

CLINICAL VERSUS SIMULATION: OUTCOMES, THE EVIDENCE, AND THE POSSIBILITIES

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Objectives: The participant will be able to:

- 1) Explain the current use of simulation as a clinical experience.
- 2) Compare the evidence relative to learning outcomes using simulation to the evidence relative to learning outcomes with use of clinical time
- 3) Describe the perceived stressors and barriers to using simulations in place of clinical experiences.

Search for Evidence

- Systematic reviews
- Integrative literature reviews
- Individual studies



Search for Evidence

- Campbell Collaboration

<http://www.campbellcollaboration.org/library.php>



THE CAMPBELL COLLABORATION

What helps? What harms? Based on what evidence?



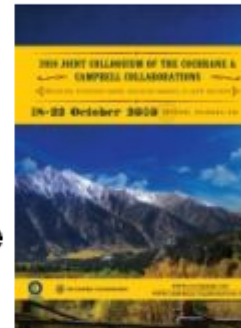
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News

Colloquium program book available

The program book for the 2010 Joint Colloquium of the Cochrane and Campbell Collaborations is now available for download!



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All roads lead to Keystone

The Joint Colloquium of the Cochrane and Campbell Collaborations is approaching fast, but there is still time to register for what promises to be the most important event of the year for people interested in systematic reviews and evidence-based policy and practice. Join us in Keystone, Colorado 18-22 October!

Joint Colloquium of the
Cochrane & Campbell
Collaborations



[Read more...](#)

Spotlight Event



Joint Cochrane/Campbell Colloquium:
"Bringing evidence-based decision making to new heights"
18-22 October 2010
Keystone, Colorado, USA


Improving decision-making through systematic reviews on the effects of interventions within the areas of education, crime and justice, and social welfare.

Search for Evidence

BEME

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Systematic Review Scholarship Professionalism Teaching & Learning Best Practice




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.

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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

PubMed “problem-based learning”
(PBL)
systematic reviews

CINAHL PBL
systematic review

Evaluating Studies

Levin's 4-stage Model

Stage 1: Pilot and observational studies

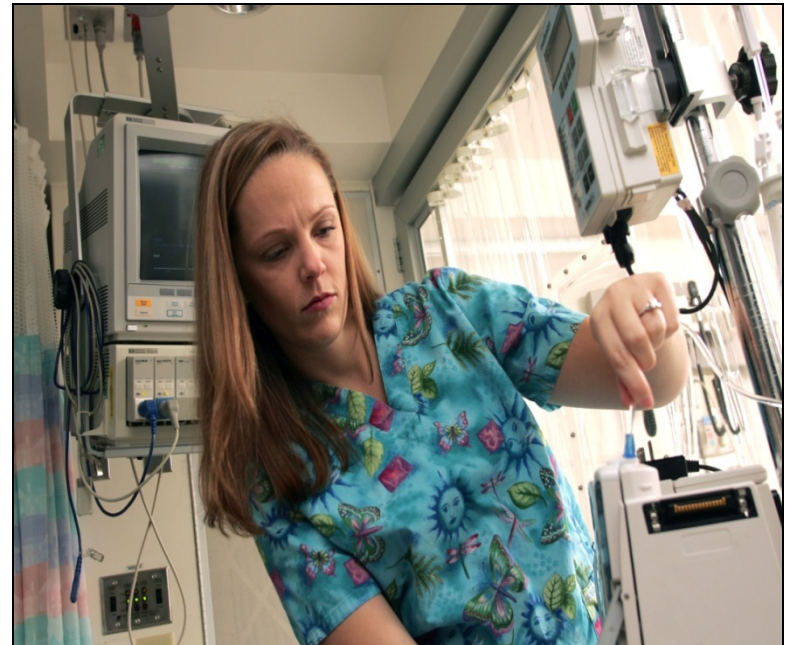
Stage 2: Controlled experiments in classroom, lab, clinical setting; observational studies of master teachers over time

Stage 3: Randomized controlled trials

Stage 4: If intervention effective - use evidence in other settings

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

- (Ironsides & McNelis).

