



Seating Technology

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Learning Outcomes

- Identify the impairments that cause a person to need seating technology
- Identify the steps in evaluating clients for seating technology
- Identify the major characteristics and features of different seating technologies



How to cover the world of seating in one hour?

- This is an overview of positioning considerations
- Many resources are available to explore each of these areas in more depth



Positioning Overview

- Goals
- 24 hour approach
- Seating options



Goals of Positioning

- Correct the flexible, accommodate the fixed
- Skeletal alignment/symmetry
- Improve postural control
- “Normalize” muscle tone
- Inhibit abnormal or primitive reflexes
- Proximal stability for distal control/function
- Pressure relief and comfort



24 hour positioning

- We change our position throughout our day and night for rest and function
- Providing positioning in and out of the wheelchair
- Consequences of only addressing positioning in wheelchair



Wheelchair Seating

- Assessment
- Define positioning challenges and the causes
- Development strategies to address these challenges, keeping in mind the goals
- Matching to product
 - Angles
 - Support surfaces
 - Components



Wheelchair Seating: Assessment

- Client/caregiver interview
- Mat exam
- Measurement tools



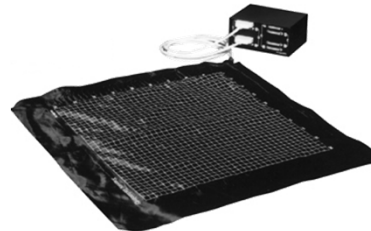
Mat Exam

- Muscle tone
- Motor control
- Postural patterns
- Joint deformities
- Range of motion
- Assess in supine and sitting, if possible
- Look for causes, not just symptoms



Assessment Tools

- Simulation
 - Planar
 - Contoured
- Pressure mapping
- Your hands!



Simulation

- Adds gravity and support surfaces

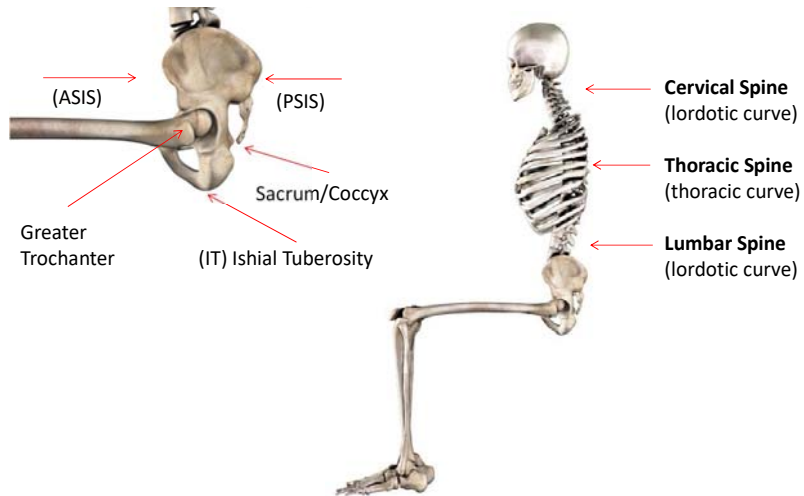


Wheelchair Seating: Define Challenges

- Define the positioning challenges and causes
- Pelvis – usually pairs with trunk challenges
- Trunk
- Lower extremities
- Upper extremities
- Head



Bony Landmarks



Positioning Challenges

Pelvis: posterior tilt



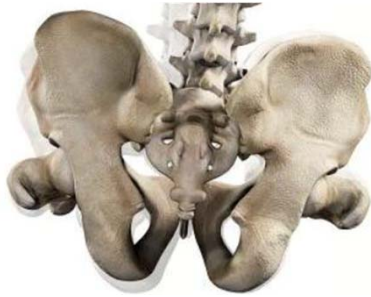
Pelvis: Posterior Tilt



Pelvis Manterior tilt



Pelvic Obliquity



Pelvic Obliquity



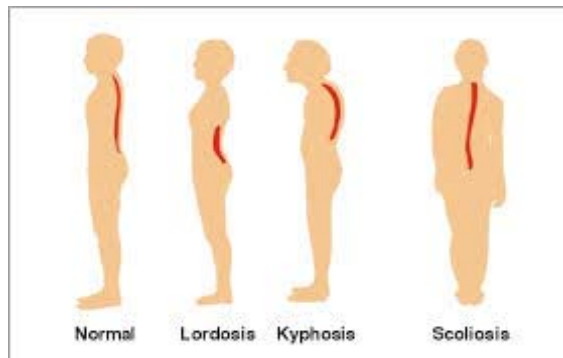
Pelvic Rotation



Positioning Challenges:

Trunk:

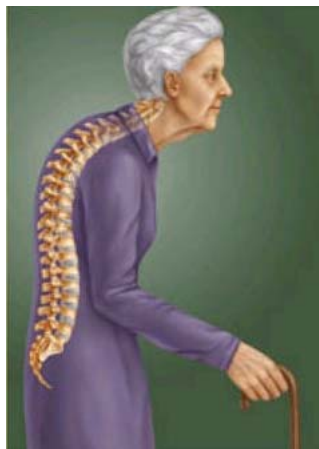
- Scoliosis
- Kyphosis
- Lordosis
- Rotation



