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Clinical Simulation with Acute Care Nurse Practitioner Students
March 2007-December 2007

Project Checklist

- Statement of support from the department chair or school dean by e-mail to lhouser@iupui.edu - as a separate file not included in the proposal.
- Simple budget : A detailed budget is not necessary. Nevertheless, please include a paragraph indicating how you intend to spend the grant money.
- Will submit if proposal accepted IRB (Institutional Review Board) approval attachment by email or hard copy to lhouser@iupui.edu or (Linda Houser ES 3155, IUPUI) or project director statement that IRB representatives have been consulted and all requirements have been fulfilled and sent to the same. **Disbursement of funds will be contingent on receipt of approval by the Institutional Review Board, if human subjects review is necessary.**

PRAC Grant Proposal

Abstract: This proposal will test a theory and data-based framework that can be used to design, implement, and evaluate simulations used as teaching strategies in advanced practice nursing education. Concepts of the Simulation Model (see in appendices) include educational principles, student factors, teacher factors, simulation design characteristics, and outcomes. The project applicant will design, implement, and evaluate a technical skill simulation on central line placement using acute care nurse practitioner students.

Purpose of the Project: Acute Care nurse practitioners have had an increasing demand in the hospital due to increasing numbers of patients, higher complexity and aging patients and restrictions on residency workloads (Howie, 2002). Decreasing resident hours have given the acute care nurse practitioner the opportunity and necessity to perform more invasive procedures including central line placement. Simulation training will better prepare advance practice nurses when these opportunities arise during their clinical experiences and prepare them for increasing responsibilities within their role. Sometimes the opportunity to perform a central line placement on a real patient can be months apart never allowing the student to become proficient at line placement. Pohl et al. reports that even though some students may need more practice opportunities to become proficient in a task, all students in the study reached the same plateau if afforded the opportunity to be able to practice enough. (Pohl et al, 2003). Having a central line simulator provides this opportunity. Nurse educators must explore innovative ways to teach advanced practice nursing students the real-world of nursing in a cost-effective, productive, and quality manner. Providing students with limited clinical experiences and

immersing them with lecture content meets the need of imparting required technical knowledge, but is inadequate to prepare them for the complexities of the work place. Clinical simulation combined with clinical experience and other teaching methods, is a powerful tool to prepare competent nurses for clinical nursing (Morton, 1997).

Incorporating simulations into advanced practice nursing curricula is just one approach to preparing advanced practice nurses for a safer, efficient practice and to introduce new skills that the complex hospital environment demands. As an increased number of simulations are used to enhance learning, little is known about the outcomes, what teaching and learning practices contribute to positive outcomes, what the teacher role needs to be for the students, or how the simulation design can contribute to the overall teaching and learning. The purpose of this project is to explore how to design simulations, implement simulations as a teaching strategy, and evaluate selected learning outcomes using a technical skill simulation in advanced practice nursing.

Research Methodology:

During the spring of 2007, a simulation on central line placement will be designed by Julie Settles MSN, APRN, BC a full-time family health nursing faculty and program coordinator for the acute care nurse practitioner program. The simulation will be based on the design characteristics as defined in the simulation framework that are being tested. These simulation design characteristics include: 1) objectives/information, 2) cues; 3) complexity; 4) fidelity; and 5) debriefing.

Aims of the Project: Assess the design characteristics and educational practices in the development of a central line placement simulation as the simulation is being

implemented as a teaching strategy in the S675 and S676 Management of the Acutely Ill II and III.

1. Obtain reliability and validity data on the instruments constructed measuring the concepts in the teaching-learning framework using simulations.
2. Assess if students have more opportunities to perform a central line placement on real patients than the students in S676 Management of the Acutely Ill III in 2006 that did not have central line simulation training.

Research Questions:

1. What simulation design features are important to include in the central line placement simulation design?
2. Were the educational practices incorporated in the central line placement simulation activity and were they found to be important to both the students and teachers?
3. Is there a positive correlation between student and teacher as to what best educational practices and design features are important in the simulation activity?
4. What are the differences of learning outcomes between the usual method of teaching central line placement and the new instructional method when incorporating a nursing simulation into the teaching-learning activity?
5. Will students have more opportunities to perform central line placement on real patients by having training using simulation.

Proposed Outcomes for the Simulation study: The learning outcomes for the study will include: 1) Enhancement of technical skill performance in placing a central line; 2) Knowledge gains from incorporating simulations in the teaching-learning process; 3)

Support and acceptance of the educational practices which are important in designing and implementing simulations in nursing; 4) Learner Satisfaction with the simulation instructional method; 5) Self-Confidence in placing a central line in a patient requiring central line placement 6) More students will place central lines in real patients during their clinical rotations.

