

Functional Seating and Positioning with SCI and ABI

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Objectives

- Participants will be able to describe the basic process of a wheelchair seating and positioning evaluation.
- Participants will be able to state the importance of addressing both support and function when considering positioning of a patient in a wheelchair.

Overview

- The wheelchair seating and positioning evaluation
- Functional considerations
- Equipment selection
 - Base
 - Cushion
 - Backrest
 - Drive controls
 - Accessories and other components
- Clinical application

The Wheelchair Seating & Positioning Evaluation

Seating & Positioning Evaluation

- Subjective
 - History-PMH & HPI (surgeries, wounds, history of falls, etc)
 - Chief Complaint
 - Goals
 - Problem List
 - ADL's (work, school, etc)
 - Home Environment
 - Wheelchair Skills
 - Current Wheelchair/Seating System
 - What works, what doesn't

Seating & Positioning Evaluation

- Clinical Assessment
 - Systems Review
 - Skin
 - Sensation
 - ROM
 - Strength
 - Balance
 - Coordination
 - Cognition
 - Tone



Seating & Positioning Evaluation

- Functional Assessment
 - Transfers
 - How do they transfer
 - Level of assist
 - Upper Extremity Function
 - Propulsion Technique (for manual wheelchair users)
 - Activity Tolerance
 - Balance
 - Ability to Stand or Walk
 - Assist required
 - Distance
 - Speed

