Medical Simulation Center

What is Medical Simulation?

Simulation is the imitation or representation of one act or system by another.

Healthcare simulation is coming of age, and has begun to share much with established methods in aviation, spaceflight, nuclear power, shipping and the military. The rapid advance of computer science, bioengineering, and design has met demands from all stakeholders for safer, more effective and efficient ethical healthcare.

Healthcare simulation is a range of activities that share to improve the safety, effectiveness, and efficiency of healthcare services. It can be said to have four main purposes – education, assessment, research, and health system integration in facilitating patient safety.

Simulation Education is a bridge between classroom learning and real-life clinical experience. Novices and patients may learn how to do injections by practicing on an orange with a real needle and syringe. Much more complex simulation exercises may rely on computerized mannequins that perform dozens of human functions realistically in a healthcare setting such as an operating room or critical care unit that is indistinguishable from the real thing. Training simulations do not put actual patients at risk. Healthcare workers are subject to unique risks in real settings too, from such things as infected needles, knife blades and other sharps as well as electrical equipment, and they are also protected during simulations that allow them to perfect their craft.

Simulation-based assessment refers to both "low stakes" learning for improvement, and "high stakes" testing to determine competency. Multiple choice tests and oral exams have been traditional methods to assess knowledge and ability for generations. Common sense dictates that once technology advances to the point that real tasks can be accurately simulated, truly demonstrating competence becomes an indispensable part of effective evaluation.

Simulation-based research differs from training and evaluation. Researchers may be trying to understand why a particular event happened, and so simulate the event with the same and/or other clinicians. Just as with an airplane engine or wing in a wind tunnel, medical devices may be tested under a range of simulated conditions before the final device is marketed and used on actual patients. New procedures for giving dangerous drugs or using advanced resuscitation methods may be studied under simulated conditions.

Systems integration refers to the integration of simulation into institutional healthcare training and delivery systems. Simulation-based processes may include quality assessment mechanisms, thereby facilitating patient safety. Simulation-based approaches can be effectively used to help evaluate organizational processes as well as individuals and team performance. Examples include disaster response or testing a new procedure before it is put into practice.

Advantage of Simulation Learning

A range of easily accessible learning opportunities:

In many disciplines, as opportunities to learn and practice come along, this is ultimately a haphazard way to learn, and puts learners and patients at a disadvantage. Simulation offers scheduled, valuable learning experiences that are difficult to obtain in real life. Learners address hands-on and thinking skills, including knowledge-in-action, procedures, decision-making, and effective communication. Critical teamwork behaviors such as managing high workload and coordinating under stress can be taught and practiced. Because any clinical situation can be portrayed at will, these learning opportunities can be scheduled at convenient times and locations and repeated as often as necessary.

The freedom to make mistakes and to learn from them:

Working in a simulated environment allows learners to make mistakes without the need for intervention by experts to stop patient harm. By seeing the outcome of their mistakes, learners gain powerful insight into the consequences of their actions and the need to "get it right".

The learning experience can be customized:

Simulation can accommodate a range of learners from novices to experts. Beginners can gain confidence and "muscle memory" for tasks that then allow them to focus on the more demanding parts of care. Experts can better master the continuously growing array of new technologies from minimally invasive surgery and catheter-based therapies to robotics without putting the first groups of patients at undue risk. Some complex procedures and rare diseases simply do not present enough opportunities for practice, even to established clinicians. Examples include treating a severe allergic reaction or heart attack in an outpatient clinic setting, or handling a case of malignant hyperthermia in the operating room. This is a gap that simulation training methods can help fill.

Detailed feedback and evaluation:

Real events do not allow for the best review and learning about why things took place, or how to improve performance. Controlled simulations can be immediately followed by videotape-supported after-action reviews that richly detail what happened. Advanced surgical and task simulators gather much data about what the learner is actually doing. These performance maps and logs provide a solid and necessary feedback mechanism to learners and help instructors target necessary improvements.

