Transition From Manual to Power Wheelchairs Due to Age & Condition

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Objectives

• The participant will identify 3 barriers that may prevent a wheelchair user from making the transition from manual to power mobility.
• The participant will list at least 3 reasons someone who uses a manual wheelchair should consider transitioning to a power wheelchair.
• Name 3 common neuromuscular conditions that often lead to transitioning from manual to power wheelchairs.

Functional Mobility

• How far does someone need to propel independently to complete their daily tasks at home, school/work, and/or in the community?
  a. 50'
  b. 250'
  c. 500'
  d. ½ mile
  e. 1 mile
  f. Depends…….

Poll 1
Assessment of current manual w/c use

- Observe your patients’ manual wheelchair propulsion skills in regards to:
  - Access to the push rims and stroke they use to propel
  - Motor control
  - ROM/Strength
  - Pain – do they grimace or avoid a full stroke?
- Provide propulsion training to reduce push frequency, increase push angle, change pattern to dropping hand below push rim.

Pediatric use of Power Mobility

- Power wheelchairs at 14 months of age to enhance
  • Mobility
  • Receptive communication
  • Self-care skills
- Independent mobility for those
  with severe motor impairments
- Option for those unable to propel manual w/c
- Recommend start training with power early, may take up to 12 months

Teens and Adults

- Progressive Impairments - Advances in medical care allows survival into later stages of diseases
- Overuse Symptoms
- Cumulative Trauma disorder

References:
Who are you?

- Rehab Technology Supplier/ATP?
- Rehab Technician?
- Occupational or Physical Therapist?
- Manufacturer Employee (REP, Educator, etc)

Poll 2

Barriers to Transition

- Transportation
- Environment
- Psychological issues
- Reliability

Transportation as a barrier

- Weight - Manual wheelchair 'breaks down' and is lightweight for loading into vehicle
- Ability to travel with family or friends
- Airlines
  - may take frame on board plane
  - easier for loading into plane
Environment as a barrier

- Transfers from manual wheelchair to other surfaces
  - Frame configuration
  - Seat height
  - Armrest options
- Space required for use – power wheelchair may require more room for turning around than a rigid manual wheelchair.
- May require stronger flooring!

Environment as a barrier

- Terrain and Stairs
  - Access into own home, school, work, community
  - Access into other family/friends homes

Case example

- Sandra, age 55 y.o.
- Diagnosis Multiple Sclerosis since 1998
- 1 step-in from basement which can be ramped and then chair lift to main floor of Ranch style home, 13-15 steps to front porch and door. Back door is not accessible from where the car is parked. Family avail to carry w/c up/down
- R shoulder injury and weakness prevents her from pushing her manual wheelchair
- Unable to obtain power assist because she has not had an ultra lightweight manual w/c for one year and obtaining one now would not provide indep mobility
- E-Fix power add on would be ideal, family could carry it up the steps, but not covered at all by Medicare
- POV recommended
Alber E-Fix Power Add on

Quick release
No tools required
Heaviest part no more than 9 Kg = 19.8 lbs
Range 30 Km = 18.6 miles


Psychological Barriers

• Family, lifestyle, individual preference and beliefs, loss of normal routine
• How a person perceives his/her world is personal and different for every individual (Lieberman, 2017, PS1.3 the Experience of SCI and w/c Use, Jenny M. Lieberman, PhD, OTR/L, ATP)
• ‘Giving up’ or ‘Giving in’ to weakness, desire to be stronger physically
• Loss of independence and function
• Geekier looking, ‘more disabled’, self image issues
• Will lose strength in arms

Reliability as a barrier

• Ease/Difficulty to maintain
• Technology adjustments required
• Charging batteries
  • Carrying charger when travel
Benefits to Transition

• Transportation
• Environment
• Psychological issues

Transportation Benefits

• Van regulations – cannot lock down a manual wheelchair and drive with hand controls
• Shoulder and spinal stress reduced by riding in a vehicle in a power wheelchair rather than transferring to regular seat, loading a manual wheelchair into vehicle

Environment Benefits

• Narrower base for access through doorways
• Access over carpet, thresholds, inclines, gravel, grass
Psychological Benefits

• Ability to keep up with peers, family
• Independence/Autonomy/Self Sufficient
• Increased confidence
• Maintain sense of productivity and usefulness
• Freedom


The Psychosocial Impact of Assistive Devices Scales (PIADS)

Physical Benefits

• Conserve Energy and Efficiently Perform Tasks
• Prevent Chronic Injuries and UE Pain
• Save Shoulders for Transfers
• Improved Hand Function
• Power Tilt/Recline/Elevating Legs to Change Position
  • Pressure relief
  • Mitigate pain, reduce spasticity
  • Reduce lower leg edema
  • Rest
  • Functional tasks

Buning, et al study on Occupational Performance and Transition to Powered Mobility

- Participant 6, a young mother with paraplegia, was more independent in her role as a mother with power mobility. Her PMD allowed her to go to the zoo (a very hilly location) and enjoy herself with her two young daughters. She no longer had to plan ahead and invite another person along to push her manual wheelchair.


