Course Objectives

• Name three functional/physical evaluation criteria when assessing the patient’s ability to safely use power assist technology.

• Name at least three objective measures to justify the need for power assist technology.

• Explain at least two different types of power assist technology and identify what type of user might benefit from it.

No Conflicts of Interest to Declare

Lois Brown, MPT, ATP/SMS
Impact of a pushrim-activated power-assisted wheelchair on the metabolic demands, stroke frequency, and range of motion among subjects with tetraplegia

The study concludes, “For subjects with tetraplegia, [power assist wheelchairs] reduce the energy demands, stroke frequency, and overall joint ROM when compared with traditional manual wheelchair propulsion.”

Impact of a pushrim-activated power-assisted wheelchair on the metabolic demands, stroke frequency, and range of motion among subjects with tetraplegia


Agenda

• Client Goals
• Clinical “Outcomes”
• Design and Differentiation of Product “Application”
• Clinical Assessment
• Clinical Outcome Measures, Justification and Documentation

Client Goals

• Transportable power for community activity?
• Environmental Access?
• Pain?
• Fatigue?
Client Outcome

The functional consequence for the patient of the therapeutic action

1. Establish that change that has occurred
2. attributing change to therapy intervention (therapy effectiveness)

Differentiate Products

Application, Features and Benefits!

Power Add on System- “Hybrid Power”

- Independent Control Upright Manual or Manual Tilt in Space User
- Full function Attendant Control
- Programmable
- Wheels removable/replaced with std wheels
- Range/speed/charge time/weight of components- see manufacturer brochures

- E-fix (Alber)
- I Xpress (Sunrise)
Types of Power Assist

- Pushrim switch activated
  - eMotion, Twion (Alber)
  - Extender (Sunrise Medical)
- Motion activated
  - SmartDrive (Max Mobility)

Pushrim Switch Activated

- User pushes on the pushrims
- Pushrim switches are engaged and the wheel motors begin to accelerate
- Wheel motors continue to accelerate until the user releases the pushrims
  - Motors remain on for a short coast period and then turn off, pushes again to continue moving forward
- Turn by pushing for a longer period of time on one side

<table>
<thead>
<tr>
<th>Pro</th>
<th>Con</th>
</tr>
</thead>
<tbody>
<tr>
<td>Provides power assist during each push</td>
<td>X</td>
</tr>
<tr>
<td>Provides braking assist</td>
<td>X</td>
</tr>
<tr>
<td>Intuitive operation (requires training)</td>
<td>X</td>
</tr>
<tr>
<td>Requires repetitive pushing</td>
<td>X</td>
</tr>
<tr>
<td>Difficult to drive straight (because dual motors)</td>
<td>X</td>
</tr>
<tr>
<td>Heavy, so difficult to transport</td>
<td>X</td>
</tr>
<tr>
<td>Requires specialized wheels and wheelchair modifications</td>
<td>X</td>
</tr>
</tbody>
</table>
Motion activated

- User pushes on the pushrims
- Motion of the wheelchair activates the drive motor
- Speed of the motor is set to the speed of the push
- Drive motor continues to power ahead like a cruise control
- Turn by gripping one of the two pushrims
- Push faster to go faster or tap a button to disengage the motor

<table>
<thead>
<tr>
<th>PRO</th>
<th>CON</th>
</tr>
</thead>
<tbody>
<tr>
<td>Provides power assist after each push</td>
<td>X</td>
</tr>
<tr>
<td>Does not provide braking assist</td>
<td>X</td>
</tr>
<tr>
<td>Intuitive operation (requires training)</td>
<td>X</td>
</tr>
<tr>
<td>No repetitive pushing</td>
<td>X</td>
</tr>
<tr>
<td>Easy to drive straight (because single motor)</td>
<td>X</td>
</tr>
<tr>
<td>Ultra lightweight, so easy to transport</td>
<td>X</td>
</tr>
<tr>
<td>Requires no wheelchair modifications</td>
<td>X</td>
</tr>
</tbody>
</table>

WHO Wheelchair-Provision Service Model

1. Referral and appointment
2. **Assessment**
3. Prescription
4. Funding and ordering
5. Product preparation
6. Fitting
7. **User training**
8. Follow-up, maintenance and repairs

WHO Guidelines 2008, Section 3.2.1, p 76
Clinical Assessment

- Physical
  - UE strength and ROM
  - Pain- Shoulders/Back/Other parts body? Why is this impt?
  - Dynamic Balance
  - Sensation
  - Coordination/Fine motor skills
  - REACTION TIME

- Environmental
  - Intended use
  - Obstacles/thresholds
  - Tight spaces

- Vision
  - Safety Awareness
  - Cognition
  - Behavior

Unit assemble/disassemble

Power Assist/ “Add-on”

Power Product Review

Smart Drive MX2 + PushTracker New Generation 2017 Model

Power up steep hills and through thick carpet.
Just push to go and tap then brake to stop.

