

# Assessment of the complex client from postural support to alternative driving options

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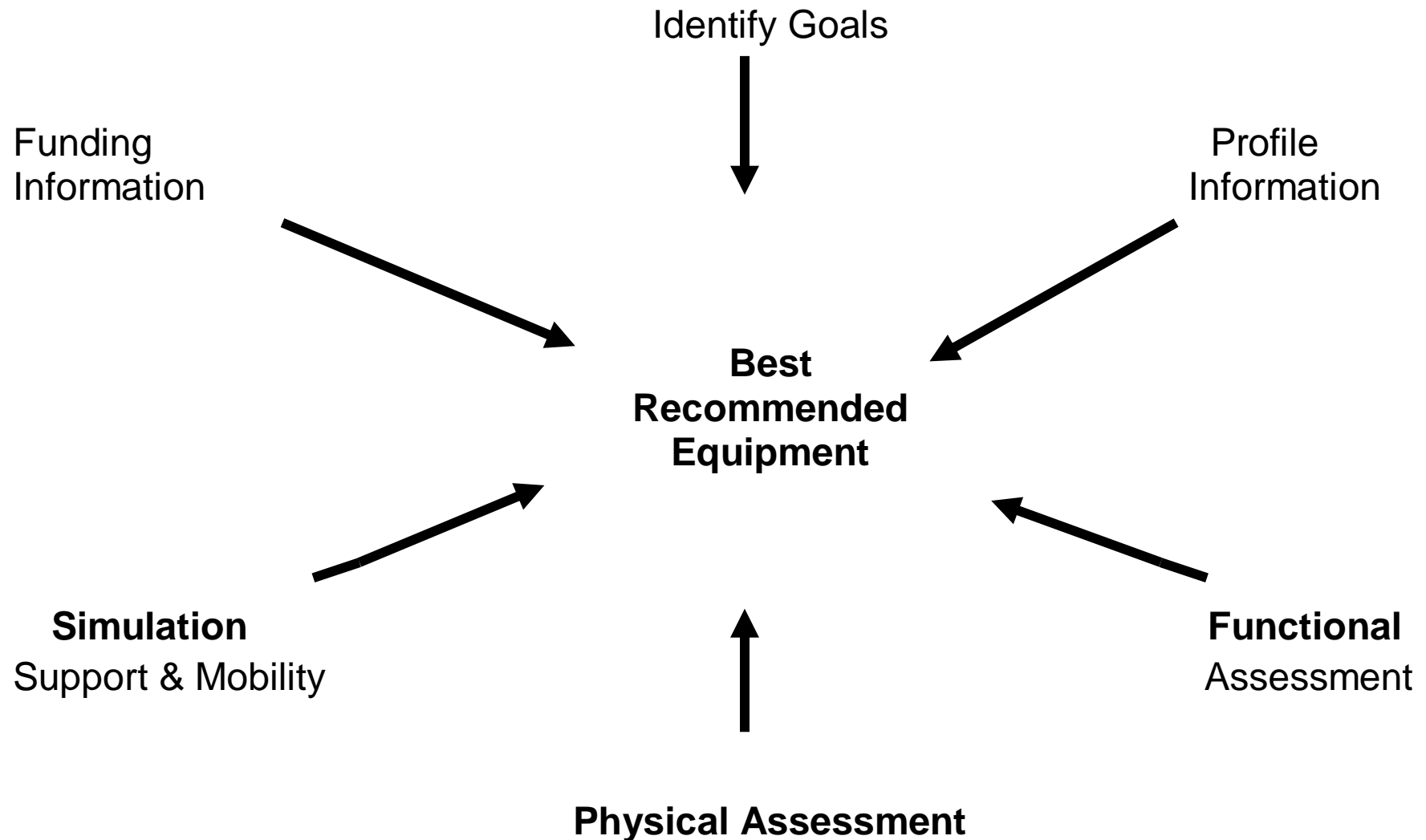
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# THE EVALUATION PROCESS

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## I. The Art of Communication

“a handicap is not a characteristic of a person but rather describes a relationship between and an individual and the environment” - C. McCarty

- 1) Are you interested in participating to create a change in this relationship?
- 2) Expert Model vs. Interactive Model (Scott)
  - a) Expert Model: The provider is considered the expert and following the provider’s assessment a solution (assumed to be), agreeable to the consumer, is initiated and implemented.
  - b) Interactive Model: The provider comes into process with greater understanding of clinical status and potential technology options, the consumer possesses a greater intuition about their own functional status, aspirations and goals.
- 3) Interactive Model focuses attention on the processes of:
  - a) Communication between provider and consumer/advocates
  - b) Consumer/Advocate education
  - c) Consumer/Advocate understanding of the proposed interventions
  - d) Consumer/Advocate participation in and joint responsibility for intervention decision making.
- 4) Communication skills needed to participate in the Interactive Model:
  - a) Concentrate first on understanding the consumer, then on being understood.
  - b) Ask one question and wait for an answer.
  - c) Focus on the answer, not you next question.
  - d) Test for your understanding  
Listening = what they said  
Understanding = what they meant.
- 5) Video Clips
  - a) Consumer’s interests in “ Business Knows Best”
  
