

# Simulation in Graduate Medical Education: Understanding Uses and Maximizing Benefits

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## The Challenge

Simulation has been shown to enhance resident learning and standardize clinical assessments, but it can be costly. The challenge for program directors is to better understand the existing types of simulation and their uses to help determine when this methodology offers substantial learning and/or patient safety benefits that warrant the added costs. This Rip Out provides program directors with key simulation terms, concepts, and considerations to guide appropriate and cost-effective use of simulation to augment their curriculum and learning opportunities.

## What is Known

### Effectiveness

Since the 1999 Institute of Medicine report<sup>1</sup> highlighting that 44 000 to 98 000 deaths annually may be due to medical error, there have been increasing calls to use simulation in resident education to enhance learning and increase the safety of care in teaching settings. Recently, some ACGME Residency Review Committees have begun to require simulation and skills laboratory training.<sup>2</sup> The benefits of simulation for procedural competence and team training, and to allow learners to experience rare or potentially dangerous situations in a safe environment, have been described extensively in the medical education literature.<sup>3,4</sup>

### Types of Simulation

Simulation encompasses a wide range of methodologies from full-scale lifelike virtual clinical environments using trained individuals and technology to mimic clinical problems, conditions, and events in the practice of medicine to computer-based clinical simulations, task trainers, and role play and games.

### Uses of Simulation

Simulations can be used to improve and assess (1) communication skills and the ability to integrate several

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## Rip Out action items

Program Directors must

1. Understand the uses and benefits of simulation by reviewing the recent simulation literature for their clinical specialty.
2. Convene residents and faculty to develop an initial list of clinical skills and situations that may benefit from the use of simulation; prioritize the list to those with the purported greatest potential benefit to resident learning, assessment, or safety and quality of care.
3. Contact their colleagues who use simulation locally (a local or regional simulation center), and/or simulation experts in their specialty to access (or create if not available) an inventory of accessible simulation technologies and scenarios (including prescenario and debriefing scripts and assessment tools).
4. Match the needs list with the inventory, focusing on finding the simplest and least costly form of simulation (from a financial and time and opportunity-cost perspective) that will allow them to reliably simulate the clinical skill or reproduce the clinical situation.
5. Select 1 or more simulation approaches with high-potential benefit by using existing scenarios if possible or author as needed.
6. Test the simulation methodology, keeping detailed notes on benefits, challenges, and opportunities for future refinement in their local setting.

competencies in lifelike clinical situations; (2) team training; (3) complex, rare, or dangerous situations, including clinical event and disaster scenarios; and (4) technical skills training, which can be augmented for clinical, procedural, and haptic skills by using increasingly more realistic models of human anatomy and physiology. All forms of simulation offer added learning through the opportunity for debriefing after the event.

## Reaping Practical Benefits From Simulation

Four areas can assist a program in using simulation to its best advantage: (1) selecting the resident skills or clinical events that would benefit from simulation; (2) defining the specific learning or performance objectives that will be met through the simulation; (3) establishing appropriate instruction and briefing documents for all participants, including learners,

BOX A FEW KEY TERMS USED IN SIMULATION<sup>5,6</sup>

(A more comprehensive list is available from the Resources.<sup>5,6</sup>)

**Debriefing:** Facilitated discussion promoting reflection upon recent learning activities. Debriefing is used in many learning methods to some extent and is a hallmark of simulation/scenario-based learning.

**Full-scale simulation:** A lifelike representation of a complete clinical care environment including team actors and mannequins.

**Hybrid simulations:** Simulation that combines standardized patients and simulators or simulated situations.

**In situ simulation:** (in situ: Latin for “in place”). Simulation activities that take place in the actual clinical work environment.

**Mannequin:** A technology that physically and functionally represents the patient, and has physiologic and pharmacologic models that direct real-time autonomous reactions to interventions and therapies.