Anti-reckless feature that allows you to stop on a hill and then easily get going again.

- Speed: 0.5 – 5.5 mph
- Range: 12 miles
- Battery: LiFePO4 – 36 V & 3.4 Ah
- Motor: 250-W Brushless DC
- Push Activated Cruise Control
- Bluetooth LE Drive Control
- Only 12.5 lbs
- Rigid and folding chair compatibility
ZX-1

power add-on unit that converts a rigid manual wheelchair

- stealth, light, fast and highly maneuverable.
- connect to many different chairs from a myriad of manufacturers with absolutely no modifications to the manual chair
- can be adjusted to fit any width chair from 14” to 20”

https://www.spinergy.com/products/ zx-1-power-add

Xtender

Alber Emotion/Twion
Clinical Decision Making
Alber Twion vs. Emotion

Twion “Cruise Mode”

New Cruise Mode Function

- New feature as part of the optional Mobility Plus Package
- Ideal for longer walks, shopping in supermarkets, airports or simply when a fast walk is needed
- Activates itself as soon as the impulse of the push is exceeded a speed of 3 mph which means for green speed automatically
- The speed can be increased with additional impulses on the push rim up to a theoretical maximum of 6 mph
- Active steering is managed by releasing the handle
- A long-lasting impulse on both push rim will deactivate the function and switch to standard hand driving mode
- The smartphone with Bluetooth connection serves as communication interface to synchronize both wheels
- The feature is automatically available within the next update of the twion app

Alber Twion- Cruise Considerations

Important hints for the user

- Cruise Mode does not provide any braking function when driving on gradients. If speed will be easily increased by gravity
- Cruise Mode is activated or can be canceled. The maximum speed is limited by the vehicle's design speed
- In dependence of the user's weight and speed will stop significaantly on gradients, 100% battery remains for use of Cruise Mode is not possible
- The optimal range is reached when used for a longer time in Cruise Mode up to 5 mph on even ground with a user weight of 70 kg
- The highest speed allowed in Cruise Mode is the higher of 6 mph or the maximum speed allowed
- Left and right wheel of twion may not be exchanged
- Can be used outside of the applicable driving demonstration in case it is part of each home delivery and courses safety instructions of user manual
- The device has an emergency function that will help to find a right path or help clinicians or caregivers
Alber Twion - BlueDrive

Wheel Position Still Counts!

Attitude Power – Hand Bike

www.sunrisemedical.com
Off-Road Setup

https://www.gofreewheel.com/

Trail Rider

Three versions available 250w, 350w and 500w (not for the faint hearted).

This is the very latest Power Trike that has a high torque motor, latest lithium battery technology and even has a reverse.

Mountain Trike

Trike for your outdoor everyday use, whether it be a muddy woodland trail, a trip to the shops, a walk in the park and for the more adventurous, it has even been known to climb the odd mountain or two!

The unique lever drive system allows the rider to have clean dry hands whatever the terrain.
Clinical Outcomes and Objective Data

- Defensible
- Descriptive
- Detailed/Objective

Functional Assessment Measure for Manual WC Users

- 13 items (tight space, uneven terrain, door management, street crossing, ramp, curb, bed tx, toilet tx, floor tx, bathing, UE & LE dressing, reaching function, & picking up object/sweeping)
- Good content validity compared to FIM
- Inter-rater reliability
- Excellent internal consistency

Stanley, et al. 2003
http://www.rehabmeasures.org
Normative Data MWC Users

<table>
<thead>
<tr>
<th>Task</th>
<th>Time</th>
<th>Distance</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Forward Wheeling</td>
<td>0.82 sec</td>
<td>0.91 m</td>
<td>Time measured on 07/12/2017</td>
</tr>
<tr>
<td>Forward Vertical Reach Ramps</td>
<td>2.27 sec</td>
<td>2.52 m</td>
<td>Time measured on 07/12/2017</td>
</tr>
</tbody>
</table>

