Virtual Mentor

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Medical Education

Simulation-Based Training: Opportunities for the Acquisition of Unique Skills

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simulator (Latin similis*, similar): an apparatus that generates test conditions approximating actual or operational conditions*

Simulation is a methodology, not a technology, although technology plays a significant role in some forms of simulation. Its utility is well documented in training people who work in jobs where the risk to human life is high: Commercial aviation, aerospace, nuclear power, and the military all routinely simulate potentially life-threatening situations and allow their trainees to practice management of these situations without risk to themselves or others. Certain types of simulation-based training have also been used in medicine; learning chest compressions on CPR mannequins and interviewing standardized patients are 2 examples. In general, however, medicine has lagged behind other industries and professions in using this methodology to improve human performance.

The first step in developing a medical simulation-based training program is to establish pertinent learning objectives and the curriculum that supports them. Among the experiences where simulation serves as an ideal training methodology are:

1. Clinical care situations where there is high risk to human life, such as cardiopulmonary resuscitation and advanced life support.
2. Counseling interactions bearing the potential for great psychological distress on the part of either the counselee or the counselor.
3. Multidisciplinary team training exercises.

The goal of simulation is to create a training environment that is so realistic that trainees suspend their disbelief and perform as they would if they were encountering those same clinical experiences in the real environment. Only then is the full potential of simulation-based training realized. Creating this high degree of realism entails providing as many realistic cues (visual, auditory, and tactile) as possible in the trainee's environment. In our work at the Center for Advanced Pediatric Education (CAPE) at Packard Children's Hospital at Stanford we create highly realistic environments for training in fetal, neonatal, pediatric, and obstetric medicine [1].

Clinical Care: Resuscitation

Medical simulation provides trainees with opportunities to acquire skills needed by first responders to challenging clinical situations—opportunities that would be unavailable to them in the real world because their inexperience would put patients at risk and create the potential for liability. With this in mind we have developed a number of novel programs. For example, while standard training programs offered through national bodies such as the American Heart Association have been developed to teach the elements of resuscitation, these courses tend to focus on content knowledge and technical skills and do not address behavioral skills in depth. Such courses also tend to be designed for individual rather than team training.

Simulation-based training programs, when well designed, offer many opportunities for acquisition and refinement of behavioral skills such as communication in the context of multidisciplinary teamwork. The use of realistic patient simulators in a physical space faithful to the actual clinical environment (including interactive human colleagues) effectively recreates the stressful conditions found during a real resuscitation. At CAPE we have the good fortune of working closely with Packard Children Hospital's Parent Advisory Council, a group of dedicated parents whose children have received care in our hospital and whose mission is to improve the care of all children coming through our doors. A subgroup of these parents has undergone training in our simulator and has developed the skills necessary to allow them to portray, realistically, the parents of the simulated patients in our scenarios. Their presence during a resuscitation mandates that the trainees must not only address the technical aspects of resuscitation but must also devote resources to meeting the needs of parents in crisis. Insertion of the parent volunteers into the scenario means that trainees must manage questions such as the following:

- Should the parent be allowed to stay during the resuscitation?
- At what point should the parent be updated about the child's response to resuscitative efforts?
- What should be done if the parent breaks down emotionally or becomes disruptive?
- If resuscitative efforts are unsuccessful, how does one deliver the news to a parent that his or her child has died?
- What happens after the child is pronounced dead? What are the roles of social work, chaplaincy, and other services?

Counseling Interactions

We have developed similar training programs in prenatal counseling, delivering bad news, death and dying, palliative care, and disclosure of unanticipated outcomes. Because of the intensity of the simulated clinical situations in these programs, the scenarios are scaled to meet the needs and experience levels of the trainees. At first, the methodology may intimidate trainees, especially the use of videotape to record their performance for playback during facilitated debriefings that immediately follow each scenario. However they universally embrace it once they become immersed in the training experience. We now have 10 years' worth of subjective data indicating that simulation-based training provides learners with valuable educational experiences. (A

number of trainees have told us that the simulator is *the* best learning experience that they have ever had.) We also have objective data indicating that trainees readily acquire skills in our simulated environments that are not obtained in conventional training programs and are exceedingly difficult to experience readily in the real clinical environment.

Team Training in Difficult Situations

From a medical student perspective, simulation-based training provides the opportunity to manage situations that students would not be charged with handling in a real clinical situation. Disclosure of medical errors and discussion of end-of-life issues are subjects that typically (and justifiably) fall to attending physicians. In this respect, higher-fidelity simulation fills a gap in training that otherwise might require years to experience. It also allows students to understand what it is like to work as a member of a multidisciplinary team delivering care to patients. This introduction to the value of each team member's contributions is critical to preparing students for the challenges of modern medical practice. Finally, in fields such as pediatrics, physicians often rely on parents as the surrogate decision makers for their children; this condition presents a unique set of challenges to all who care for children and their families. Simulation of scenarios involving these and other complex situations creates structured learning opportunities that simply are not achievable in the real clinical domain.

While hospitals and clinics will never be replaced as sites for training health care professionals, they will certainly be augmented by simulated clinical experiences. Perhaps most importantly, the skills that can be acquired and refined in a simulator are not limited to the cognitive (content knowledge) and technical (hands-on procedures) aspects of medical practice. Behavioral skills such as effective communication and teamwork are critical to modern clinical medicine and are readily practiced in simulated environments. As we advance in our medical careers, it becomes apparent that the greatest challenges lie not so much in what drugs to prescribe or what dials to turn but rather in how to find ways to care for our patients and their families both competently and *compassionately.* Traditional training methodologies do not do enough to prepare us for the demanding conversations that we must hold and the difficult decisions that we must make as physicians and healers. High-fidelity simulation provides the best opportunity to acquire and refine these important skills.

Reference

1. Examples of highly realistic simulated environments used for training at the Center for Advanced Pediatric Education at Lucile Packard Children's Hospital at Stanford University can be found at http://www.cape.lpch.org.

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