**Role play:** A form of simulation/scenario-based learning that involves scripted or semisc scripted interactions between health professionals and patients, and among health professionals.

**Standardized/simulated patient:** An actor trained to play the part of a patient with a specific illness.

**Task trainer:** A simulator designed for practice of specific clinical skills.

**Virtual patient:** A patient in a laptop or web-based simulation.

**Virtual reality (VR) simulations:** Simulations that use computers combined with anatomic models to mimic realistic organ and surface images and the touch sensations a physician would expect while examining a real patient.

faculty, and individuals engaged in the simulation, such as standardized patients; and (4) determining appropriate metrics for assessment and strategies for debriefing.

In selecting the appropriate simulation modality, consider the simplest form of simulation that allows the educational objective to be met. For example, to teach and/or practice a simple procedural skill, a task trainer may be most appropriate; if communication skills are the focus, then a scripted role play progressing to a standardized patient may be the most effective approach. Incorporating procedural and communication skills could use a hybrid simulation that combines a mannequin with a standardized patient.<sup>7</sup> Full-scale,

high-fidelity simulated environments carry significant financial and opportunity costs, and are most effective for team simulations and when complex, rare, or potentially dangerous clinical scenarios need to be accurately portrayed.

### How You Can Start TODAY

1. Have faculty and residents review 1 to 2 key review articles on the use of simulation in your specialty.
2. Explore whether your specialty society offers guidance for the use of simulation in resident education.
3. Discuss with faculty and residents the advantages of moving some clinical learning away from the patient care setting, focusing on the specific benefits to learning and assessment, considering patient safety.
4. Obtain resident opinion about which clinical situations and skills they feel would benefit from simulation.

### What You Can Do LONG TERM

1. Develop a small library of simulations (high, low and no technology) that are applicable to your residents and program.
2. Join a national or regional simulation organization to learn about and share the latest developments in the field.
3. Discuss the latest literature on simulation-based education in journal clubs and rounds.
4. During the annual required review of the program, include a discussion of areas for improvement in the curriculum and/or the learning experiences that may benefit from the application of simulation.
5. Advocate with your specialty organization for discussion about the best uses of simulation to enhance resident education in the specialty.

### Resources

- 1 Kohn LT, Corrigan JM, Donaldson MS, eds. *To Err Is Human: Building a Safer Health System*. Washington, DC: National Academy Press; 1999.
- 2 Accreditation Council for Graduate Medical Education. Program Requirements for Graduate Medical Education in General Surgery. [http://www.acgme.org/acgmeweb/Portals/0/PFAssets/ProgramRequirements/440\\_general\\_surgery\\_01012008\\_07012012.pdf](http://www.acgme.org/acgmeweb/Portals/0/PFAssets/ProgramRequirements/440_general_surgery_01012008_07012012.pdf). Effective January 1, 2008. Accessed August 17, 2012.
- 3 Issenberg SB, Scalese RJ. Simulation in health care education. *Perspect Biol Med*. 2008;51(1):31–46.
- 4 Cook DA, Hatala R, Brydges R, Zendejas B, Szostek JH, Wang AT, et al. Technology-enhanced simulation for health professions education: a systematic review and meta-analysis. *JAMA*. 2011;306(9):978–988.
- 5 Selected terms were excerpted from the Glossary of Terms and Acronyms, Center for Simulation and Research at Cincinnati Children's Hospital. <http://www.cincinnatichildrens.org/service/c/simulation/glossary/>. Accessed August 19, 2012.
- 6 Case Western Reserve University School of Medicine, Mt. Sinai Skills and Simulation Center. Glossary and acronyms, simulation terms. <http://casemed.case.edu/msssc/glossary.cfm>. Accessed August 19, 2012.
- 7 Kneebone R, Kidd J, Nestel D, Asvall S, Paraskeva P, Darzi A. An innovative model for teaching and learning clinical procedures. *Medical Education*. 2002;36(7):628–634.