

Evaluation for Seating and Wheeled Mobility

Mark R. Schmeler, PhD, OTR/L, ATP
Jeannie Minkel, PT, ATP
Kendra Betz, MSPT, ATP

VA-Polytrauma 14th Grand Rounds
University of Pittsburgh

Functional Mobility

What does that mean?



Crossing street in scooter



Driving scooter into elevator



Indications for Scooter

- Safely transfer to & from a scooter
- Be able to operate the tiller steering system
- Maintain postural stability and position while operating the scooter in the home
- The patient's home provides adequate access between rooms, maneuvering space, and surfaces for the operation of the scooter that is provided

Additional Scooter Indications

- User able to cognitively, perceptually, & physically operate device
- Device will maneuver in the home
- User meets weight capacity
- User has not expressed an unwillingness to use the device in the home

Power Wheelchair Bases



Front-Wheel Drive



Mid-Wheel Drive



Rear-Wheel Drive

Intake/Interview

- 65 year old male
- T9 Incomplete SCI from a gun shot wound resulting in paraplegia
- Bilateral rotator cuff tears
- Carpal Tunnel Syndrome
- Congestive Heart Failure
- Depot style manual wheelchair
- 12 hours per day in wheelchair
- Lives with wife in accessible home
- Retired



Intake/Interview

Mobility Related Activities of Daily Living

- Unable to functionally ambulate
- Unable to functionally propel WC
- Independent with all basic ADL's
- Difficulty getting to locations where ADL's are performed
- Limited community mobility



Intake/Interview

Client Stated Goals

- Independent ADL's
- Comfort
- Indoor mobility
- Outdoor mobility
- Transportability



Physical Motor Examination

Posture

- Mild fixed kyphosis
- Sits symmetrical
- No history of pressure sores
- Low back pain



Physical Motor Examination

Upper Extremity

- Grip 4/5 bilaterally
- Wrist extension 4/5 bilaterally
- Biceps R 5/5 L 3/5
- Deltoids R 5/5 L 2/5
- Reports bilateral shoulder pain and hx of left elbow fracture and left carpal tunnel release



Physical Motor Examination

Lower Extremity

- Strength L 5/5 R 0/5
- Reports pain, numbness and tingling in R LE
- Wears a R AFO with high tone on the right



Weight Shift Status

- Independently able to shift body weight for pressure relief



Transfer Status & Clinical Trials

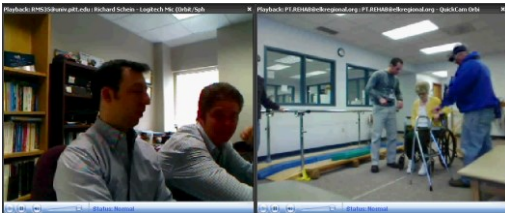
- Independent stand pivot weight bearing on the left



Functional Mobility

- Attempts to ambulate with use of a R AFO and straight cane
- Hx of falls resulting in ER visits
- Ability to ambulate is NOT functional

Example: Timed Up & Go (TUG) Test



Reach

- Independent with reaching objects located at different surface heights



Clinical Trial: Indoor Mobility

- Group 2 Mid-Wheel Drive Power Wheelchair

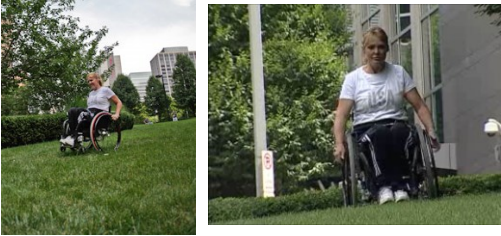


Clinical Trial: Outdoor Mobility

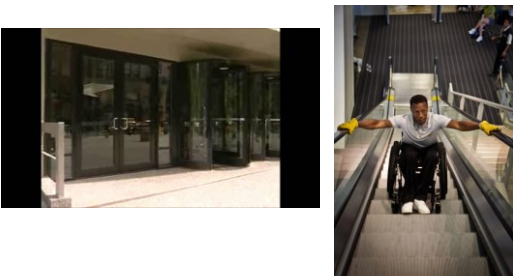
- Curb cuts
- Uneven surfaces and terrains



Independence in Manual Wheelchair



Independence in a wheelchair



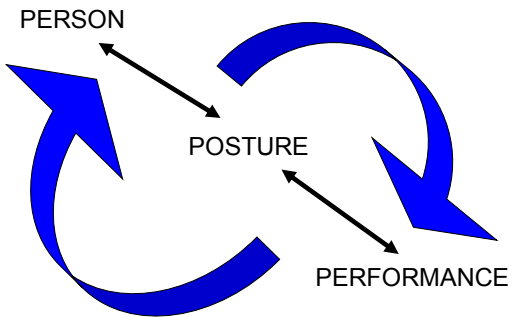
Independence in Manual Wheelchair



Wheelie to get up a curb



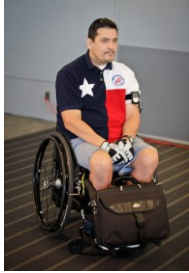
Matching Person to Technology



Technology Impacts Performance



Person Impacts Technology



Rear Wheel Position

Once posture optimized . .

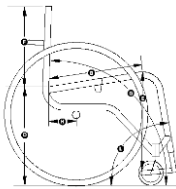
Adjust the rear wheel as far forward as possible without compromising the stability of the user.



CPG Recommendation #8

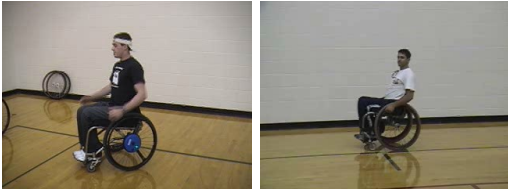
Horizontal Position

Often referred to as Center of Gravity (COG)



Usually designated as front of backpost to center of rear axle.

The Wheelie



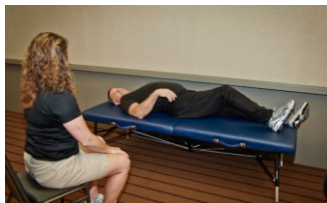
Rear Wheel VERTICAL Position

CPGR #9



- With hand at top dead center of handrim, recommended elbow angle is between 100 and 120 degrees (van der Woude, 1989)

- Strong correlation with center of finger at center of axle



The Genius of "AND" . . .

Jim Collins



- 1) Handcycling 2) track 3) swimming,
- 4) skiing 5) tennis 6) basketball . . .



Right above knee prosthetic limb, left ankle foot orthosis, custom wheelchair AND sports equipment.



Alternative Controls



Tilt



Recline



Front View Posture



MAT ASSESSMENT (SEE VIDEO)

Best Practice

RESNA Wheelchair Service Delivery Guide (Shea et al, 2011)

- **Assessment by a knowledgeable team of clinicians**
- **Face-to-face evaluation**
- **The individual's medical history**
- **Physical abilities and needs**
- **Functional abilities and needs**
- **Seating and positioning abilities and needs**
- **Home accessibility**
- **Currently used assistive devices**
- **Environmental considerations**
- **Follow-up & Outcomes**

Why We Do What We Do



Why We Do What We Do



Thank You...
