CLINICAL VERSUS SIMULATION: OUTCOMES, THE EVIDENCE, AND CURRENT RESEARCH

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Objectives: The participant will be able to:

1. Briefly review current national and international evidence in clinical education and clinical simulations

2. Compare the evidence relative to learning outcomes using simulation to the evidence relative to learning outcomes with use of clinical time

3. Examples of empirical research
Search for Evidence

- Systematic reviews
- Integrative literature reviews
- Individual studies
Search for Evidence

- Campbell Collaboration
  http://www.campbellcollaboration.org/library.php

- An international network of academics and practitioners who prepare, maintain, and make accessible authoritative systematic reviews of the effectiveness of interventions in the fields of social welfare, education, and criminal justice.

- Is modeled after the successful Cochrane Collaboration, established in 1993 to produce reviews of the evidence relating to the effectiveness of services in the field of health care. The aim of such reviews is to provide practitioners with a summary of the best available empirical evidence on which to base practice decisions.
Search for Evidence

BEME

The BEME Collaboration is a group of individuals or institutions who are committed to the promotion of Best Evidence Medical Education through:

- the dissemination of information which allows medical teachers, institutions and all concerned with medical education to make decisions on the basis of the best evidence available
- the production of appropriate systematic reviews of medical education which reflect the best evidence available and meet the needs of the user, and
- the creation of a culture of best evidence medical education amongst individual teachers, institutions and national bodies.

BEME is supported by:

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Published Reviews

BEME Guide No 4
Features and uses of high-fidelity medical simulations that lead to effective learning: a BEME systematic review
Lead reviewer: Barry Issenberg MD

BEME Guide No 5
Predictive values of assessment measurements obtained in medical schools and future performance in medical practice
Lead reviewer: Professor Hossam Hamdy

BEME Guide No 6
How can experience in clinical and community settings contribute to early medical education? A BEME systematic review
Lead reviewer: Dr Tim Dornan

BEME Guide No 7
Systematic review of the literature on assessment, feedback and physicians’ clinical performance: BEME Guide No 7
Lead reviewer: Dr Jon Veloski

BEME Guide No 8
A systematic review of faculty development initiatives designed to improve teaching effectiveness in medical education
Lead reviewer: Yvonne Steinert
Use Multiple Databases

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<th>Database</th>
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Evaluating Studies

Levin’s 4-stage Model

**Stage 1:** Pilot and observational studies

**Stage 2:** Controlled experiments in classroom, lab, clinical setting; observational studies of master teachers over time

**Stage 3:** Randomized controlled trials

**Stage 4:** If intervention effective - use evidence in other settings
Clinical Nursing Education: Limited Evidence

• Studies lack rigor
• Small samples
• 1 setting only
• Few replications
• Few use valid and reliable tools (most investigator developed, not tested)
Clinical versus Simulations

- Schools of nursing across the country are grappling with the question of how much clinical time can be provided via simulation or other alternative experiences.

- Traditionally the discipline has assumed that experience in actual clinical settings is the "gold standard" for students learning nursing practice and, by default, that any substitution is a threat to this standard, to the quality of graduates' practice and to the safety of the public.
Clinical Reality

• A recent national survey of faculty teaching prelicensure students in clinical settings showed that barriers such as lack of quality clinical sites and lack of qualified faculty are fostering the widespread adoption of alternatives

• (Ironside & McNelis, in press).

The need to manage increasingly large clinical groups encourages faculty to:

• Pair students in the care of a single patient,
• Send students off the clinical unit for observation,
• Decrease the numbers of skills students perform
• To increase the use of simulation.
Real Clinical Time

- Polifroni (1995) noted that for approximately 12% of the time, students were not engaged in care activities at all.

- Students were waiting for someone or something or were occupied in non-clinical matters.

- Interactions students have with faculty and expert nurses during clinical experiences are believed to be crucial in their formation.

- Little is known about the nature of these interactions and the ways in which they enhance students' nursing knowledge, skill acquisition, and management of the cognitive work of nursing.
Evidence on the Traditional Clinical Model

- 2005 Yonge and colleagues reviewed 1286 published articles reporting research in nursing education and found only 39 to be studies of clinical education.

