

Competency Based Medical Education and Healthcare Simulation



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Goal: Goal: Understand how healthcare simulation fits into competency based medical education

Objectives: At the end of this presentation the learner will be able to:

1. List frameworks for competency
2. Describe the 4 main methods of simulation
3. Link simulation to competencies
4. Design your own sim

Questions:

Which of the following is currently a healthcare simulation method?

- a. Standardized Patient
- b. Mannequin Simulator
- c. Task Trainer
- d. Virtual/Augmented reality
- e. All of the above

What is the basic assumption in Competency Based Medical Education?

- a. It is far superior to other methods
- b. It is process based
- c. It is based on the outcomes we want to achieve
- d. It begins with an assessment of the learner
- e. It involves high inference judgments

Which Learning Theory best describes Simulation Based Medical Education?

- a. Kolb
- b. Kearns
- c. Dewey
- d. Bloom
- e. Knowles

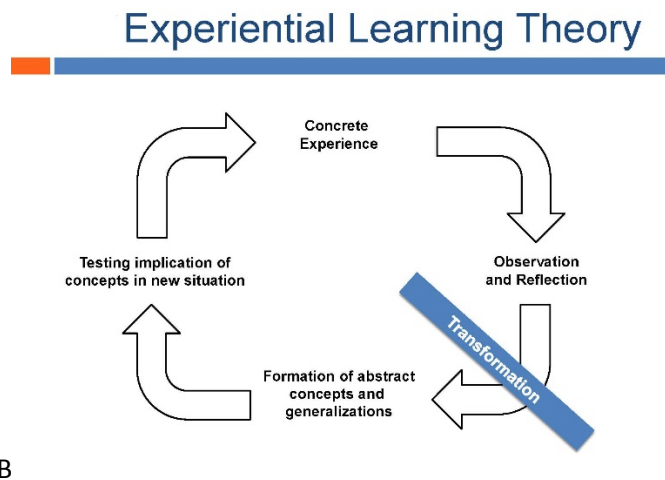
Definition of Simulation Based Medical Education (SBME)

- a. The use of healthcare simulation modalities: Standardized patients, human patient simulators, task trainers and virtual reality simulators as a teaching tool in medical education.
- b. A tool for learning, to be used by competent instructors, for a specific learning outcome.
- c. A form of experiential learning and a complement to the experiential learning in the real clinical world.
- d. As in any form of instruction, still based on learning goals and measurable objectives.

Factors that have increased the growth of SBME:

- e. Focus on patient safety
- f. Limited clinical exposures and training hours
- g. Desire for just in time training
- h. Need to practice or refresh skills

Theory for SBME:



FOUR MAIN METHODS USED IN HEALTHCARE SIMULATION

1. **Simulated Patients** – Humans who are trained to portray patients
2. **Mannequin Simulators** – Computerized full sized humans: infants, children, adults
3. **Task Trainers** – Simulated body parts or simulated organs
4. **Virtual Reality & Screen based Simulation** – Computer generated tissues, body parts or humans

Success of any program of simulation depends on operations, logistics and faculty development.

See: Khan, K. *Simulation in healthcare education, building a simulation program. A practical guide: AMEE Guide No. 50 (2011)*

What is some evidence for Simulation to Assess Competencies?

1. Motola, I. Simulation in healthcare education: A best evidence practical guide. AMEE Guide No. 82, (2013).

Four principles for Effective Simulation Based Medical Education:

- **Curriculum Integration:**
 - Simulation becomes part of the curriculum, not an additional component.
See: Issenberg 2005; MCGaghie 2010
 - **Feedback and Debriefing**
 - Definition: Any specific information, given to a learner, designed to improve their performance. A comparison of the learner's performance to a given standard.
 - In BEME review, feedback was the most cited factor in successful learning. *See: Issenberg, SB. Features and uses of high fidelity medical simulations that lead to effective learning: A BEME systematic review. Med Teach 27:10-28 (2005).*
 - **Deliberate Practice**
 - Defined as the repetitive performance of a task with feedback.
See: Ericsson, KA. (2004) . Also : McGaghie, William C. Acad Med (2011).
 - **Good Assessment Plan to measure performance**
 - Need for every simulation.
 - Need to have valid and reliable measurement tools.
 - Examples: Mini-CEX, Objective Surgical Assessment of Technical Skills, procedure checklists, etc.....
2. Validity of Simulation-Based Assessment for Accreditation Council for Graduate Medical Education Milestone Achievement. Robert S Isaak, Fei Chen, Susan M Martinelli, Harendra Arora, David A Zvara, Gene Hobbs, Marjorie P Stiegler. Simulation in Healthcare 2018 Jun; 13 (3) : 201-210.
 - This is a retrospective analysis of 55 anesthesia residents' performance in in OSCE over 2 academic years of training. They demonstrated that OSCEs can discriminate between years of training and correlate well with other measures of competence using the ACGME competencies.
 3. Mallory LA, Calaman S, Lee White M, Doughty C, Mangold K, Lopreiato J, Auerbach M, Chang TP. Targeting Simulation-Based Assessment for the Pediatric Milestones: A Survey of Simulation Experts and Program Directors. Acad Pediatr. 2016 Apr;16(3):290-7
 - This is a survey of pediatric program directors asking them to rate competencies that they struggle to measure and what if any may be amenable to simulation. Their answer: "interprofessional teamwork," "clinical decision making," and "effective communication."
 4. Cheng, A. et al. Technology Enhanced Simulation and Pediatric Education; A Meta-Analysis. Pediatrics 2014; 133:e1313-e1323
 - A Meta-analysis of 57 studies and 3,666 learners: 20 RCT, 36 studies involved residents, 42 studies involved children (vs neonates, adolescents). Effect Sizes were large (0.80-1.91) for outcomes in knowledge, procedure skills and behaviors with patients.

