

## Chapter 49

# Healthcare Education: Integrating Simulation Technologies

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### **ABSTRACT**

*The integration of technology into the education and continuous professional education of allied health professionals is evolving. Integrating simulation as an authentic instructional modality has changed how clinicians learn and practice the clinical knowledge, skills, and abilities they are required to be competent in to ensure patient safety. A lot of advances have been made in the utilization of simulation in various domains. Continuing medical education is such a domain, and this chapter will briefly describe the history of simulation, present simulation as an authentic instructional activity, examine education trends of using simulation-based learning, highlight two applicable theoretical frameworks, and present a case study that effectively utilized simulation as an authentic instructional strategy and assessment during a continuing medical education course for athletic trainers.*

### **INTRODUCTION**

The integration of technology into the education and continuous medical education of healthcare personnel is evolving. Integrating simulation as an instructional modality has changed how clinicians learn and practice the clinical knowledge, skills, and abilities they are required to be competent in to ensure patient safety. The safety of patients and the ability to integrate a learning tool into education to decrease medical errors has larger healthcare implications. When embedded appropriately, simulation immerses the learner into a real-world environment that provides them with opportunities to practice and refine skills; thereby, decreasing medical errors or their likelihood to harm a patient due to the lack of exposure to specific clinical skills. The ability for the learner to deliberately practice clinical skills, techniques, and behaviors, is imperative to foster and ensure the safety of all patients (Gaba, 2007). Simulation is an ideal instructional strategy that is effective when utilized in teaching clinically relevant knowledge and skills to a multitude of health care providers (Birdane et al., 2012; Fraser et al., 2011; Hatala, Issenberg, Kassen, Cole, Bacchus, & Scalese, 2008; Issenberg & Scalese, 2008; Lavranos, Koliaki, Briasoulis,

DOI: 10.4018/978-1-5225-7305-0.ch049

Nikolaou, & Stefanadis, 2013; McKinney, Cook, Wood, & Hatala, 2013). Simulated educational activities have revolutionized the process of educating health care professionals at all levels (Gaba, 2007). The utilization of simulation is diverse and spans across various domains. Continuing medical education is such a domain, and this chapter will (1) provide a brief history of simulation, (2) present simulation as an authentic instructional activity to enhance learning, (3) review the various types of simulators that are available, (4) examine educational trends of utilizing simulation as an instructional modality, (5) highlight two theoretical frameworks that simulation-based instruction can be grounded in, and lastly, (6) present a case study that effectively utilized high-fidelity and low-fidelity simulation as an authentic instructional strategy and assessment during a continuing medical education course for athletic trainers.

## **SECTION 1: A BRIEF HISTORY OF SIMULATION**

Simulation dates back to the 1940s, when it was successfully incorporated into training professionals on flight simulators who worked in high-risk environments. Since then, simulation and its application broadened into the military, civic aviators, and the National Aeronautics and Space Administration (NASA), who all have utilized simulators to train their pilots and astronauts for hypothetically catastrophic in-flight situations (Rosen, 2008). When utilizing simulation to train professionals, they are provided with the ability to practice their behavior in a high-risk, potentially life-threatening, situation. More importantly, pilots and astronauts learn how to effectively behave and manage such situations without risking an actual injury to themselves or others. With this being said, there is a direct connection with utilizing simulation in the healthcare domain to advance the delivery of healthcare and improve the safety of the patients (Byrne, 2013).

The history of medical simulators and its use in training medical professionals has primitive origins. In the ninth century, simple models aided in explaining the process of childbirth and in the 1600s, the process of childbirth was taught to midwives via manikins referred to as ‘phantoms’ (Gardner & Raemer, 2008). Over the years, the basic models gradually advanced into more sophisticated simulators that have realistic features and functions. The advancement of the medical simulators largely relied on advances in science and technology. Now a day, simulators are largely used to train healthcare professionals for a variety of clinical situations, especially those that require practice, are high-risk and infrequently experienced. Simulation is an ideal modality to teach students and professionals the behaviors, knowledge and clinical skills necessary to function in clinical environments. Furthermore, the public exposure of the use of simulation in medical training developed an expectation amongst patients who expected professionals to train on simulators before applying their skills on the patients (Barrott, Sunderland, Nicklin, & Smith, 2013). Training on simulators became the new standard for practicing clinical and non-clinical skills. This challenged the educator to develop relevant learning activities to effectively integrate simulators.

## **SECTION 2: SIMULATION AS AN AUTHENTIC ACTIVITY**

Healthcare providers in training, and those actively involved in clinical practice, must cultivate their clinical & non-clinical knowledge, skills, and abilities by engaging in relevant learning activities that permit them to acquire and stay abreast on medical information. Relevant activities should be administered in an authentic way; simulation is an example of an authentic activity (Jeffries, 2012). A primary

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