Benefits of Medical Simulation

Simulation-based medical training allows for realistic training in communication, leadership and team interaction. It also provides better-trained health care providers, reduces medical errors, saves money, and improves the quality of patient care overall

The simulation-based medical training benefits all of us:

- Patients benefit from improved health outcomes and reduced errors.
- Patients with rare or unusual conditions benefit from better-trained providers.
- Physicians, nurses, and health professionals benefit from better skills and lower malpractice rates through demonstrated clinical competence.
- Students benefit from a flexible training curriculum set at their need.
- Students have the opportunity to practice, make mistakes, and improve their skills and knowledge on the simulated patient *without consequence to the patient***.**
- Consumers benefit from reduced health care costs and enhanced quality.
- Health care organizations benefit from reduced adverse events.
- Insurers benefit from defending fewer malpractice claims.
- Businesses benefit from the creation of high-tech jobs and greater productivity.

Who is interested in Simulation-based Medical Training?

Many groups, organizations, and individuals are interested in medical simulation and the science

behind it, including:

- Nurses
- Physicians
- Patients
- Teaching Hospitals
- Medical Schools
- Nursing Schools
- Armed Forces
- Low Enforcement Agencies
- Emergency Responders

Simulation Tools and Approaches

Simulation-based Medical Education (SBME) includes several tools and approaches, for example:

Low-Tec Simulator

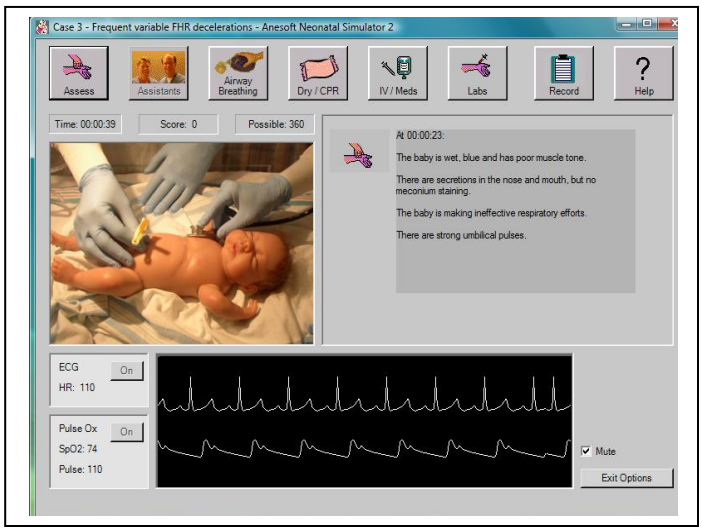
Models or mannequins used to practice simple physical maneuvers or procedures**.**

Simulated Patients

Actors trained to role-play patients for training and assessment of history taking, physicals, and communication skills.

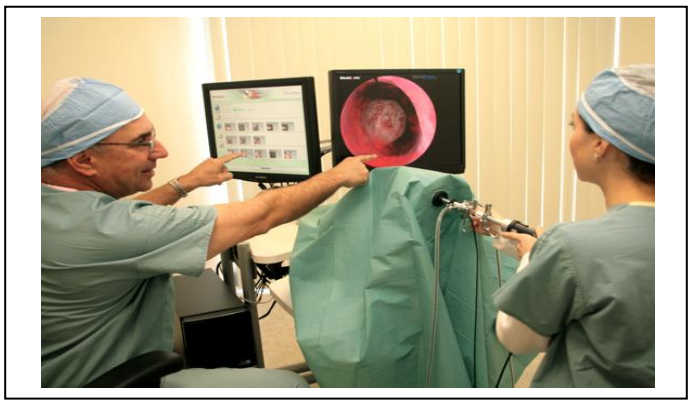
Screen-based computer simulated

Programs to train and assess clinical knowledge and decision making, e.g. peri-operative critical incident management, problem-based learning, physical diagnosis in cardiology, acute cardiac life support



Complex Task Trainer

High-fidelity visual, audio, touch cues, and actual tools that are integrated with computers. Virtual reality devices and simulators that replicate a clinical setting, e.g., ultrasound, bronchoscopy, cardiology, laparoscopic surgery, arthroscopy, sigmoidoscopy, dentistry



Realistic patient Simulators

Computer-driven, full-length mannequins. Simulated anatomy and physiology that allow handling of complex and high-risk clinical situations in lifelike settings, including team training and integration of multiple simulation devices

Military Casualty Simulator