Virtual Reality Technology: Driving Innovation in Healthcare Education and Training

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Introduction

TIPS Education Center in collaboration with the Pediatric Stem Cell Transplantation and Cellular Therapy designed and implemented Virtual Reality (VR) simulations for the Contemporary Critical Care Complications of Stem Cell Transplant and Immune Effector Cell Recipients Conference. This education program is designed for healthcare professionals, emphasizing critical care complications of Stem Cell Transplantation- Immune Effector Cell (SCT-IEC) in the pediatric population. In alignment with the institution's strategic themes of Reach, Breakthrough and Values, TIPS Education Center sought to design educational products that would impact education within the institution and beyond our walls.

Aim Statement

The aim of this project was to deliver a highly realistic and immersive simulation experience to an interprofessional audience while maintaining COVID-19 restrictions.

Educational Tool

Virtual Reality Technology

Virtual reality (VR) is an educational tool that allows a learner to simulate a situation using a VR headset, within an interactive, computer-generated environment. The VR system does not require educators and learners to be presents which makes access to the simulations more flexible and broad-based.

Virtual Reality Simulation Components

Case Presentation/Hand-off

Learners are orientated to the simulation. An interprofessional team member from MD Anderson gives the learner a hand-off report.

Patient Assessment

Learners conduct an assessment on the patient, access the medical record and consult with family member

Intervention Scavenger Hunt

Learners are presented with potential interventions that could be used to treat the patient.

Assessment and Intervention Review

Learner's knowledge is assessed based on the information presented in the Case Presentation/Hand-off, Patient Assessment, and Intervention Scavenger Hunt.

Case Debrief

An interprofessional team member from MD Anderson debriefs the learners as a team. Asynchronous and synchronous formats are used to debrief.

Methodology

Clinical reasoning was used as the framework to prioritize module phases and set content variables within the learning VR system. A provider handoff report with general patient information was presented to initiate hypo-theoretical-deductive reasoning. The second phase included objective and subjective patient data in the form of physical assessment findings on the patient, in the electronic medical record, and video presentations of the patient. This data afforded learners the opportunity to apply their knowledge of human anatomy and pathophysiology to begin the formation and testing of hypothesized diagnosis based upon sound scientific and evidenced basis. An intervention scavenger hunt was implemented to access learners' self-agency in the formulation and validation of diagnosis and a plan of care. A multiple choice check on learning was used to indemnify new knowledge. This was followed by a debriefing session to reorganize false and disorganized reasoning used to achieve new knowledge.

Educational Strategies:

Scaffolding: Conceptual Scaffolding

To help learners learn to successfully navigate VR environment, the simulation included appropriate guidance (scaffolding) and support. The use of scaffolding focused on three interlinked aspects of inquiry: sense making (making connections between current and new knowledge), process management (decision making about how to proceed based on the information/hints/feedback provided; model progression- simple to complex environments), and articulation and reflection (learners express and evaluate their experiences throughout the inquiry process).

Gamification

Virtual Reality

The VR simulation used game elements and techniques to engage learners and influence learner's behavior. Features included clear goals expressed as win states, quests (scavenger hunt), feedback, and levels (phases) which are typical of games and served to enhance learning.

Scavenger Hunt Technique

In the Intervention Scavenger Hunt component of the VR simulations, learners were tasked to find and learn about potential interventions that may be appropriate for the patient. As they learn about possible interventions, learners reflect on the case/assessment findings and their differential diagnosis to consider an intervention implementation plan.

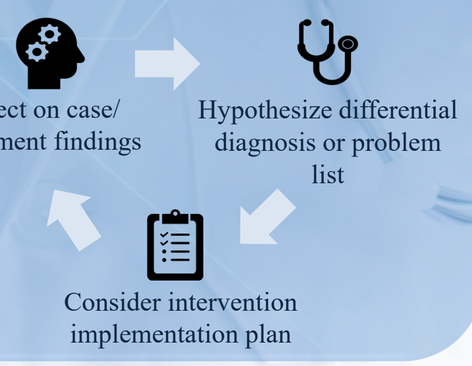
Virtual Reality Simulations

A total of 9 simulations (phases) were designed to address 2 complications of SCT-IEC in the pediatric population.

Cytokine Release Syndrome
5 Progressive Phases

Sinusoidal Obstruction Syndrome
4 Progressive Phases

Expectation of Learners During (and After) the Virtual Reality Simulation



Results/Conclusions

TIPS Education Center in collaboration with the Pediatric Stem Cell Transplantation and Cellular Therapy implemented Virtual Reality (VR) simulations for the Contemporary Critical Care Complications of Stem Cell Transplant and Immune Effector Cell Recipients Conference following didactic lecture. N=75 learners (Nurses (n=37), APPs (n=24), MDs (n=12), and other healthcare professionals (n=2)) participated in a nine hour education session focused to improve care outcomes of Pediatric Stem Cell Transplant and Cellular Therapies patients through early recognition and management of critical care complications strategies and effective interprofessional team communication. 71% (n=51) utilized smartphones/tablets, 18% (n=13) reported use of headsets alone, and 11% (n=8) used the portable headset/smartphone devices to access the VR simulations. 50% (n=36) of learners were able to fully immerse in the VR world. But, 68% (n=49) reported noticing the headsets after the VR session began. 72% (n=52) stated the system was easy to use, 89% (n=64) perceived VR as an enjoyable method of learning, and 71% (n=51) would choice VR again as a method for learning.

With COVID-19, VR is a novel education modality that is capable of providing fully immersive and highly realistic clinical simulation where ever learners have access to desktop or smartphone technology. More research is needed to develop sound instructional strategies that are valid and reproducible in diverse healthcare provider learner populations.

References:

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CARING

The VR simulation was designed by a collaborative, interprofessional team. The interprofessional education and collaborative practice approach was essential in creating synergy to promote inclusion and high-quality patient care.

INTEGRITY

The VR simulation components were designed to foster open, honest communication amongst facilitators and learners of different background and experiences.

DISCOVERY

Innovative methods were utilized to encourage continuous learning, inspire new ideas and collaboration beyond MD Anderson.

SAFETY

The VR simulation activities were designed to foster a safe environment, both physically and psychologically. All mistakes/errors were used as opportunities to improve learning.

STEWARDSHIP

In designing the VR simulations, the team was fiscally responsible in choosing and purchasing software and equipment that would allow for us to be innovative in this project, as well as many other projects.