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

hjf Henry M. Jackson Foundation for the Advancement of Military Medicine

Mount Aloysius College

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

Simulation in History

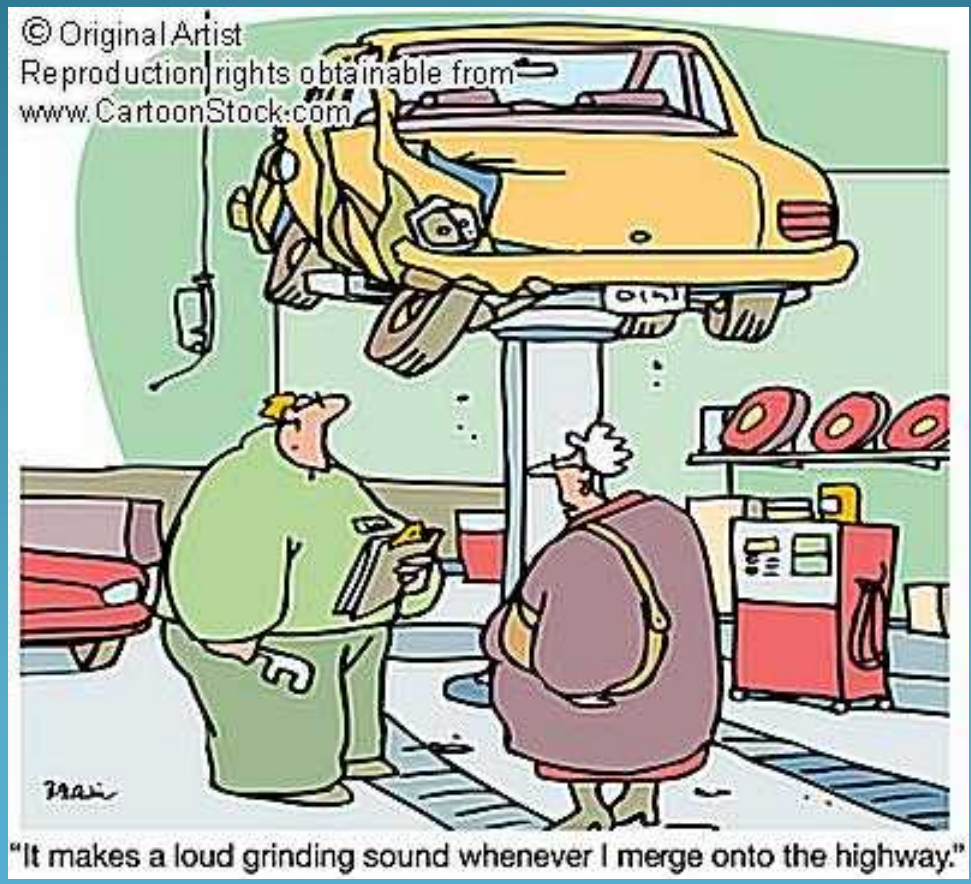
Pilot Training

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

Horse Rider Training

http://en.wikipedia.org/wiki/Image:Horse_simulator_WWI.jpg

Driver Training



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

Resuscitation Training

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

NCA Medical Simulation Center

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

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**

  Rentschler, Eaton, Cappiello, McNally, & McWilliam – Journal of Nursing Education, March 2007
- **Motor Vehicle Accident Simulation**

  Henneman, Cunningham, Roche, & Curnin – Nurse Educator, Sept/Oct 2007
- **Mock Code Simulation**