Methodology and Assessment Method: In the S676“Management of the Acutely Ill III”, a hands-on simulation will be incorporated into the course to help students apply concepts they are learning in the didactic/clinical portion of this course. Before the proposed simulation is incorporated in the spring and summer of 2007, data will be collected from the graduating class of summer 2006 on the teaching/learning strategies and outcomes when students were only provided text and video information on central line placement and performed their first central line on a real patient. (without any simulations being incorporated). Questionnaires and surveys about current teaching strategies will be distributed to the student participants and instructors. After this initial, baseline data collection, students in S676“Management of the Acutely Ill III” will participate in the clinical simulation on central line placement. The simulation will be designed based on the simulation framework developed by the national NLN/Laerdal Simulation Group (Jeffries, 2004, submitted).

Instruments: Instructor-made and former developed instruments will be used to measure the design characteristics, educational practices, learner satisfaction, self-confidence in central line placement, and knowledge gains. Questionnaires measuring outcomes and student perceptions of the simulated learning experience will be obtained. Data collection will take 20-30 minutes.

Data Analysis: A descriptive summary of items and scales will be done overall for each group. Pearson correlations and t-tests will be used to evaluate relationships and group differences between the teaching strategies. A statistician from the Biostatistics Division to oversee the data management and statistical analyses (see budget).

Evaluation and Dissemination of the results: Data analyses will be done with the assistance of a statistician from the Biostatistics Department on the IUPUI campus. Forms will be printed via scantron sheets and distributed to the Research Coordinator when time for data collection.

Results of the study will be disseminated in peer reviewed journals and peer-reviewed regional, national, and international conferences. The results of this study will be compared with the NLN/Laerdal National, multi-site research findings.

Intended use of the findings will be to broaden our teaching learning strategies based on evidenced-based practice, in both didactic and clinical courses using simulations to improve skill and learning outcomes.

Diverse utilization: Beyond the utilization of the simulator for the advanced practice nurses the intention is also for it to be utilized in undergraduate program as well. The S470 – Didactic “Restorative Health in Multisystem Failure” and S471 the clinical co-requisite critical care course for 7th semester undergraduates are eager to be able to use an anatomically correct trainer for their better understanding of central lines and the care they require and other undergraduate courses not yet identified could only benefit as well.

Budget: Total \$2455.80

Appendices:

Simulation Model.....Appendix A

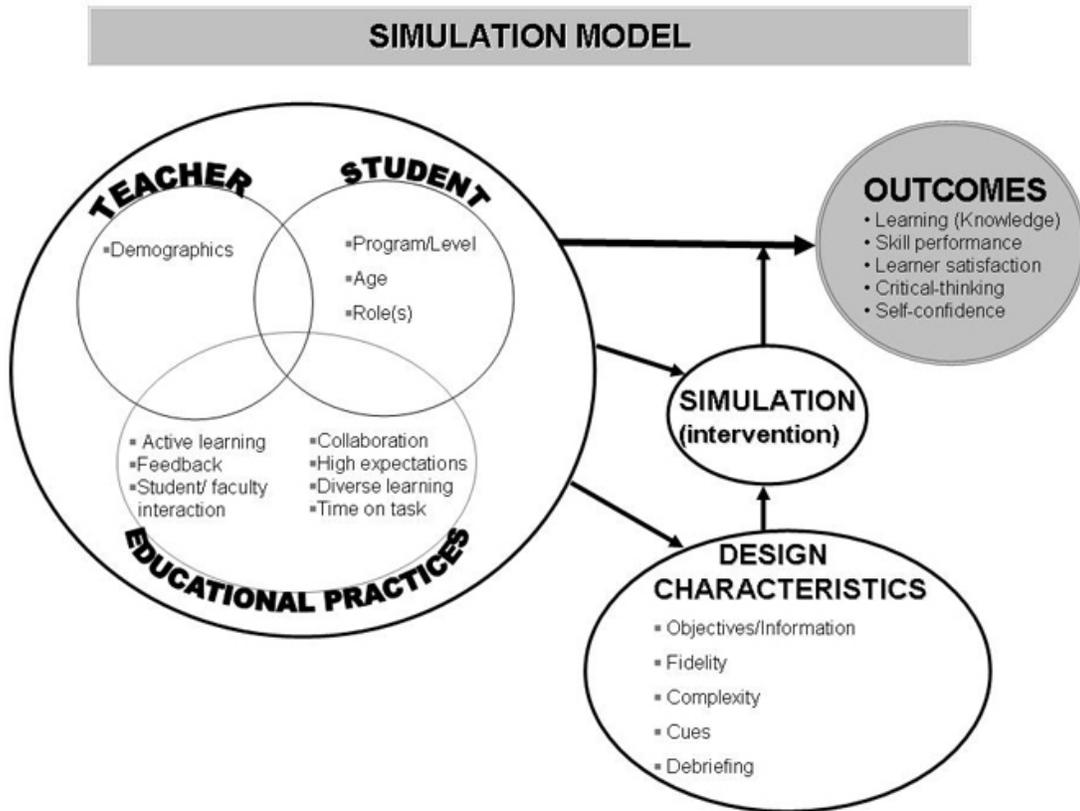
Description of Instruments and Instruments.....Appendix B

