Wiihabilitation in Geriatric day hospital:

A Pilot study to assess its feasibility, acceptability and efficacy

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Background
• Geriatric Day Hospital (GDH)
  – provides multi-disciplinary rehabilitation for old patients (age >65) with different medical problems.
• Rehabilitation using interactive virtual reality Wii (Wiihabilitation)
  – Feasible and effective
    • Stroke
    • Subsyndromal depression
    • Reduce fall
• NO study looking at its use in Geriatric Day Hospital (GDH)
Methodology
• **Clinical interventional trial** with matched historic-controls

• Patients of a GDH were recruited to participate in Wiihabilitation by playing
  – “2P run” of “Wii Fit”
• Participants used Wii controller to perform movements involved in arm-ergometer (手動單車)
• Each participant received 8 sessions of Wiihabilitation on top of conventional GDH rehabilitations (during lunch time session)
  – Each session last around 10 minutes
• Inclusion criteria
  – Patients referred for rehabilitation in GDH of FYKH
  – had to be able to understand the procedure of using Wii
  – signed written informed consent prior to entry into the study
• Exclusion criteria
  – **In general: any unstable medical condition or patient refused**
  – poor vision
  – was unable to follow verbal commands
  – had global aphasia
  – had unstable angina or recent myocardial infarction, had heart failure (New York Heart Association Class III or IV)
  – had history of symptomatic ventricular tachyarrhythmias
  – had history of seizure
  – had severe chronic obstructive pulmonary disease
  – had uncontrolled hypertension
  – the patient was unwilling or unable to comply with the protocol.
• 25 secondary school student volunteers under close supervision by GDH doctor and staff helped to conduct the study.
Measurements and Outcomes
Feasibility

• Total time receiving Wii-IVR (event free)
• Objective measurement
  – Heart rate measurement before and during participating in Wii-IVR by pulse oximeter
  – Percentage maximal heart rate reserve (%MHR)
• Subjective measurement
  – Subjective fatigue assessment after participating in Wii-IVR
  – Borg Perceived Exertion Scale (BS) after participating in Wii-IVR
• %MHR and BS were compared with that after performing same duration of arm-ergometer
Acceptability

• Participants were assessed by an interviewer-administered questionnaire

• Volunteers were assessed by another questionnaire
Efficacy

• assessed by comparing improvements in Functional Independence Measure (FIM)
  – between Wiihabilitation participants and matched historic-controls
    • who had received conventional GDH rehabilitations only
Ethics

• Formally approved by the institutional review boards at the HKU and HA HKWC
• We did NOT receive any sponsorship or assistance from Nintendo
Result
80 consecutive patients referred to GDH from 7/2010 to 8/2010

16 excluded due to medical conditions

34 refused

30 participants with mean age 80.1 ± 7.1

30 participants completed the study

Compared with 60 matched historic control from another GDH cohort study
Feasibility

- Participants completed a total of 1941 minutes of event-free Wii-IVR
Table 3. Percentage maximal heart rate reserve and Borg perceived exertion scale for participant in Wii-IVR and its comparison with arm ergometer

<table>
<thead>
<tr>
<th></th>
<th>Wii-IVR</th>
<th>Arm ergometer</th>
<th>Difference (%)</th>
<th>p value&lt;sup&gt;b&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Percentage maximal heart rate reserve (%)&lt;sup&gt;a&lt;/sup&gt;</td>
<td>15.9 ± 9.9</td>
<td>17.3 ± 13.2</td>
<td>1.4 ± 7.7</td>
<td>0.36</td>
</tr>
<tr>
<td>Borg perceived exertion scale&lt;sup&gt;a&lt;/sup&gt;</td>
<td>7.9 ± 2.3</td>
<td>7.3 ± 1.5</td>
<td>0.6 ± 1.5</td>
<td>0.11</td>
</tr>
</tbody>
</table>
Acceptability

• No participant had experience of participating in Wii-IVR before this study.
• 85 to 90%
  – felt happy after participating in Wii-IVR.
  – wished and would like to continue Wii-IVR at their home or nursing home if Wii-IVR was available.
  – agreed that older people could participate in Wii-IVR.
Efficacy
<table>
<thead>
<tr>
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<th>Participants (n=30)</th>
<th>Controls (n=60)</th>
<th>p value</th>
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</thead>
<tbody>
<tr>
<td><strong>Age (year)</strong></td>
<td>80.1 ± 7.1</td>
<td>80.0 ± 7.0</td>
<td>0.92</td>
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<tr>
<td><strong>Gender</strong></td>
<td></td>
<td></td>
<td>0.15</td>
</tr>
<tr>
<td>Female</td>
<td>22 (73)</td>
<td>37 (62)</td>
<td></td>
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<tr>
<td>Male</td>
<td>8 (27)</td>
<td>23 (38)</td>
<td></td>
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<tr>
<td><strong>Charlson Comorbidity Index</strong></td>
<td>2.2 ± 1.3</td>
<td>2.1 ± 1.5</td>
<td>0.94</td>
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<tr>
<td><strong>C-MMSE on admission</strong></td>
<td>21.7 ± 3.9</td>
<td>21.9 ± 5.0</td>
<td>0.83</td>
</tr>
<tr>
<td><strong>Baseline FIM</strong></td>
<td>100.0 ± 8.9</td>
<td>99.0 ± 9.2</td>
<td>0.78</td>
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<tr>
<td><strong>Referred diagnosis</strong></td>
<td></td>
<td></td>
<td>0.89</td>
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<tr>
<td>Fall</td>
<td>7 (23)</td>
<td>16 (27)</td>
<td></td>
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<tr>
<td>Fracture neck of femur</td>
<td>6 (20)</td>
<td>12 (20)</td>
<td></td>
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<tr>
<td>Stroke</td>
<td>10 (33)</td>
<td>15 (25)</td>
<td></td>
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<tr>
<td>Parkinson’s disease</td>
<td>3 (10)</td>
<td>5 (8)</td>
<td></td>
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<tr>
<td>Low back pain</td>
<td>4 (13)</td>
<td>12 (20)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Participants (n=30)</td>
<td>Historic Controls (n=60)</td>
<td>p value</td>
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<tr>
<td>Baseline FIM$^a$</td>
<td>100.0 ± 8.9</td>
<td>99.0 ± 9.2</td>
<td>0.78</td>
</tr>
<tr>
<td>Final FIM$^b$</td>
<td>108.7 ± 8.5</td>
<td>105.1 ± 9.1</td>
<td>0.091</td>
</tr>
<tr>
<td>FIM difference$^c$</td>
<td>7.4 ± 2.5</td>
<td>5.9 ± 3.6</td>
<td>0.043$^d$</td>
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Attitude of volunteers

- 90 to 100% of volunteers
  - the first time to play Wii-IVR together with older adults
  - felt interesting or amazing when older adults participate in Wii-IVR
  - felt Wii-IVR may improve the relationship between them and older adults
  - would recommend Wii-IVR to their relatives
  - felt Wii-IVR under supervision was suitable for older adults
Conclusion
• Wiihabilitation under supervision in GDH is
  – Feasible
  – welcome by older people.
  – Improve motivation of performing rehabilitation exercise
• Wiihabilitation participants seemed to have more improvement in FIM scores.
• Wiihabilitation may promote inter-generation harmony
• 10/2011
  – We had received a grant from Tung Wah group to acquire more Wii and related rehabilitation tools
  – to build up a “Wiihabilitation corner” in FYKH GDH
Acknowledgements

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- MSW
  - Rebecca Leung YT
  - All secondary school volunteers
Thank you very much!