

Virtual Reality: An innovative approach to sharing learnings with Health Care Professionals on Cytokine Release Syndrome and neurological events after Chimeric Antigen Receptor T-Cell Therapy (CAR-T) infusion

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Background

Chimeric Antigen Receptor T-Cell Therapy (CAR-T) is an orphan medicinal treatment developed for certain rare cancers, and is currently indicated for the treatment of diffuse large B-cell lymphoma (DLBCL) and B-cell acute lymphoblastic leukemia (ALL). CAR-T is a living drug made from the patient's own T-cells that are genetically reprogrammed to fight cancer. CAR-T is currently used in patients who have very limited treatment options remaining.¹

Cytokine Release Syndrome (CRS) and neurological side-effects are known complications of CAR-T cell therapy that may occur when the T-cells multiply and activate in the patient's body, and require urgent and complex care.^{2,3} Learning and practicing how to manage these challenging situations is essential in ensuring patient safety.

A recent study in orthopedic surgery indicates that medical students are more likely to correctly perform complex procedures when they are taught in an immersive virtual reality (VR) environment compared to traditional educational methods.⁴ The students randomized to use virtual reality performed 233% better when assessed by an orthopedic surgeon using standardized assessment scores, blinded to the randomization. Higher levels of engagement, interaction, practice and mental presence leading to higher levels of subsequent recall and possibly a shift towards procedural rather than declarative memory are all plausible factors in explaining these results.⁴

Aim

Our aim was to create a supportive training tool in VR for Health Care Professionals (HCPs) to raise awareness of CRS and neurological side effect management protocols and seek to improve confidence in treating these adverse events after the infusion of CAR-T cell therapy.

Methods

Up to 150 HCPs were provided with a VR headset, during a gathering of clinical study investigators in 2019. In our custom-made VR environment, the HCPs were presented with at least one of four different scenarios for ALL and DLBCL patients, developed in partnership with experts in the field of the two disease areas and in intensive care. The scenarios included the patient's history and relevant medical information required to assess their condition. The interactive nature of the tool then led the HCPs to identify and classify side effects by severity, institute appropriate therapies and request other medical interventions, being clearly alerted when choices were not in line with current best practices.

Discussion

Data gathered from the survey reflects a likely improvement in terms of experience and knowledge of the proper management of CRS and neurological events after infusion of CAR-T.

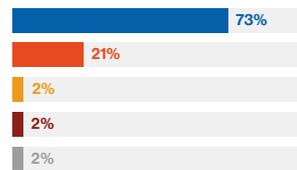
This analysis is limited by the low number of respondents (48 out of 150 participants). Furthermore, the anonymization of participants meant it was not possible to identify the HCPs' level and area of expertise.

Following its initial use in 2019, the VR tool has been made available to attendees during several HCP conferences in different countries across Europe. Feedback, albeit not systematically collected, has been very good, adding weight to our growing understanding of VR as a serious teaching tool for complex topics. We encourage the use of VR in similar settings, to study its impact and efficacy.

Results

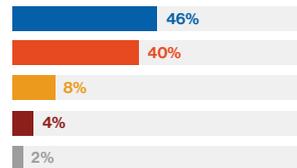
A subsequent survey was answered by 48 (32%) users with very positive outcomes. Of the respondents, more than 79% (n=38) rated the experience as either very helpful or extremely helpful.

94% (n=45) expressed their interest in receiving more educational content in this format



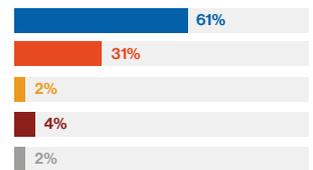
Question: How much do you agree that you would be interested in seeing more educational content in this format?

86% (n=41) found the tool easy to navigate



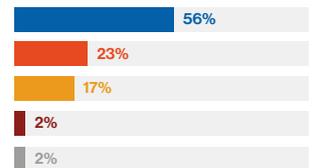
Question: How much do you agree that the experience was easy to use?

92% of the users (n=44) judged the usefulness of the scenario to be either very or extremely useful



Question: How do you rate the usefulness of the scenario?

79% (n=38) of the users rated the learning as either very or extremely useful



Question: How do you rate the learning value of the scenario?

Key: Not at all useful 1 2 3 4 5 Extremely useful

Conclusion

Virtual Reality has the potential to improve the management of serious illnesses and potential side effects for patients, like CRS. It provides a unique, safe, fully immersive environment to understand the impact of the decisions being made and may enhance HCPs confidence in managing these side effects in real life practice. While more studies are needed, VR has the potential to improve patient care.

Acknowledgements

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