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Wheelchair Seating: Considerations for the Hands-free Sitter

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Learning Outcomes

The participant will be able to:

1. Define a Hands-free sitter
2. List 3 goals when positioning a hands-free sitter
3. List 3 clinical guidelines when positioning a hands-free sitter

What we will be covering:

- What is a “hands-free sitter”?
- Clinical Guidelines
- Case Study

Seating and Wheeled Mobility

- Every mobility base includes some form of seating
- Primary supports include seat, back, armrests, and footrests
- Seating interventions vary tremendously depending on the client age, diagnosis, prognosis, postural needs, pressure risks, etc.

Postural Needs

- One way of looking at Wheelchair Seating is by postural support needs:
  - Hands-free sitter
  - Hands-dependent sitter
  - Prop sitter

Hands-free Sitter

- The person is able to lift their hands off of the surface without changing the position of the trunk
  - Can also shift weight to the side and return to a midline position
  - Good trunk control

Hands-dependent Sitter

- This person uses one or both hands on a surface to maintain sitting balance
  - If hands are lifted, the trunk will collapse

Prop Sitter

- This person cannot maintain sitting, even with the support of both arms
  - External support is required

The Hands-free sitter

- Goals
  1. Maximize reach without loss of position
  2. Maximize function
  3. Prevent development of asymmetrical postures
  4. Mitigate pressure issues

The Hands-free sitter

- Clinical Guidelines – Assessment
  - Observation of seated posture
  - Sitting balance
  - Range of motion
  - Muscle strength
  - Sensory status

Assessment

- Observation of seated posture
  - Observe the client in their current seat to ensure that the pelvis is in neutral, the trunk and head are aligned and upright, and the lower extremities are aligned with the hips.
  - Even if a client can sit unsupported, their posture may not be ideal, potentially impacting stability and function.

Assessment

- Sitting balance
  - Static sitting balance
  - Dynamic sitting balance
    - During functional activities
      - i.e. self-propulsion, ability to stay upright over rough terrain or inclines, reach
    - Over time
  - Assessment tool: Boswell-Ruys et al., 2009

Assessment

- Range of Motion
  - Range of motion of the hip joints and flexibility of the lumbar spine are critical in maintaining an upright pelvis.
  - Adequate hip flexion is required for hands-free sitting.

Assessment

- Muscle Strength
  - Manual muscle testing may be indicated to ensure adequate muscle strength for hands-free sitting, as well sitting over time and over varied terrain.

Assessment

- Sensory status
  - Impaired proprioceptive awareness impacts control of movement and position sense.
  - Lack of deep pressure and pain sensation increases pressure injury risk.

The Hands-free sitter

- Clinical Guidelines – Functional Activities
  - Stability
  - Functional Reach
    - transfers

Functional Activities

- Stability
  - Intrinsic
  - Extrinsic
    - If the client is lacking intrinsic stability, the seating system must provide this stability through:
      - Primary support surfaces
      - Secondary support surfaces
      - Secondary supports
  - Stability is critical for functional activities.

Functional Activities

- Functional Reach
  - Reach is dependent on stability, optimal proximal support, upper extremity strength, and ROM.
  - Smaller mobility base footprint allows client to get closer to target.

Functional Activities

- Transfers
  - Many people with good sitting balance can perform an independent transfer.
  - The seating system may need to accommodate the type of transfer.
    - Seat to floor height
    - Lateral obstruction/stability for side to side or sliding board transfers

The Hands-free sitter

- Clinical Guidelines – Interventions
  - Seating system
  - Cushions
  - Backs
  - Secondary supports
  - Orientation of seating
  - Pressure management

Seating Systems

- Hands-free sitters require less postural support than hands-dependent or prop sitters.
- As a result, seating systems used may include:
  - Sling seat and back supports
    - Contributes to posterior pelvic tilt and trunk kyphosis
  - Captain's seating
    - Often used on group 2 PWCs
    - Generic contours, size options
  - Rehab seating
    - More size, contour, and support options
    - More pressure management options

Cushions

- Cushions tend to fall into several categories.
- This is also due to HCPCS codes.