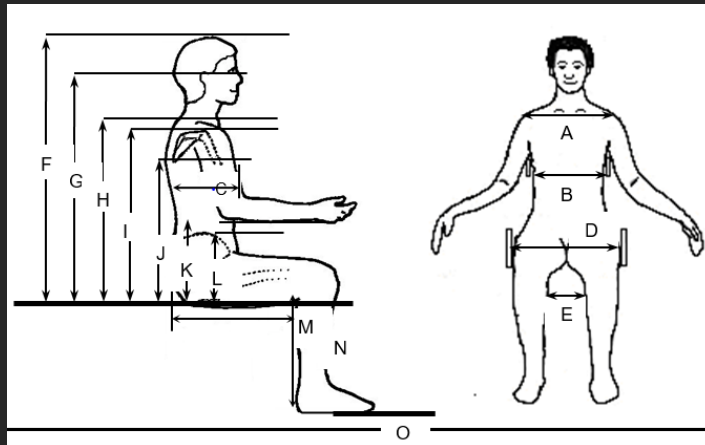
Seating & Positioning Evaluation

- Mat Evaluation

- Posture

- Spinal Deformity
 - Pelvic Obliquity, Rotation, Tilt
 - Windsweeping

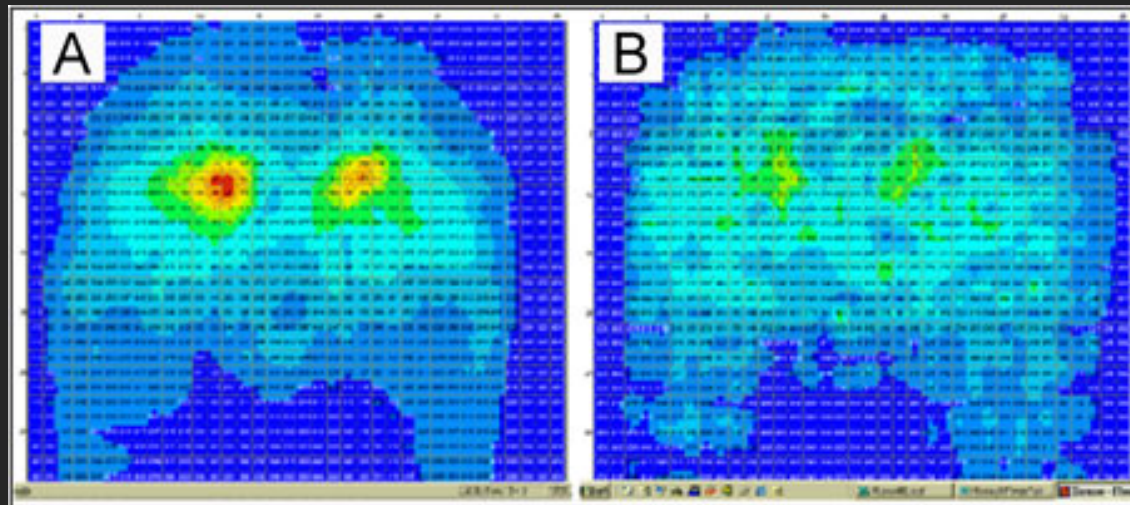
- Measurements in Sitting



Anterior / Posterior <input type="checkbox"/> Neutral <input type="checkbox"/> Posterior <input type="checkbox"/> Anterior <input type="checkbox"/> Fixed <input type="checkbox"/> Flexible <input type="checkbox"/> Partly Flexible <input type="checkbox"/> Other	Obliquity <input type="checkbox"/> WFL <input type="checkbox"/> R elev <input type="checkbox"/> L elev <input type="checkbox"/> Fixed <input type="checkbox"/> Flexible <input type="checkbox"/> Partly Flexible <input type="checkbox"/> Other	Rotation-Pelvis <input type="checkbox"/> WFL <input type="checkbox"/> Rt Ant <input type="checkbox"/> Lt Ant <input type="checkbox"/> Fixed <input type="checkbox"/> Flexible <input type="checkbox"/> Partly Flexible <input type="checkbox"/> Other
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Seating & Positioning Evaluation

- Equipment Trials
 - Best method to determine if a new product could work
 - Time: *At least* a few hours, days are preferable
 - Pressure mapping can assist in cushion selection



Seating & Positioning Evaluation

- Justification
 - Promote and Increase Independence
 - **Mobility Related Activities of Daily Living (MRADL's)** Key phrase for LMN's
 - Support Client in Optimal Position
 - Reduce/manage Pain
 - Manage Tone/Spasticity
 - Decrease risk of Secondary Conditions
 - Shoulder dysfunction
 - Pressure injury
 - Skeletal deformity

Functional Considerations

Functional Considerations

- Transfers
- Access
 - Home
 - Community
- Transportation
- ADLs
- Vision
- Respiration
- Communication

Functional Considerations

- Transfers
 - Is it safe and functional?
 - Can patient transfer independently to/from surface?
 - Consider height of transfer surface and height of wheelchair
 - Consider seating surface on wheelchair
 - Consider possible sources of injury
 - Consider power seat elevator
 - For dependent patients, can caregiver safely transfer patient
 - Consider body mechanics of caregiver



Functional Considerations

- Access & Transportation

- Home

- Does the wheelchair fit through all the necessary doors
 - Are the surfaces flat or are ramps available
 - Can they reach items they need
 - Can they maneuver to safely transfer

- Community

- Can they transport the wheelchair or do they have access to a way to do it
 - Are they able to access workplace
 - Can they tolerate extended periods in seating system without adverse effects
 - Public restrooms
 - Various surfaces



Functional Considerations

- ADLs
 - Do they have the support they need to complete ADLs
 - Do they have the mobility they need to complete ADLs
 - Do they dress in their wheelchair
- Vision
 - Resting position
 - Position during mobility
 - Consider line of sight



Functional Considerations

- Respiration

- Posture and positioning can significantly impact
 - Consider impact of pelvic position
 - Consider upper extremity support



- Communication

- Do they have adequate breath support for speech
- Do they use an AAC device
 - Can it be mounted on the base
 - Can they access it once mounted



Equipment Selection

Equipment Selection

- Considerations
 - Do they meet the criteria
 - Safety
 - Cognition/Neglect
 - Vision
 - Motor control
 - How will they operate the wheelchair
 - Power-joystick vs alternative drive controls
 - Manual-bilateral upper extremities, hemi propulsion, foot propulsion
 - Ability to reposition
 - Weight shifts
 - To manage tone, pain, blood pressure
 - Manage edema

Equipment Selection-Base

- Power Wheelchair Base
 - Front Wheel Drive
 - Best cornering ability
 - Outdoors, obstacles
 - Can be difficult to learn to drive
 - Mid Wheel Drive
 - Most common
 - Smallest turning radius
 - Intuitive drive
 - Rear Wheel Drive
 - Largest turning radius
 - Good with rough terrain
 - Drives similar to car



<https://www.karmamedical.com/2021/01/which-driving-wheel-configuration-should-you-choose/>