- Without an evidence base for clinical teaching, many faculty members continue to teach as they were taught (Ironside, 2001) even though the context in which students learn and nurses practice has changed, and continues to change, dramatically.
Evidence on Clinical Education

- Clinical studies tend to involve a single class at a single school (often a class taught by the investigator), utilize small (less than 100) sample sizes (Yonge et al., 2005).

- Studies rely on anecdotal evidence or outcomes that may or may not relate to actual practice abilities (i.e., satisfaction).

- Evidence is frequently collected via self-report or questionnaire (Yonge et al., 2005).

- The paucity of research to guide clinical teaching has led to little change in the predominant model of clinical education over time.

- Tanner (2006a) reports that the current clinical model (one clinical faculty member assigned to a group of 8-12 students, each of whom provides care to one or two patients during the clinical experience) can be traced to the 1930s and continues to be the predominant model today.
Asking Questions

• What studies have been done to document clinical education?

• Consistent findings:
  • Teachers and preceptors ask low level questions (knowledge, recall) during clinical practice and in discussions
  • Most questions seek yes/no response

ASKING QUESTIONS:
Sequence from Low to High Level

M. Oermann (2010)
Nurses not prepared for practice

- The Carnegie Foundation of Teaching, the NCSBN, and the Joint Commission of State Board of Nursing, and Joint Commission of Accreditation of Hospitals have issued reports concluding that nurses entering the workforce are not prepared for practice challenges.

- The current educational model has failed students, faculty, and patients.

- Some schools have redesigned their clinical teaching model to include simulations.
Need to “bridge the gap” between education and practice

• A gap exists between the academic preparation of nursing students and the needs of the clinical agency

• There is a growing concern among the frontline hospital leaders about the new graduates

• Clinical education is not currently working using only the traditional models we have used for decades
The Nurse Executive center of the Advisory Board (2008)

• Survey taken 2008

• Of 135 nurse executives – 10% who responded to the survey stated new graduates were fully prepared for practice while 89.9% of the 362 nursing school leaders agreed

• A large preparation-practice gap exists!

The Nursing Executive Center of The Advisory Board Company (2008)
Practice-Readiness defined in 6 general areas

- Clinical knowledge
- Technical skills
- Critical Thinking
- Communication
- Professionalism
- Management of responsibilities
Studies on comparing clinical to simulations

• A few studies have determined that clinical simulations as a clinical time was at least as good as clinical. (Alinier, G., Hunt, Gordon, R., Harwood, C. (2006).

• Schlaret, MC & Pollock, JW (2010) – study showed simulation experience just as good as real clinical time.

• Cant and Cooper (2010) reported that only 12 quantitative studies using an experimental design with most of the studies measuring knowledge, critical thinking, satisfaction, and confidence.
Study comparing simulation experiences to traditional model of clinical


- Findings included that time spent in simulation enhanced clinical performance as students in simulation achieved higher scores more quickly than those without simulations.
Clinical Simulation Evidence

- Qualitative/Quantitative synthesis of research on simulations
  - Selective, critical review of research from 2003-2009
  - Meta-analysis, JAMA (2011)


Technology-Enhanced Simulation: A meta-analysis and systematic review

• From a pool of 10,903 articles, the researchers identified 609 studies for synthesis

• In comparison, with no intervention, technology-enhanced simulation training in health professions education is consistently associated with large effects for outcomes of knowledge, skills, and behaviors, and moderate effects for patient outcomes

Comments from the JAMA meta-analysis

Important questions in the area of simulations are those that:

- clarify when to use simulations
- how to use simulation most effectively and cost efficiently

Need for research in the area of theory-based comparison between different technology-based simulation designs that minimize bias, achieve appropriate power, and avoid confounding, as well as rigorous qualitative studies, are necessary to clarify how and where to effectively use technology-enhanced simulations for training healthcare professionals.
Nursing Research on the HPS


