FEASIBILITY OF INTENSIVE INTERVENTIONS

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A dose-response relationship between deliberate practice and acquiring and maintaining a motor skills (Ericsson 2004, Helsen-Starkes 1998)

- Motor control research
- Animal research (e.g. Kleim 1998, Nudo 1996, Cha 2007)
- Human research post- neurological Injury (e.g. Brady 2006, Wolf 2006)

Take home message: lots of repetition

In clinic- doses are substantially smaller than doses used in research that investigates the adaptive capacity of the nervous system. (Lang 2007)
### Intensive Mobility Training

<table>
<thead>
<tr>
<th>Ambulation</th>
<th>Balance</th>
<th>Strength/ROM/Coordination</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1 Hour</strong></td>
<td><strong>1 Hour</strong></td>
<td><strong>1 Hour</strong></td>
</tr>
<tr>
<td>□ Locomotor training</td>
<td>□ Tandem stance</td>
<td>□ Sit → Stand</td>
</tr>
<tr>
<td>□ Over-ground walking</td>
<td>□ Single leg stance</td>
<td>□ Hamstring curls</td>
</tr>
<tr>
<td></td>
<td>□ Standing on soft/moving surfaces</td>
<td>□ Functional stretching</td>
</tr>
<tr>
<td></td>
<td>□ Addition of cognitive or attention demanding tasks</td>
<td>□ Targeted movements</td>
</tr>
</tbody>
</table>

- Ambulation:
  - Locomotor training
  - Over-ground walking

- Balance:
  - Tandem stance
  - Single leg stance
  - Standing on soft/moving surfaces
  - Addition of cognitive or attention demanding tasks

- Strength/ROM/Coordination:
  - Sit → Stand
  - Hamstring curls
  - Functional stretching
  - Targeted movements

30 minutes of rest
LT to IMT

- LT may lack attention to essential components of gait
  - independent balance
  - full-weight bearing
  - transitional movements
  - adaptability of gait

- The **massed practice** component of IMT may supplement the benefits of LT and improve not only gait, but balance and mobility

- “Cocktail” of modalities to address walking deficits post-stroke  
  (Duncan, CSM 2011)
Sample Populations

- Hemispherectomy (n=19)
  - NIH R21
- Incomplete SCI (n=14)
- Stroke (ongoing) (target n=42)
- TBI (planned) (target n=12)
### Table 2: Feasibility data for each of the participants with varying neurological conditions.

<table>
<thead>
<tr>
<th></th>
<th>Parkinson's Disease</th>
<th>Incomplete Spinal Cord Injury</th>
<th>Cerebral Vascular Accident</th>
<th>Hemispherectomy</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>mean (sd)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Change Pain*</td>
<td>0 (0)</td>
<td>0 (0.97)</td>
<td>0 (.876)</td>
<td>3 (2.53)</td>
</tr>
<tr>
<td>Change Fatigue*</td>
<td>3 (1.49)</td>
<td>1 (2.25)</td>
<td>0 (1.15)</td>
<td>7 (1.03)</td>
</tr>
<tr>
<td>Total Activity (min)</td>
<td>134 (15.66)</td>
<td>135 (11.1)</td>
<td>148 (4.30)</td>
<td>157 (7.53)</td>
</tr>
<tr>
<td>Balance (min)</td>
<td>47 (5.78)</td>
<td>47 (5.76)</td>
<td>50 (.471)</td>
<td>50 (4.52)</td>
</tr>
<tr>
<td>ROM, strength,</td>
<td>46 (9.21)</td>
<td>49 (6.04)</td>
<td>51 (2.13)</td>
<td>52 (3.54)</td>
</tr>
<tr>
<td>coordination (min)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Treadmill step time</td>
<td>47 (2.16)</td>
<td>40 (4.09)</td>
<td>47 (4.17)</td>
<td>55 (1.81)</td>
</tr>
<tr>
<td>(min)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Rest (min)</td>
<td>36 (9.77)</td>
<td>45 (8.07)</td>
<td>24 (8.66)</td>
<td>16 (6.04)</td>
</tr>
</tbody>
</table>

