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You Should Try This!

Evaluation of a novel virtual reality Immersive Clinical Experience to enhance medical education curriculum

Évaluation d'une nouvelle expérience clinique immersive en réalité virtuelle pour améliorer le programme d'éducation médicale

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Implication Statement

Medical students often find the transition to clerkship challenging and stressful. The use of virtual reality (VR) technologies such as screen-based learning, 360-video and immersive VR using head-mount-devices is becoming more utilized in medical education. Immersive technologies in particular have been shown to lead to greater enthusiasm and provide higher knowledge gain for students compared to screen-based VR. The University of British Columbia Faculty of Medicine has developed a novel immersive patient experience using VR to enhance the clinical skills program and evaluate student perception regarding its formal integration into curricula. Students reported positive feedback on the experience, and interest in more immersive learning opportunities in future sessions. VR technology has the potential to enhance medical education and provide a safe immersive learning environment to build clinical acumen.

Énoncé des implications de la recherche

Les étudiants en médecine trouvent souvent la transition vers l'externat difficile et stressante. L'utilisation des technologies de réalité virtuelle (RV), telles que l'apprentissage sur écran, la vidéo à 360° et la RV immersive à l'aide d'appareils montés sur la tête, est de plus en plus répandue dans l'éducation médicale. Il a été démontré que les technologies immersives, en particulier, suscitent un plus grand enthousiasme et permettent aux étudiants d'acquérir davantage de connaissances que la RV sur écran. La faculté de médecine de l'Université de la Colombie-Britannique a mis au point une nouvelle expérience immersive du patient en utilisant la RV pour améliorer le programme de compétences cliniques et évaluer la perception des étudiants concernant son intégration formelle dans les programmes d'études. Les étudiants ont fait part de leurs réactions positives à l'égard de l'expérience et de leur intérêt pour des possibilités d'apprentissage plus immersives dans les sessions futures. La technologie de la RV a le potentiel d'améliorer l'éducation médicale et de fournir un environnement d'apprentissage immersif sûr pour développer le sens clinique.

Introduction

Medical students get limited opportunities for patient encounters in their pre-clerkship years, typically in the form of volunteer or standardized patients.[1] Despite these measures, medical students in their clerkships often report feeling unprepared for transition to clerkship.[2] Adjustment to unfamiliar environments, discernment of relevant information, and practical application of theoretical knowledge present unique challenges that hinder learning at the onset.[3] Gradual immersion of students in clinical environments with increasing fidelity provides better preparation for novel experiences, promoting confidence and effective learning.[3-6]

Innovation

We designed an immersive clinical experience (ICE) of a patient encounter in a virtual emergency setting that emphasizes core clerkship competencies including history-taking, physical examination, generating differential

diagnoses, and implementing investigation and management plans. The Faculty of Medicine's EdTech team directed the storytelling, consisting of a film producer and a team of seven student virtual reality developers who developed the interactive experience over a period of six weeks. Clinical faculty and undergraduate medical students authored patient case content, providing feedback during both paper prototyping and with minimal viable product.

A 3D patient was created using Microsoft Kinect sensors, DepthKit and Adobe software. The experience was authored for delivery on an Oculus Quest Headset using Unity and involved voice-activated commands powered by IBM Watson. Hardware costs totaled $700.

Learners used voice-activated/display questions to interact with a patient with respiratory symptoms. They could select from a list of questions depending on what they thought to be relevant to the scenario. A virtual progress note was automatically populated throughout the history. Students performed a physical examination using virtual 3D anatomical models of vital organs with pathological findings, such as audio clips of crackles on auscultation. Learners could order and interpret relevant diagnostic investigations (x-ray, echocardiogram), that they used in conjunction with their history and exam findings to construct a differential diagnosis. The case then prompted students to present their final diagnosis and management plan to their virtual physician preceptor, who provided formative assessment and feedback.

Sessions were integrated into the medical undergraduate curriculum and delivered to second-year students in preparation for clerkship. The education technology team developed an instructional video to orient learners to virtual reality (VR), equipment used and cleaning protocol. A single 30-minute session was followed by an optional 10-item feedback survey. This evaluation was exempt from REB review as per TCPS2, Article 2.5 for quality improvement studies.

Evaluation

Out of 197 students who participated in ICE, 107 completed a follow-up survey (Figure 1). Majority of learners (94%) found the experience to be helpful, with an average overall satisfaction of 8.5/10. Ninety-five percent enjoyed using VR, with 84% expressing desire for increased integration into the curriculum. Difficulty level and duration were deemed 'just right' (91% and 65%, respectively).

Written comments about the experience highlighted common themes of autonomy, motivation, instant feedback, and ease of use. Areas of improvement included suggestions for further feedback, development of longer cases, and integration of additional prompts for guidance.

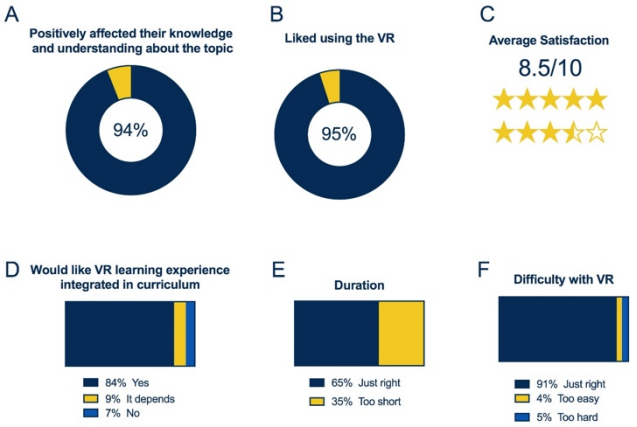

Figure 1. Quantitative survey results evaluating the immersive clinical experience (ICE).

Next steps

Augmentation of medical education with VR technology has demonstrated established benefits, from factual and spatial knowledge acquisition to improvements in technical skills and applications in anatomy.[7-9] It provides immersion in interactive settings with the autonomy to explore and apply clinical knowledge for flexible remote learning, thereby creating engaging opportunities for education from virtually anywhere across the globe! As demonstrated in this pilot project, our ICE application has not only allowed medical students to continue clinical experiences under restrictions of the COVID-19 pandemic, but it also created a truly standardized patient encounter thereby enabling all students a fair and equitable learning opportunity. Given its positive reception and efficacy in challenging students to strengthen clinical acumen, we hope to expand our initiative to integrate further clinical applications and practical scenarios. Scenarios in the future could be further modified to mimic changes in clinical status and mimic acute decompensation. Furthermore, by utilizing the advancement of artificial intelligence such as ChatGPT, the immersive interaction can mimic a realistic conversation between the patient. Lastly, implementation of a built-in scoring system to provide real time feedback can further enhance learning during the simulation. Ultimately, our goal is to enhance medical education and improve clinical skills curriculum through integration of VR technologies, to produce more confident and better-prepared future physicians.

Published ahead

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