- State of the science in pre-licensure nursing education – for HPS
- 9 articles (2002- present) – focus on student perceptions, learner satisfaction/self efficacy, skill attainment, knowledge gains, knowledge transfer, and critical thinking
- Summary: Move simulation studies to the level of empirical research to determine if the HPS improves critical thinking and as a result, improves patient outcomes
- Carefully designed multi-site studies are needed
Types of Empirical Studies using Simulations

- Deliberative Practice Curriculum – cardiovascular skills
- Chest Compression Study
- EXPRESS (INSPIRE)-research collaborative
Simulation: Deliberate Practice

- Deliberate practice
  - Repetitive practice of well defined skill
  - Assessment of performance
  - Specific, informative feedback

- Strong association between hours of practice on high-fidelity simulators and learning outcomes
Deliberate Practice
Curriculum Features

• Highly motivated learners
• Engaged with well-defined objectives
• Approved level of difficulty
• Focused, repetitive practice
• Rigorous, precise educational measures
• Trainer monitors learning experiences
• Advance to another task, once completed

(Ericsson & Lehmann, 1996, pp. 278-279)
Goal in Deliberate Practice

*Constant skill, knowledge, or professional improvement, not just status quo.*

A. Ericsson 2007
Best Evidence Training Using Simulation

- Mastery Learning – benchmarks set
- Deliberate Practice – repetitive practice/feedback
- Curricular Integration – part of existing courses
- Adaptive Learning – small group/self learning/remediation
- Clinical Variation – 10 clinical cases

Key Features of BEME Review of Simulation

Issenbreg, et al 2005
Harvey: The Cardiopulmonary Patient Simulator

**Pulses**

Venous & Arterial

Chest Wall

**Auscultatory Findings**

Cardiac

Pulmonary
Research Question: An exemplar

Can APNs perform accurate cardiovascular assessments after completing the Harvey curriculum?

Is there a significant difference in nursing skill performance and clinical diagnostic reasoning pre-post testing?
Chest Compressions Initiative (Dr. Betsy Hunt, 2009)

Time Elapsed From Onset of PVT to Initiation of Chest Compressions

Proportion of Residents

Time in Minutes

Compression Start Goal

log-rank test of equality p < .001

2005 2007
Other empirical research: Stresses of Students in Clinical Practice

- What studies have been done?
  - **Fear** of making mistake that would harm patient
  - Interacting with teacher, other providers, patients, staff
  - Changing nature of patient conditions
  - Lack of knowledge and skill
  - Being unfamiliar with clinical setting
Stresses of Students in Clinical Practice

Being observed and evaluated by teacher
Differences across Clinical Nursing Courses

High stress

Pediatric nursing

Low stress

Foundations
Stressors of Students in Simulation
(L. Rubino, Jeffries, P.R. – 2012)

Stressors identified by students immersed in simulations

• Close evaluation by instructor and peer
• Fear of mistakes
• Feeling very responsible for outcomes
• Fear of embarrassment
Students Stressors in Simulations

Nursing Students' Self-Reported Significance of Individual Stressors Across 3 Academic Semesters

Significance of Stressor
1-Strongly Disagree
2-Disagree
3-Agree
4-Strongly Agree

- Setting...
- Insufficient...
- Inexperience...
- Responsible for...
- Fear of Mistakes
- Time Constraints
- Close Evaluation
- Fear of Failure
- Other Class...
- Fear of..
- Situation Felt..
- Other Life Stresses

Semester 1
Semester 2
Semester 3
Students Self-Perceived Overall Stress

Nursing Students' Self-Reported Overall Stress Across 3 Academic Semesters

<table>
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<tr>
<th>Semester</th>
<th>Self Reported Stress Level (0-10 Scale)</th>
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<td>Semester 2</td>
<td>4.57</td>
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<td>Semester 3</td>
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*P < 0.05

Based on Paired Data Only, to depict trend across 3 semesters.
Coping mechanisms of Students in Simulations

- Use both coping types:
  - problem-focused
  - emotion-focused

- Problem-focused:
  - Individual preparation
  - Get familiar to room and equipment
  - Anticipate situations
  - Discuss with instructor
Coping mechanisms continued

• Emotion-focused Coping
  • Know the setting is safe to make mistakes
  • Remind self this is a learning experience
• Solidarity from group
  • Support
  • Comfort
  • No judgment by peers
Where are we going?