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 (Ironsides, 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.

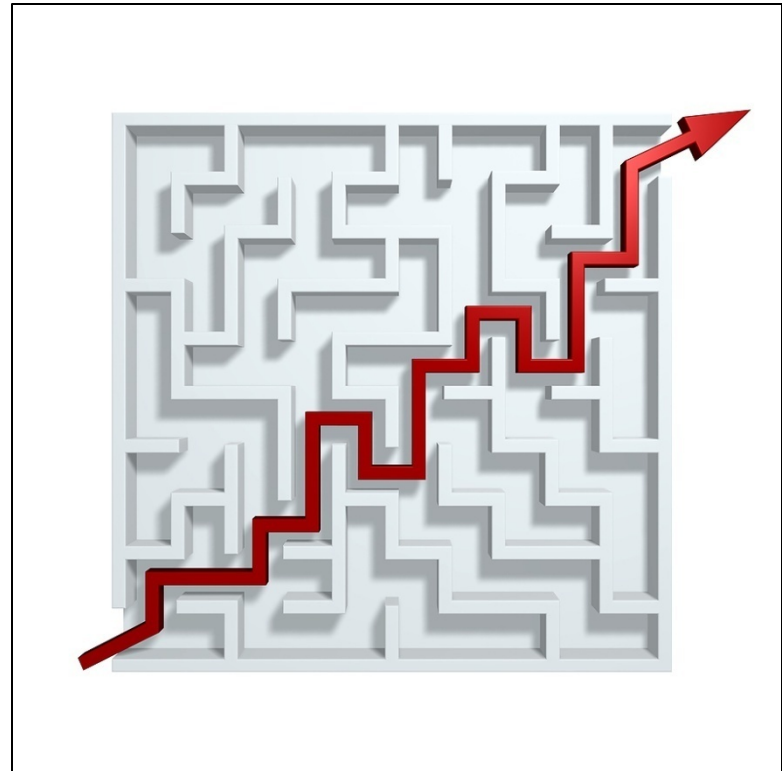
Asking Questions

- 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 questions

Low level TO high level



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

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

- Meyer, M. Connors, H., Hou, Q., & Gajewski, B (2011) evaluated the effects of a theory-drive pediatric simulation curriculum on nursing students' performance studying 116 nursing students.
- Findings included that time spent in simulation enhanced clinical performance as students in simulation achieved higher scores more quickly than those without 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**



Clinical Simulation Evidence

- Qualitative/Quantitative synthesis of research on simulations
 - Summary of results of 3 prior evidence reviews (1969-2003)
 - Selective, critical review of research from 2003-2009
 - Meta-analysis, JAMA (2011)

McGaghie WC, et al. A critical review of simulation-based medical education research: 2003-2009. *Med Educ.* 2010;44(1):50-63.

Cook, D., Hatala, R., Brydges, R., Szostek, J., Wang, A., Erwin, P., & Hamstra, S. (2011). *Technology-Enhanced Simulation for Health Professionals Education- A systematic review and meta-analysis*, JAMA, 306 (9), 978-988.

Shinnick, M. Woo, M., & Mentis, J. (2011). Human Patient Simulation: State of the Science in Pre-Licensure Nursing Education, JNE, 50(2), pp. 65-72.

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
- Cook, D., Hatala, R., Brydges, R., Szostek, J., Wang, A., Erwin, P., & Hamstra, S. (2011). *Technology-Enhanced Simulation for Health Professionals Education- A systematic review and meta-analysis*, JAMA, 306 (9), 978-988.

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

Shinnick, M. Woo, M., & Menten, J. (2011). Human Patient Simulation: State of the Science in Pre-Licensure Nursing Education, JNE, 50(2), pp. 65-72.

