



Topic Exploration Report

Topic explorations are designed to provide a high-level briefing on new topics submitted for consideration by Health Technology Wales. The main objectives of this report are to:

1. Inform discussions on new topics received by HTW.
2. Determine the quantity and type of evidence available on a topic.
3. Assess the topic against HTW selection criteria.

Topic:	Virtual reality distraction therapy
Topic exploration report number:	TER098

Aim of Search

Health Technology Wales researchers searched for evidence on the effectiveness of virtual reality as a distraction therapy for the relief of symptoms such as pain, breathlessness or nausea, or to control phobias or other anxiety disorders.

A high-level review of the evidence on virtual reality distraction therapy was carried out, with the aim of identifying the level of evidence associated with each of these indications. Specifically, we searched for evidence on the effectiveness of using virtual reality as a distraction therapy in any clinical scenario that may cause pain and anxiety, or be associated with phobia.

Summary of Findings

Technology assessments, guidelines and economic evaluations

The ECRI institute have published a rapid review (2018) on the use of virtual reality for relieving pain and anxiety in children and adolescents. This review suggests that the technology may reduce pain and anxiety more than standard care across a range of procedures. No published guidelines or economic evaluations were identified that have assessed the clinical or cost effectiveness of virtual reality distraction therapy.

Systematic reviews

Several recent systematic reviews were identified assessing the use of virtual reality in a range of clinical conditions and settings. Most of the evidence relates to virtual reality for the relief of pain and anxiety. The reviews identified covered general pain management, and also use in more specific scenarios such as spinal cord injury, outpatient surgical procedures, and dressing changes/physical therapy in burns patients. Some evidence on the use of virtual reality in phobias was also identified, but this appears to use virtual reality as an exposure therapy rather than a distraction technique.

In general, the systematic reviews tentatively concluded that VR offers benefits over standard care alone, although the quality and quantity of evidence varies depending on the area of interest.

Individual trials/primary research

For clinical scenarios of interest where no systematic reviews were found, we searched for individual trials. Trials were identified studying the use of VR in dental procedures (for the relief of pain, anxiety, or management of phobia), women with breast cancer receiving chemotherapy (management of fatigue, anxiety and symptom distress), outpatient surgery (for management of pain and anxiety), and dressing changes for non-burns patients (for management of pain and anxiety). One study comparing different types of VR delivery (a virtual environment viewed on a specific VR headset or app-based VR viewed on a converted mobile device).

No published evidence was found on the use of virtual reality to relieve breathlessness or nausea.

Conclusions

Evidence is emerging that supports the use of virtual reality distraction therapy across a range of possible clinical applications. A fuller and more focussed assessment of the evidence would be needed allow more detailed judgements about the clinical and cost effectiveness of this technology, and the clinical applications in which it offers most benefit. No economic evaluations or other sources of costing information were identified and consideration would need to be given to the economic impact of VR in any fuller assessment.

Areas of Uncertainty

The report focusses on virtual reality as a distraction therapy. For conditions such as anxiety, using virtual reality as an exposure therapy could also be of potential relevance but this scenario is beyond the scope of this report.

Virtual reality distraction therapy has been studied in a wide range of clinical settings. Further scrutiny of the evidence is needed to identify whether there are specific settings where virtual reality could be beneficial.

There are likely to be practical issues (such as infection control) to consider in deploying virtual reality in health and care settings and these would need to be considered as part of any wider assessment of the technology.

Feasibility of Technology Assessment

HTW's Assessment Group concluded to progress this topic to Evidence Appraisal, subject to refinement of the scope of the appraisal. This will be published as Evidence Appraisal Report 017.

Brief literature search results

Resource	Results
HTA organisations	
Healthcare Improvement Scotland:	No assessments or recommendations on virtual reality were identified.
Health Technology Assessment Group	No assessments or recommendations on virtual reality were identified.
Health Information and Quality Authority	No assessments or recommendations on virtual reality were identified.
UK guidelines and guidance	
SIGN	No guidelines on the clinical areas of interest make any recommendations on the use of virtual reality.
NICE	No assessments or recommendations on virtual reality were identified.
Secondary literature and economic evaluations	
ECRI	<p>Custom rapid response: "Immersive Virtual Reality for Relieving Pain and Anxiety in Pediatric Patients during Procedures". April 2018.</p> <p><i>Conclusions: Limited evidence from controlled studies and systematic reviews suggests immersive VR may reduce pain and anxiety more than standard of care (SOC) in children and adolescents during venipuncture, wound dressing changes, physical therapy for burns, or dental procedures.</i></p>
Cochrane library	<p>Uman LS, Birnie KA, Noel M, et al. (2013). Psychological interventions for needle-related procedural pain and distress in children and adolescents. Cochrane Database Syst Rev. (10): Cd005179. doi: 10.1002/14651858.CD005179.pub3</p> <p><i>This review included virtual reality as an intervention, but did not identify any relevant evidence.</i></p>
Medline	<p><i>Systematic reviews were identified studying the use of virtual reality in the context of phobia therapy, pain management and anxiety management.</i></p> <ul style="list-style-type: none"> • Arroll B, Wallace HB, Mount V, et al. (2017). A systematic review and meta-analysis of treatments for acrophobia. Med J Aust. 206(6): 263-7. • Botella C, Fernandez-Alvarez J, Guillen V, et al. (2017). Recent Progress in Virtual Reality Exposure Therapy for Phobias: A Systematic Review. Curr Psychiatry Rep. 19(7): 42. doi: 10.1007/s11920-017-0788-4 • Chan E, Foster S, Sambell R, et al. (2018). Clinical efficacy of virtual reality for acute procedural pain management: A systematic review and meta-analysis. PLoS One. 13(7): e0200987. doi: 10.1371/journal.pone.0200987 • Chi B, Chau B, Yeo E, et al. (2019). Virtual reality for spinal cord injury-associated neuropathic pain: Systematic review. Ann Phys Rehabil Med. 62(1): 49-57. doi: 10.1016/j.rehab.2018.09.006 • Chirico A, Lucidi F, De Laurentiis M, et al. (2016). Virtual Reality in Health System: Beyond Entertainment. A Mini-Review on the Efficacy of VR During Cancer Treatment. J Cell Physiol. 231(2): 275-87. doi: 10.1002/jcp.25117 • Dascal J, Reid M, IsHak WW, et al. (2017). Virtual Reality and Medical Inpatients: A Systematic Review of Randomized, Controlled Trials. Innov Clin Neurosci. 14(1-2): 14-21.

