Learning by Simulation: How Far Have We Come and Where Do We Want To Go?

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Objectives

- Describe the growth and evolution of simulation in the nursing curriculum.
- Identify outcome measures commonly used in simulation research.
- Discuss findings related to the effectiveness of learning by simulation.
- Identify where evidence is lacking and future research efforts need to focus.
Research Sponsors

NTAI – Research effort focused on defining and testing innovative telehealth clinical and educational methodologies
Pilot Training

http://homepage.ntlworld.com/bleep/SimHist1.html

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Horse Rider Training


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Driver Training

“It makes a loud grinding sound whenever I merge onto the highway.”

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Resuscitation Training

http://www.snopes.com/medical/emergent/cprannie.asp

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NCA Medical Simulation Center

http://www.simcen.org/VME%20Lab/projects/wave/index.html

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Simulation in Nursing Education
Variety of Simulation Strategies

Role Playing  Computer Programs

High Fidelity  Haptic Devices

Task Trainers  Standardized Patients

Virtual Experiences
Use of Simulation
Exemplars

• **Role Playing to Enhance Clinical Understanding**  
  Comer, SK, Nursing Education Perspectives, Nov/Dec 2005

• **Clinical Evaluation Using NURSEOSCE**  

• **Motor Vehicle Accident Simulation**  
  Henneman, Cunningham, Roche, & Curnin – Nurse Educator, Sept/Oct 2007

• **Mock Code Simulation**  
  Spunt, Foster, & Adams – Nurse Educator, Sept/Oct 2004

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Evaluating Effectiveness
Outcome Assessment

- What are we trying to create?
- Do changes in nursing practice mandate changes in nursing education?
- What skills and abilities are needed?
- What are students expected to do with the knowledge?
Framework of Clinical Assessment

Educational Competencies for AD Nursing Grads

- EBP and critical thinking are foundational.

- Encompasses analysis and integration of knowledge and information.

- Results in ... safe care that moves the client... toward positive outcomes.
Essentials of Baccalaureate Education

- Demonstrate appropriate teambuilding and collaborative strategies.
- Employ a range of technologies that facilitate patient care...patient safety.
- Demonstrate clinical judgment and accountability for patient outcomes.
What abilities will our students need?

- Synthesizes available data, information, and knowledge relevant to the situation to identify patterns and variances. (S1)
- Incorporates new knowledge to initiate changes in nursing practice if desired outcomes are not achieved. (S7)
- Collaborates in creating a documented plan of care, focused on outcomes...that indicates communication with patients, families, and others. (S11)
IOM Core Competencies

- Deliver patient-centered care
- Work as a member of an interdisciplinary team
- Engage in evidenced-based practice
- Apply quality improvement approaches
- Use information technology.
Advice from “Above”…

- NLN, AACN, NCSBN
- Implement and evaluate educational innovations to promote the development of critical and reflective thinking skills
- Experts advocate need for research to examine learning effectiveness
Virtual Clinical Practicum® (VCP)

Photo courtesy of Stripe, WRAMC

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“Virtual Clinical Practicum” is a registered trademark of iTelehealth, Inc. The VCP process is patent pending, iTelehealth, Inc.
Evaluation Objectives

- Student and faculty perceptions
- Comparison with onsite clinical
- Satisfaction of students, nurse mentor and faculty
Methodology

- Quantitative Approach
  - Virtual Clinical Practicum® Attitude Survey (VCPAS)

- Qualitative Approach
  - Open-ended questionnaires
  - Focus groups/interviews
VCP – Beta Test

- Improvements
  - Technology
  - Connectivity
  - Questionnaire
  - Process
Surprise Finding:

Photo courtesy of *Stripe*, WRAMC

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Simulation Enhanced VCP®

Student issue:

Lack of hands-on!
Roles: Charge Nurse, RN, Instructor, Student, Med Nurse
Logistics

- Clinical day
- 10 students/clinical group
- VitalSim® manikins
Student Responses

- ‘Hands-on’ experience
- Working as a team
Remote Health Assessment
Standardized Patients

- Individuals trained to be SP’s
- Practice in “thinking on one’s feet”
- Faculty prepare case studies
- Situational learning emphasizes authenticity and context

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State of the Science?

- Many examples from colleagues worldwide
- Relatively slow to adopt...evaluate
- Resulting lack of studies for evidence base
Simulation and Learning Effectiveness: Where have we been?