- 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

Simulation: Feedback

- Feedback (debriefing)
 - Most important across studies
 - Formative (improve performance)
 - Limited use for summative evaluation
 - High stakes testing



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

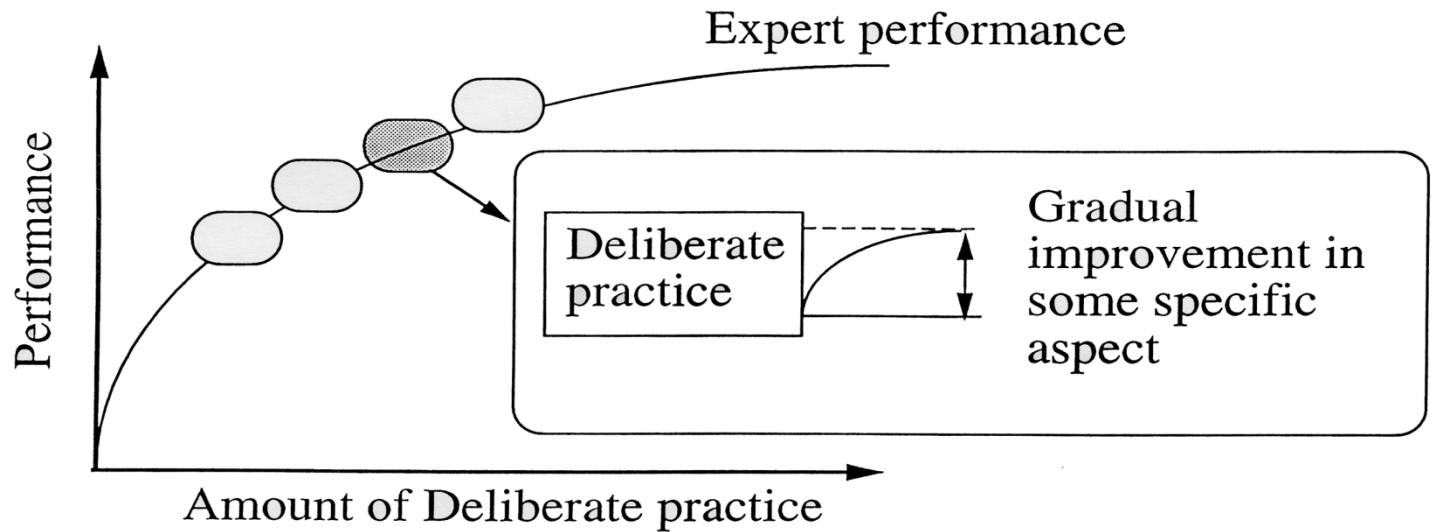
Deliberate Practice Curriculum Features

- 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.



Mastery Learning

Goal: All learners accomplish all educational objectives without variation

Features

1. Baseline (e.g., diagnostic testing)
2. Clear learning objectives, units ordered by difficulty
3. Educational activities (e.g., deliberate skills practice) focused on objectives
4. Minimum passing *mastery* standard (MPS) for each unit
5. Formative testing → *mastery* of each unit
6. Advancement if performance \geq MPS
7. Continued practice or study until MPS is reached

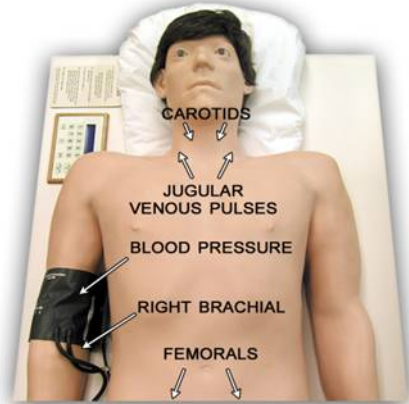
Best Evidence Training Using Simulation

- 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

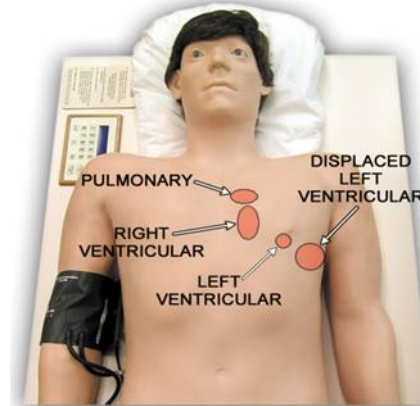
Key Features of BEME Review of Simulation

