Wheelchair Skills Assessment and Training: Focus on Power

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Setting the Stage

• Conflicts of interest: none
• Acknowledgements:
  – Wheelchair Research Team
  – Collaborators
  – Funding bodies
• Handouts:
  – pdf of the PPT presentation
  – www.wheelchairskillsprogram.ca
• Apologies to repeat attendees

Knowledge Translation

• KT of Wheelchair Skills Program for Rehabilitation Clinicians: A Feasibility Study.
• Rushton PW, Boronowski L, Demers L, Kirby RL, Rowe S, Miller WC
• Funding: CIHR $194,532
• Stage: Data collection in progress

Session Objectives

On completion of the session, participants will be able to:
1. Describe the rationale and evidence supporting the assessment of wheelchair skills
2. Describe the rationale and evidence supporting the effectiveness of wheelchair skills training
3. Describe the impact of wheelchair skills on participation
4. Move one step along the “stages of change”

Prevalence of Wheelchair Use

• World: ~65M people need wheelchairs (~20M people do not have them).
• US: 3.86M non-institutionalized users by 2009 (~30% PWCs or scooters).
  – Flagg JF. Buffalo, February 2009.

Importance of Wheelchairs

• #1 rehabilitation intervention
• Positive impacts on:
  – Mobility
  – Participation
  – Caregiver burden
  – Long-term-care placement
Improper Wheelchair, Fit or Set-Up

- N = 263 residents of 11 LTC facilities in Vancouver, BC
- Inappropriate seating prevalence: 58.6% (range among facilities 30.4-81.8%)

Giesbrecht EM et al. Gerontology 2012;58:378-84

Maintenance & Repair Problems

- 16 Model SCI Centers in US
- N = 2213
- 6 months follow-up:
  - 45% of full-time users completed a repair, more often with PWCs
  - 8.7% had an adverse consequence, more often with MWCs


Powered Wheelchairs

- Australia
- N = 202
- 25% powered WC, 74% scooter users
- 33% consulted health-care professional before purchase
- 21% reported accidents in previous year, resulting in personal injuries and device damage


Natural History & Measurement of Power Mobility Outcomes

P2 Natural History & Measurement of Power Mobility Outcomes

Objectives
- To assess the measurement properties of a power wheelchair outcomes tool kit
- To describe the natural history of power wheelchair use over a 1 year period among cohorts of power wheelchair users and caregivers

Design: Multi-Site Longitudinal
**Procedure**

- Assistive Technology Outcome Profile
- Life Space Assessment
- Wheelchair Skills Test - Power
- Wheelchair Skills Test - Questionnaire - Power
- WheelCon-Power
- Interpersonal Support Evaluation List
- Hospital Anxiety and Depression Scale
- Late Life Disability Index

**Power Wheelchair Outcomes Tool Kit**

**Progress to Date**

- Data collection completed at all sites (Nov 2014)
  - 1 Yr data for 129 wheelchairs users & 34 caregivers
  - 2 Yr data for a subset of 35 wheelchair users
  - Sub-sample of 20 qualitative interviews

**Wheelchair Skill Capacity Improves Over Time for New Power Wheelchair Users**

**Subjective Wheelchair Skill Capacity is Higher for Experienced Power Wheelchair Users**

**Wheelchair Skill Predicts Life Space Assessment, Activity, and Participation**

**Wheelchairs**

**Benefits**

- Better wheelchair provision

**Problems**
World Health Organization

WHO Service-Delivery 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

WHO Wheelchair Service-Delivery Model

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WHO Guidelines 2008, Section 3.2.1, p 76

Established 1996
Versions of WST by Type of Wheelchair and Nature of the Test Subject

<table>
<thead>
<tr>
<th>Type of Wheelchair</th>
<th>Type of Test Subject</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manual</td>
<td>Wheelchair user</td>
</tr>
<tr>
<td></td>
<td>Caregiver</td>
</tr>
<tr>
<td>Powered</td>
<td>Wheelchair user</td>
</tr>
<tr>
<td></td>
<td>Caregiver</td>
</tr>
<tr>
<td>Scooter</td>
<td>Scooter user</td>
</tr>
</tbody>
</table>

Individual Skills: WST 4.2 examples

<table>
<thead>
<tr>
<th>Individual Skills</th>
<th>Manual WC</th>
<th>Powered WC</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>WCU</td>
<td>CG</td>
</tr>
<tr>
<td>Turns controller on and off</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Controls positioning options</td>
<td>X</td>
<td>✓</td>
</tr>
<tr>
<td>Rolls forward 10m</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Turns 90° while moving forward</td>
<td>✓</td>
<td>✓</td>
</tr>
</tbody>
</table>