  
  - b) Consumer’s interests in “ Terrorist Therapist”

## **II. PRINCIPLES OF POSITIONING**

1. Sitting Posture with Intact Neuromuscular Control
  - A. Head positioned above hips
  - B. Spine has natural curves
  - C. Pelvis is level and not tilted
  - D. Thighs slightly abducted
  - E. Feet resting at neutral
  
2. Remove Internal Support of Normal Tone, ligaments, and tendons
  - A. Effect of hypotonia with gravity and desire for balance
    1. Posture pelvic tilt - increases base of support
    2. Kyphotic spine - center of gravity moved behind base of support
  - B. Effect of hypertonicity and asymmetrical muscle pull
    1. Pelvic obliquity, hip subluxation
    2. Scoliotic spine curvature, rotation possible
  
3. Postural Support Provides the Support Lacking due to Central Nervous System Dysfunction
  - A. Forms of postural support
    1. Spinal fixation
    2. Intimate support (body jacket, corset)
    3. Adaptive seating
      - \* Linear
      - \* Contoured
      - \* Molded
  
4. Goal of Adaptive Seating
  - A. Provide sufficient external support to restore normal sitting posture without restricting function, and to maximize pressure distribution to prevent tissue trauma
  
5. Classification of Sitters
  - A. Hands free sitter - able to maintain erect trunk position without hand support
  - B. Hands dependent sitter - able to maintain erect trunk when using upper extremities for support. When asked to lift arms, trunk begins to collapse
  - C. Prop sitters - unable to maintain an upright posture against gravity without full support
  
6. Pelvis is the Key
  - A. Effect of Posterior Pelvic Tilt on Balance
  
  
  - B. Effect of Anterior Pelvic Tilt on Balance

### III. POSITIONING EVALUATION

1. Observe the individual in an unsupported sitting position.

Ask individual to raise their arms, if possible.

Are they a:

- A. Hands free sitter
- B. Hands dependent sitter
- C. Prop sitter

#### POSITION IN SUPINE ON A FIRM MAT

2. What are the available pelvic mobility and lower extremity joint ranges?

- A. Check available pelvic mobility:

1. Anterior/Posterior pelvic mobility:

- a. Posterior rotation: Position yourself on one side of the person. Using your hand closest to their head, locate and hold the ASIS closest to you. Use your arm closest to their feet to hold under their knees. Flex their hips and knees at the same time until the thighs rest on their stomach and the buttocks has rocked up off the mat surface. Person is rolled up into a ball, lumbar spine rounded, pelvis is posteriorly tilted.

- b. Anterior rotation: Start with thighs on chest position (see above). Keep one hand on the ASIS. With the other arm behind the knees, slowly extend the hips and knees until the legs are straight. Take your arm out from under the knees and reach across the person's body and slide your palm under the pelvis on the opposite side of the body. (To gain leverage, if you are kneeling next to the client, you will need to assume a half-kneeling position and turn your body to face the top half of the persons body.) Rock your own body back pulling on the backside of the pelvis to create an exaggerated lumbar lordosis and pull the pelvis into an anteriorly tilted position.

2. Pelvic Obliquity: Place each of your thumbs on the persons ASIS. Rest the web space of your hand and your index finger on the pelvic crest. Note the "resting" orientation of the pelvis. Kneeling next to the person, place one arm under the knees, support the legs in a flexed position. Pull both legs toward you, flexing the trunk on the side closest to you and extending the opposite side. Maintaining this trunk flexed position, let the feet rest on the mat and re-palpate the ASIS. The side closest to you should be higher than the opposite side. Move yourself to the other side and repeat

the procedure. Can you return the pelvis to a midline position? If not, which side is higher than the other?

3. Pelvic Rotation: Start with the pelvis in a centered position. Position yourself in a 1/2 kneeling position next to the person. Place your palm on the ASIS closest to you. With your other hand reach behind the person and place your hand over the posterior pelvic crest. At the same time, push down on the ASIS and pull up on the posterior pelvic crest to rotate the pelvis. Reverse your hand position. Slide your palm from the ASIS closest to you around the back to the posterior pelvic crest. Move your hand from the posterior crest forward and place your palm on the ASIS. Repeat the rotation, this time in the opposite direction.

