SIMULATION-BASED MEDICAL EDUCATION: MODERN TOOLS AND METHODS

Ortemenka Ye.P.

Bukovinian State Medical University, Chernivtci

Simulation technology has witnessed a rapid growth and interest in medical education. It is able to facilitate the creation of clinically realistic situations in a safe learning environment. The highest goal for every healthcare worker is to improve the quality of a patient's life and to ensure patient safety. Simulation-based training can achieve that for the following reasons: practicing in a safe environment, understanding human behavior, improving teamwork, providing confidence and giving insight into trainees' own behavior.

The aim of the survey was to overview the modern tools and methods of simulation-based medical education.

Clinical skills training should be one of the most important courses in medical education. Medical students must master communication skills, medical interviewing, physical examination and basic clinical procedures in clinical skills training. Although such training using real patients is most effective in learning clinical skills, there is a limitation in using real patients in terms of the COVID pandemic and ethical viewpoints. To overcome such limitations, simulation-based education is considered
useful and unique.

Effective simulation-based medical education is founded on an understanding of the attributes of the various tools and methods available.

Simple models or manikins is a low-tech, relatively low-cost simulators have been used to teach basic cognitive knowledge or hands-on psychomotor skills. Simple manikins are used to train and assess basic life support maneuvers such as mask ventilation, intubation or chest compression.

Animal models have been used traditionally for physiology and pharmacology education. In addition, they have served for training in interventional procedures, such as laparoscopic cholecystectomy. The use of animals in medical education is on the decline, however, owing to growing ethical concerns in the face of the availability of better options such as improved simulation techniques.

Human cadavers typically used in medical school anatomy classes for hands-on dissection, cadaver tissues have also been employed in surgical courses aimed at teaching practitioners new procedures, or as supplements to training in complex injection techniques for pain therapy or nerve blocks. Expense, inconvenience, limited availability and use of formalin-fixed tissues are considerations.

Simulated/standardized patients (SPs) serve mostly for the training and assessment of history taking, physical examination and communication skills. Since the introduction of the SP methodology (Barrows, 1968; Harden et al., 1975), SPs have become the single most studied simulation-based educational tool in medicine. Growing recognition of the unique features and advantages of SPs has resulted in their being integrated into medical school curricula, followed by incorporation into major high-stakes licensure exams.

Screen-based simulators (computer-based clinical case simulations) were 1rst developed in the 1960s but not until the advent of the personal computer in the 1980s did this approach to clinical education begin to proliferate. As self-tutorials with built-in feedback features, screen-based simulators offer a comprehensive learning experience that is less dependent on the involvement of external educators.

Realistic high-tech procedural simulators (task trainers) is a new generation of highly sophisticated computer-driven realistic simulator devices has extended the envelope and complexity of tasks and procedures that can be modeled for education, training and research. These tools invest static models with rich audiovisual and touch/feel interactive cues, and build on powerful software for teaching, learning, and assessment. The well-known Harvey Cardiology Patient Simulator presents ausculatory and pulse findings of 27 cardiovascular conditions and supports a comprehensive curriculum.

Virtual reality (VR) can be defined as a system that enables one or more users to move and react in a computer-simulated environment. Technically, true VR refers to totally synthetic environments, where cues for all senses are computer generated. The trend in VR is for maturing technologies to be 1rst combined in hybrid approaches with simulation methods (role play with live people, use of actual tools), moving to completely digitally represented worlds which real people can enter. This simulation is expected to have both clinical and educational applications that will radically change the face of medical training and procedural medicine during this century.

Realistic high-tech interactive patient simulators — realistic patient simulators (RPSs) were first used in 1966 for anesthesia training. RPSs are now advanced in the number and detail of the features they possess and the large range of programs and trainee types they support. RPSs have eyes responsive to light, pain and selected cranial nerve palsies, an anatomically correct and dynamic airway, patient voice, arm movement, heart and breath sounds, and excretion of carbon dioxide. Chest-tube insertion, monitoring of neuromuscular transmission using standard nerve stimulator devices and provision of dynamic physical cues mimicking extremity compartment syndrome are supported features. Bar coding of

drug syringes and the use of an in-line intravenous flow measurement device allow automatic computer recognition of injected drugs and appropriate adjustment of vital and physical signs. Ventilators, defibrillators, rapid transfusion devices, anesthesia machines and other devices easily interface with the RPS.

Conclusion. Medical educators must respond to the ethical messages, policy directives, and practical challenges raised by the emerging patient safety movement. New curricula are needed to train providers more safely, inculcate safety culture, and better assess actual applied knowledge and skills. Simulation-based medical education is increasingly endorsed as an educational strategy. It allows health-care professionals to practice clinical skills within a safe learning environment, but requires devices for simulation or simulated patients, trained teachers, and an appropriate environment.

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THE ROLE OF USING SIMULATION EDUCATION IN PRACTICAL TRAINING OF MEDICAL STUDENTS

Peryzhniak A.I.

Bukovinian State Medical University, Chernivtsi