Cushion Categories

- General use
- Positioning
- Skin protection
- Skin protection & positioning
- Adjustable skin protection
- Adjustable skin protection & positioning
- Custom

Cushions

- General use cushions are for clients who do not require a lot of postural support or stability and are at low risk of pressure injuries.
- Positioning cushions are designed to provide increased postural support and stability through aggressive contours, positioning options, and strong contact. These are not designed for users at high risk of pressure injuries.

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Cushions

- Skin Protection cushions are designed to provide superior skin protection for users at high risk of pressure injuries. These are not designed to provide a great deal of postural support and stability.
- Some cushions combine features of these last two categories for users who can benefit from both.

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Cushions - Contour

- Lateral and pre-ischial shelf contours
- The more contour, the more assertive support is provided to keep the pelvis and legs in alignment.
- Lateral and medial contours keep the legs in alignment with the pelvis – limits hip adduction and abduction.
- Pre-ischial shelf limits forward pelvic movement and posterior pelvic tilt.

Cushions – Coccyx Relief

- Another area of pressure injury risk is the coccyx or tailbone.
- Higher risk in clients who have more obvious bony prominences due to muscle atrophy or low weight
- Higher risk in clients who have certain pelvic positions, such as posterior pelvic tilt
  - Can reduce pain

Cushions - materials

- Foam
  - Often multiple layers
    - Allows for softer layers on top for increased envelopment/pressure distribution
    - Firmer layers underneath prevent ‘bottoming out’
  - Viscoelastic foam under at-risk areas
    - High quality foam that contours to body contours, increasing pressure distribution
    - Heavier, so often only used at at-risk areas, like the ITs

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Cushions - materials

- Gel or Air
  - Viscous fluid gel or air under all or just at-risk areas
  - Superior pressure distribution for users at high risk
  - Less stable under ITs, though foam comprising the rest of the surface increases overall stability

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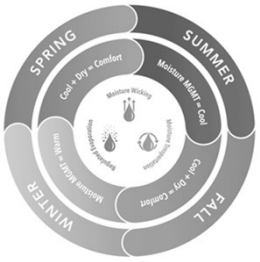
Cushions - covers

- Moisture wicking, transportation, and evaporation
- 4 way stretch
  - Heat and moisture are contributing factors to pressure injury development.
  - The 4 way stretch allows the user to 'sink' into the cushion materials and take full advantage of the material properties.



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Cushions vs. Other Seating Options

- Cushions meet many clients needs as various degrees of contour, materials, and covers are available.
- Secondary support surfaces and secondary supports work with the cushion to provide adequate postural support and stability.

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Cushions vs. Other Seating Options

- Pros:
  - Often less costly than other options
  - Some customization may be available
    - Wedges, asymmetrical seat depth
- Cons:
  - Lack of growth or modification options
  - Sometimes placed in the wheelchair backwards
  - Covers can be lost
  - Materials can be compromised, impacting performance

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Backs

- Generic contours are typically adequate for the hands-free sitter.

Backs

- Generic contours are designed to keep trunk in alignment midline.
- If further support is needed for lateral alignment, external laterals can be added.
- Many are easily removable for wheelchair folding (side to side or folding back down).
- Various heights are available to meet client need.
- Many allow change of angle.
  - Though, this may not truly change thigh to back angle.

