HIBBOT: A NEW WALKING AID PROVIDING ALIGNMENT AND INDIVIDUALLY ADJUSTABLE SUPPORT FOR CHILDREN WITH CEREBRAL PALSY

Ria Cuppers, Dirk Wenmakers, Jos Seyler

FACILITATION OF GAIT

- Gluteal muscle activity
- Weight shift
- Postural control

Case 1  3.5 years old

70% develop motor control to walk

Ambulation declines over time


WITHOUT MANUAL SUPPORT

- Lack of selective motor control
- Muscle weakness
- Overuse of flexion

Case 1  3.5 years old
**NATURAL HISTORY OF CP**

- Bony deformities
- Lever arm disfunctions
- Inefficient gait pattern

**Case 1  3.5 years old**

**WHAT DO WE KNOW ABOUT GAIT REHABILITATION?**

- Early and intensive task specific training
- Self-initiating and variability of movements
- Child’s environment
- Fun and motivation
- Weight shift and single limb stance
- Trunk stability may improve muscular synergism

**FEASIBILITY STUDY 2014 - 2015**

**AIM**

- Technical Development of a new walking aid
- 3 DGA

**COOPERATING PARTNERS**

Medical Robots
- Ria Cuppers
- Dirk Wenmakers
- Jos Seyler

University of Leuven, Belgium
- Kaat Desloovere
- Guy Molenaers

**FEASIBILITY STUDY - METHOD**

<table>
<thead>
<tr>
<th>Methodology</th>
<th>Participants</th>
<th>Case 1</th>
<th>Case 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>GMFCS level</td>
<td>N=2</td>
<td>GMFCS II - 9Y</td>
<td>GMFCS III - 4Y</td>
</tr>
<tr>
<td>Intervention</td>
<td>3 months</td>
<td>3X/week Hibbot 30 min</td>
<td>2x/week Hibbot 30 min</td>
</tr>
<tr>
<td>Method pre and post measurement</td>
<td>3D gait analysis</td>
<td>With Hibbot and without walking aid</td>
<td>With Hibbot and with posterior Kaye Walker</td>
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</tbody>
</table>
**FEASIBILITY STUDY**
- Technical development started in the clinical field

**CASE 1: GMFCS II – 9 YEARS**

<table>
<thead>
<tr>
<th>PRE-INTERVENTION March 2014</th>
<th>INTERVENTION</th>
<th>POST INTERVENTION March 2015</th>
</tr>
</thead>
<tbody>
<tr>
<td>[Images of pre-intervention, intervention, and post-intervention scenes]</td>
<td>[Images of intervention scenes]</td>
<td>[Images of post-intervention scenes]</td>
</tr>
</tbody>
</table>

**Other interventions**
- Bilateral DVO May 2012
- Btx hamstrings, gastro bilater Dec 2012
- 2 weeks LL casting June 2014

**CASE 2: GMFCS III – 4 YEARS**

<table>
<thead>
<tr>
<th>PRE INTERVENTION</th>
<th>INTERVENTION</th>
<th>POST INTERVENTION</th>
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</table>

**No other interventions**

**Individual adjustable support in 6 Degrees of Freedom (DOF)**
RESULTS AND CONCLUSION OF FEASIBILITY STUDY

Results

• Development of the Hibbot: adjustable support in 6 DOF
• Insight into applicability and effect
• No statistical analysis (N=2)

Conclusion

• Guidelines prepared for future research

COMPARISON OF HIP EXTENSION WITH THE HIBBOT VERSUS CONTROLE

FUTURE RESEARCH – PILOT STUDY 2018 - 2019

AIM

• Literature search on walking aids for children with Cerebral Palsy
• Pilot study: comparison Hibbot and control
  ✓ kinematics LL and trunk
  ✓ tempo-spatial parameters
  ✓ video analysis of gait pattern
  ✓ ground reaction force

COOPERATING PARTNERS 2018 - 2019

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• Karolien Cavens
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• Laura Taemans
• Charlotte VandeReck
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• Ronny Van Assche
• Marian Moens
• Philippe Caers
• Mari Naaris

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REFLECTIONS ON WALKING AIDS

• Choice of a walking aid for the individual child
• Balance between body structure and function and activity and participation
• Effect on kinematic and kinetic data of lower limbs, head, arms and trunk
• The child’s, parents’ and the environment’s perspective
• Practical issues, inclusion and exclusion criteria
FEASIBILITY STUDY 2014 - 2015

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Thanks for your attention!