NEW WHEELCHAIR OR NEW SOLUTIONS?
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1) Plan
   a) Review the more commonly seen postural challenges in those with an SCI and review the basics of a mobility seating evaluation
   b) Address 10 areas of wheelchair and seating system that can be considered with a few simple, cost-effective interventions in each area for the more commonly seen postural issues. Look at what effect each has and cautions to consider.

2) Objectives
   a) Attendees will be able to list several of the more common postural challenges in those with SCI (and other disabilities) and the basics of a mobility seating evaluation
   b) Attendees will be able to list ten areas of wheelchair and seating system that can be considered for interventions
   c) Attendees will be able to list at least two interventions for each of the ten areas addressed and how each can effect posture

3) Why not just order a new wheelchair

4) The First Step - A GOOD EVALUATION
   a) What are the issues? Common postural challenges in SCI.
   b) What are the goals? What is preventing achievement of those goals?
   c) Evaluate the client
   d) Evaluate the chair

5) Seat to Floor Angle
   a) What does this effect?
      i) More anterior angle
         (1) Encourages anterior rotation of pelvis and, thereby, enhances trunk extension
         (2) More dynamic position
         (3) Encourages sliding forward on seat
      ii) More posterior angle
         (1) Encourages posterior pelvic rotation
         (2) More stable position
         (3) Assists in keeping pelvis back in seat
         (4) Can improve thigh support
         (5) Can help to neutralize pelvic rotation in anterior rotation
   b) How can we accomplish?
      i) Adjust axle housing
      ii) Adjust seat frame
      iii) Add wedge under cushion
   c) Cautions
      i) Skin- Transfers weight distribution
      ii) Increasing seat angle and height may affect functional skills
      iii) Increasing front seat height may affect access
      iv) Decreasing seat angle may encourage sliding forward
      v) May affect propulsion positively or negatively
      vi) Anterior angle may create fatigue
6) Back Angle
   a) What does this effect?
      i) More open
         (1) Increases seat depth
         (2) Allows more freedom of movement of arms
         (3) Allows gravity to assist balance
         (4) Accommodates for fixed or functional kyphosis and for lack of hip flexion
      ii) More closed
         (1) Decreases seat depth
         (2) Gives more upright posture
         (3) Decreases extension tone
   b) How can we accomplish?
      i) Adjustable back angles
      ii) Bent backposts
   c) Cautions
      i) Opening may make reaching more difficult
      ii) Opening may encourage forward head positioning
      iii) Closing may decrease stability anteriorly

7) Back Height and Gap
   a) What does this effect?
      i) Gap
         (1) Increased
            (a) Allows pelvis to move back into the chair
            (b) Can assist with rotating pelvis when tilting
            (c) Can allow room for extra tissue
         (2) Decreased can assist in neutralizing anterior rotation
      ii) Height
         (1) Too high can restrict scapular and upper extremity movement
         (2) Too low doesn’t provide adequate support for trunk and/or for scapula
         (3) If user is not stable, he/she will sacral sit
         (4) If scapula retract over top of back when tilted, user will probably acquire significant pain
   b) How can we accomplish?
      i) Move back up/down if physical height of back is adequate
      ii) Modify
      iii) Switch to another back that is shorter, taller, or shaped differently
      iv) Loosen flap and/or upholstery straps at bottom
   c) Cautions
      i) Be sure gap does not allow pelvis to rotate and move back so much that they become an anterior rotator
      ii) Assure that back has sufficient padding to avoid excessive pressure on sacrum and/or PSIS
      iii) Assure thoracic and scapular area are supported sufficiently in both upright and tilted/reclined position

8) Foot/Leg Rest Position
   a) What does this effect?
      i) Bringing feet back takes stretch off hamstrings
ii) Bringing footrests in can help to control abduction and rotation and decrease pressure on hangers
iii) Bringing footrests down can increase leg support and bring legs in to more neutral position
iv) Bringing footrests up can level out thighs to keep person from sliding forward on seat
v) Improves foot support by adjusting amount of contact
vi) Shortens overall length if foot/legrests, feet are brought back

b) How do we accomplish?
i) Loosen, lengthen, move heel loops (or remove them if good calf strap)
ii) Adjust footplates back and in
iii) Loosen or lengthen calf strap/pad
iv) Switch from elevating legrests to standard
v) Lower footplates or raise cushion front for support under thighs
vi) Move hangers back

c) Cautions
i) Make sure heels clear casters
ii) Make sure there is sufficient ROM in knees, ankles, hips or feet will slide forward off footrests
iii) Make sure ground clearance is sufficient
iv) Make sure knees aren’t too high for necessary access
v) Make sure feet are well supported

