

Editorial - Educational

Simulation-Based Medical Education

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“Primum non nocere” is a fundamental principle in medicine. Reducing errors and improving patient safety is of paramount importance. Today, there is less tolerance in accepting medical errors. Healthcare professionals are no more perceived as angels and medicine is seen as an industry which should have high standards, quality assurance and transparency.

To err is human, but in medical practice, error could be costly. In the USA, approximately 98,000 patients die per year due to medical errors¹. Tremendous changes in societal and legal systems had developed in the last five decades; therefore, medical practice was recognized as a healthcare industry. Improving our patient’s safety is a must, it could be by training medical students and residents through simulation. I have to emphasize that this is not the only method; the apprenticeship model of training, as first described by Halsted, has been proven to stand the test of time².

Simulation-based medical education became an integral part of modern medicine. It encompasses a broad range of methods from simple to complex computerized virtual reality procedures. There are different levels of fidelity involved from low cost, low fidelity to high cost, high fidelity simulators. Simulation-based training is incorporated in all levels of medical education, not only for physicians but also for nurses, paramedics and allied healthcare workers.

The Royal College of Surgeons in Ireland (RCSI) has recognized early the importance of simulation in undergraduate education. I remember as a medical student in the 90’s when we had to perform videotaped simulated communication skill course. There were different simulated clinical scenarios performed by professional actors, such as dealing with angry patients, breaking bad news, and so forth. This course was one of the best experiences in my pre-clinical years. I enjoyed and it had benefitted me significantly until today. Objective structured clinical examinations (OSCEs) were also part of the curriculum, and provided a more realistic representation of the clinical situation than multiple choice questions (MCQs) and essays.

History of medical simulation could be traced back to 1968 when Harvey cardiology simulator was first launched at the University of Miami³. GABA introduced the first anesthesia simulation trainer in 1980⁴. Up to date, clinical simulation has advanced greatly and will improve more in the near future.

Simulation should be considered as a supplementary to healthcare professionals’ education and training. Research and scholars are expanding in this field of medical education. There are journals now dedicated to medical simulation, such as the Simulation in Healthcare Journal with plenty of literature available. The industry is also recognizing its importance and investing in this field.

“If you fail to plan, you are planning to fail”⁵. Simulation has become a part of our daily practice, especially in the field of surgery. We now pre-plan our surgeries before going to the operating theatre especially in delicate surgeries that need precision, such as orthopedics, neurosurgery and ENT.

“Absence of evidence is not the evidence of absence”⁶. You can doubt the usefulness of simulation in medical training. According to one systematic review in 2004, there was no added benefit from surgical simulation, despite numerous studies supporting its use in medical education⁷. One study in the USA showed better bedside skills and cognitive knowledge when cardiology students trained in simulation versus traditionally trained fourth year students⁸. Rapid response team function had improved and performance regarding response to hospital codes has been enhanced with proper simulation training^{9,10}.

The learning curve is one of the most important factors during training especially throughout acquisition of new bio skills. The learning curve can be long and steep. This curve can be shortened and flattened if simulated training was acquired¹¹. That may reduce time, errors and cost of training. It has been shown that surgeons trained with simulators can perform surgeries faster, more accurately and with fewer errors¹².

During simulated training, mistakes are acceptable and repetition is possible until a certain benchmark proficiency level is attained. Retention of simulated training has been shown to have long-term persistence as long as 14 months¹³.

A mentor’s presence all the time is not always available in real-life situations. Exposure time to cases has been reduced in recent years due to factors like restricted working hours. Opportunities to encounter rare emergency cases, such as cardiac tamponade, etc., may not be possible. Rapid advances in surgery may not allow sufficient time to gain proficiency in such new procedures. All these can be possibly mitigated today with computerized simulation training.

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In some countries, simulation-based training is mandatory before medical professionals start practicing with real patients. In the USA since July 2010, surgical residents must pass fundamental laparoscopic simulation training before completing their program¹⁴. Denmark made it mandatory since 2015 for all physicians to complete certain simulation courses before they can practice medicine. The FDA mandates that interventionalists must complete a simulated carotid stenting course before they are allowed to perform the procedure in the clinical setting¹⁵. In the military, staff are not deployed to war zones unless they have successfully completed simulated exercises to reduce casualties and collateral damage.

Cost-effectiveness is an issue when establishing an advanced simulation center. Modern simulators are not cheap. Simulation education can be started with low cost, low fidelity equipment, which has been found to be more beneficial to the novice. However, training experts require high fidelity more expensive equipment to be beneficial¹⁶. A basic surgical course such as the one conducted by the RCSI is one example of low fidelity, a low cost highly beneficial course for residents at entry level. Proper allocation of resources is important especially with the current situation of a limited resources. Appointment of a qualified director and proper staffing is required as well as the allocation of spaces. Funding can be done through institutions, research funds, donations, etc.

Simulation-based education and training no doubt would play a great role in medicine in the near future. In the airline industry, pilots are licensed only after completing and passing the internationally accredited course. The healthcare industry would likely follow the same venue since both have the same goal of optimizing safety.

We at King Hamad University Hospital are proud to be the first hospital in the Kingdom of Bahrain to inaugurate a simulation center on 19 April 2016. The center became an important tool in resident training and CME education. Even though I consider it to be in its infancy, with hard work, it will reach milestones. King Hamad University Hospital CEO, Major General Dr. Sh. Salman bin Atteyatallah Al-Khalifa's support and vision made this center possible. In addition, the commitment and hard work by the Education and Proficiency Center to establish this innovated landmark is greatly appreciated.

Team work is essential to achieve our goals and we are looking forward to expand our service to undergraduates and other healthcare professionals. Not only that, we are also in the process of adding other modules related to simulation training which hopefully will see light in the near future. We are in the process of establishing a wet lab for microvascular surgery training to augment the simulation center training of residents.

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Competing Interest: None.

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