Before proceeding, Position the pelvis in the best "corrected" position possible. Record findings about pelvic mobility on assessment form.

- B. Check hip flexion in supine while palpating the pelvis in the best corrected position.
  1. **Thigh to Trunk Angle.** Kneel next to the person. With your hand, which is closest to their head, hold the pelvis. Thumb on ASIS, web space and index finger on crest. With your other hand hold the back of the leg closest to you, under the knee and flex at the hip. As you move the hip toward 90 degrees of flexion, slow down. Concentrate on your thumb and index finger, when you feel movement of the pelvis under your thumb, stop and observe the amount of hip flexion. Repeat the movement starting back with 45 degrees of flexion and slowly flexion until you feel the pelvis start to "rock". Record results on form.  
Move to the other side of the body. Find and hold the ASIS and pelvic crest. Position your arm under the knee closest to you and repeat the procedure. Record results on form.

#### C. Thigh to Lower Leg angle

1. Hamstring range - 2 joint muscle. Maintain your position kneeling next to the person. Hold the ASIS and the pelvic crest with the hand closest to the person's head. Slide the other arm under the knee and wrap your hand onto the knee cap, your elbow and forearm should be supporting the lower leg. Flex the hip to range available, without pelvic rocking. Now extend the knee by pushing the knee cap and extending your elbow toward the ceiling. As the knee extends, concentrate on any movement you may feel under

your thumb, indicating the pelvis is being pulled into a posterior tilted position. Record your findings on form. Move to the other side and repeat the procedure. Record.

- D. Hip abduction /adduction and rotations
  - 1. Start with one leg extended on the mat. Flex the other leg at the hip and the knee. With a flexed hip, slowly abduct the hip and then adduct. Return to a midline position and rotate the lower leg, internally then externally. Caution: Subluxed or dislocated hips often have limitations in joint range, especially in abduction and possibly external rotation. Record findings on form. Move to the other side of the body and repeat both procedures with the other leg.

If the person naturally assumes a windswept deformity, it is critical to determine the available passive abduction and adduction range, and not position the hip into a neutral position, if range is not available.

- E. Ankle and Foot position: Can the foot be positioned so that the sole of the foot is a weight bearing area. If foot deformities prevent the sole from being a weight bearing area, determine which part of the foot will need to be supported while in the sitting position. Holding a "corrected" foot position is most often best accomplished with an orthotic and not from extensive modifications to the footrests.

### 3. Skin Inspection

- A. Check all weight bearing areas
  - 1. Note areas of persistent redness
  - 2. Note size, shape and location of any open areas
  - 3. Determine mechanism of trauma:
    - a. pressure
    - b. shear
    - c. moisture

### **Sitting - up: Integrate findings from supine evaluation into supported sitting**

- 4 Sit the individual up against gravity.
  - A. Assist the person to assume a sitting position over the edge of the mat. Ask to remove a shirt (or at very least lift the back of a shirt to see spine and pelvis. Position yourself behind the person, placing your legs on either side of theirs and provide pelvic support with the inside of your thighs.

Position the hips in the available amount of flexion found during the supine eval. Let knees flex under the mat, if 90 degrees of flexion is not available with hips flexed.  
Palpate spinous processes from cervical through sacral regions.

1. Mobility of lumbar spine
  2. Scoliosis - flexibility
  3. Kyphosis - flexibility
  4. Hyperlordosis - flexibility
5. Determine location and amount of support to achieve and hold balanced position.
1. Maintain your leg position to provide pelvic. Position your hands on the trunk to provide support and trunk control, then observe:
    - A. Head position
    - B. Upper/lower extremity position
    - C. Effect of tilt or recline
  2. Determine whether you are able to "correct" into a desired position or are you accommodating a fixed position. How much force are you hands and legs applying to the person to hold this position? (Minimal, Moderate, Maximal force).
  3. Can you find a "mutually agreed" position? A position which allows the person to be relaxed, functional and feel well supported. Can the person or their caregivers get them into this position?
6. Record observations - See Evaluations Findings.
7. Put it altogether
- A. Is the pelvis flexible or is it fixed in a position?
    1. Will your intervention need to reduce a flexible deformity or accommodate a fixed deformity?
  - B. Think about the recorded hip range in terms of the angle between the seat surface and the backrest.
  - C. Do the hamstring muscles have enough flexibility to allow the feet to rest on standard foot plates?  
To keep the hamstrings on slack, will the footplate need to be closer to the front edge of the seat?
  - D. Are the spinal curves flexible or fixed?



1. Will your intervention need to reduce a flexible deformity or accommodate a fixed deformity?
2. How much support is needed to maintain the agreed upon position?
3. Where will the supports need to be located?

