

Low-Cost Simulation: How-To Guide

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“If you look for perfection, you’ll never be content.”

—Leo Tolstoy, *Anna Karenina*

The Challenge

Resident skill acquisition and competency assessment is especially challenging in today’s current environment of complex patients and decreased training hours. Alternative teaching and assessment methods are critical to optimize patient safety and quality, *and* excellent education. While high-fidelity simulation is costly and may not be available in smaller institutions, low-fidelity simulation can provide similar experiences and fill assessment gaps with fewer resources.¹

What Is Known

Benefits in Knowledge and Skill Acquisition

Simulation exercises are a key strategy to improve residents’ exposure to critical “never miss” clinical events that occur infrequently as well as to address challenges in communication, interpersonal skills, and teamwork in the clinical setting. These exercises replicate clinical care scenarios by controlling the situation(s) and equipment, which permits detailed observation of individuals “in action” without potential harm to patients. Low-fidelity simulation has been demonstrated to be superior to traditional classroom didactics in teaching medical procedures,² and has been used in a broad range of skill acquisition and maintenance, mastery learning, and team training activities. Through these simulations, learners and teachers can gain valuable performance-based feedback,³ particularly when the gap between the ideal and current performance can be objectively rated with behavioral anchors. Consider simulation as a technique—not a technology—yielding task and professionalism performance data.⁴

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Rip Out Action Items

Programs should:

1. Identify high-stakes performance tasks with educational gaps.
2. Search online or at national meetings for available materials (cases, tasks, assessment tools) to meet the gap.
3. Run pilot simulation and evaluate.
4. Obtain support from key leadership.
5. Run again and provide milestone-linked performance data to learners and their Clinical Competency Committee.

Benefits in Competency Assessment

With the implementation of the Accreditation Council for Graduate Medical Education Milestones, Clinical Competency Committees (CCCs) need multiple and diverse data sets gathered over time to inform their trainee progress recommendations and associated learning plans. Low-cost simulation provides another CCC data set as it can yield assessments of performance that can be trusted.⁵ The decreased complexity of low-fidelity simulation helps mitigate implementation barriers (eg, limited faculty, staff, and curricular time; faculty expertise; equipment expense; facility availability), facilitating its use in more training programs.

Practical Low-Cost Simulation Examples

High “psychological fidelity” enables trainees to suspend disbelief and perceive the scenario to be realistic. Embedding the simulation into a realistic context improves psychological fidelity at minimal cost as illustrated by the following examples:

- Suturing techniques can be honed and assessed by using pigs’ feet or inexpensive synthetic skin.
- Through the hands-on “Pills, Pills and More Pills: A Pill Box Exercise to Reduce Polypharmacy” simulation, learners “become” the patient for a week by filling a pillbox with medications (candy “pills”) and attempting to follow a medication regimen.⁶ Postsession debriefing highlights barriers to adherence and possible solutions targeted to the patient, family, or medical team and can assess Patient Care, Systems-Based Practice, Communication, and Professionalism Milestones.

- Using inexpensive, altered cardboard/plastic eyeglasses to simulate visual loss from glaucoma, macular degeneration, and retinopathy, residents can experience the profound effects of vision loss on everyday tasks (eg, reading pill bottles). This can be paired with brief ophthalmology curriculum content (such as when to refer) and useful low-vision resources. Assessments can focus on appropriate patient care, professionalism, or systems-based practice.
- YouTube videofluoroscopic swallow studies that demonstrate aspiration can be combined with residents' sampling thickened liquids, and a patient case simulating dysphagia evaluation and management options. Assessment can focus on Patient Education, Communication, Professionalism, and Medical Knowledge-related Milestones.
- Scripted case scenarios—such as a patient handoff resulting in incorrect medication administration and subsequent adverse effect—can highlight and assess patient care, and quality and safety competencies. Residents can demonstrate how to correct the handoffs, use conflict resolution methods and strategies for disclosure of adverse effects/medical errors to patients, while addressing multiple competency domains and milestones.

How You Can Start TODAY

1. *Identify 1 high-stakes performance gap/task deficiency and link it to milestones and/or Clinical Learning Environment Review areas.*

2. *Scan existing resources in online peer-reviewed educational repositories (eg, MedEdPORTAL or specialty/topic specific) and journals (eg, *Simulation in Healthcare*).*

3. *Adopt or adapt the simulation activity/scenario to your needs. Create a new activity if needed.*
4. *Pilot and debrief the simulation on a small scale, using other trainees as observers/raters.*

What You Can Do LONG TERM

1. *Modify the simulation based on evaluations and feedback.*
2. *Identify allies* such as program directors/coordinators, colleagues, chief residents, and quality/safety stakeholders, and *engage program leadership* for time, supplies, and educator effort.
3. *Run modified pilot curriculum* on a larger scale by incorporating more learners, trained raters, etc.
4. *Disseminate—internally* to the CCC as milestone-linked performance reports and *externally*, publish your materials and data in online educational portals.

Resources

- 1 Maran NJ, Glavin RJ. Low-to high-fidelity simulation—a continuum of medical education? *Med Educ*. 2003;37(suppl 1):22–28.
- 2 McGaghie WC, Issenberg SB, Cohen ER, Barsuk JH, Wayne DB. Does simulation-based medical education with deliberate practice yield better results than traditional clinical education: a meta-analytic comparative review of the evidence. *Acad Med*. 2011;86(6):706–711.
- 3 McGaghie WC, Issenberg SB, Petrusa ER, Scalese RJ. A critical review of simulation-based medical education research: 2003–2009. *Med Educ*. 2010;44(1):50–63.
- 4 Okuda Y, Bryson EO, DeMaria S Jr, Jacobson L, Quinones J, Shen B, et al. The utility of simulation in medical education: what is the evidence? *Mt Sinai J Med*. 2009;76(4):330–343.
- 5 Gaba DM. The future vision of simulation in health care. *Qual Saf Health Care*. 2004;13(suppl 1):i2–i10.
- 6 Brown D, Denson K, Kuester J. Pills, Pills and More Pills: A Pill Box Exercise to Reduce Polypharmacy. The Portal of Geriatric Online Education (POGOe). 2010. <http://pogoe.org/productid/20624>. Accessed December 4, 2014.