WST 4.2 Capacity Scores

<table>
<thead>
<tr>
<th>Score</th>
<th>Score</th>
<th>What this means</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pass</td>
<td>2</td>
<td>Task independently and safely accomplished without any difficulty</td>
</tr>
<tr>
<td>Pass with difficulty</td>
<td>1</td>
<td>Evaluation criteria met, but the subject experienced some difficulty worthy of note (e.g. excessive time or effort, inefficient method, minor injury)</td>
</tr>
<tr>
<td>Fail</td>
<td>0</td>
<td>Evaluation criteria not met</td>
</tr>
<tr>
<td>Not possible</td>
<td>NP</td>
<td>The wheelchair does not have this part</td>
</tr>
</tbody>
</table>

Example of a full WST 4.2 (Example #4, 14 minutes)

WST vs WST-Q

<table>
<thead>
<tr>
<th>Consideration</th>
<th>WST</th>
<th>WST-Q</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time to administer</td>
<td>~5 minutes</td>
<td>~10 minutes</td>
</tr>
<tr>
<td>Obstacles needed</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Space needed</td>
<td>~900 square feet</td>
<td>None</td>
</tr>
<tr>
<td>Relies on training effect</td>
<td>Possible (~5%)</td>
<td>None scored</td>
</tr>
<tr>
<td>Can assess capacity (can do)</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Can assess performance (does so)</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Simulated vs real setting</td>
<td>Simulated usually</td>
<td>Real</td>
</tr>
<tr>
<td>Likelihood of finding a skill on a technically</td>
<td>Occasional</td>
<td>Rare</td>
</tr>
<tr>
<td>Possibility of being an error</td>
<td>Occasional</td>
<td>Rare</td>
</tr>
<tr>
<td>Can be administered by phone</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Can be administered by postal questionnaire</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Can be completed by a proxy</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Requires ability to follow instructions</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Requires ability to communicate</td>
<td>Yes</td>
<td>Yes (unless proxy)</td>
</tr>
<tr>
<td>Potential for measurement functional level</td>
<td>Lower</td>
<td>Slight lower</td>
</tr>
<tr>
<td>Test scores</td>
<td>Slight score</td>
<td>Slight higher</td>
</tr>
<tr>
<td>Provides detail about how the skills are performed</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Risk of injury</td>
<td>Minimal</td>
<td>None</td>
</tr>
</tbody>
</table>

http://www.wheelchairskillsprogram.ca/eng/tests_video.php
**WST-Q 4.2 Capacity Scores**

**Capacity question:** “Can you do this skill?”

<table>
<thead>
<tr>
<th>Answer</th>
<th>Score</th>
<th>What this means</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>2</td>
<td>I can safely do the skill, by myself, without any difficulty.</td>
</tr>
<tr>
<td>Yes with difficulty</td>
<td>1</td>
<td>Yes, but not as well as I would like.</td>
</tr>
<tr>
<td>No</td>
<td>0</td>
<td>I have never performed the skill or I do not feel that I could perform it right now.</td>
</tr>
<tr>
<td>Not possible</td>
<td>NP</td>
<td>My wheelchair does not have this part.</td>
</tr>
</tbody>
</table>

**WST-Q 4.2 Performance Scores**

**Performance question:** “How often do you actually do this skill during your daily life?”

<table>
<thead>
<tr>
<th>Answer</th>
<th>Score</th>
<th>What this means</th>
</tr>
</thead>
<tbody>
<tr>
<td>Daily</td>
<td>4</td>
<td>At least once a day.</td>
</tr>
<tr>
<td>Weekly</td>
<td>3</td>
<td>At least once a week.</td>
</tr>
<tr>
<td>Monthly</td>
<td>2</td>
<td>At least once a month.</td>
</tr>
<tr>
<td>Yearly</td>
<td>1</td>
<td>At least once a year.</td>
</tr>
<tr>
<td>Never</td>
<td>0</td>
<td>Less often than once a year or never.</td>
</tr>
</tbody>
</table>

**WST-Q 4.2 Answer Code**

**Goal question:** “Is this a skill for which you would be interested in receiving some training?”

<table>
<thead>
<tr>
<th>Answer</th>
<th>What this means</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>I would be interested.</td>
</tr>
<tr>
<td>No</td>
<td>I would not be interested.</td>
</tr>
</tbody>
</table>

**WST-Q Algorithm**

**Total % Calculated Scores**

- WST Capacity Score
- WST-Q Capacity Score
- WST-Q Performance Score
- Goal Attainment Score (GAS)
**Clinical Vision for WST:** for specific wheelchair users

- Document initial status (diagnosis)
- Identify needed interventions (training, equipment change)
- Wheelchair prescription & funding
- Treatment planning (e.g. walk vs wheel)
- Document changes in function
- Institutional “driver’s license”

**WHO Wheelchair-Provision Service Model**

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2. Assessment
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**Prevalence of Powered Wheelchair Skills Training**