- Outcomes of interest
  - Knowledge
  - Self-confidence
  - Student attitude toward simulation
  - Student satisfaction
  - Clinical competence/judgment
  - Transfer/transition
Student/Faculty Perceptions

- Positive attitude (realism)
- Satisfaction
- Stress
- Confidence
- Self-efficacy
- Development of clinical competence
- Critical thinking
- Ability to transfer learning
Data Collection Methods

- Pre- and posttests
- Student self-evaluation
- Skill performance checklists
- Anecdotal data
- Videotape evaluations
- SP evaluations
Common Themes

- Overwhelming support for the use of simulation
- Need to develop valid and reliable methods for evaluation
- Use of simulation is consistent with best educational practices
- Ultimate goal is to enhance education thereby improving clinical competency

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CINAHL Search

Simulation
- Nursing Education, English, Research

Major Concepts:
- Computer Simulation
- Computerized Clinical Simulation testing
- Patient Simulation
- Simulations
- Virtual Reality
- Vignettes

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CINAHL Search, con’t.

- Limited to “Special Interest – Nursing Education”
- English
- Research
- Yielded 69 hits
- No systematic reviews
CINAHL Search, con’t.

- Of 69, 21 were deemed not relevant to question at hand
- Remaining 48 addressed some form of simulation and included some aspect of evaluation
- Of these 48, 34 measured student perceptions
Perceptions

- Improved performance
- Improved critical thinking
- Increased confidence
- Increased active learning
- Increased competence
- Increased critical analysis of performance
- Decreased stress
CINAHL Search, con’t.

- Types of student participants in remaining 14 studies
  - Anesthesia
  - Nurse Practitioner
  - Nurse Midwives
  - Undergraduate nursing students
  - Nursing assistants
CINAHL Search, con’t.

- Approaches to evaluating learning effectiveness
  - Score on critical behavior checklist
  - Score on therapeutic communication checklist
  - Quality of final videotaped physical examination
  - Comparison of performance on simulated encounter to other evaluation measures
  - Score on CCTST
Examples

• Comparison of simulation to case analysis with NPs and anesthesia patients – used CCTST (Becker, 2007)

• Comparison of simulation to lecture with midwife students – evaluated decision-making (Cioffi, Purcal & Arundell, 2005)

• Comparison of OCSE only to OSCE plus simulation – robust study (Alinier, Hunt & Gordon, 2004)
High/Low Fidelity Simulation
Hypothesis #1

- Training supported by a reactive simulator will produce a better learning environment and result to better performance as compared to learning with traditional systems.
Hypothesis #2

- Males will be more comfortable with and more receptive to training on a high-fidelity mannequin, and will perform better on return demonstrations.
Nursing Procedures

- Nasogastric tube insertion
- Urinary catheter insertion
Dependent Measures

- Observer-based Instrument
- Skills checklist
- Performance measure

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Dependent Measures

- Self-report Questionnaires
  - Post-training
    - Student attitudes
  - Post-Evaluation
    - Self-assessment
    - Opinions
### Results

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<th>Measure</th>
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<td>Interrater reliability</td>
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<tr>
<td>Observer - NG</td>
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<td>Interrater reliability</td>
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<tr>
<td>Observer – UC</td>
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<tr>
<td>Tool reliability - NG</td>
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<tr>
<td>Tool reliability - Questionnaire</td>
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Results - Learning

- Observer-based Tool
  - $F(1,37) = 2.83, p<.05$

- Enhanced learning effectiveness

- Self-report Questionnaire
  - $F(1,37) = 3.22, p<.05$

- More realistic
Results – Males vs Females

- Observer-based Tool

- Fidelity and gender

  Male students benefited more from high fidelity \([t(37) = 1.69, p<.05]\)

- No gender differences with low fidelity
Results – Males vs Females

- Self-report questionnaire
- Positive attitudes of males
  \[ F(1, 37) = 5.01, \ p < .05 \]
- Vis-à-vis low-fidelity
  \[ t(11) = 1.90, \ p < .05 \]
Simulation and Learning Effectiveness – *Where Do We Need to Go?*

- More difficult to measure
- Tip of the triangle
- The BIG question
Resources

- SIRC Website
- Bibliography
- Online learning
- Data Collection Tools
Future Research?

Questions yet to be answered…
The Future of Nursing Education is here, and it’s depending on you!!