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Using virtual reality to allow paramedics to familiarise themselves with a new ambulance patient compartment design

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ABSTRACT

Background: Virtual reality (VR) is still an evolving domain that presents a versatile medium to simulate various environments and scenarios that can be easily reset between users, which can be particularly useful for training purposes[1,2]. In this pilot study, we recreated the interior of a modular ambulance patient compartment with elements that can be moved and also had access to the real physical ambulance with the same interior design and equipment. The primary objective of this study was to determine the usability of the VR patient compartment in terms of functionality and sense of presence.
Methods: Paramedics were invited to take part in this pilot study which involved them attending a 15-minute presentation about ambulance safety and ergonomics, familiarise themselves with the VR equipment (Figure 1), position the modular elements of the ambulance patient compartment in the VR or real setting (and vice versa), and complete a questionnaire corresponding to the task completed and adapted from an existing tool[3]. They were unknowingly timed during the activities inside the real and VR ambulance for comparative purposes.
Results: Twenty-seven participants were recruited, 77.8% of whom had no prior VR experience. On the 7-point Likert scale questionnaire, the participants scored the various aspects of usability (ease of grabbing elements, ease of recognising fixed/movable elements, distinguishing close from far objects, ease of "playing" the game . . .) between 5.59 to 6.26 and their sense of presence as 6.11 (SD = 1.121). Participants were faster arranging the modular elements in the VR setting than in the real one (8.78 min, SD = 4.47 versus 13.05 min, SD = 5.04).
Conclusion: VR technology and potential applications are still rapidly developing. This pilot study shows promising results in terms of ease of use and sense of presence for the paramedics. This demonstrates that VR can be used for interactive familiarisation with an environment such as an ambulance patient compartment and can be used to assist in their design.

Keywords: virtual reality, ambulance design, training, ergonomics, safety

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Figure 1. Paramedic interacting with the VR setting via the Oculus Rift DK2 head-mounted display and hand-held controller to grip and move objects.

Ethical approval statement: This pilot study was approved by Hamad Medical Corporation as a quality improvement project (#17116/17).

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REFERENCES

[1] Schild J, Lerner D, Misztal S, Luiz T. EPICSAVE—Enhancing vocational training for paramedics with multi-user virtual reality. In: 2018 IEEE 6th International Conference on Serious Games and Applications for Health (SeGAH); 2018 May 16. IEEE; p. 1–8.
[2] Kardong-Edgren SS, Farra SL, Alinier G, Young HM. A Call to Unify Definitions of Virtual Reality. *Clinical Simulation in Nursing*. 2019;31:28–34.
[3] Lee EA, Wong KW, Fung CC. How does desktop virtual reality enhance learning outcomes? A structural equation modeling approach. *Computers & Education*. 2010;55(4):1424–42.