**Supplementary materials**

Template for Intervention Description and Replication (TIDieR) Checklist (Hoffman et al., 2014).

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| **1. Brief name** | Virtual reality (VR) interventions and palliative care patients: A pilot study |
| **2. Why** | Specialist palliative care patients may present with a multitude of physical and psychological symptoms related to the burden of disease. Patients in palliative care become increasingly reliant on caregivers as their disease stage makes it difficult for them to engage in daily activities. The aim of this study was to implement a novel immersive virtual reality intervention for specialist palliative care patients and monitor its effect on the occupational participant and satisfaction, symptoms, and heart rate in specialist palliative care patients. Furthermore, we sought to assess the participants’ experience of virtual reality interventions in the community and inpatient contexts. |
| **3. What – material** | **Technology considerations:** Patients used wireless Oculus Go™ headsets plus motion controllers (Facebook Technologies, 2021) while seated in a chair or bed with the elbows rested at the participants’ side. Suitable VR experience content were described as low-immersion, effective and acceptable by palliative care participants in previous studies. These therapeutic modalities, such as meditation, may alleviate psychological distress and physical pain, while exploring client-specified goals: coping with pain, inner peace and mindfulness, and adventure. The virtual applications were downloaded prior to the intervention sessions using the paired Apple device. Another relevant feature of the applications chosen is their use of immersion in a natural virtual environment’s visuals and sounds to promote the relationship between the therapy and the participants’ occupational engagement. The natural immersive environments were selected to try to influence the user’s mood while performing the intervention in a comfortable, motivating, and peaceful virtual setting.  **User interface:** Applications chosen were briefly tested to determine that participants could navigate through the environment as easily as possible. If the application required input on behalf of the user, the instructions were provided to the patient in a clear and simple manner.  **Internet connectivity:** Operating Oculus Go headsets™ requires tethering by wifi or mobile hotspot and initial configuration to one single iPhone. This limitation is a feasibility issue for future consideration. The Oculus Go, once paired to an iPhone, could not be used by multiple devices, therefore the clinician administering the VR treatment must have access to the iPhone paired with that specific Oculus Go headset during the treatment session. Similarly, if the wifi connection in the location of the VR treatment was unstable, the user experience of the VR therapy was impacted by interruption. Our study utilised the clinician’s iPhone to broadcast a mobile hotspot, which the Oculus Go was then tethered to. We encountered issues with connectivity when administering VR treatment at the hospital. This was due to the tethered iPhone attempting to connect to the hospital’s guest wifi access during the VR session.  **Companion application:** It is necessary to download the Oculus companion app to the configured iPhone. It is also necessary to login to the device using a Facebook and an Oculus Go account.  **Hardware considerations:** Oculus Go headset™ motion controllers were stored without batteries inserted, as it was found that leaving batteries inserted within the motion controllers 1) created damage to batteries through overheating and 2) drained batteries when not in use.  **Clinical data sheets:** The information obtained in each session was written in a clinical data sheet and then scanned and stored in the patient’s electronic medical record. In this way, it was possible to allow the supervising Occupational Therapist (OT) to check remotely the therapy’s progress. Each clinical data sheet was de-identified, to ensure privacy and confidentiality. |
| 4. What – procedures | To reduce the risk of physical discomfort with the VR device, treating clinicians were trained in proper adjustment of side and top straps, and comfortable placement of the facial interface prior to implementation. The treating clinician ensured the area in which the VR intervention to take place had a suitable chair or bed, free from objects within arm’s reach that may have caused injury. The motion controller was set up to accommodate the participant’s hand dominance so that the participant may control the device independently. The VR intervention was discontinued immediately if the participant asked for it to be stopped or if any of the following symptoms are experienced: seizures, loss of awareness, eye strain, eye or muscle twitching, involuntary movements, altered/blurred/double vision, dizziness, disorientation, discomfort or pain in the head or eyes, drowsiness, fatigue or any symptoms of motion sickness.  **Infection control:** Following the established infection control procedures for using the VR device, treating clinicians ensured patients wore a disposable hair net and used a disposable foam face insert. Non-abrasive anti-bacterial wipes were used to disinfect equipment after each use. The treating clinician made verbal refreshers on safety and handling of equipment prior to each intervention to support participant’s familiarity with the technology. A social worker from the service was available to provide support and mitigate risk in the event of participant psychological distress.  Prior to the VR intervention, the clinical assistant spent on average 17 minutes consulting with the patient, discussing the study and establishing informed consent, orienting them to the equipment. On average 18 minutes were spent establishing the participant’s goals for the session and administering the pre-intervention outcome measures. The treating OT or clinical assistant was present throughout the intervention to monitor the participant’s tolerance and enjoyment. End-of-life goals may include VR-related modified activities such as: being immersed in a meaningful environment (beach, mountains), engaging in an activity for reminiscence therapy (rowing, horseback riding), adventure, experiencing an immersive guided meditation in a natural environment (Kabir et al., 2020).  