Buning, et al study on Occupational Performance

- Participant 8, an attorney, added productive time to his daily schedule
  - gained 20 min of time on each trip to the courthouse from his office.
  - able to extend his workday when his caseload demanded - able to use several other buses that stopped at the downhill end of his street, instead of only the one that stopped at the top, so he could work later
  - could now share in child care responsibilities
  - grocery shop


Assessment

- How long has person used a manual wheelchair?
- What type of manual wheelchair?
- How does the person propel?
- Consider ultra lightweight rigid frame with optimal alignment to access rear wheels
- Provide training on efficient stroke
- Body size and weight
- UE strength and ROM limitations
- Ability to perform a weight shift?
Pain Assessment

• What problems is person having
  • Pain
  • What causes pain?
  • What reduces the pain?
  • Pain meds taken and if so how often?
  • What activities are you unable to do?
  • Previous treatment and/or home exercise program

Wheelchair User’s Shoulder Pain Index WUSPI

Curtis, KA, et. Al., 1995, subject to U.S. Copyright Law

• Person self reports level of pain during 15 activities including ADL’s, pushing wheelchair and sleeping
  • Visual analog 10 cm line
    No Pain [ ] ________________________ Worst Pain Ever
    Experienced X

• Maximum score is 150

Contact for permission to use the WUSPI: Kathleen Curtis <kacurtis@utep.edu>

Endurance and Functional Assessment

• Endurance
  • Limited mobility now?
  • Ability to maneuver throughout the day for ADL’s?
  • Ability to cross a street safely?

• Function
  • Pressure relief
  • Transfers
Objective Tests to justify power mobility

- Borg Rating of Perceived Exertion (RPE) Scale
  A quantitative measure of perceived exertion during physical activity.
- 6-Minute push test
  Assesses distance propelled over 6 minutes as a sub-maximal test of aerobic capacity/endurance
- Manual and Power Mobility Wheelchair Skills Test

Other tests

Other measures used to justify need for complex rehabilitation technology:

- Spinal Cord Independence Measure (SCIM)
- Functional Mobility Assessment (FMA) or Functioning Everyday with a Wheelchair (FEW)
- Self-report questionnaires administered to consumers of wheeled mobility, as an indicator of perceived user function related to walking/wheelchair use
- Multiple Sclerosis Scales (http://www.nationalmssociety.org/For-Professionals/Researchers/Resources-for-Researchers/Clinical-Study-Measures)
- Pain Scale
- Wheelchair Users Shoulder Pain Index (WUSPI)

Matt

- Matt, 36 y.o.
- Quadriplegia, C5-7 complete, onset 6-13-99 at age 18
- Seating Clinic since d/c IP
- TiLite ZR with CoG 3” forward, custom RIDE seat since 2005
- Continued R pelvic obliquity, now with R hip pain. Previous c/o neck and shoulder pain
- WUSPI score 51.5 out of 150. Most painful tasks: loading w/c & pushing up inclines
Scoliosis and trunk instability especially when propelling
Obtained custom RIDE back 2016. Improved stability and ease of propelling.
Since early 2000’s recommended he consider power assist or power add on for long distance mobility to reduce further shoulder pain. At that time, and still today, unable to transport power wheelchair. He does not want to obtain a w/c accessible van.

