

Fundamentals of Wheelchair Seating & Mobility

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Advisory Team

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Outline & Overview

Eight Modules

1. Service Delivery Process
2. Seating Biomechanics
3. Cushions & Backs
4. Manual Wheelchairs
5. Powered Mobility Devices
6. Seat Functions
7. Transportation
8. Documentation & Billing

Methodology

1. Web-based/On-Demand
2. Self-Paced
3. Lectures
4. Case-Based
5. Evidence Based
6. Readings
7. Links to other Resources
8. Post-Test



Learning Objectives

- Recognize the contribution that a **systematic functionally-based approach** to wheeled mobility and seating evaluation and intervention brings to successful outcomes
- Identify the role and importance of **evidence-based practice** related to wheeled mobility and seating interventions
- Identify the essential **components of the wheeled mobility and seating evaluation** and service delivery process to ensure successful outcomes
- Identify the fundamentals of **seating biomechanics** and the components of a physical motor assessment
- Differentiate between specific types of **seating and positioning interventions** and how they could affect functional performance



Learning Objectives

- Recognize how different **manual wheelchairs** and various **powered mobility intervention** options and configurations can maximize functional performance
- Identify essential **documentation** components and strategies that comply with **coverage** policies and result in successful funding outcome
- Identify standardized methods to **collect assessment findings** and **measure outcomes**



Why is this Important?

- **2.2 million users in the USA** (Kaye, Kang, & LaPlante, 2002)
 - More recent data indicates >3.4
- **Important AT Devices in Rehab** (Kirby et al, 2002)
- **Complex intersection & compromise of user; device; and environment Facilitates quality of life** (Devitt, Chau, Jutai, 2003)
- **Poorly fitted devices result in;**
 - unnecessary expenses
 - duplication of effort
 - possible injury
 - Abandonment (Batavia, Batavia & Friedman, 2001)



Proper Devices Facilitate:

- **Ability to perform ADLs** (Mills, Holm, Schmeler, & Trefler, 2007)
- **Participate in communities** (Chaves et al, 2004)
- **Reduction of secondary complications;**
 - **Upper Limb Repetitive Strain Injuries** (Boninger & Stripling, 2007)
 - **Pain & Discomfort** (Crane & Hobson, 2003)
 - **Pressure Sores** (Geyer et al, 2001)



Best Practice

RESNA Wheelchair Service Delivery Guide

- Assessment by a knowledgeable and trained clinician
- 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



RESNA Standards of Practice Assistive Technology Professional (ATP)

- Competence — refer out
- Abide licensure laws
- Respect other credentials
- Disclose bias and conflict of interests
- Need of consumer is paramount
- Offer range of service (start to finish)
- Direct assessment (in-person)
- Avoid unnecessary risks/disclose risks
- Continued competency (continuing education)
- Avoid fraud, dishonesty and misrepresentation
- Withdraw from practice (substance abuse/health conditions)



Evidence Based Practice

(Rappolt, 2003)

1. Client Evidence
2. Research Evidence
3. Professional Expertise

Integration with Clinical
Decision Making



Levels of Evidence

- **Level I** - systematic reviews or meta-analysis
- **Level II** - one or more well-designed study
- **Level III** - a well designed study but without randomization
- **Level IV** - well designed non-experimental study from more than one facility or research group
- **Level V** - subjective opinions of well known respected authorities based on clinical experience, case studies, or expert committee reports
 - also known as expert opinions



Service Delivery Process

- Referral & Screening
- In-Depth evaluation
- Final Specifications
- Documentation
- Funding Approval
- Fittings
- Delivery / Training
- Follow-up / Outcome Measurement



Variables

(International Classification of Functioning Disability and Health, 2001)

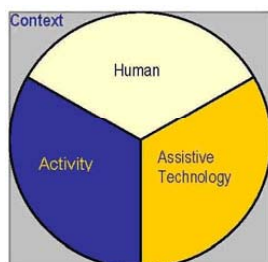
- **Body Systems** – Impairment, motor, sensory
- **Equipment** – Current & past experience
- **Functional** – Capacity, performance, participation
- **Living Situation & Support**
- **Environmental** – Physical, social, political
 - Home & Community
 - Transportation
 - Funding/Policy



HAAT

Human Activity Assistive Technology Model

Cook & Polgar (2007)



Outcome Measures

- **WHY???**
 - Accountability
 - Policy
 - Effectiveness
 - Justification
 - Knowledge
- **Problems with Global Function Tool (FIM™):**
 - Penalizes for use of AT
 - Not sensitive to function using AT
 - Ceiling effect when using AT