*Change in pain and fatigue is the average change per day for the 10 days of the intervention, 0 is no pain or fatigue, 10 is “worst imaginable” pain or fatigue.
<table>
<thead>
<tr>
<th>Subject 2</th>
<th>Treatment (Time in Minutes)</th>
<th>TM rest (Time in Minutes)</th>
<th>Other rest (Time in Minutes)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Subject 3</td>
<td>113 (±14)</td>
<td>34 (±8)</td>
<td>13 (±7)</td>
</tr>
<tr>
<td>Subject 4</td>
<td>126 (±15)</td>
<td>24 (±11)</td>
<td>11 (±7)</td>
</tr>
<tr>
<td>Subject 5</td>
<td>121 (±12)</td>
<td>27 (±6)</td>
<td>21 (±7)</td>
</tr>
<tr>
<td>Subject 6</td>
<td>138 (±18)</td>
<td>18 (±6)</td>
<td>21 (±7)</td>
</tr>
<tr>
<td>Subject 7</td>
<td>129 (±10)</td>
<td>26 (±9)</td>
<td>14 (±7)</td>
</tr>
<tr>
<td>Subject 9</td>
<td>137 (±19)</td>
<td>22 (±11)</td>
<td>17 (±7)</td>
</tr>
<tr>
<td>Subject 13</td>
<td>135 (±12)</td>
<td>17 (±7)</td>
<td>25 (±6)</td>
</tr>
<tr>
<td>Subject 15</td>
<td>142 (±12)</td>
<td>24 (±7)</td>
<td>8 (±3)</td>
</tr>
<tr>
<td>Subject 17</td>
<td>148 (±13)</td>
<td>15 (±7)</td>
<td>20 (±13)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Subject 8</th>
<th>Treatment (Time in Minutes)</th>
<th>TM rest (Time in Minutes)</th>
<th>Other rest (Time in Minutes)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Subject 10</td>
<td>156 (±8)</td>
<td>10 (±4)</td>
<td>10 (±7)</td>
</tr>
<tr>
<td>Subject 11</td>
<td>156 (±6)</td>
<td>11 (±4)</td>
<td>11 (±4)</td>
</tr>
<tr>
<td>Subject 12</td>
<td>157 (±7)</td>
<td>6 (±3)</td>
<td>10 (±4)</td>
</tr>
<tr>
<td>Subject 16</td>
<td>152 (±7)</td>
<td>9 (±1)</td>
<td>10 (±5)</td>
</tr>
</tbody>
</table>

**Average time**

<table>
<thead>
<tr>
<th></th>
<th>Lower Functioning ISCI</th>
<th>Higher Functioning ISCI</th>
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<tr>
<td></td>
<td>131 (±11)</td>
<td>148 (±15)</td>
</tr>
<tr>
<td></td>
<td>25 (±8)</td>
<td>12 (±6)</td>
</tr>
<tr>
<td></td>
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<td>12 (±5)</td>
</tr>
</tbody>
</table>
Stroke- Qualitative Assessment

- Three interviews were conducted.
- Open-ended questions on impressions of therapy.
- Guided questions on the feasibility and benefits.
- Questions pertaining to their impressions of the therapy.

Give a voice to those who participate!
Feasibility Model (Merlo et al.)

5 themes emerged

- Manageable Amount of Fatigue (85)
- Difficult, But Doable Intensity (37)
- Therapy Too Short (30)
- Enjoyment of Intervention (26)
- Muscle Soreness (25)
Perceptions on Feasibility

Identified Themes

Manageable Fatigue

Responses

- “I’m tired - that is to be expected, but not to the point that I can’t function... I get to the point where two and a half hours in and I’m pretty well shot, but I get two to two and a half hours of real good work.”

- “Some of the days I was just wiped. Other days I was able to stay up and watch TV or maybe go out to the grocery store or whatever. As my body got used to it I wasn’t as wiped out when I got home. I mean the first two days I was totally wiped out.”
Perceptions on Feasibility

Identified Themes

Difficult, but Doable Intensity

Responses

- “At first I thought the length was too long, three hours... but by the end I thought it was fine.”

- “I mean its... rough, but it’s enjoyable. Its not too tough that you can’t put up with it. Its tiring, yes. You hurt. The muscles you haven’t used in a while start achin’, but uh... you want to quit, but you can’t.”
Perceptions on Feasibility

Identified Themes

- Therapy too short

Responses

- “It really needs to be 2 week, 4 weeks, 6 weeks longer to really get the most benefits out of it cause right now I’m at the point where I have the endurance, I built up the endurance and now I’m there, I’m there, lets take it to the next level and now I gotta go home…”
Benefits Model

- Improvements in Walking Ability (89)
- Ability to do Daily Activities (74)
- Increased Confidence in Abilities (71)
- Improvements in Balance (70)
- Improvements in Endurance (59)
- Improvements in Lower Extremity Strength (29)
Perceptions of Benefits

- **Identified Themes**
  - Walking Improvements

- **Responses**
  - “The most significant [impact of participation]... well the fact that we just we don’t take the wheelchair with us anymore. Now when we go out or whatever, we just leave it in the garage. If we go out to a restaurant she [wife] will just pull up at the front and I just get out and walk in the restaurant.”

  - “Yeah, we went to the grocery store yesterday and my wife asked me if I want to ride in one of those scooter things and I said, ‘No, I will walk.’”
Individuals with chronic disability can benefit from motor rehabilitation programs that apply novel or different parameters and modalities. IMT (Intensive Motor Training) is a novel intervention schedule combined with a pairing of therapeutic modalities that can be used as a vehicle to access motor function. Collaborations include multiple sites (replication), different dosages of application, and various outcome measures (current focus is function).
Questions?

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