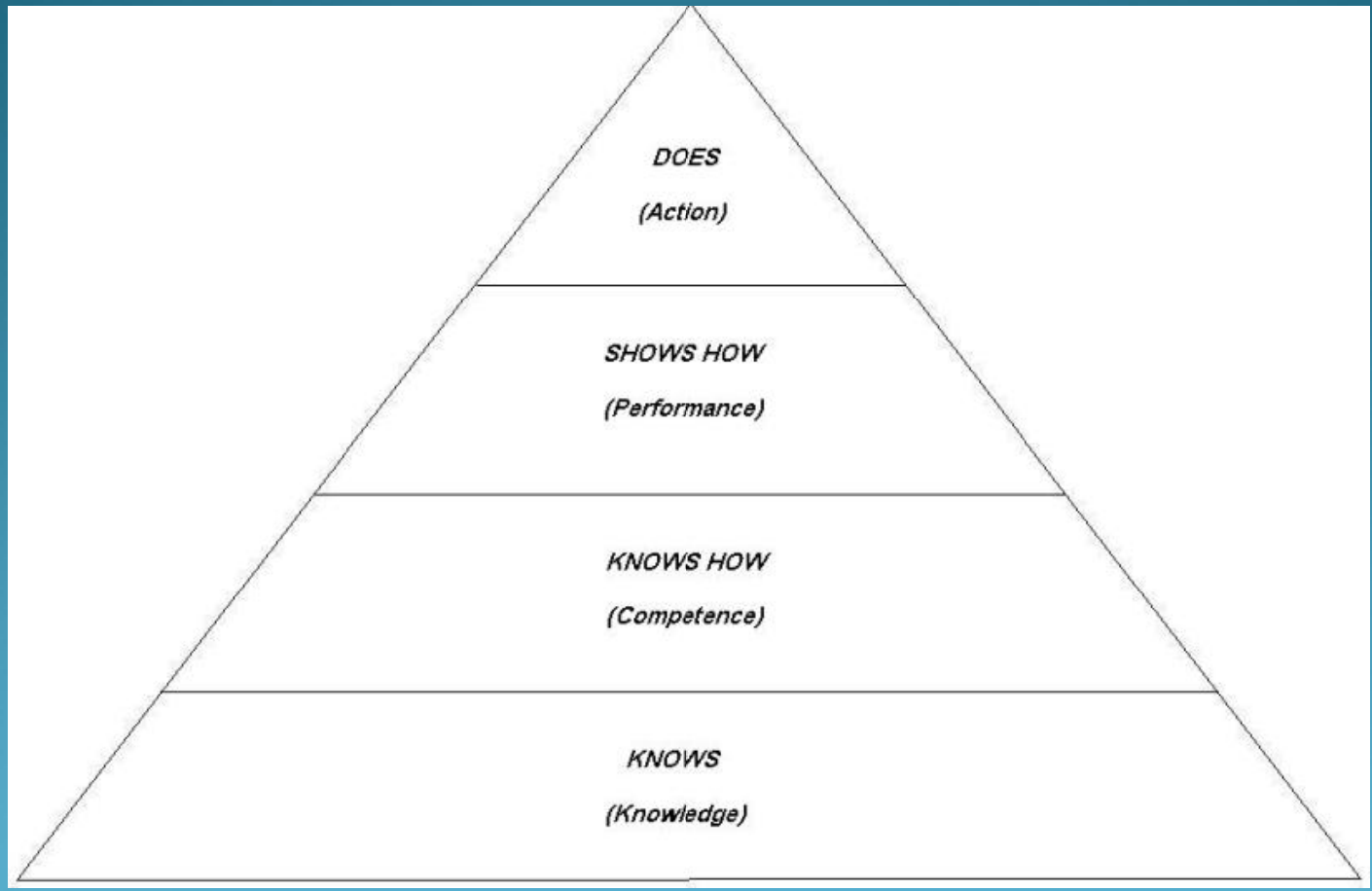
  Spunt, Foster, & Adams – Nurse Educator, Sept/Oct 2004

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



[Miller, 1990]. From Academic Medicine, Journal of the Association of American Medical Colleges.

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.

NLN National League for Nursing

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.

American Association of Colleges of Nursing
ADVANCING HIGHER EDUCATION IN NURSING

ANA Standards of Practice (2004)

- 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”…

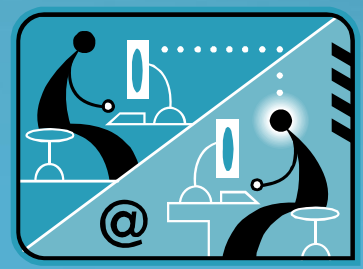
- NLN, AACN, NCSBN
- Implement and evaluate educational innovations to promote the development of critical and reflective thinking skills
- Experts advocate need for research to examine learning effectiveness

Virtual Clinical Practicum® (VCP)

Photo courtesy of *Stripe*, WRAMC

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

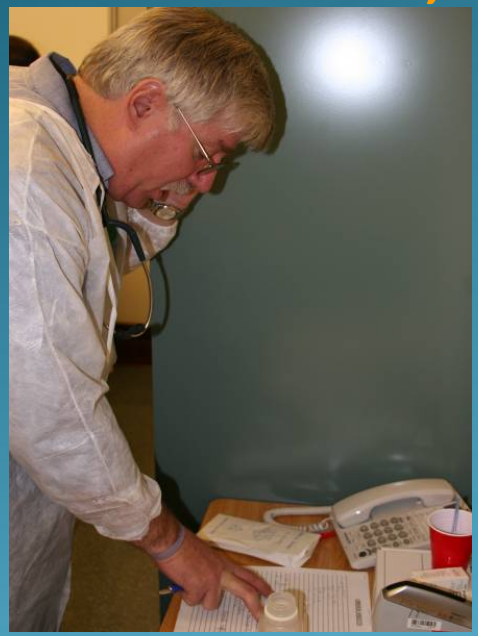
More Examples...

