Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

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Disaster medicine training: The case for virtual reality

The current Covid 19 pandemic has provided an opportunity to reflect on how future training and preparedness for pandemics and disasters might be improved upon. Previous authors have highlighted knowledge and skill gaps in disaster medicine (DM) training for physicians [1]. Integrating cutting-edge technology to improve cost effectiveness in DM training, quality and outcome goals can be achieved using virtual reality platforms. A number of emergency management and response organisations are currently exploring and incorporating its use as part of their training and education programs [2,3].

DM training, including field exercises, often necessitates a combination of classroom work, table top training, and the use of mannequins or real life actors with special effects makeup to recreate disaster scenarios (including costs such as venue hire, use of medical training equipment and need for safety officers), with the latter often a resource-intensive and expensive but critical part of the programme [4].

Improving the effectiveness of disaster training requires the ability to simulate a high stress, high fidelity environment with realistic patient distress and injuries in order to stress inoculate medical personnel to be able to process real time new information, respond accordingly and follow specific disaster algorithms and protocols, or provide clinical treatment under duress. Whilst live simulations are regarded as the "gold standard" of disaster training, they are challenging to organise, expensive, and disruptive.

DM training must also be ongoing, with regular refresher courses to keep first responders ready for deployment. The financial cost, time, and logistical effort to coordinate, prepare and deliver these functional and on-location exercises remain a significant barrier in maintaining work force preparedness. Novel ways to reduce these barriers while maintaining the quality and realism of training are continually being explored. Leveraging new or maturing technologies such as Virtual Reality (VR) should be considered, as recent studies have suggested that a well-designed, full immersion VR environment for mass casualty training can provide similar learning outcomes and at a significant cost savings [5,6,7].

Technology has long been used to improve efficiencies, reduce costs and improve existing processes in fields beyond medicine, but is now particularly pertinent in the DM space [8,9].

The past decade has seen a big boom in VR technology with over 200 + companies developing VR-related products and the likes of Amazon, Facebook, Apple, Google, Microsoft, and Sony launching dedicated VR development arms. Commercial off the shelf wireless headsets such as Facebook's Oculus Quest 2 (retail price $299–399 USD) launched in October 2020 are now providing relatively affordable VR systems to all who seek them.

Other advantages of VR include instant feedback on disaster training performance. Live simulation drills necessitate the need for referees to supervise and assess each student on a 1–1 basis during scenarios. Reliably recording data points has been problematic as it depends on manual data collection in a chaotic environment, whereas a VR environment automates the process, providing immediate data analysis and feedback to students [10]. Furthermore, highly realistic and interactive VR platforms have the additional ability and benefit of running simultaneous and consistent, standardised scenarios and these attributes are ideal for forming a standardised testing and competency assessment tool [9,10,11].

VR also provides a viable research tool for examining mass casualty triage, as well as a platform to test knowledge and skill retention, accuracy of triage algorithms, and to compare performance of different triage systems [10]. It also provides a flexible, consistent, on-demand training option using a stable, scalable and reproducible platform essential for the development of assessment protocols and performance standards.

Finally, the ability to leverage VR and other technologies to improve disaster training and concurrently educate large numbers of medical responders could have significant mental health impacts. The recent Covid19 pandemic has seen significant surge capacity issues around the globe, often placing medical staff with little to no disaster training in unfamiliar mass casualty and psychologically traumatic environments. VR could potentially play a part in pre-deployment stress inoculation training to enable front line personnel to cope better with mass casualty-related stressors, and mitigate the negative effects of high stress exposure [12].

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