Harvey: The Cardiopulmonary Patient Simulator

Pulses

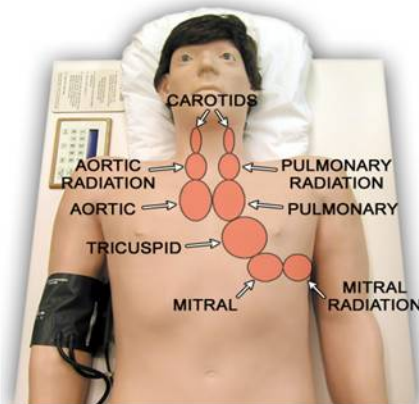


Venous & Arterial

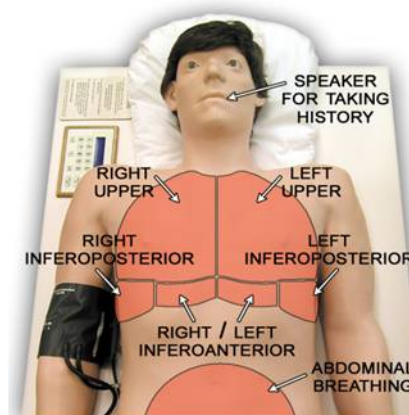


Chest Wall

Auscultatory Findings



Cardiac

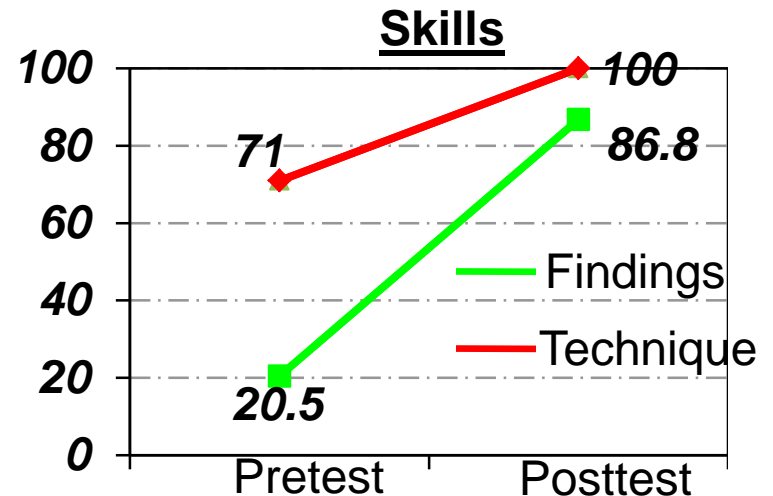
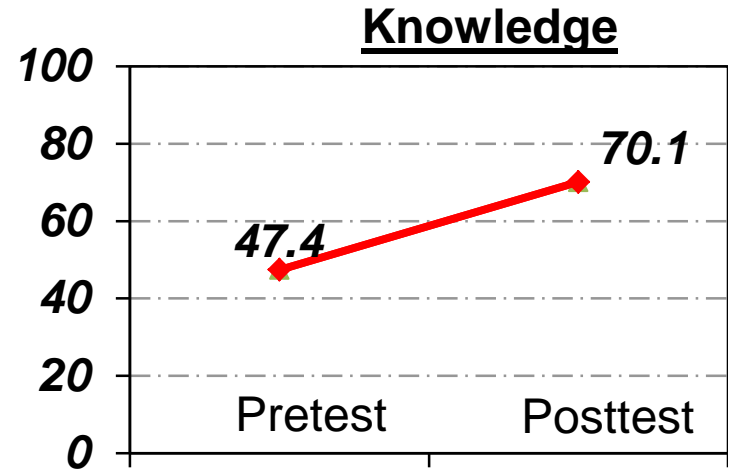


Pulmonary

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?



