Power assist wheelchairs: a good alternative?

Marieke Kloosterman
Govert Snoek
Lucas van der Woude
Jaap Buurke
Hans Rietman

Power assisted wheelchair

• Power assist during push phase
• Motor at wheel axis
• Wheels fit on subjects own wheelchair frames

Power assist wheelchairs

• Yamaha JWII / Quickie Xtender (Sunrise Medical)
• E-motion (Ulrich Alber GmbH)
• Delta Glide was available as the iGLIDE
• Wheeldrive (Handicare)

Review

Upper extremity function
Activity
Participation

16 studies included

Body functions & structures
Reduce risk of arm overuse

Minimize extreme wrist positions and positions were the shoulder is prone to impingement
Reduce push frequency as well as forces necessary for propulsion
Body functions & structures
Reduce risk of arm overuse

- Decreased wrist ulnar-radial deviation and flexion-extension, shoulder flexion-extension and internal-external rotation
- Shoulder abduction tended to decrease
- The results on push frequency were not unambiguous
- Peak forces decreased

Body functions & structures
Remain active vs decrease load

Reduced effort needed for propulsion based on decreased:
- Intensity of muscle activation arm
- Heart rate
- Metabolic costs
- Perceived exertion

Activity
Wheelchair skills

- Beneficial for tasks which require more effort
- Less beneficial for precision task and tasks which requires wheelies or removing / replacing wheels

Activity & Participation
Daily use

- One study out of four reported faster or further traveling
- No significant change in:
  - Number of involved activities, occupational performance
  - Time spend traveling a wheelchair
  - Quality of life

Summary

<table>
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<tr>
<th>PROS</th>
<th>CONS</th>
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<tr>
<td>Promising in reducing upper extremity load</td>
<td>Additional weight (+10 kg per wheel) and width (2cm) transportation and access to home environment</td>
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<td>Decrease in cardio-pulmonary demand</td>
<td>Difficulty performing tasks which require greater control such as a wheelie</td>
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<tr>
<td>Increase in propulsion efficiency</td>
<td>Easy access to challenging environments</td>
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<td>Compared to a powered wheelchair: Relatively light weight and easy to transport</td>
<td>Maintaining benefit of exercise</td>
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Long term effect on upper extremity injuries and physical fitness unknown.

For more information

A systematic review on the pros and cons using a push rim-activated power-assisted wheelchair

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m.kbosterman@md.nl
Thank you for your attention

Marieke Kloosterman
Govert Snoek
Lucas van der Woude
Jaap Buurke
Hans Rietman

m.kloosterman@rrd.nl
Roessingh Research and Development
Enschede