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

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

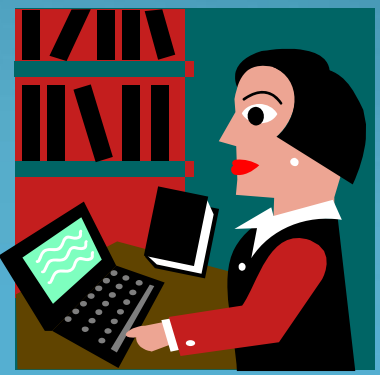
- Overwhelming support for the use of simulation
- Need to develop valid and reliable methods for evaluation
- Use of simulation is consistent with best educational practices
- Ultimate goal is to enhance education thereby improving clinical competency

CINAHL Search

Simulation

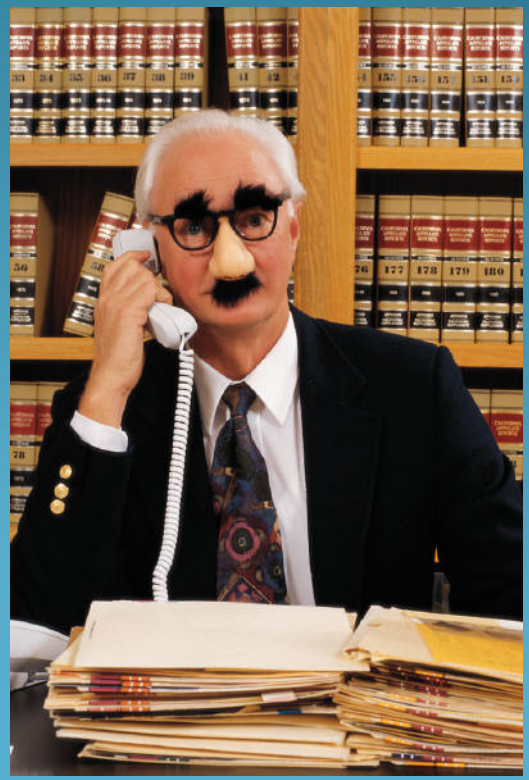
- Nursing Education, English, Research

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



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

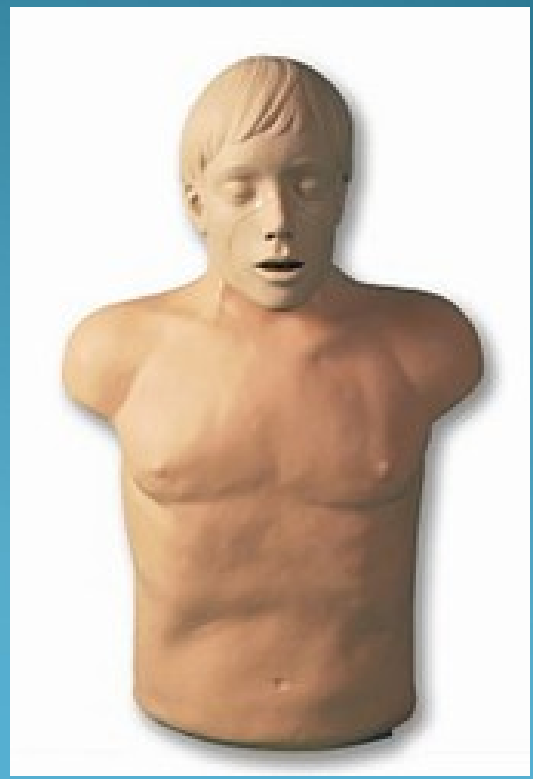
CINAHL Search, con't.

- 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

Dependent Measures

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

Results

Measure	Cronbach's alpha
Interrater reliability Observer - NG	0.99
Interrater reliability Observer – UC	0.96
Tool reliability - NG	0.93
Tool reliability - UC	0.84
Tool reliability - Questionnaire	0.88

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

NLN National League for Nursing

Resources

Simulation Innovation Resource Center

- SIRC Website
- Bibliography
- Online learning
- Data Collection Tools

Future Research?

Questions yet to be answered…

Thank You, and Congratulations in Advance…

The Future of Nursing Education is here, and it's depending on you!!