Power Add On Obtained
In 2013 he did obtain a Spinergy ZX-1 power add-on on his own at reduced cost OOP, but reports it’s heavy. “I need a lift to get it into my car and I can’t get it onto my chair by myself”
https://www.spinergy.com/products/zx-1-power-add

Propelling with ADI back support
Propelling with custom RIDE back support

Power Assist Options
- Considering lighter weight power assist
- Requirements:
  - long use battery life
  - assistance to descend inclines — he states it is very hard to slow his w/c down
  - ability for him to transport
  - ability to independently attach to w/c

Reasons he needed/needs power mobility
- “Outside long distances and hilly terrain is when I wish I had a power chair or power assist. This wasn’t a problem in Calif, but in WNC, it’s an issue!”
- “Sometimes have to rely on someone to push me when I am exhausted and don’t like to do this.”
- “I know it’s harder at my level of injury than if I were a para, could conserve my energy with power. When I was in college, getting from one class to another I was often so fatigued by the time I got to class it was hard to focus. Don’t even go downtown Asheville on my own.”
Reasons he resists power wheelchair

- Transportation is his number one reason
- With manual w/c he can access into private residences with 1 person to help for 1-2 steps or 2 people for more steps.
- "Versatile and more flexible in manual w/c. Buildings are often harder to access, tight spaces that I can get into with my manual wheelchair but a power wheelchair will not fit."
- "Having to charge the batteries could be an issue – having enough power for the day."
- "I feel better pushing, more in touch with my body, gets my blood flowing. Being active is important. Keeps my energy level up."
- "Once I get a power chair, know it will be impossible to get a new manual."

Ann

- Ann, 60 years old
- Diagnosis Friedreich Ataxia, G11.1 = Early-onset Cerebellar Ataxia, diagnosed 1978, 2 brothers passed away years ago. One used power chair and one used a manual wheelchair
- Resistant to power, happy to stay in bed most of the time. Used a manual wheelchair since the 1990's
- Most recent visit in clinic, she only wants new seat and back cushions for her 14 y.o. LXI ultra lightweight manual wheelchair
- She can only propel on flat smooth surfaces, otherwise dependent

Gina

- 51 y.o.
- 1990 SCI T2 complete, due to gunshot wound, 27 years using w/c
- 2012 MVA with fractures of R shoulder, both femurs, tibias and injury L hip.
- 2012/13 Breast Cancer
- Current bilateral rotator cuff syndrome and carpal tunnel syndrome.
Medical Conditions and Vocation

- Edema both LE's, wears Jobst custom compression hose, thigh high
- Abdominal Binder for BP
- Pain shoulders, R elbow, L wrist, thumb and fingers
- WUSPI score 100 out of 150 with pain ranging from 7-9 with all 15 tasks
- Arthritis in hands
- Musician, plays mandolin
- Jewelry designer

Issues to consider

- Transportation - Honda Odyssey, lowered floor Entervan, hard to push up ramp
- Environment - home wood flooring except bedroom carpet, ramp entry. Small closet, removed door frame to access. Grass, gravel, dirt, inclines
- Psychological – She is very active and optimistic. States the fractures from the MVA were harder to mentally and physically recover from than her initial SCI. Once informed of options, would like to obtain power assist
- Transfers - independent with transfer board for car, commode, shower

Power Assist Options

- Alber Emotion and Twion
  - [http://www.alber-usa.com](http://www.alber-usa.com)
Power Assist Options

• Max Mobility Smart Drive
  • [http://www.max-mobility.com/#mx2pluspushtracker](http://www.max-mobility.com/#mx2pluspushtracker)

Power Assist Options

• Sunrise Medical Xtender

Manual wheelchair stroke concerns
Videos without and with power assist system

Pushing on tires

Pushing on Rims
Propelling up ramp with Smart Drive

Propelling on carpet with Smart Drive

Propelling her wheelchair
Propelling with Twion

Mackenzie

• Mackenzie, 16 yo
• Osteogenesis Imperfecta, Type III or IV
• Manual ultra lightweight rigid frame (manual w/c for over 12 years)
• High school cheerleader
• Fractured L arm April 2015 when caster hit loose threshold and threw her out of w/c

• PT Eval Seating Clinic Sept 2015
  L elbow extension - 70 degrees, considering surgery to straighten arm
  R convex scoliosis, reluctant to do surgery with brittle bones, but curve had progressed

Post spinal fusion
Issues to consider

- Transportation – Mom, Nissan SUV; Dad, pick up truck, considering used converted Honda Element modified with ramp entry & hand controls, she has her Drivers Permit. Seat raises up so she can reach the steering wheel. Until obtain this, will either ramp the power chair into the vehicle or obtain an external carrier
- Transfers – Indep. scoot to even surfaces, mod assist of 1 if higher surface than w/c
- Environment – Double wide with hardwood flooring, ramp access in and out. Hard to propel up inclines + High school has hilly campus
- Psychological – She does not want to be ‘more handicapped’