Practice is Critical

- Meta-analysis of 53 studies on skill decay
 - **Substantial** loss of acquired skills from nonuse or lack of practice
 - Skills not practiced or used for 1 year:
 - Average participant performs at less than 92% of original skill
 - Skills taught early in nursing program that are not used are not retained

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 – 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

Coping mechanisms of Students in Simulations

- Use both problem-focused and emotion-focused coping mechanisms
- Problem-focused:
 - Individual preparation
 - Get familiar to room and equipment
 - Anticipate situations
 - Discuss with instructor



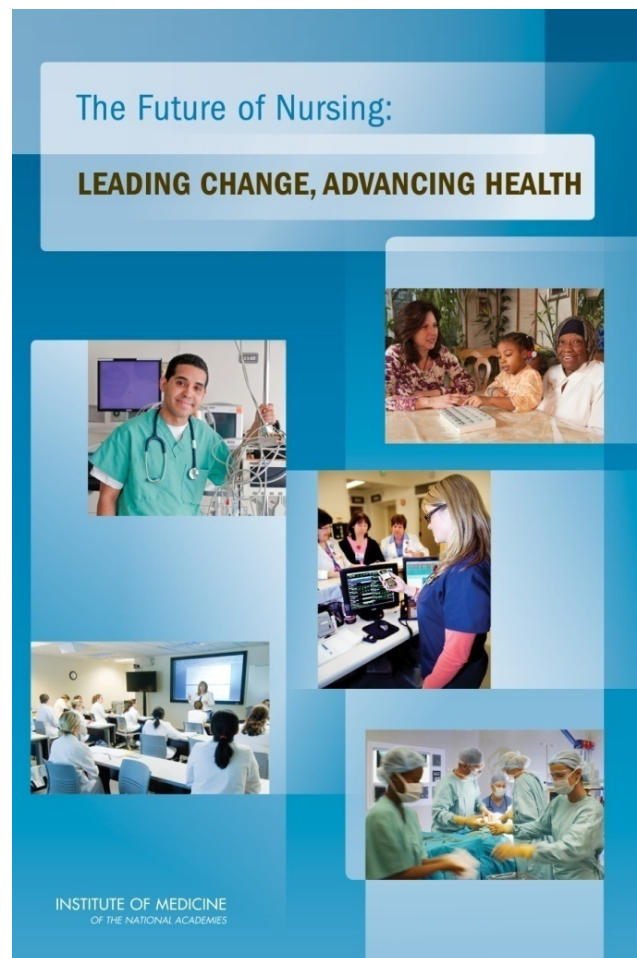
Coping mechanisms continued

- 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



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

NCSBN Survey 2010

- Survey mailed to 1720 schools of nursing
- N – 1060 responded – 62% response rate

- Program type
 - Associate – 614
 - Baccalaureate – 433
 - Diploma – 79
 - Prelicensure MSN – 42

Hayden, J. (2010). Nursing Program Simulation Use, Faculty Preparation, and Clinical Replacement: A national survey. NCSBN.

Use of High Fidelity Simulations

- Overall – 87% of schools are using
- Associate – 86%
- Baccalaureate – 89%
- Diploma – 73%
- Prelicensure MSN – 94%

NCSBN Multi-Site Study 2011

- 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 Research 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



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), evidence to support the application and defensibility of decision rules needs to be gathered
 - Theoretical basis for what is being measured?
 - Link between decisions (e.g. identifying those in need of remediation) and educational activities
 - For an evaluation to yield valid inferences, the data must be reliable

Goal for using simulations: Optimal Student Learning for High Quality Patient Care



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Questions?

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