Transcending the boundaries of patient education in radiotherapy using a VIRTUAL REALITY application to enhance patient experience for paediatric patients.

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INTRODUCTION

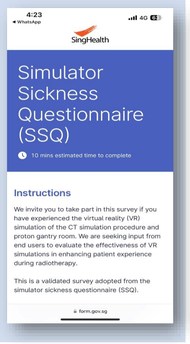
Clinical procedures for paediatric patients undergoing radiotherapy often require more time to allow for better cooperation and familiarisation of the environment. Invasive general anesthesia may also be required for some cases.

This project aims to develop a virtual reality (VR) application to enhance patients' understanding of the CT simulation procedure and proton therapy facility to supplement traditional education materials (e.g. booklets) used during patient briefing. We hope to provide an immersive experience to enhance users' understanding of the CT Simulation and proton therapy environments.

METHODOLOGY

This is a multi-institutional project that involved radiation oncologists, radiation therapists, child-life specialist and media design academics from NCCS, KKH and NYP. Leveraging on VR technology to develop a VR patient education module to provide an immersive experience to enhance users' understanding of the CT Simulation and proton therapy environment. The development process of the VR application is illustrated below.

The VR application was piloted in a group of healthy volunteers (2 children and 11 adults) between Apr to Jun 2023 and a questionnaire was administered to evaluate the overall user experience of the VR application via using a validated simulator sickness questionnaire (RS Kennedy et al 1993) consisting of 20 questions and 4-pt Likert scales.



RESULTS

A pilot simulator sickness questionnaire was conducted among healthy volunteers (n=13) and no one experienced headache, eye strain, difficulty in focusing, nausea, vertigo. Three responders experienced mild fullness of the head based on the 4-point Likert scale. Overall, the application of the VR patient education module was well received by the responders and we will be implementing this clinically.

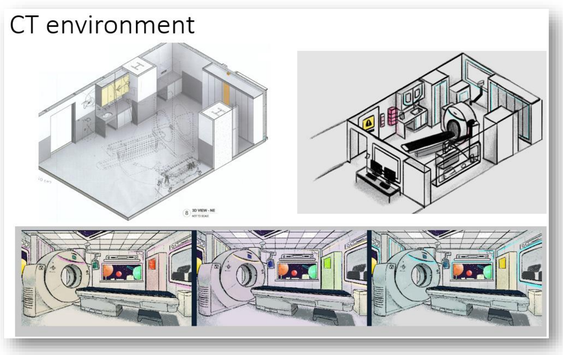
Reduce anxiety and shorten the time of CT simulation. May possibly avoid the need for invasive general anesthesia.

Reducing operation cost: In terms of scalability, VR modules of other clinical procedures can be produced. Potential time-saving of the clinical procedural slots may result in direct/indirect cost-saving.

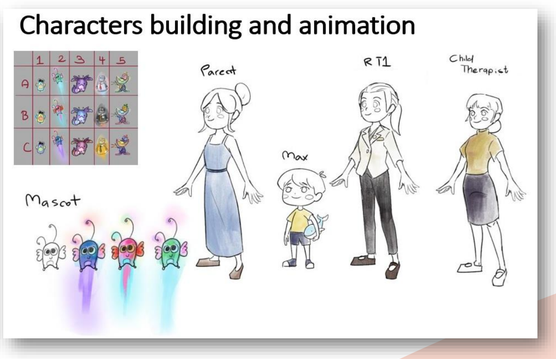
Optimise manpower operation requirements: Improve overall patient education experience for paediatric patients, who often require more time due to understanding of the clinical procedure.

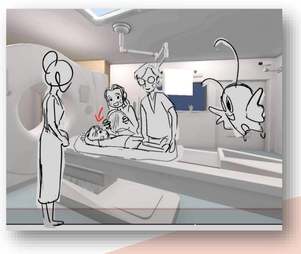
Improved consistency of patient briefing given the standardized VR format will in turn free up clinical staff to prepare peripheral clinical workflow.

CT environment



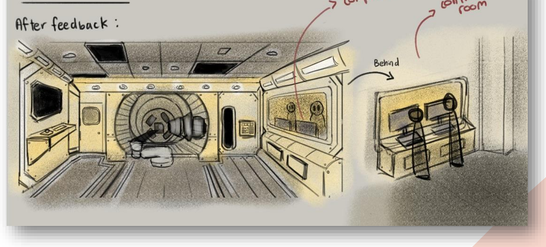
Characters building and animation





CT room environment

Sketch of Proton room



DESIGNING A VIRTUAL REALITY:

Animated characters (mascot, caregiver, patient and radiation therapists) were modelled with dialogues scripted for paediatric patients (5-12 years old) undergoing CT simulation procedure.

FINE TUNING:

Animation included accurate portrayal of the textual finishes of the immobilization gadgets used during the clinical procedure.

STUDYING REALITY:

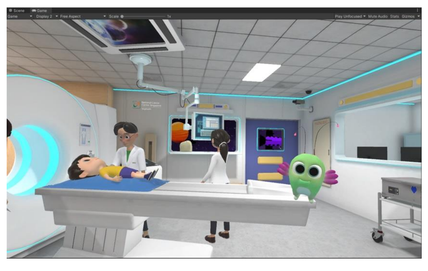
Site visits were organized for the students to contextualize the requirements of the animation to ensure an immersive experience is achieved with a 360-VR patient education module (5-7min).

COLLABORATIONS:

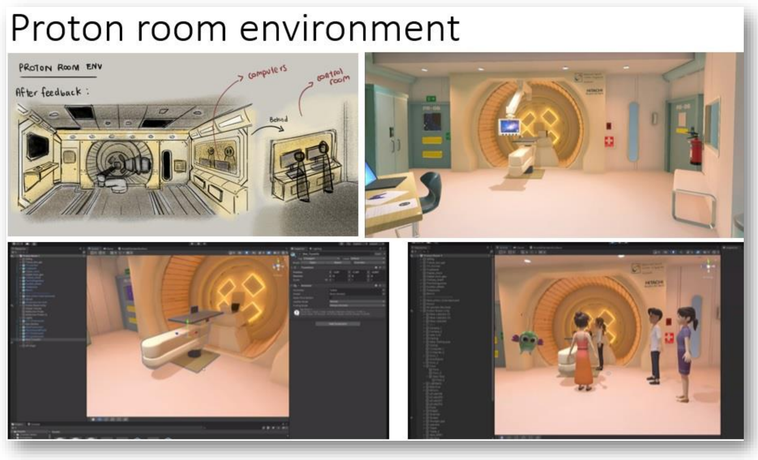
Final year students and a lecturer from the School of Design and Media from NYP were engaged to create animations of the clinical room setting and characters.

FORMING THE TEAM:

A multi-institutional project that involved Radiation oncologists, Radiation therapists, Child-life specialists, Media design academics from NCCS, KKH and NYP.



Proton room environment



CONCLUSION

A 360-VR patient education module for CT simulation has been successfully developed and implemented for future paediatric cases.

Acknowledgements

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