	<ul style="list-style-type: none"> • Luo H, Cao C, Zhong J, et al. (2019). Adjunctive virtual reality for procedural pain management of burn patients during dressing change or physical therapy: A systematic review and meta-analysis of randomized controlled trials. <i>Wound Repair Regen.</i> 27(1): 90-101. doi: 10.1111/wrr.1 • Malloy KM, Milling LS. (2010). The effectiveness of virtual reality distraction for pain reduction: a systematic review. <i>Clin Psychol Rev.</i> 30(8): 1011-8. doi: 10.1016/j.cpr.2010.07.001 • Meyerbroker K, Emmelkamp PM. (2010). Virtual reality exposure therapy in anxiety disorders: a systematic review of process-and-outcome studies. <i>Depress Anxiety.</i> 27(10): 933-44. doi: 10.1002/da.20734 • Morris LD, Louw QA, Grimmer-Somers K. (2009). The effectiveness of virtual reality on reducing pain and anxiety in burn injury patients: a systematic review. <i>Clin J Pain.</i> 25(9): 815-26. doi: 10.1097/AJP.0b013e3181aaa909 • Scapin S, Echevarria-Guanilo ME, Boeira Fuculo Junior PR, et al. (2018). Virtual Reality in the treatment of burn patients: A systematic review. <i>Burns.</i> 44(6): 1403-16. doi: 10.1016/j.burns.2017.11.002 • Scheffler M, Koranyi S, Meissner W, et al. (2018). Efficacy of non-pharmacological interventions for procedural pain relief in adults undergoing burn wound care: A systematic review and meta-analysis of randomized controlled trials. <i>Burns.</i> 44(7): 1709-20. doi: 10.1016/j.burns.2017.11.019
Primary studies	
<p>Medline <i>We searched for trials studying virtual reality only in contexts where no secondary evidence was identified.</i></p>	<p><i>Trials of virtual reality during outpatient/ambulatory surgery:</i></p> <ul style="list-style-type: none"> • Mosso JL, Gorini A, De La Cerda G, et al. (2009). Virtual reality on mobile phones to reduce anxiety in outpatient surgery. <i>Stud Health Technol Inform.</i> 142: 195-200. • Mosso Vazquez JL, Mosso Lara D, Mosso Lara JL, et al. (2019). Pain Distraction During Ambulatory Surgery: Virtual Reality and Mobile Devices. <i>Cyberpsychol Behav Soc Netw.</i> 22(1): 15-21. doi: 10.1089/cyber.2017.0714 • Walker MR, Kallingal GJ, Musser JE, et al. (2014). Treatment efficacy of virtual reality distraction in the reduction of pain and anxiety during cystoscopy. <i>Mil Med.</i> 179(8): 891-6. doi: 10.7205/milmed-d-13-00343 <p><i>Trials of virtual reality during dressing changes (for non-burn wounds):</i></p> <ul style="list-style-type: none"> • Guo C, Deng H, Yang J. (2015). Effect of virtual reality distraction on pain among patients with hand injury undergoing dressing change. <i>J Clin Nurs.</i> 24(1-2): 115-20. doi: 10.1111/jocn.12626 • Hua Y, Qiu R, Yao WY, et al. (2015). The Effect of Virtual Reality Distraction on Pain Relief During Dressing Changes in Children with Chronic Wounds on Lower Limbs. <i>Pain Manag Nurs.</i> 16(5): 685-91. doi: 10.1016/j.pmn.2015.03.001
<p>Cochrane library <i>We searched for trials studying virtual reality only in contexts where no secondary evidence was identified.</i></p>	<ul style="list-style-type: none"> • Alshatrat SM, Alotaibi R, Sirois M, et al. (2019). The use of immersive virtual reality for pain control during periodontal scaling and root planing procedures in dental hygiene clinic. <i>International journal of dental hygiene.</i> 17(1): 71-6. • Raghav K, Van Wijk AJ, Abdullah F, et al. (2016). Efficacy of virtual reality exposure therapy for treatment of dental phobia: a randomized control trial. <i>BMC oral health.</i> 16: 25. doi: 10.1186/s12903-016-0186-z

	<ul style="list-style-type: none">Schneider SM, Prince-Paul M, Allen MJ, et al. (2004). Virtual reality as a distraction intervention for women receiving chemotherapy. <i>Oncology nursing forum</i>. 31(1): 81-8. doi: 10.1188/04.ONF.81-88
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Concepts used:	virtual reality, exergaming, pain, phobia, nausea, anxiety
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