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Back Height

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Back Height

- Top of shoulders
  - Fully encompasses scapulae
  - Provides more postural support for the trunk
  - Provides a position of rest
  - Supports anterior trunk support in correct placement
    - At or above level of shoulders
  - Often not required for the hands-free sitter

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Back Height

- Below scapulae/mid thoracic
  - Client has good trunk control – hands-free sitter
  - Allows more movement of the shoulders for optimal self propulsion
    - Longer stroke requires arm to be placed behind back canes
  - For client who does not require anterior trunk support or head support

Back Height

- Top of pelvis/lower thoracic
  - Client has excellent trunk control
  - Client requires maximum trunk movement for functional tasks
  - Client does not require higher back for position of rest

Back Features

- Curved top
  - Provides increased spinal support but allows room for arms to swing during self-propulsion
- Flat top
  - Provides increased posterior shoulder support and works better with anterior trunk supports

Secondary Supports

- Secondary support surfaces include lateral trunk supports, lateral pelvic supports, and posterior head supports
  - The hands-free sitter typically only requires the support from the cushion and back contours.

Secondary Supports

- Secondary supports include pelvic positioning belts, anterior trunk supports. and foot supports (i.e. foot straps)
  - The hands-free sitter typically only requires a pelvic positioning belt to keep the pelvis in neutral and provide stability.

Orientation

- Orientation of the seating system impacts ground clearance, knee clearance, and turning radius
- Posture:
  - Orientation also impacts stability and balance of the user.
- Function:
  - Orientation may impact reach and transfers.

Orientation

- Seat height
  - Impacts transfers, stability, and ground clearance of footplates
  - The height may be higher at the front to increase stability
    - dump
- Backrest angle
  - Impacts balance and postural support

Pressure Management

- Pressure was addressed in another course in this series.
- Hands-free sitters are often at risk for pressure injuries.
- General strategies
  - Good alignment
  - Skin protection cushion
  - Changing positions
  - Redistribute pressure
  - Weight shifts

Case Study

- Lori
- Diagnosis: cerebral palsy, arthritis
- Age: 35 years
- Goals:
  - Improve postural support and stability
  - Tone management in a seated posture
  - Optimize self-propulsion
  - Optimize ADLs

Case Study

- Background information:
  - Lori lives with her parents and attends a day care program 4 days a week.
  - The home and vehicle are accessible.

Case Study

- Medical:
  - Baclofen, Clonazepam – tone management
  - Bladder medication
  - Motrin
  - Right patella subluxated – not painful, but swells
  - Intact sensation
  - No history of skin breakdown
  - No temperature regulation issues

Case Study

- ADLs:
  - Feeding: can feed self, needs help cutting meat
  - Toileting: continent, can transfer to and from the toilet
  - Transfers:
    - Can get up from floor, difficult
    - Transfers from MWC, but has fallen numerous times

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Case Study

- Physical:
  - Increased muscle tone, greater in LEs
  - More extension in LEs, more flexion in UEs
  - Can sit on edge of mat table independently
  - Fixed kyphosis and hyperextended neck
  - Hip flexion is limited (more on right side), and she requires a thigh to trunk angle of 115 degrees to maintain a neutral pelvis, required significant posterior pelvic support
  - Hip and knee extension within functional limits

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Case Study

- Mat exam performed in supine and sitting on the edge of the mat table.
- Optimal postural support and stability were key to promote relaxation, rather than fixing, and improve overall function.

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Case Study

- Current equipment:
  - TiLite TR ultralight MWC
  - Ride Designs custom cushion
  - Jay 3 back
- Posture:
  - Pelvis: mild to moderate posterior pelvic tilt, mild obliquity and rotation – all reducible
  - Trunk: leaning to right side (reducible), kyphosis (non-reducible)
  - LEs: mild windsweeping to left, adducted

Case Study

- Recommendations:
  - Increased seat to back angle to accommodate hip flexion limitations, as well as kyphosis
  - Higher back, but placed just above the top of the cushion to provide improved posterior pelvic support
  - Increased overall support and stability to reduce fixing, reduce tone, increase function
  - Continued use of Ride Designs cushion to provide aggressive posterior pelvic support, stability
  - Pelvic positioning belt
  - Anterior lower leg strap

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Case Study

- Results:
  - Lori is not having any pressure issues
  - Lori is more stable, demonstrating less fixing and is more functional, particularly with her self-propulsion, reaching and transfers

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Questions?

- Email

Thanks!

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