The effectiveness of virtual reality on reducing pain and anxiety in burn injury patients: a systematic review

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CRD summary
The authors' concluded that virtual reality may be an effective non-pharmacologic non-invasive adjunct analgesic technique to pain management for burn injury patients receiving wound dressing changes or physiotherapy treatment. The conclusions reflected the results presented. However, as the limited available evidence came from small studies, the conclusions should be interpreted cautiously.

Authors' objectives
To evaluate the effectiveness of virtual reality combined with pharmacologic analgesia in reducing pain and anxiety in burn injury patients undergoing wound dressing changes and physiotherapy.

Searching
PubMed, CINAHL, The Cochrane Library, BIOMED, PEDro, Science Direct, PsycINFO, ProQuest Medical Library, IngentaConnect and SPORTDiscus were searched from inception to January 2009 for published English-language articles. Search terms were reported. Reference lists of retrieved articles were scanned for further studies. ClinicalTrials.gov was searched for ongoing trials.

Study selection
Randomised controlled trials (RCTs), controlled trials, case series and case studies of all types of burn injury patients who received virtual reality and pharmacologic analgesics in the process of wound dressing changes and physiotherapy management were eligible for inclusion in the review. Eligible comparators were pharmacologic analgesics alone (such as opioids, anaesthetics and non-steroidal anti-inflammatory drugs) or other distractors (such as standard video games and television). Participants were eligible regardless of receipt of pharmacologic analgesics prior or during the virtual reality intervention. Primary outcomes of interest were pain (measured by visual analogue scale, numeric rating pain scale, graphic rating scale, FACES pain scale or any similar measurement tool) and anxiety (measured by burn specific pain anxiety scale, Spielberger State-Trait Anxiety Inventory scale or any similar measurement tool).

Most studies were conducted in USA in a hospital setting. Participant ages ranged (where reported) between five and 65 years. Virtual reality was most commonly offered during wound dressing changes or wound care. Virtual reality interventions included three different video games (reported in the paper). A range of included pharmacological analgesia was reported.

Two reviewers independently selected studies for inclusion.

Assessment of study quality
Study quality was assessed using an adapted version of the PEDro scale with a maximum achievable score of 7.

Two reviewers independently carried out the quality assessment. Any disagreements were resolved by reference to a third reviewer.

Data extraction
Data were extracted on the amount of reduction in pain and anxiety. This was reported in millimetres (on a scale from 0mm to 100mm). Where possible, data were collected to enable calculation of effect sizes and 95% confidence intervals (CI). Authors were contacted for missing information, where necessary.

Two independent reviewers carried out data extraction.
Methods of synthesis
Due to reported heterogeneity of the studies, a narrative synthesis was presented.

Results of the review
Nine studies (n=152) were included in the review. Over half of the included participants were from one study. There was one case report (n=2), one case study and seven within-patient study designs; two were RCTs (n=97) and one was a controlled study (n=12). The overall methodological quality of studies was reported to be good. One study scored 7, four studies scored 6 and four studies scored 5 on the adapted PEDro scale. Assessor blinding was reported in only one study.

Six studies reported effect sizes and/or 95% CIs. Five of these studies found a statistically significant difference in favour of interventions that included virtual reality. The remaining three studies reported reductions that ranged from 0mm to 80mm (five participants).

Anxiety was measured in three of the nine included studies; results were equivocal.

Authors' conclusions
Virtual reality may be an effective non-pharmacologic non-invasive adjunct analgesic technique to pain management for burn injury patients receiving wound dressing changes or physiotherapy treatment.

CRD commentary
The review question was clear and inclusion criteria were explicitly described. The search strategy included several relevant sources, but the restriction to published English-language articles meant that publication and language biases could not be ruled out. The review process was carried out with sufficient attempts to minimise error and bias. The validity assessment was used to inform the results. The chosen method of synthesis appeared appropriate in light of observed heterogeneity in the tabulated study details. The authors’ conclusions reflected the results presented. However, as the limited available evidence came from small studies that assessed within-patient changes, the conclusions should be interpreted cautiously.

Implications of the review for practice and research
**Practice:** The authors stated that health professionals could use virtual reality to help make the rehabilitation process less painful while improving compliance and functional outcomes for burn injury patients.

**Research:** The authors stated that large RCTs were needed to confirm the findings of this review, with careful attention paid to assessor blinding. More research was needed to assess anxiety outcomes, outcomes that arose in the context of physiotherapy management and evidence in populations in developing countries.

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