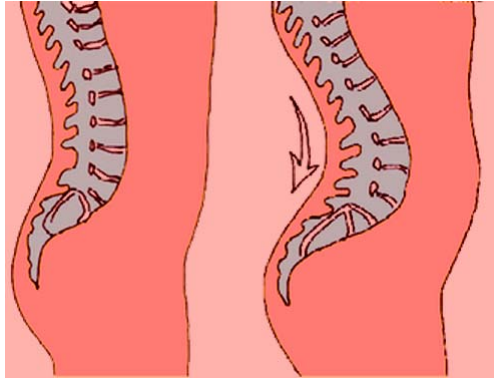
Scoliosis



Kyphosis



Lordosis



Rotation



Positioning Challenges:

Lower Extremities:

- Hip adduction
- Hip abduction
- Hip or knee flexion
- Hip or knee extension
- Ankle and foot limitations



Positioning Challenges:

Upper Extremities:

- Shoulder retraction
- Elbow extension
- Uncontrolled movements



Positioning Challenges:

Head:

- Decreased/limited head control
- No head control
- Lateral flexion



Wheelchair Seating: Develop Positioning Strategies

- Develop positioning strategies
- Keep goals in mind



Wheelchair Seating: match to product

Match to product

- Angles
- Support surfaces
- Components



Angles of Support

- Pelvis: seat to back
- Knee: seat to calfrest
- Ankle: calfrest to footrest
- Position in space
 - tilt
 - recline



Pelvis: Seat to Back angle

- Based on orientation of hips, pelvis, lower spine



Pelvis: Seat to Back angle

Closed

- less than 90 degrees
- can inhibit extensor tone
- can be combined with tilt to prevent falling forward
- can be combined with anterior tilt of thighs
- can be a “task performance” position



Pelvis: Seat to Back angle

Opened

- more than 90 degrees
- can increase extensor tone
- can improve head and trunk control
- provides a resting position



Knee: Seat to Calfrest angle

- Based on orientation of hips and knees



Knee: Seat to Calfrest angle

- Closed (feet closer to base)
 - relieves pull on hamstrings
 - can lead to loss of range
 - may not clear front castors
- Opened (feet ahead of base)
 - clears front castors
 - passive stretch on hamstrings**



Ankle: Calfrest to Footrest

- Based on orientation of knees, ankles, feet



Ankle: Calfrest to Footrest

- Closed
 - dorsiflexion
 - range may not be available
 - can “break up” extensor tone
 - angle adjustable footplates
- Opened
 - plantar flexion
 - may affect ground and castor clearance



Position in Space: Recline



Position in Space: Recline

- Open seat to back angle
- Pros
 - easier catheterization
 - pressure redistribution
 - can do weight shifts at work surface
 - tray remains parallel to floor
 - may relieve orthostatic hypotension
 - passive range of motion at hips and knees
 - transfer may be easier



Position in Space: Recline



Cons

- shear forces can disrupt alignment
- reclining increases pressure over sacral area
- opening seat to back angle can set off spasms
- cannot be used with contoured positioning system
- cannot be used by positioning systems with fixed seat to back angle



Position in Space: Recline

Cons, cont.

- clients with limited ROM at the hips or knees may be pulled out of position
- reclining may affect the client's ability to access other assistive technology devices



Position in Space: Tilt

- Posterior tilt



Position in Space: Tilt

- Anterior tilt



Position in Space: Tilt

- Lateral tilt



Position in Space: Tilt

All angles stay the same: pelvis, knees, ankles



Position in Space: Tilt

Pros

- redistributes pressure
- maintaining angles may inhibit muscle tone and maintains posture
- no shear forces
- other assistive technology devices remain in position relative to the client



Position in Space: Tilt

Pros, cont.

- tilt systems accommodate contoured positioning systems and positioning systems with fixed seat to back angle
- range of motion limitations are accommodated



Position in Space: Tilt

Cons

- pressure relief not as great as with recline systems
- must move away from a work surface to tilt
- items left on tray will slide and fall
- maintaining the hips in flexed position can constrict the bladder
- a leg bag can leak during a tilt



Position in Space: Tilt

Cons, cont.

- lack of movement at hips and knees can lead to range of motion losses
- some tilt systems have a higher seat to floor height than recline systems which can affect transfers and clearance under tables



Support Surfaces

- Linear or planar
- Contoured
- Molded
- Materials



Related Components

- Armrests
- Footrests
- Upper Extremity Support Surface (aka tray)



Review Questions (feel free to discuss with your neighbors)

1. Pelvic asymmetries include:
 - a. Scoliosis, kyphosis, lordosis
 - b. Abduction, adduction, flexion
 - c. Tilt, rotation, obliquity
 - d. Extension, flexion and adduction
2. The following issues are assessed during a mat exam:
 - a. Muscle tone
 - b. Range of motion
 - c. Postural patterns
 - d. All of the above
3. What is a functional advantage of an open seat to back angle?
 - a. Improved head and trunk control
 - b. Increased extensor tone
 - c. Reduced pull on hamstrings
 - d. Providing a "task performance" position



Review Questions (Here are the answers. How did you do?)

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Questions?