(Kirby, 2002; Harvey, Batty, & Fahey, 1998; Ota et al., 1996; Marino et al., 1993; Yarkony, Roth, Heinemann, Lovell, & Wu, 1988)



Barriers to Outcomes

- Rehab is a Young Science (Rusk, 1969)
- Rehab is very "Practice Based" (Opit et al, 1997)
- Few Rehab Practitioners with Research Training (Kajermo et al, 1998; Dubouloz et al, 1999)
- Existing Research tends to be Quasi-Scientific
- Limited Access to Large Sample Sizes
- Lack of time & resources to engage in research (Jette, 1993)
- Research articles too Scientific w/out Clinical Relevance (Philibert et al, 2003)
- Perceived Potential Threats to Practice (Cusick et al, 1999)



Choosing a Tool

- **Validity**
 - Does it Measure What You are Looking For
- **Reliability**
 - Consistently Repeatable (time & scorers)
- **Sensitive to Change**
 - Change in Scores Consistent with Clinical Observations
- **Administrative Burden**
 - Time, Apparatus, Clinical Routine



Choosing a Tool

- **Self-Report Questionnaires**
 - Lower Administrative Burden
 - Limited Expertise
 - Flexible Administration
 - Less Valid & Reliable
- **Performance/Capacity Observations**
 - More Administrative Burden
 - Expertise of Observer
 - Apparatus Required
 - In-Person Administration
 - More Valid & Reliable



Functioning Everyday with a Wheelchair (FEW) Questionnaire

(Mills, Holm, & Schmeler, 2007)

www.few.pitt.edu

- | | |
|-----------------------------------------|---------------------|
| 1. Stability, Durability, Dependability | 6. Transfers |
| 2. Comfort Needs | 7. Personal Care |
| 3. Health Needs | 8. Indoor Mobility |
| 4. Operate | 9. Outdoor Mobility |
| 5. Reach | 10. Transportation |



Functional Mobility Assessment (FMA) Questionnaire

- Same 10 Items of FEW
- Reworded for Simplicity
- Considers Non-Wheeled Mobility
 - Non-device, cane, prosthesis, walking
- Validity Borrowed from FEW
- Test-Retest In Process (ICCs>0.80)
(Kumar, 2010)



Scoring

- 6 Completely Agree
- 5 Mostly Agree
- 4 Somewhat Agree
- 3 Somewhat Disagree
- 2 Mostly Disagree
- 1 Completely Disagree

- Area to provide comments for each item
- Can also rank items by importance



Meet Pete

- 50 years old
- 26 yrs post C6-C7 ASIA A SCI
- Upper extremity repetitive strain injuries
- 6'1" & 285lbs.
- Married
- MWC User
- Political Advocate
- Accessible Home
- Accessible Transportation
- Transition from MWC to PWC



Pre FMA Scoring

Daily Routine	1	Transfers	5
Comfort Needs	5	Personal Care	5
Health Needs	5	Indoor Mobility	5
Independence	1	Outdoor Mobility	1
Reach	2	Transportation	5

Pre-Total: 35



Meet Rhonda

- 40 years old
- Bachelors of Science degree in communications
- Single
- Full-time employee at university hospital
- Cerebral palsy, repetitive shoulder injuries due to prolonged use of forearm crutches and possibly independent transfers



Rhonda Pre FMA Scoring

Daily Routine	4	Transfers	4
Comfort Needs	4	Personal Care	4
Health Needs	4	Indoor Mobility	3
Independence	2	Outdoor Mobility	4
Reach	1	Transportation	5

Pre-Total: 33



Body Systems

- **Diagnosis**
 - Static
 - Progressive
- **Secondary Conditions**
 - Skin issues
 - Size & Weight
 - Cognitive & Sensory
 - Endurance
 - Falls
 - Pain
- **Physical Motor Abilities**
 - Mat Assessment



Documentation Criteria (Medicare)

- **Symptoms**
- **Related diagnoses**
- **History**
 - How long the condition has been present
 - Clinical progression
 - Interventions that have been tried and the results
 - Past use of walker, manual wheelchair, POV, or power wheelchair and the results
- **Physical exam**
 - Weight
 - Impairment of strength, range of motion, sensation, or coordination of arms and legs
 - Presence of abnormal tone or deformity of arms, legs, or trunk
 - Neck, trunk, and pelvic posture and flexibility
 - Sitting and standing balance



Documentation Criteria Cont'd (Medicare)

- **Functional assessment**
 - Any problems with performing the following activities including the need to use a cane, walker, or the assistance of another person
 - Transferring** between a bed, chair, and PMD
 - Walking** around their home - to bathroom, kitchen, living room, etc. - provide information on distance walked, speed, and balance"