Central Line Simulator.....Appendix C

Budget description Appendix D

Appendix A

The Simulation Model:



Appendix B
Instruments for the Simulation Study
PRAC Grant Proposal

Instruments for the Study:

- ***Design Characteristics in the Simulation Framework:*** A tool developed for this study to measure constructs from the Simulation Model .
- ***Educational Practices in the design and implementation of the simulation:*** A tool developed for this study to measure the best practices in undergraduate education base on Chickering and Gamsons work (1987). (see the appendices)
- ***Satisfaction with the teaching methodology*** will be measured using a five-item subscale with a 5 point Likert response scale ranging from strongly agree to strongly disagree. Previous studies, modifying Kirkpatrick's (1996) Evaluation Scale, (Jeffries, 2000, 2001) had Cronbach's alphas of 0.88 and 0.92, respectively.
- ***Self-efficacy in learning*** will be measured as how competent the students feel to learn the skills and material covered in the medical/surgical class. The subscale contains eight items on the same response scales. The reliability for previous studies (Jeffries, 2000) using Kirkpatrick's modified Scale was 0.87.
- ***Cognitive gains*** will be measured by comparing pre and post-tests over the technical skill content (placement of a central line). The identical 12-item pre and post tests were instructor-developed, with content validity checks done by three experienced clinicians. The Kuder-Richardson test will be performed to evaluate reliability of the exam. Additionally, scores on the regular course exam (items pertaining to the simulation only) will be evaluated and compared with student scores from past classes to assess for cognitive gains and knowledge.
- ***Student's ability to perform the designated skills central line placement*** will be measured by an objective observation of the skill performance using a weighted skills competency check-list evaluating the learner on each procedural step as satisfactory or unsatisfactory. Individual items on the skill test will be weighted from 1-2 based on the importance of each step. A total score will be obtained for each participant and statistical analysis will be done on group scores. Content validity of the checklist will be done by the course instructor.

Appendix C

CentralLineMan™

www.simulab.com

Simulab Corporation, an internationally recognized leader in soft tissue simulation, is pleased to introduce the **CentralLineMan** training platform for practicing **Central Vascular Catheterization** (CVC). This new trainer which utilizes the same patented technology found in the highly acclaimed TraumaMan® System, trains surgeons on subclavian, supraclavicular and internal jugular access. In addition, the model allows the user to practice real-time **ultrasound guidance** during catheter placement.

High Fidelity Model...

CentralLineMan offers an unsurpassed level of realism in the look and feel of the simulated tissue. In addition, the torso has anatomically correct landmarks that allow the users to practice a wide range of subclavian, supraclavicular and interjugular techniques. The simulator also differentiates the arterial and venous blood to show a positive or negative response. During the simulated procedure the user will experience natural resistance, natural flashback of blood, and it has self-sealing veins and skin for multiple practices.



Ultrasound compatible...

CentralLineMan's replaceable tissue responds to ultrasound imaging for needle guidance. The arterial pulse and all of the necessary anatomical landmarks are present to help avoid or detect errors.

Training ready...

CentralLineMan is designed with both the trainer and student in mind; and is designed for interchangeable tissue sets each allowing for multiple practices. It is a highly portable and affordable training platform with refillable veins and arteries, water-based (washable) blood, and a carrying case.

CentralLineMan is the only training platform that:

- ❖ has all the necessary anatomical landmarks
- ❖ responds to ultrasound
- ❖ has arterial pulse and easily adjustable venous pressure to simulate complications

Appendix D
Proposed Budget

I. Hours for IUPUI as a site (for the Simulation Grant):

Central line simulator	1*	\$1340=	\$1340
Replaceable tissue	2*	\$435=	\$900
Shipping			\$75
Printing	160 pages *	\$0.08/page =	\$12.80
Statistical work	2 *	\$64/hr =	\$128
Total			\$ 2455.80

Printing actual costs:

20 packets printed for students and instructors, 8 pages per packet, \$0.08/page => \$ 12.80

Total Budget Requested:\$2455.80