What does the future hold for healthcare simulation?

- Initial – FLS/FES/FUSE in Gen Surgery
FLS in OB-GYN
MOC – Anesthesia
- Refresher trainer before SIM
- Individual practice – mobile AR/VR for individuals
- AI – machine learns your strengths and weaknesses and prescribes practice for you

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Research Agenda for Healthcare Simulation

The following research questions are based on national consensus.

1. Feedback

- a. What model and level of feedback is needed in simulation education?
- b. What is the faculty level of feedback proficiency? How can it be improved?

2. Deliberate practice

- a. Is short term or long term deliberate practice more effective?
- b. What is the decay curve?

3. Curriculum integration

- a. How best does simulation fit into your curriculum?
- b. Can simulation methods (SPs or virtual SPs or task trainers) trigger Problem Based Learning or Team based learning or Clinical reasoning?

4. Simulation fidelity

- a. What level of fidelity is necessary in various educational settings and contexts?

5. Skill acquisition and maintenance

- a. What is the learning curve to acquire a skill?
- b. What is the decay curve for a skill?

6. Transfer to practice

- a. What are patient outcomes of our simulation training?
- b. Do they last?

7. Team Training

- a. What are the key principles in training teams?
- b. How do we measure good functioning teams?
- c. How long does the team training effect last?

8. High Stakes Testing

- a. How can we use G-studies and D-studies to look at our clinical skills performance data and develop highly reliable assessment cases?
- b. How many cases are needed to make a high stakes assessment about progression to the next level?
- c. What is the effect of the rater, the case and the learner on the performance outcome?

9. Instructor training

- a. What is the value of instructor training?
- b. How much is needed?
- c. How much do advances in simulation affect the context of training?

Make your own Simulation Based Medical Education Scenario: 8 steps

Step 1: Choose a competency to assess:

- Professionalism
- Patient Care
- Medical Knowledge
- Interpersonal Communication
- Practice Based Learning and Improvement
- Systems based Practice

Step 2: Then, choose a **behavior** or a **skill** that you can simulate within that competency. Some examples are:

1. Breaking bad news
2. Angry parent/vaccine refusal
3. Informed consent
4. Feedback to a resident
5. Procedure: IV/IO, placement, airway, etc....
6. Cardiac arrest
7. Lumbar puncture
8. Bag Valve mask in the delivery room
9. Sepsis in a heme-onc patient
10.

Step 3: What simulation method will you use?

- Standardized Patient
- Human Patient Simulator
- Task trainer
- Virtual Reality

Step 4: Where in the curriculum does it fit?

- MS-3/4
- PGY 1-5
- Fellow

Step 5: What are the learning objectives?

For example: At the end of the scenario, the learner will be able to:

- a.
- b.
- c.

Step 6: How will you measure performance?

- Procedure checklist?
- SP checklist of skills?
- Faculty global rating scale?
- ACGME milestone scale?

Step 7: Feedback and debriefing plan: How will you do it?

- use video review?
- Direct observation and oral feedback?
- Written feedback from observers?

Step 8: Will you include deliberate practice? E.g., repeat the scenario if the learner needs more practice to reinforce the feedback?

- Yes (if a low stakes exam)
- No (if a high stakes exam)

Help page

COMPETENCY DOMAIN	STANDARDIZED PATIENTS	HIGH FIDELITY HUMAN SIMULATORS	VIRTUAL REALITY
Interpersonal Communication & Professionalism	☺		
Procedures [PC]		☺	☺
Teamwork [PC]		☺	☺
Physical exam [PC]	☺	☺	☺
Applying Knowledge of Medical Science [MK]	☺	☺	☺

☺ = Best methods