Conclusion

4 tasks are practical, safe, reliable for clinical eval of WC Seating
Rehab Measures: Fatigue Severity Scale

Rehabilitation Measures Database

<table>
<thead>
<tr>
<th>Title of Measure</th>
<th>Fatigue Severity Scale</th>
</tr>
</thead>
<tbody>
<tr>
<td>Link to Instrument</td>
<td><a href="http://www.wheelchairskillsprogram.ca/eng/manual.php/">www.wheelchairskillsprogram.ca/eng/manual.php/</a></td>
</tr>
<tr>
<td>Developer</td>
<td>Workbook by Audrey Mach as a formative evaluation for wheelchair users with limited mobility and its potential for patients with a variety of disabilities.</td>
</tr>
<tr>
<td>Description</td>
<td>A self-report measure which measures the severity of fatigue and its impact on a patient's activities and lifestyle in patients with a variety of disabilities.</td>
</tr>
<tr>
<td>Copyright</td>
<td>Copyright © 2018, Rehabilitation Measures Database.</td>
</tr>
<tr>
<td>Summary Data</td>
<td>14th March 2018</td>
</tr>
<tr>
<td>Description</td>
<td>It is then administered to the patient, beginning with the individual activities and identifying fatigue severity.</td>
</tr>
<tr>
<td>Intended Users</td>
<td>It is designed for individuals with limited mobility who report fatigue severity.</td>
</tr>
<tr>
<td>Self-report scale</td>
<td>Scale 1-10, with 10 being the most severe level, and 1 being the least severe level.</td>
</tr>
</tbody>
</table>

FATIGUE SEVERITY SCALE

<table>
<thead>
<tr>
<th>Date</th>
<th>Name</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

TOTAL AVERAGE FACTORS

Scale 1 to 10, with 10 being the most severe level, and 1 being the least severe level.

www.wheelchairskillsprogram.ca/eng/manual.php/
Documentation and Justification

Ultralightweight Manual Wheelchair

- An ultralightweight manual wheelchair (K0005) is covered for a beneficiary if criteria (1) or (2) is met and (3) & (4) are met:
  - The beneficiary must be a full-time manual wheelchair user.
  - The beneficiary must require individualized fitting and adjustments for one or more features such as, but not limited to, axle configuration, wheel camber, or seat and back adjustments, which cannot be accommodated by a K0001 through K0004 manual wheelchair.
  - The beneficiary must have a specialty evaluation that was performed by a licensed/certified medical professional (LCMP), such as a PT or OT, or physician who has specific training and experience in rehabilitation wheelchair evaluations and that documents the medical necessity for the wheelchair and its special features (see Documentation Requirements section). The LCMP may have no financial relationship with the supplier.
  - The wheelchair is provided by a Rehabilitative Technology Supplier (RTS) that employs a RESNA-certified Assistive Technology Professional (ATP) who specializes in wheelchairs and who has direct, in-person involvement in the wheelchair selection for the patient.

www.cms.gov
Medicare Policy- Power Assist Technology

- Beneficiary has a mobility limitation that significantly impairs his/her ability to participate in one or more mobility-related activities of daily living (MRADLs) such as sitting, feeding, dressing, grooming, and bathing in customary locations in the home.
- Prevents the beneficiary from accomplishing an MRADL entirely, or
- Places beneficiary at a reasonably determined risk secondary to the attempts to perform an MRADL; or
- Prevents beneficiary from completing an MRADL within a reasonable amount of time; and
- Beneficiary’s mobility limitation cannot be sufficiently and safely resolved by the use of an appropriately fitted cane or walker; and
- Beneficiary does not have sufficient upper extremity function to self-propel an optimally configured manual wheelchair in the home:
  - Limitations of strength, endurance, range of motion, or coordination, presence of pain, or deformity or absence of one or both upper extremities; and
- Beneficiary has been self-propelling in a manual wheelchair for at least one year; and
- Beneficiary had specialty evaluation as described above; and
- Wheelchair is provided by a supplier that employs a RESNA-certified Assistive Technology Professional.

www.cms.gov

Documentation Needs

why the beneficiary’s mobility and functional outcome goals could not be met with “an optimally configured manual wheelchair”

And why no other mobility aide (cane, walker, wheeled walker, POV, POWER WHEELCHAIR) could meet their needs!

Wheelchair Skills Training References

References


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Independent Clinical Consultant
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