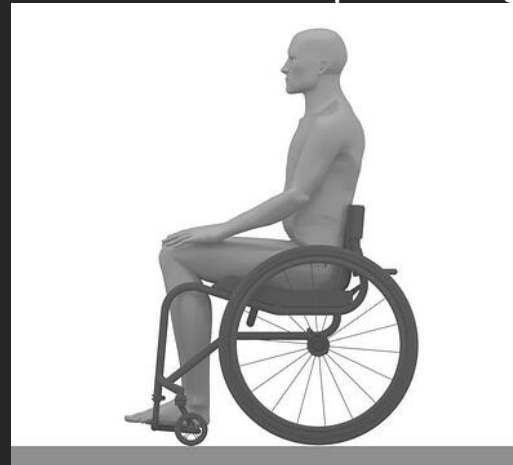
Equipment Selection-Base

- Power Seating Functions
 - Tilt
 - Recline
 - Elevating Leg Rests
 - Seat Elevator
 - Standing



Equipment Selection-Base

- Rigid Frame Manual Wheelchair
 - Most often used for full time wheelchair users
 - Lightest weight
 - Durable
 - Highly customizable
 - Adjustable rear axle
 - Adjust as far forward as possible without compromising stability
 - Limited adjustability in size
 - Option of Ergo frame



Equipment Selection-Base

- Manual Wheelchair
 - Folding
 - Wide variety (standard to ultra lightweight)
 - Can be off the shelf or custom
 - Can be easier for ambulatory patients, hemi propellers, and foot propellers
 - Sling seat and sling back promote poor posture, difficult to tolerate for longer periods



<https://www.spinlife.com/en/HowToChooseAManualWheelchair.cfm>



<https://www.quickie-wheelchairs.com/Ultra-Light-Wheelchairs/Ultralight-Folding-Wheelchairs/>



Equipment Selection-Base

- Manual Tilt-in-Space
 - Dependent user
 - For patients that are dependent in both mobility and weight shifts
 - Up to 55 degrees of tilt available and recline is an option
 - Heavier than other manual wheelchairs
 - Can be folded down to transport



<https://www.sunrise-medical.com/manual-wheelchairs/quickie/tilt-in-space-wheelchairs/iris>

Equipment Selection-Base

- Power Assist
 - Push Rim Activated vs Add-ons
 - Push Rim Activated: Heavy, adds noticeable weight when not in use, amplifies push
 - Add-ons: Slightly lighter, not as noticeable when not in use, is motor driven
 - Bridges the gap between power and manual
 - Reduction of push strokes
 - Reduces risk of overuse injury
 - Good for those with limited strength
 - Allows for increased independence in community (longer distances, ramps)
 - Think proactive not reactive



<https://www.alber-usa.com/us/products/active-drives/e-mobility/>



<https://smooov.com/us/en/>



<https://www.sportaid.com/smartdrive-power-assist-by-max-mobility.html>

Equipment Selection-Cushions

- Classifications of cushions
 - General Use
 - Skin protection
 - Positioning
 - Both skin protection and positioning
- Considerations
 - Maintenance
 - Transfers
 - Continence
 - Weight
 - Comfort

Equipment Selection-Cushions

- Air
 - Good for skin protection
 - Poor for positioning
 - High maintenance
- Gel/Fluid
 - In combination with foam
 - Good for skin protection
 - Lower maintenance
 - Temperature can affect
- Foam
 - Good for positioning
 - Variety of types
 - Skin protection ability varies



Equipment Selection-Cushions

- Honeycomb
 - Lightweight
 - Good breathability
- Hybrid
 - Combo of foam/air
 - Good pressure relief with improved positioning
 - High maintenance
- Custom
 - Costly
 - More complex



Equipment Selection-Backrests

- Considerations

- Posture
- Height
- Lateral support
 - Deep contour back vs separate laterals
- Transfers
- Padding
 - Be conscious of skin integrity, pressure injuries can occur on the back too!
- Comfort

Equipment Selection-Backrests

- Types of backrest
 - Upholstered
 - Lightweight
 - Least supportive
 - Tension Adjustable
 - Some support,
 - Requires adjustment
 - Solid
 - Various sizes, contours
 - Various materials
 - Good support
 - Dynamic
 - Allows for movement
 - Custom molded
 - Most supportive
 - Tend to be heavier/thicker