Equipment

- **Current Equipment**
 - Status & Condition
- **Other Technologies**
 - Computer, EADL, AAC
 - Compatibility/interfaces



Functional

- Activities of Daily Living
 - Basic & Instrumental
 - Transfers
 - Assistance
- Activity Endurance
- Work
- Leisure



Activities of Daily Living

AOTA (2008). OT Practice Framework: Domain & Process 2nd Ed. AJOT, 62(6). 625-683

ADLs

- Bathing, showering
- Bowel & Bladder management
- Dressing
- Eating & Feeding
- Functional mobility
- Personal device care
- Hygiene & Grooming
- Sexual activity
- Toilet hygiene & Grooming

Instrumental ADLs

- Care of Others (Supervising care-givers)
- Care of pets
- Child rearing
- Communication Management
- Community mobility
- Financial management
- Health management and maintenance
- Home establishment and management
- Meal preparation and clean-up
- Religious Observance
- Safety & Emergency Maintenance
- Shopping



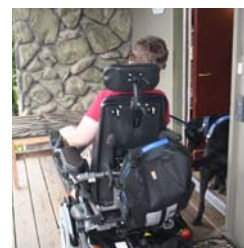
Living Situation

- Roles & Routines
 - Parent
 - Spouse
 - Worker
- Assistance Available

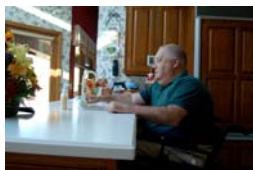


Environmental

- Access in & Out of the Home
- Accessibility within the Home
- Other Accessibility
 - Work/school
 - Community
- Terrain
- Distances



Indoor Mobility



Outdoor Mobility



Transportation

- Personal Vehicle
 - Passenger or Driver
 - Accessibility
- Public Transportation & Paratransit
- Ride in Wheelchair Vs. Transfer Out
- Restraint System
- Airlines



Goals

- What do you want in a new system?
- What is currently working that you do not want to change?



Rhonda's Goals

- Tilt in Space
- Seat Elevator
- Standing
- Stand in Church
- Reach



Pete's Goals

- Avoid pressure sores
- Get around easier
- Avoid tips & falls
- Interface with work station



Further Assessment

- simulation
- clinical trials
- discussion of options
- review of goals
- compromises
- home trials
- consensus and final decisions



In-Clinic Trials



In-Clinic Trials

Insert photo of Pete in wheelchair in clinic



Role Delineations

Clinician

- Physical Motor
- Function / ADL
- Cognition/Perception
- Sensory
- Environmental
- Treatment Plan
- Training
- Outcome
- Documentation
- Appeal

Supplier

- Equipment
- Integration
- Environment
- Specifications
- Funding & Policy
- Procurement
- Technical Training
- Service
- Documentation
- Appeal



Home Assessment & Trials

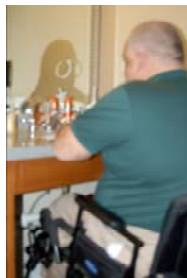
- Access/Egress
- Living room, kitchen, bathroom, bedroom
- Go through the daily routine
 - Transfers
 - Reaching
 - ADLs



Home Assessment & Trials



Home Assessment & Trials



Rhonda Follow-up



Rhonda Pre & Post FMA Scoring

	<u>Pre</u>	<u>Post</u>		<u>Pre</u>	<u>Post</u>
Daily Routine	4	6	Transfers	4	5
Comfort Needs	4	6	Personal Care	4	5
Health Needs	4	6	Indoor Mobility	3	5
Independence	2	6	Outdoor Mobility	2	6
Reach	1	5	Transportation	5	6
Pre-Total: <u>33</u>			Post-Total: <u>56</u>		



Pete Pre & Post FMA Scoring

	<u>Pre</u>	<u>Post</u>		<u>Pre</u>	<u>Post</u>
Daily Routine	1	6	Transfers	5	6
Comfort Needs	5	6	Personal Care	5	6
Health Needs	5	6	Indoor Mobility	5	6
Independence	1	6	Outdoor Mobility	1	6
Reach	2	6	Transportation	5	6
Pre-Total: 35			Post-Total: <u>60</u>		



Summary

- Thorough Assessment of Needs & Goals
- Simulations & Trials of Devices
 - Clinical & Natural Environments
- Feature Trade-Offs for every intervention
- Match Variables, Goals, & Features
- Apply Evidence & Best-Practice
- Measure & Report Outcomes

