

Resource Summary Report

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Exploration of rehabilitation through the use of virtual reality interventions for patients with upper limb conditions: protocol for scoping review.

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Summary: BackgroundThe use of virtual reality to aid rehabilitation of upper-limb conditions has been an emerging field over the past decade. The majority of research seems to focus on post-stroke therapies with major advances in improving hand function through various robotic and digital techniques (1), however it is still not standard practice. With the recent crisis of COVID 19, home therapy has been thrust into the forefront of rehabilitation. At present a wide variety of technology has been developed to target rehabilitation in the upper limb. This includes hand tracking technology (e.g. Leap Motion) where various prototypes have been tested using haptics (2), robotic-assisted movement devices which predominantly target stroke or neurorehabilitation by means of exoskeleton prototypes (3,4), and exercise programmes through telerehabilitation and virtual reality (5). The majority of hand devices that have been developed are bulky and can impact on the accuracy of functional measurements (6). In terms of virtual reality, studies suggest that patients find it enjoyable and are as, if not more, motivated in these rehabilitation sessions when compared to traditional exercises, even in the older population (7). Hoffman et al in 2020 (8) found that patients undergoing hand rehabilitation with virtual reality felt that their pain was reduced, they had increased levels of motivation and therefore felt more able to perform exercises. This has been matched by studies looking at pain and anxiety levels whilst using virtual reality during wide awake anaesthesia with a significant reduction in both (9). Hand rehabilitation outside of stroke and neurological disorders, for example post-surgery or trauma, involves intensive hand rehabilitation by the hand therapy team but there is a global shortage of this service. Current practice is one-to-one patient-to-therapist and involves intensive rehabilitation, assessment and documentation. Virtual

reality could prove a vital technology to develop to enable patients to undertake immersive therapy within their own homes whilst allowing remote assessment of their progress and function from the hand therapy and clinical teams.

Aims The overarching aim of this review is to identify the range and variety of virtual reality tools that are available and effective for upper limb conditions.

Review objectives

- 1) What is the “extent (size), range (variety) and nature (characteristics) of the evidence” of virtual tools to enhance hand rehabilitation?
- 2) Do these tools have the potential to be used in the field of hand surgery and hand rehabilitation?
- 3) What are the barriers and facilitators to hand rehabilitation using virtual tools?

Design The scoping review will be conducted in accordance with PRISMA-ScR guidelines (10) and the frameworks developed by Arksey and O'Malley (11) and Levac et al. (12). Preliminary searches will be conducted and two librarians will be consulted to create a comprehensive search strategy. Screening of titles and abstracts will be undertaken by three independent reviewers, with conflicts resolved by discussions and consensus. Full-text screening will be undertaken following this same approach. A charting form will be developed based on the objectives of the review and refined by the research team. Data will be collated and summarised, with quantitative sources described descriptively and qualitative data analysed thematically (13). Results will be presented using summary tables and/or using pictorial/flow charts, if appropriate.

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