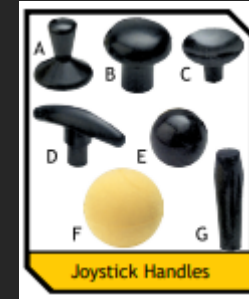


Equipment Selection-Drive Controls & Power Seat Functions

- Drive Controls

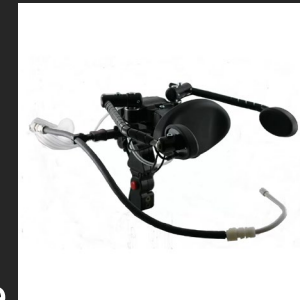
- Joystick

- Various styles/shapes: Standard, goal post, mushroom, etc
 - Ability to swing away or retract
 - Placement: typical, midline, foot
 - Specialty: mini, micro
 - Attendant controls



- Alternative Drive Controls

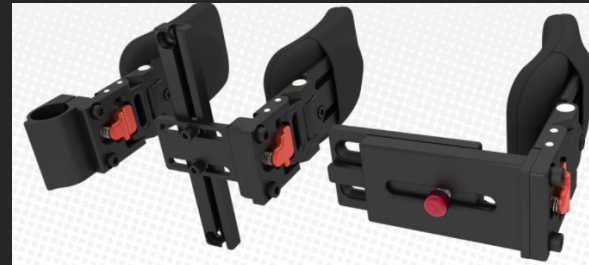
- Multiple types-find what is best to allow for independent use
 - Head array, sip and puff, chin controls, latched switches
 - Ensure good access



Equipment Selection-Accessories & Other Seating Components

- Seating Components

- Belts and Straps
 - Pelvic belts
 - Chest straps
 - Shoulder Harnesses
- Lateral supports
- Headrest
- Thigh/hip guides



Equipment Selection-Accessories & Other Seating Components

- Seating Components
 - Lower extremity supports
 - Calf straps or pads
 - Foot boxes
 - Foot/ankle straps
 - Heel loop
 - Upper extremity supports
 - Trays
 - Half Trays
 - Arm supports
 - Elbow blocks



Equipment Selection-Accessories & Other Seating Components

- Accessories
 - Bags/Cargo Nets
 - Wallet/phone
 - Medical necessities
 - Hydration
 - Cup holder
 - Hydration pack
 - Cane/Crutch holder
 - Transfer Handles
 - Push Handles
 - Caregiver assistance
 - “Hooking”



Clinical Implications

- Weight shifting education
 - Team approach (Nursing, Therapists, Physicians, etc)
 - Duration needed to be effective
 - Methods
 - Angle of tilt/recline with power seat functions
 - Pressure mapping can be an effective tool to assist with this
- Having an effective bowel/bladder program
- Wheelchair mobility instruction
 - Push-rim biomechanics
- Effective communication and respiration
- Balance between support and function

Resources

- RESNA
 - Position papers
 - Continuing education
 - Certification
- PVA
 - Clinical Practice Guidelines
 - Consumer Guides
- APTA
 - Academy of Neurologic Physical Therapy Online education
 - 10 part wheelchair education series

Conclusion

- There is no easy, one size fits all solution to seating
- Educate and empower the patient
- Trial equipment, when possible
- Get to know your vendors and product reps
- If interested in performing wheelchair evaluations, go to as many courses as you can
- Refer to a therapist specializing in wheelchair seating

Questions?



References

- RESNA Wheelchair Service Provision Guide <https://www.resna.org/Portals/0/Documents/Position%20Papers/RESNAWheelchairServiceProvisionGuide.pdf>
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- RESNA Position on the Application of Wheelchair Standing Devices: 2013 Current State of the Literature https://www.resna.org/Portals/0/Documents/Position%20Papers/RESNAStandingPositionPaper_Dec2013.pdf
- PVA Clinical Practice Guideline: Preservation of Upper Limb Function Following Spinal Cord Injury https://pva.org/wp-content/uploads/2021/09/cpg_upperlimb.pdf
- PVA Clinical Practice Guideline: Pressure Ulcer Prevention and Treatment Following Spinal Cord Injury https://pva.org/wp-content/uploads/2021/09/cpg_pressure-ulcer.pdf
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