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EDITORIAL

Simulation Training—a Necessity for Future Surgeons

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The concept of simulation is not new, rather medical simulation in primitive forms has been practiced for centuries; the first medical simulators were simple models of human patients varying from different cultures and continents. For hundred years, we have been using the traditional Halsted model for surgical training (see one, do one, teach one). For the last two decades, the surgical training has changed due to several reasons, shorter 80-h work weeks, emphasis on operating room efficiency and turnover time, sicker and more complex patients, increasing complexity of cases, ACGME core competencies, (medical knowledge, patient care, interpersonal and communication skills, professionalism, practice-based learning and improvement, and system-based practice) evolution of new technology, emphasis on patient satisfaction, and medical-legal environment.

Simulation is defined as a technique—not a technology—to replace or amplify real experience with guided experiences that evokes or replicate substantial aspects of the real world in a fully interactive manner as stipulated by Dr. David Gaba. The introduction of human patient simulation toward the end of twentieth century was a major step in modern simulation. There was a long delay in acceptance of modern simulation in medical education. The three reasons for slow progress are skepticism, lack of communication, and the burden of proof.

Medical simulation is the modern day methodology for training healthcare professionals through the use of advanced educational technology. Simply put, medical simulation is the experiential learning every healthcare professional will need, but cannot always engage in during real-life patient care. Simulation-based medical education works well with all forms of education and can be incorporated with classroom lectures and problem solving in clinical areas and hospitals.

Modern medical simulation derived from the aviation industry, which has utilized simulation-based learning practices to train pilots since the First World War. Simulation allows for the safe training of learners engaging in activities that would otherwise be too dangerous to practice. For example, it is risky and expensive to send a new 747 jumbo jet pilot 40,000 ft into the air and practice a three-engine failure drill. Whereas with a hyper-realistic hydraulic-enabled simulator, a new pilot could learn to perform such maneuvers while safely on the ground. In the same fashion, during a real-life emergency, a patient's life cannot be risked to learners without the proper training to perform possible life-saving procedures. However, the need to train healthcare professionals in the team-based communication, cognitive thinking, and skills-based action necessary during such a stressful situation is vital to successful patient outcomes for code blue team, trauma team, rapid response team, and disaster drill team.

The Institute of Medicine released a land mark report in 1999: To err is human, building a safer health system with findings that 44,000 to 98,000 people die each year as a result of preventable medical errors and recommended: Use *simulators* to ensure that clinical training is safe for patients, develop *simulators* for use in skills assessment, use *simulation* technology to improve individual and team performance through interdisciplinary team training, and use *simulation* for problem solving and recovery from problems—"crisis management."

Simulation-based training is the new way of medical education. Physicians face a challenge once they enter the current

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training method. We have been trained for years to care of patients, overtime developed knowledge, skills, and attitudes to deliver care in a variety of situations and at the same time transfer the knowledge to new graduates. With the new simulation-based training, clinicians are not only taking care of patients and teaching but are educators designing learning experiences to facilitate learning by real clinical simulation.

Traditionally, it has been assumed that an expert clinician is an expert teacher. However, effective teaching requires a set of knowledge, skills, and attitudes that come from disciplines outside of healthcare: education, pedagogy, psychology, and organizational behaviors. It requires that educators understand the foundations and theories of adult learning and apply best practices in order to improve the quality of medical education.

Simulation provides an intersection where education, clinical practice, and healthcare quality and safety meet. The use of simulation requires simulation educators and administrators to be knowledgeable not only about clinical practice and curriculum design but also methods of process development. Simulation can be used to investigate errors in healthcare as a part of failure modes and effective analysis before a sentinel event occurs and as a part of root cause analysis after an error or mistake occurs. A broad understanding of the theories of patient quality and patient safety as well as knowledge and specific tools can allow the simulation experts to become a more integral part of the healthcare safety team.

While focusing on patient safety, simulation-based medical education is not limited to healthcare professionals but involves patients and their family: training patients to care for themselves after leaving the hospital and bringing their experience of care into simulation education. This involves their reaction, emotion, impressions, and overall experience to change the behaviors of the healthcare professionals and improve the quality and safety of care.

Simulation has played a vast role in terms of basic procedural skills training such as skin suturing, knot tying, airway management, peripheral intravenous line placement, nasogastric tube placement, Foley catheterization, and central line placement. This leads to ATLS and ACLS certification which is required for completion of surgical residency. In addition, simulation has been widely adopted and practiced in minimally invasive surgery. In all surgical specialties and a few medical specialties such as gastroenterology and cardiology, a well-developed curriculum has been established and certification processes are in place for all minimally invasive surgical techniques. FLS certification is required at present by the American Board of Surgery, and FES will be required from 2017–2018 academic year. Certifications are available in FRS, FVS, FUSE, and TeamSTEPPS (curriculum for team training) and will be required for surgical board certification in the future.

Training physicians and surgeons has changed from see one, do one, teach one *to* see one, practice many (*simulation*), do many, and teach one. The main goal of simulation training is to have a competent surgeon who can provide a safe, quality, cost-effective, and efficient surgical care.