- 19% in US got > 30 minutes of training (Salatin B et al. Proc RESNA 2010)
- 17% in Canada (Rushton P et al. CAG 2012)
- 31% in US of 283 people with tetraplegia (Zanca JM et al. Physical Therapy 2011;91:1877-91)

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*March 23, 2015*
Wheelchair Skills Training Program

**Process**
(How to teach)

**Content**
(What to teach)

WSTP

Moving turns

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**WSTP Curriculum**

- Individual or small group sessions
- 30-60 minute sessions, 1-5x/week
- ~2-4 hrs extra training time

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**Effectiveness of a Wheelchair Skills Training Program (WSTP) for Powered Wheelchair Users**

- CBHR CanWheel team in Wheeled Mobility for Older Adults (AMG-100925)
- RCT on 116 experienced powered wheelchair users in 6 cities
- Intervention group received 5 30-minute WSTP training sessions
- WST-Q 4.1:
  - WST-Q capacity (p = 0.600)
  - WST-Q performance (p = 0.016), T2/T1 gain of 10.8%, not retained at T3
- No difference in Injury Rate, WheelCon or Life Space Assessment scores
- Goal Attainment Score (GAS): mean (SD) 93.8% (11.4)
- Satisfaction with training:
  - 78% found the training was neither stressful nor uncomfortable
  - 92% found it useful
  - 92% found they had improved their abilities to perform wheelchair skills
  - 100% would recommend training to others

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*March 23, 2015*
Interpretation

- Satisfaction: consistent with earlier studies
- Was there a training effect?
  - GAS suggests yes
  - If not, low dose?, Wrong environment?, Experienced users (~6.5 years)?
- Did WST-Q fail to detect?
  - Probable ceiling effect (T1 capacity ~86%, performance ~75%)

Other Outcomes - Confidence

- 20 manual wheelchair users, RCT
- WSTP 4.1: 2 x 1-hour training sessions
- WheelCon scores (0-100)
- WSTP group:
  - Absolute change +13.7% (relative 24%)
- Control group:
  - Absolute change -0.4% (relative -0.6%)
  - P = 0.004


International Classification of Function (ICF)

- Participation (Handicap)
- Activities (Disability)
- Health (Impairment)
- Whole person
- Society
- Organ or tissue

WHO, 2001

Do Skills Improve Participation?

- Training increases amount of wheelchair use:
- Skills (WST) correlate with daily wheeled distance:
- Skills correlate with return to work:
- Skills correlate with participation measures:
  - Mortenson WB. Arch Phys Med Rehabil 2009;90:2237-4
  - Phang SH et al. Disabil Rehabil 2012;34:625-32

Levels of Scientific Evidence

I. Large randomized trials with clear-cut results (and low risk of error)
II. Small randomized trials with uncertain results (and moderate-high risk of error)
III. Nonrandomized trials with concurrent controls
IV. Nonrandomized trials with historical controls
V. Case series with no controls

Sackett DL. Chest (2 Suppl) 1989;2S-4S

Gold Standard of Practice 2015

1. Wheelchairs should be provided using the 8-step process of the WHO.
2. All people who use wheelchairs and their caregivers should have their wheelchair skills assessed.
3. Training should be provided, if appropriate.
4. Assessment and training should be documented in the health record.

• Article 20 – Personal mobility
  – States Parties shall take effective measures to ensure personal mobility with the greatest possible independence for persons with disabilities, including by… Providing training in mobility skills to persons with disabilities and to specialist staff working with persons with disabilities…

Assistive Devices

• “To ensure that assistive devices are appropriate, suitable and of high quality, the devices need to:
  – Suit the environment.
  – Be suitable for the user (assessment, selection, training)
  – Include adequate follow-up to ensure safe and efficient use (including local maintenance).”

Guidelines for the prescription of assistive locomotion: a mobility scooter for people with traumatic brain injury or spinal cord injury

Web Site: December 31, 2014
(78,844 sessions/49,973 users/166 countries)
Knowledge Translation

- KT of Wheelchair Skills Program for Rehabilitation Clinicians: A Feasibility Study.
- Rushton PW, Boronowski L, Demers L, Kirby RL, Rowe S, Miller WC
- Funding: CIHR $194,532
- Stage: Data collection in progress

Aim and Objectives

**AIM:** To design and implement a multi-modal KT intervention specific to using the Wheelchair Skills Program at GF Strong.

**Objective # 1:** To evaluate the KT intervention outcomes, including knowledge acquisition, knowledge use, and self-efficacy.

**Objective # 2:** To evaluate the feasibility of delivering the KT intervention, including process, resource, and intervention outcomes.

Procedure - Knowledge to Action Framework

- Interactive Educational Workshop
- Clinical Champions
- Wheelchair Skills Program Website
- Increased Organizational Support

KT Intervention
Knowledge Acquisition Improves After KT Intervention

Self-Efficacy Improves After KT Intervention

Established 1996