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

Cervical Spine (lordotic curve)
Thoracic Spine (thoracic curve)
Lumbar Spine (lordotic curve)

Greater Trochanter
Sacrum/Coccyx
(ASIS) (PSIS) (IT) Ischial Tuberosity

Positioning Challenges

Pelvis: posterior tilt
Pelvis: Posterior Tilt

Pelvis: Anterior Tilt
Pelvic Obliquity
Pelvic Rotation

Positioning Challenges:

Trunk:
- Scoliosis
- Kyphosis
- Lordosis
- Rotation

Normal  Lordosis  Kyphosis  Scoliosis
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

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

Pros
- 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

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

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?