- Leading Healthcare change
- Traditional clinical instruction versus Clinical Simulations?
- How much is enough?
- Future trends
IOM Report Goal

Transform nursing field to prepare nurses to lead change and advance health for all Americans
Ensure that Nurses Engage in Lifelong Learning

Faculty

- Partner with health care organizations to develop and prioritize competencies so curricula can be updated regularly to ensure that graduates at all levels are prepared to meet population’s current and future health care needs

Commission on Collegiate Nursing Education and National League for Nursing Accrediting Commission

- Require nursing students to demonstrate comprehensive clinical performance competencies that encompass knowledge and skills needed to provide care across settings and lifespan
National and International Simulation Trends and Topics

1. How much “clinical” of nursing, medical or allied health sciences can/should be replaced by simulation - pros vs cons

2. Focus on conducting more “T3” research, i.e. demonstrating simulation translates to better patient care and improved patient outcomes
   - Decreased errors in central venous line placement
   - Decreased Blood Stream Infection Rates

3. Maintenance of Certification programs imbedding simulation

4. Standard setting for “high quality simulation”
   - simulation center accreditation programs: SSiH, ASA,
   - simulation instructor certification programs
Other trends....IPE/safe practice

• Partner with health care organizations to develop and prioritize competencies so curricula can be updated regularly to ensure that graduates at all levels are prepared to meet population’s current and future health care needs
What do we believe?

- Healthcare providers should demonstrate competency at *before* being allowed to do on a patient?
  - central venous lines? (i.e. MedStar, Mayo, Northwestern)
  - conscious sedation?

- Healthcare providers should NOT be allowed to have skill decay, **MUST** demonstrate competency “annually”?
  - chest compressions? (AHA considering Resuscitation Ctrs)
  - defibrillation? (Jt Commission to require reporting of time to defibrillation metric)
  - managing maternal hemorrhage? (recent deaths, utilizing simulators created for “3rd World”)
The NCSBN is conducting a landmark, national, multi-site, longitudinal study of simulation use in pre-licensure nursing programs across the country.

The study will follow a cohort of students throughout their education and into the first year of their respective careers to discover the effects of simulation in learning, and how it translates into the workforce post graduation.

In the final phase of the study, translational outcomes of simulation into the workforce will be evaluated, which has, heretofore, been the "missing link" in nursing simulation research.
NCSBN Study Goals

• **Evaluate the learning** occurring with varying amounts of simulation substituting for clinical hours

• **Evaluate new graduates** ability to translate nursing knowledge and skills into the workplace

• Highlight **best practices in simulation** use
Thinking About the evidence in Simulation-Based and Traditional Clinical Experiences

• There is a need for more focused research in both areas pertaining to:
  • Educational impact
  • Program improvement
  • Role in advancing patient safety
  • Interprofessional (IPE) educational and practice outcomes
Limitations

• At the heart of all research in simulation-based or traditional clinical assessment rests the key issue of score validity
  • “Are we really measuring what we think we are measuring?”

• Gathering evidence to support the answer can be complex and time-consuming
  • Expansion of measurable skill domains beyond PE, Hx, communication
Summary

• As simulation-based performance assessments & evaluations become more commonplace for higher-stakes decisions (e.g. certification, licensure), & as simulations begin to replace real clinical practice, evidence to support the application and defensibility of decision rules needs to be gathered

  - Identify a theoretical basis for what is being measured?

  - Need reliable data for an evaluation to yield valid inferences
Leadership Challenges in Simulation

• Leadership in simulations requires us to link to the past and present

• According to novelist William Gibson, The future is already here…it is just unevenly fragmented.”

• The best way to learn about the future is to immerse yourself in it!

• Since the future is “already here” your challenge will be to find the best way to experience and learn from the unevenly distributed future.
Goal for using simulations: Optimal Student Learning for High Quality Patient Care
References


References


Questions?

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