TITLE: Immersive Technologies for Neurorehabilitation: Clinical and Cost-Effectiveness

DATE: 18 July 2016

RESEARCH QUESTIONS

1. What is the clinical effectiveness of immersive technologies (excluding commercial gaming systems) for pediatric patients undergoing neurorehabilitation?

2. What is the cost-effectiveness of immersive technologies (excluding commercial gaming systems) for pediatric patients undergoing neurorehabilitation?

KEY FINDINGS

One systematic review with meta-analysis, two systematic reviews, four randomized controlled trials, and two non-randomized studies were identified regarding immersive technologies for neurorehabilitation in pediatrics.

METHODS

A limited literature search was conducted on key resources including PubMed, The Cochrane Library, University of York Centre for Reviews and Dissemination (CRD) databases, Canadian and major international health technology agencies, as well as a focused Internet search. Filters were applied to limit the retrieval to health technology assessments, systematic reviews, meta-analyses, economic studies, randomized controlled trials and non-randomized studies. Where possible, retrieval was limited to the human population. The search was also limited to English language documents published between January 1, 2011 and July 5, 2016. Internet links are provided where available.

The summary of findings was prepared from the abstracts of the relevant information. Please note that data contained in abstracts may not always be an accurate reflection of the data contained within the full article.
SELECTION CRITERIA

One reviewer screened citations and selected studies based on the inclusion criteria presented in Table 1.

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<th>Table 1: Selection Criteria</th>
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<tr>
<td><strong>Population</strong></td>
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<td><strong>Interventions</strong></td>
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<td><strong>Comparators</strong></td>
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<td><strong>Outcomes</strong></td>
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<td><strong>Study Designs</strong></td>
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RESULTS

Rapid Response reports are organized so that the higher quality evidence is presented first. Therefore, health technology assessment reports, systematic reviews, and meta-analyses are presented first. These are followed by randomized controlled trials, non-randomized studies, and economic evaluations.

One systematic review with meta-analysis, two systematic reviews, four randomized controlled trials, and two non-randomized studies were identified regarding immersive technologies for neurorehabilitation in pediatrics. No relevant health technology assessments or economic evaluations were identified.

Additional references of potential interest are provided in the appendix.

OVERALL SUMMARY OF FINDINGS

One systematic review with meta-analysis, two systematic reviews, four randomized controlled trials, and two non-randomized studies were identified regarding immersive technologies for neurorehabilitation in pediatrics. Most of the identified literature was in favour of the use of virtual reality in pediatric patients undergoing neurorehabilitation.

One systematic review with meta-analysis reported that virtual reality was successful in improving upper extremity function in children with cerebral palsy. The authors of another systematic review concluded that virtual reality systems appear to motivate children with acquired brain injuries during rehabilitation; however, the findings were limited by the lack of evaluated measures of motivation. The authors of the last identified systematic review did not generalize any findings due to small sample sizes and inconsistencies in outcome measurement.

Four randomized controlled trials (RCTs) examined virtual reality in the rehabilitation of children with cerebral palsy. Two RCTs reported that a virtual reality-based rehabilitation
therapy improved gait and the authors of one of the RCTs\textsuperscript{4} further concluded that the therapy also improved balance, muscular strength, and gross motor function. Another RCT\textsuperscript{6} reported that virtual reality improved hand-eye coordination in the population. One RCT\textsuperscript{7} reported that therapy in a virtual environment could be a promising rehabilitation procedure.

The authors from one non-randomized study (NRS)\textsuperscript{8} concluded that virtual reality games appeared to improve motor function in children with developmental coordination disorder. Another NRS\textsuperscript{9} reported that virtual reality could be a potential tool in the rehabilitation process of children with acquired brain injuries.
REFERENCES SUMMARIZED

Health Technology Assessments
No literature identified.

Systematic Reviews and Meta-analyses


Randomized Controlled Trials


Non-Randomized Studies


Economic Evaluations
No literature identified.

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APPENDIX – FURTHER INFORMATION:

Systematic Review and Meta-Analyses – Population Age Uncertain


Non-Randomized Studies – Population Age Uncertain