Results

- Family purchased the used converted Honda Element early October
- Power w/c recommended October 2015 and obtained December 2015 with power tilt and power seat elevate, Java seat cushion
- Eval March 2017: She had spinal fusion Dec 2016 with curvature reduced from 122 to 54 degrees and she feels much better now with no pressure points and reduced redness in crease. Would not have been mobile post op without power w/c
- Tried to straighten L arm surgically, but not successful
- She states she feels she is now less handicapped! Opposite of what she thought would happen. Able to keep up with friends easier

Adjustment to power chair

- Graduates high school this year and plans to attend college and live in dorm Fall 2017 rather than at home
- Still uses manual wheelchair to access bathroom, tighter spaces and go out with friends
- Hardest thing about changing from manual to power was learning to manage doors that automatically close
Videos of Mackenzie

Propelling Manual in hallway

Driving power in hallway
Access through lightweight auto closing door with manual w/c

Accessing through lightweight auto closing door with power

Accessing through heavier auto closing door with power
Rick

- Rick, 61 yo
- SCI T12, paraplegia complete
- Onset 1-20-74, manual w/c user for 32 years
- 5’11”, 185 lbs
- Initial evaluation 1982 using E&J manual wheelchair and obtained first ultra lightweight frame, Quickie 2, then years later TiLite rigid
- L hand grade III arthritis

Issues to consider re manual to power

- Transportation – has a van, transfers manual w/c to driver seat
- Home environment - one level home, ramp entry, entrance door threshold, carpet
- Work Environment – carpet, jewelers table and tool access
- Psychological – resistant to power due to “how I will look”
- Need for more functional pressure relief
- Need for power seating to reduce edema

Manual to Power 2006

- 2006 transitioned from TiLite rigid frame to Permobil
- Permobil C500 with Aeron Seating (tri-weave Pellicle suspension material) with power tilt, recline and seat elevate, low profile ROHO cushion/airflow enhancement. Chose this model for aesthetics
• Now has a Permobil C300 with all power seat functions and RIDE custom cushion due to chronic R IT pressure ulcer
• Still uses manual w/c to access bathroom and transfer to shower bench

Power Benefits
• Continued shoulder and hand pain – but significantly reduced
• Access over carpet, gravel, grass and sometimes up and down curbs
• Transferring independently to various height surfaces such as his bed and driver seat of van
• Pressure reliefs but chronic stage II R IT pressure injury – may be from toilet and/or shower chair
• Elevating legs above heart

Other Patient’s Transitioned to Power
• Amy, dx Cerebral Palsy, 13 y.o., K5 Frame obtained ready for Power assist. Fundraising to purchase in time for middle school.
• Cindy, dx Spina Bifida, now age 46 y.o. referred for power w/c in 2003, obtained power assist and has used one for 14 years. She states she “can go more places, better access in my home and power is more chair than I want to deal with”. When non operational causes increased pain
• Lori, dx SCI, onset Dec 2005, at age 42, L1 paraplegia, manual w/c burned in house fire 2009. Group 2 power w/c donated to her, once she learned the benefits, she returned to clinic in for eval to obtain Group 3 with power tilt.
• Dakota, dx SCI, C5-7 incomplete, onset July 2007 @ age 16 y.o.
• IP Rehab out of state.
• Obtained K5 with power assist in 2008 through private insurance.
• 6’2”, 210 #.
• In 2010 pain all the time 3/10 in R shoulder.
• Resolved using a power wheelchair, but unable to obtain until 2012
• Can do more with transfers, reaching. End of day sometimes pain 2-3/10.

Other wheelchair users who benefit from power mobility

• Those who do not have the visual or cognitive skills to drive a power chair and their caregiver is unable to push them in a manual wheelchair. An attendant control will allow an elderly parent or spouse to safely move the person they are caring for

• 38 y.o. blind from birth, Domestic Violence in 2005 caused encephalopathy. Ultra lightweight manual w/c since injury, but no longer able to ascend/descend inclines nor propel long distances. Lives in an apartment with thick carpet and uses public transit. She now successfully uses E-Motion power assist

Consider transitioning user from manual to power mobility when functionally necessary

• Cerebral Palsy
• MS
• Muscular Dystrophy
• SCI
• Sequelae of Poliomyelitis
• Spina Bifida
Final Thoughts

• Importance of taking holistic approach
• Risk of abandonment – best not to recommend PMD if the user/family is not ready for this type of AT
• Most people do not want to be a burden to their caregivers and desire to live in their own homes as they age with a disability
• High levels of pain lead to fatigue, anger, poor health, loss of independence and depression
• Let’s keep our users happy, healthy, functional and living their lives!

References


References cont’d


References, cont’d

