**Background**

Intensive physiotherapy shortly after acquired brain injury (ABI) facilitates important gains in functional gross motor skills. However, motor changes plateau over time, leaving children with ongoing balance and mobility concerns.

New technologies are often explored as adjuncts to traditional physiotherapy (PT) to enhance these gains.

The Gross Motor Function Measure (GMFM) is used internationally to evaluate gross motor progress after ABI but GMFM change in inpatient PT is not well-documented, making it difficult to determine if adjunctive technologies are more beneficial than PT alone.

**Research Objectives**

1. Estimate gross motor change via outcome measure pre-post data from charts
2. Explore factors affecting gross motor change
3. Summarize goal areas that influence PT

**Methods**

**Study Design:** Retrospective chart review

**Inclusion Criteria:**
- Inpatient ABI admission at Holland Bloorview Kids Rehabilitation Hospital between 01 Jan 2009 and 31 Dec 2019
- 5 to 18 years old
- Admission up to 6 months after ABI
- Minimum 6-week admission
- At least two GMFMs assessments completed OR one GMFM plus one of the following measures to give follow-up data:
  - Community Balance and Mobility Scale (CB&M) x 2
  - 6-Minute Walk Tests (6MWT) x 2, or
  - ≥ 1 set of scored Goal Attainment Scaling (GAS)

**Exclusion Criteria:**
- Enrolled in a physiotherapy treatment-based research study during admission
- Readmission to acute care > 14 days

**Results**

- 266 eligible charts (546 screened)
- 88 children scored ≥ 95% on GMFM at admission

<table>
<thead>
<tr>
<th></th>
<th>GMFM</th>
<th>CB&amp;M</th>
<th>6MWT</th>
</tr>
</thead>
<tbody>
<tr>
<td>n</td>
<td>202*</td>
<td>89*</td>
<td>98*</td>
</tr>
<tr>
<td>Mean Baseline Score</td>
<td>73.64% [27.98]</td>
<td>65.48% [15.88]</td>
<td>362.6m [141.9]</td>
</tr>
<tr>
<td>Mean Change Score</td>
<td>18.03% [19.34]</td>
<td>17.85% [10.77]</td>
<td>142.3m [101.8]</td>
</tr>
</tbody>
</table>

* Charts with outcomes repeated

**Gross Motor Goal Areas**

Baseline GMFM < 50% (108 goals in 37 children)
- Stroke
- Traumatic Brain Injury
- Neuroinflammatory
- Infectious
- Epilepsy
- Hypoxic

Baseline GMFM > 50% (335 goals in 169 children)
- Bed mobility
- Sitting
- Standing
- Transfers
- Transitions
- Ambulation
- Stairs
- High level gross motor

**Multiple Regression Results**

<table>
<thead>
<tr>
<th>Factors Influencing Outcomes (p values)</th>
<th>GMFM Δ</th>
<th>CB&amp;M Δ</th>
<th>6MWT Δ</th>
</tr>
</thead>
<tbody>
<tr>
<td>n</td>
<td>202</td>
<td>89</td>
<td>98</td>
</tr>
<tr>
<td>R²</td>
<td>0.7216</td>
<td>0.3348</td>
<td>0.3880</td>
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<tr>
<td>Age</td>
<td>0.3323</td>
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<td>Sex</td>
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<td>0.0238</td>
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<td>Diagnosis</td>
<td>0.0858</td>
<td>0.7584</td>
<td>0.5991</td>
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<tr>
<td>Baseline Score</td>
<td>&lt; 0.0001</td>
<td>&lt; 0.0001</td>
<td>0.0004</td>
</tr>
<tr>
<td>Time between Assessments</td>
<td>0.0001</td>
<td>0.2870</td>
<td>&lt; 0.0001</td>
</tr>
</tbody>
</table>

**Conclusions**

- The GMFM detected gross motor change when children had greater mobility challenges to start
- However, the GMFM's known ceiling effect was often encountered when children were admitted with high level gross motor goals
- The CB&M detected change with higher level mobility concerns and showed no ceiling effect
- Lower baseline scores and more time between assessments were associated with larger change scores for GMFM, CB&M, and 6MWT
- Older males had greater change in walking speed (i.e., 6MWT) but there were no other age or sex differences detected

**IMPLICATIONS:** These clinically based outcome measure change scores can be used to compare traditional PT with new treatment adjuncts in children and youth with subacute ABI

**References**