Is Xbox Kinect™ based rehabilitation a feasible adjunct for remote burns rehabilitation: a pilot study
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Introduction

• Interactive video games (IVGs) are affordable, easy to use and engaging1.
• Recent studies conducted on the Nintendo®Wii and PlayStation EyeToy have supported its use in the rehabilitation of burns injuries.2-3
• The Xbox Kinect™ allows for controller free interaction with full-body 3D motion capture, facial and voice recognition, which may provide greater benefits in rehabilitating burns patients.
• Furthermore the current model of burns care in WA involves a well-developed telerehabilitation network involving convenient and cost-effective follow up care, However, the utility of remote burns rehabilitation has yet to be fully explored.4
• The Xbox Kinect™ may have uses at home, which could be integrated cost-effectively into the state-wide model of care.

Aims

1. To demonstrate the feasibility and efficacy of using the Xbox Kinect™ as an adjunct to burns rehabilitation by comparing a range of outcomes between patients using the Xbox and patients receiving physiotherapy only.
2. Examining the feasibility of using the Xbox Kinect™ to deliver unsupervised remote rehabilitation by mimicking home conditions as much as possible.

Methods

Study design
1. Participant Selection: this is a pilot RCT, where patients are selected from the RPH burns patient and sorted into either intervention or control groups.
2. Demographic data and baseline measurements – taken from each suitable participant following recruitment
3. Both groups Perform two 30 minute exercise sessions daily at participant’s convenience in their own room
   A. Intervention: 15 minutes physiotherapy exercises + 15 minutes Xbox game play
   B. Control: 30 minutes same physiotherapy exercises
4. At conclusion of patient’s involvement in study, baseline measurements remeasured (see outcomes)

Outcome

• Pain: Measured by patients rating their pain out of 10 after each session. Regression lines plotting daily pain scores were drawn for each patient and the gradient of the slope were measured. The median gradient of all slopes was used to compare pain reduction in both groups.
• AROM: Assessed goniometry using a goniometer: Standardised composite ROM was calculated for each patient. The pre and post study change in composite ROM was used to assess improvements in ROM, and to compare both groups.
• Functional Performance: Assessed using the QuickDASH questionnaire. The questionnaire assesses patients ability to complete daily to day tasks. The percentage change in quickDASH score pre and post study was used to compare intervention and control groups. Given the fact that lower scores correlate with better performance, a negative difference is indicative of an improvement in function.
• Kinesiophobia: The 17 item TAMPA questionnaire assesses fear avoidance behaviours of individuals in pain. Individual responses to each question are scored and summed, with high results indicating a greater fear of reinjures. The data was analysed in a similar manner to QuickDASH.
• Grip Strength: Assessed using a isometric dynamometer. An average of three measurements was recorded for each hand. The pre and post study percentage change in grip strength was calculated to compare intervention and control groups.

Results

A total of 18 patients, 10 intervention and 8 control, enrolled in the study from February 2013 to August 2013.
• Study included 11 males and 7 females with TBSA’s ranging from 1% to 7% with a median of 4%.
• As this was an interim analysis, descriptive analysis was done for each of the variables, with P values to look for statistical significance. Mann-Whitney U Scores were calculated for continuous variables and chi squared analysis for categorical variables.
• With the exception of QuickDASH, all other differences in outcome measures did not achieve statistical significance (see Figure 1).
• The intervention group showed a marked improvement in functionality (quickDASH), with a 55.6% change vs. 9.1% for the control group (p = 0.002).
• There was no marked difference in outcomes between the two groups.

Figure 1: Results table

Table: Outcome scores for categorical and continuous variables

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Control</th>
<th>Intervention</th>
<th>MV-U score</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pain</td>
<td>8</td>
<td>8</td>
<td>84</td>
<td>0.085</td>
</tr>
<tr>
<td>Grip Strength</td>
<td>16.2%</td>
<td>16.8%</td>
<td>84</td>
<td>0.500</td>
</tr>
<tr>
<td>QuickDASH</td>
<td>0.1%</td>
<td>-56.8%</td>
<td>2</td>
<td>0.002</td>
</tr>
<tr>
<td>ROM: shoulder</td>
<td>-4.6%</td>
<td>-5%</td>
<td>20</td>
<td>0.045</td>
</tr>
<tr>
<td>ROM: elbow</td>
<td>0.096</td>
<td>0.085</td>
<td>22</td>
<td>0.675</td>
</tr>
<tr>
<td>ROM: finger</td>
<td>0.15</td>
<td>0.25</td>
<td>14</td>
<td>0.456</td>
</tr>
</tbody>
</table>

Discussion

• Functionality: Significant improvement in upper limb disability for intervention group (lower scores indicate improvement in functionality), indicating Xbox Kinect™ may be of use in improving functional outcomes.
• Pain: Pain is a significant barrier to recovery. However, both groups demonstrated a similar decline in pain. There was a wider variation in the control group, and consistently higher scores in the intervention group. Feedback received from the intervention group indicated that they were satisfied with the treatment, with some patients commenting that being able to play games together, they could involve their family in their burns care.

Conclusions

Preliminary findings indicate that the Xbox Kinect™ increases patient functionality and, does not impede recovery given outcomes were similar in both groups. Therefore, the Xbox Kinect™ may be a safe adjunct to physiotherapy. Increasing the number of participants in this study is planned.

References