If the client’s preferences were not met using existing downloaded VR applications, additional VR applications were considered, downloaded and tested prior to the intervention.  The average reassessment time post-intervention was 17 minutes. One standalone VR session was administered lasting on average 15 minutes. The duration of the VR session was dependent upon the participant’s tolerance and enjoyment.  During the pre-intervention consultation time, the clinical assistant discussed the participant’s goals and occupation-related problems in accordance with the modified Canadian Occupational Performance Measure.  Patients performed one of four applications: Bear Island, Calm Place, Guided Meditation VR, or YouTubeVR. The VR application chosen depended upon the preference and goals of the participant.  Implemented virtual reality applications:  For this study, the VR applications were chosen as they required minimal upper limb movement, were low immersion and required minimal cognitive effort on behalf of participants. VR applications chosen were downloaded at no cost from the Oculus Go application store.  The functionality of each game is described as follows:  **Bear Island** (Facebook Technologies, 2022a): This educational low-immersion VR application was created in partnership with BBC Earth and National Geographic and encourages the user to escape into the world of a young black bear. Real-life footage, including underwater angles, captures the journey of the bear as she travels a river feeding and hunting for fish. Other bears and wolves appear in competition for food sources. Users are required to advance the story with minimal controls using the motion controller. The application is suitable for participants who enjoy documentaries and animal stories.  **Calm Place** (Facebook Technologies, 2022b): This application provides guided meditations within three changeable environments under the following categories: deep breathing, body/muscle relaxation, and mindfulness. Each experience is promoted for the purpose of altering the user’s emotional state. This application was developed for the purpose of use in a clinical trial provided to psychiatric inpatients to reduce symptoms of stress and anxiety.  **Guided Meditation VR** (Facebook Technologies, 2022c): This application provides meditations from five to 20 minutes in length in over 100 virtual environments. Sessions may be customised based on environment, to utilise a timer, music or no music, audio guidance or no audio guidance. Meditation themes include: zen, loving compassion, depression, and sleep.  **YouTubeVR** (Google, 2022): This application was developed as a sub-application of the YouTube video sharing website. It provides immersive VR access to YouTube’s online free library of videos recorded in 180° and 360°. Advancing the application requires minimal user controller interaction.  Overall, the use of these applications aimed to be appealing to the target population and easy to use in time durations according to the participant’s wishes.    **Clinical data sheets:** at the end of each VR intervention, the clinical assistant reassessed the participant using the described outcome measures and collected verbal feedback, which was written on the clinical data sheet. |
| **5. Who provided** | The virtual reality applications selected as most suitable to fit with patient goals were downloaded from the Oculus Go application store. One treating clinician (occupational therapist) with more than 10 years of experience performed the initial assessments. Treatments were carried out by one clinical assistant who were with the patients throughout the intervention sessions. The occupational therapist had experience with specialist palliative care. |
| **6. How** | Face-to-face VR interventions were given to each patient individually. The statistical evaluations were performed by the clinical assistant. |
| **7. Where** | Sessions were conducted at the participants’ homes in the community using a quiet room with a comfortable chair or bed, where the clinician could be seated nearby. Alternatively, the participant received interventions in a patient room in the specialist palliative care ward of the hospital. Oculus Go virtual reality glasses and motion controllers were used. The patient sat in the chair or a bed in and the OT or clinical assistant was located close to him/her in another chair. |
| **8. When and how much** | Treatments were conducted during November and December of 2021 and March of 2022. From initial contact to goal setting and VR intervention, in total sessions lasted on average 67 minutes. |
| **9. Tailoring** | The intervention was carried out in a similar way for all patients.  The VR applications were easy to customize according to the participant’s preference. The settings, such as hand dominance for the motion controller, could be defined by clinicians at the beginning of the intervention session, or during the performance of the VR application. The volume of the VR application could be increased or decreased through an external button on the Oculus Go headset. Headset straps could be adjusted, however due to the presence of the required infection control disposable foam face insert, especially for users wearing glasses, were not able to be as tightly fitted across the head. |
| **10. Modifications** | There were not modifications of the initial protocol. |
| **11. How well – planned** | The patients' compliance with the therapies was high (100%) and there were no adverse side effects observed. The occupational therapist or clinical assistant documented patient attendance to VR sessions through the clinical data collection sheet. |
| **12. How well – actual** | Interventions were delivered as planned. The patients' compliance with the therapies was high (100%) and there were no adverse side effects observed. |