Virtual ACS 2021 Surgeons and Engineers: A Dialogue on Surgical Simulation Meeting

Challenges in Surgical Education

The Role of Virtual Reality in Bridging the Gap in Surgical Training

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Background: Despite advances in technology over recent decades, surgical education is still often delivered using traditional printed materials and methods such as the "See one, do one, teach one" model. This apprenticeship model is no longer appropriate as it cannot reliably monitor or predict the output of a training program. Online and mobile training materials are generally limited to teaching cognitive skills and surgical process.

Current Challenges: Hands-on training time is increasingly reduced for trainees. Access to high end clinical training simulation labs and cadaveric training is expensive and limited. Paper-based and non-immersive online materials are generally restricted to teaching anatomy and surgical process. Textbook pages and mobile device screens are not well suited to recreating learning environments that match the real-world operating theatre.

Need of Innovation Introduction: There is a need to bridge the educational and experiential gap between textbooks, screen based learning and real-world experience. Immersive technologies such as AR and VR can create risk-free, repeatable, recordable environments that resemble the real world and can provide both training for cognitive and psychomotor skills.

VR offers an attractive alternative to improve both cognitive and technical skills free of the demands of challenging clinical environments. It plays an important role and encourages diversity in educational portfolios by allowing residents to gain experience in procedures that would otherwise be inaccessible (Fig. 1) In clinical practice, VR can facilitate manipulation of patient-specific data for perioperative use in order to optimize surgical planning and intraoperative support.

Further research is required to demonstrate the full utility and usability of VR in skills transfer. It has the capability to enhance the productivity of surgeons and consolidate resources without compromising patient safety.