided reflection during debriefing. Faculty and peer feedback will be provided to encourage and reinforce performance, knowledge, and decision-making. Student-student and student-faculty interactions are designed to encourage collaboration in evaluating the pediatric patient's situation and implementing the appropriate plan of care as well as promote achievement of the goals of each simulation and meet the learning outcomes for the course. Students will be evaluated on age appropriate assessment skills, development of the differential diagnosis, planning an appropriate course of treatment, interaction with the family, documentation, and overall integrative knowledge of the care needed including laboratory values and pharmacology (if needed). The objectives for each scenario will be clearly identified and focus on clinical reasoning and clinical considerations at key points.

Course faculty will develop, collaborate, and implement the pediatric scenarios with support as needed by graduate assistants (GAs). The GAs will be trained and will be responsible for running the manikin during simulation with faculty support. The School of Nursing will support this grant by providing one school age high fidelity manikins. A toddler aged high fidelity manikin will be purchased with this grant.

Evaluation

Evaluation of the student learning outcomes of this project will be conducted through the use of the Student Satisfaction and Self-Confidence Learning instruments developed by the National League for Nursing (NLN) and Laerdal Medical Company (Jeffries & Rizzolo, 2006). Permission to use these instruments has been obtained from the NLN. Upon completion of the high-fidelity simulation experience, the student participants will complete three hard-copy instruments that have been previously tested for validity and reliability by content experts in simulation development and testing. The first tool is a Simulation Design Scale, a 20-item questionnaire using a five-point Likert scale designed to evaluate the design features of the simulations used in the study, and the importance of those features to the learner. These features include: a) objectives/information; b) support; c) problem solving; d) feedback and e) fidelity. The second tool is an Education Practices Questionnaire, consisting of 16-items using a five-point Likert scale designed to measure whether four education practices are present in the simulation (active learning, collaboration, diverse ways of learning, and expectations), and the importance of each practice to the learner. The third tool is a Student Satisfaction and Self-Confidence in Learning Questionnaire, consisting of 13-items using a five-point Likert scale designed to measure student satisfaction with the simulation activity and self-confidence in learning. Data will be analyzed using SPSS using a mixture of descriptive statistics and nonparametric inferential statistics.

Dissemination

Findings from this project will contribute to the current body of knowledge regarding the impact of high-fidelity simulation activities on knowledge, confidence, and self-efficacy in APN's in the

care of children and adolescents. Potential journals for project dissemination include: The Journal of the American Association of Nurse Practitioners, The Journal for Nurse Practitioners, The Journal of Nursing Education and The NLN Nursing Education Perspectives. Potential conferences for dissemination of information through presentations include: The International Nursing Association for Clinical Simulation & Learning Conference, The Society of Pediatric Nurses, The American Academy of Nurse Practitioners Annual Conference, and the NLN Education Summit. The UNC Charlotte SOTL Research Grant will be acknowledged in any publication or presentation.

Human Subjects

To ensure for the protection of human subjects, UNC Charlotte Institutional Review Board (IRB) approval will be sought prior to implementing the project.

External Funding

No additional funding will be required to sustain the project beyond the life of the grant.

Timeline

January – February 2015

1. Develop case scenarios
2. Purchase manikin
3. Provide in-services to all faculty participating in simulations
4. Run mock scenarios

5. Train graduate assistant in managing manikin
6. Refine and print debriefing evaluation forms

March 2015 – April 2015

1. Implement case scenarios
2. Evaluate simulation experiences
3. Refine experiences as needed

April 2015 – June 2015

1. Publish and present findings

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