9) Pelvic Guides
a) What do these affect?
i) Keep hips centered in wheelchair
ii) If obliquity is long-standing or created by function/spasticity should consider even if it does not appear pelvis is shifting
iii) Decreases windswept positioning

b) How do we accomplish?
i) Adding to wet-weather guards
ii) Adding to armrest panel
iii) Adding lower lateral
iv) Constructing removable pad
v) Constructing non-removable pad
vi) Teaching positioning

c) Cautions
i) If tendency is to shift strongly, need to be sure it is well padded
ii) If contour or height is not sufficient, pelvis may shift over onto it
iii) If too thick, may over correct
iv) Instruction is essential for proper use
v) May prevent armrest from flipping back

10) Cushion Modifications
a) What do these effect?
i) Positioning and support of legs
ii) Control, stability, positioning, and support of pelvis
iii) Improvement in pressure distribution for comfort and skin integrity
iv) Decreases risk of trauma

b) How do we accomplish?
i) Commercially available accessories
ii) Custom
   (1) Strategically placed and sized foam will add contour to cushion
   (2) Modifications
   (3) Manufacturer mods

iii) Cautions
   (1) Additions and subtractions create pressures- be sure there is sufficient protection
   (2) Assure mods do not effect function such as adductor wedges impacting transfers
   (3) Assure mods do not impact skin for clients who sit differently on cushion for some activities
   (4) Assure add-on is sufficient to control

11) Trunk Supports
   a) What do these effect?
      i) Correction of scoliosis, leaning
      ii) Stability/Safety for mobility and function
      iii) Balance
      iv) Ability to use upper extremities
      v) Comfort
      vi) Decrease in fatigue
      vii) Decrease ability to move
      viii) Stability versus mobility
   b) How do we accomplish?
      i) Commercially available
      ii) Custom Mods
      iii) Contoured Backs
      iv) Corsets
   c) Cautions
      i) Need to be adjustable in all planes
      ii) May need 3 points of control
      iii) Evaluate in dynamic as well as static postures when determining placement
      iv) May require extra padding for pressure relief
      v) Need to slowly correct or accommodate for tight or fixed postures
      vi) Need to be monitored for fit with any changing of clothing and weight
      vii) Need to increase wearing time on corsets
      viii) May need to be swingaway for functional tasks

12) Lumbar/Pelvic Supports
   a) What do these effect?
      i) Can control posterior rotation of pelvis
      ii) Support lumbar curve
      iii) Can decrease anterior rotation of pelvis
   b) How do we accomplish?
      i) Commercially available add ons/ins
      ii) Adjustable upholstery
      iii) Custom manufactured
   c) Cautions
      i) Assure flexibility of lumbar spine
      ii) Placement/Size
      iii) Upper trunk balance
      iv) Skin
13) Armrests and Drive Control
   a) What do these effect?
      i) Reaching can cause rotation, scoliosis, anterior collapse, and pain
      ii) Too close can cause shoulder and wrist strain from hyperextension
      iii) Too low can exaggerate subluxation and encourage scoliosis
      iv) Too high can cause shoulder and neck pain
      v) Insufficient support can cause pain and leaning
      vi) Can widen or narrow for improved fit
   b) How do we accomplish?
      i) Joystick
      ii) Armrests
      iii) Pads
   c) Cautions
      i) Asymmetry

14) Headrests
   a) What do these effect?
      i) If inadequate neck control, headrest should support head in all directions, control asymmetry
      ii) Use of head switches can encourage asymmetry
      iii) If adequate neck control, the headrest should just support the head when in a tilted or reclined position
      iv) Too far forward will encourage forward head position, rounding of shoulders
      v) Too far back will encourage cervical extension, problems with swallowing, visual field, pain
   b) How do we accomplish
      i) May need to reverse the standard bracketry configuration
      ii) Most headrest hardware allows for adjustment on multiple planes
      iii) Can add on lateral pads or reposition
      iv) Can switch to different size, contour of pad
      v) Can change switches to opposite side
      vi) Baseball cap anterior control
   c) Cautions
      i) This should be the last thing that is addressed
      ii) Teach client that if headrest isn’t correct, they probably aren’t positioned correctly
      iii) Anything that encourages asymmetry should be switched side to side frequently if possible (switches, breath controls, etc.)
      iv) Unless client doesn’t have neck control, shouldn’t contact in upright position

15) Conclusions and questions

Speaker Bio

Cindy Smith, PT. Out-Patient Therapy Coordinator at Craig Hospital in Englewood, CO. Has been in the Out-patient SCI program at Craig for over 17 years and is an integral team member in both Seating/Positioning Clinic and Skin Clinic