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Computer-based dental and medical simulation: A future perspective

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Computer-based simulation is one of the best steps for the development of curriculum for teaching and learning process. Simulation-based medical education is defined as any educational activity that utilises simulation aides to replicate clinical scenarios. Although medical simulation is relatively new, simulation has been used for a long time in other high risk professions such as aviation. Simulation tools serve as alternatives to real patient situations.[1] In medicine, medical technologies have already been developed for surgical training, including endoscopy, laparoscopy, neurosurgery simulators, etc.[2] Virtual reality simulators are being explored as adjunct tools for dental education.[3] In context of dentistry/ dental education, psychomotor skill is mandatory and covers bulk of the curriculum. A dentist has to perform the procedure on small area, where eye and hand coordination plays a crucial role. In such circumstances simulation prevents mishaps caused by human errors.[4]

In dentistry conventional preclinical training uses mannequin heads known as phantom heads, mounted on metal rods. These phantom heads are provided with sets of maxillary and mandibular plastic teeth. Theoretically, extracted human teeth are the best materials for practice. However, the challenges faced to collect them restrict their usage in training.[5] Plastic teeth might not accurately reflect the anatomy of teeth and are defect free.[6] At present newer practices are available using simulation like Simodont and PerioSim dental trainers. These computer-assisted simulation are connected to computer learning software to a simulator.[7] Desired morphology and pathology can be obtained from scanning those teeth and making virtual teeth by using computer tomography. A shared library system can pool those resources and can upload as interesting cases for other students and future purposes. Teachers can add patient records and history to simulate clinical scenario.[8] Teachers are connected through their computers and can have live experience that will allow stepwise evaluation and self-assessment for students unlike in conventional training.[9]

The promise of simulation-based medical and dental training offers useful opportunities to reduce risks to patients and learners; improve learners' competence and confidence; and can have immediate feedbacks and productive self-learning environment. However, most of the published work is descriptive and limited in generalisability. All simulation learning that are directly transferable to the clinical context are often untested. Simulation for test of new drugs cannot be replicated.[10]

In conclusion, changes in medical and dental education are life-changing and life-saving. Despite this fact, simulation is costly and technique sensitive which

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requires trained personnel. In context of developing country like ours where many people are facing unemployment, these techniques definitively will be economical and emotional challenge, and caution should be taken for their appropriate and healthier use. Computer-based simulation along with human teachers can provide knowledge, mentorship, guidance, and emotional support to students.

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