## Seating Evaluation Findings

### Supine Assessment

1. Pelvic Tilt:                      Neutral achieved                        
   Fixed Posterior Tilt                        
   Fixed Anterior Tilt
2. Pelvic Obliquity                      Neutral achieved                        
   Right Higher                        
   Left Higher
3. Pelvic Rotation                      Neutral Achieved                        
   Right side forward                        
   Left side forward
4. Thigh to Trunk Angle  
   Right                      \_\_\_\_\_ degrees  
   Left                      \_\_\_\_\_ degrees
5. Thigh to Lower leg angle  
   Right                      \_\_\_\_\_ degrees  
   Left                      \_\_\_\_\_ degrees
6. Hip abduction / adduction  
   Right, neutral achieved                        
   Right, \_\_\_\_\_ (ab or adducted)   
  
   Left, neutral achieved                        
   Left, \_\_\_\_\_ (ab or adducted)
7. Foot Position  
   Right: Weight bearing on sole                        
                        Medial weight bearing                        
                        Lateral weight bearing                        
                        Weight bearing on toes                        
  
   Left: Weight bearing on sole                        
                        Medial weight bearing                        
                        Lateral weight bearing                        
                        Weight bearing on toes

Describe Supported/ corrected Upright Sitting Position:

**Synthesis of Findings  
Supine and Seating Assessment**

<b>HANDS FREE SITTER</b>	<b>HANDS DEPENDENT SITTER</b>	<b>PROP SITTER</b>
<p>1. Using Intrinsic Muscle Control for Trunk Support against Gravity in the seated position.</p> <ul style="list-style-type: none"> <li>• Good Balance in the seated position, able to dynamically change seated position.</li> <li>• External Postural Support Needs- MINIMAL</li> <li>• Primary Need for Support of the lower back - Lumbar / Sacral Support – Posterior Support Only.</li> </ul>	<p>1. Able to achieve a seated position, though needs external support to maintain position.</p> <ul style="list-style-type: none"> <li>• Fair Balance – very limited ability to dynamically change seating position, rely on UE for support when sitting on mat.</li> <li>• External Support Needs – Moderate</li> <li>• Primary Need for postural support – Posterior and lateral:               <ul style="list-style-type: none"> <li>a) Lateral Supports at pelvis and trunk .</li> </ul> </li> </ul>	<p>1. Unable to achieve or maintain upright seated position, without being supported by someone else.</p> <ul style="list-style-type: none"> <li>• Little to no Balance or righting reactions when placed in a seated position.</li> <li>• External Support Need – Maximum</li> <li>• Primary Support Need – full contact - pelvis, trunk and head.</li> </ul>

## Anatomical Measurements:

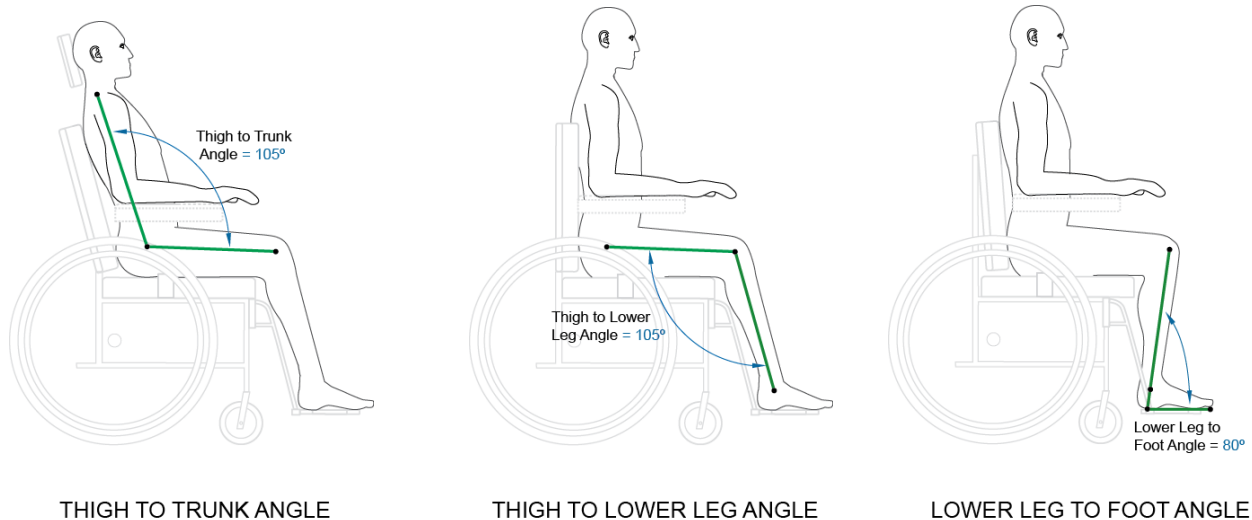
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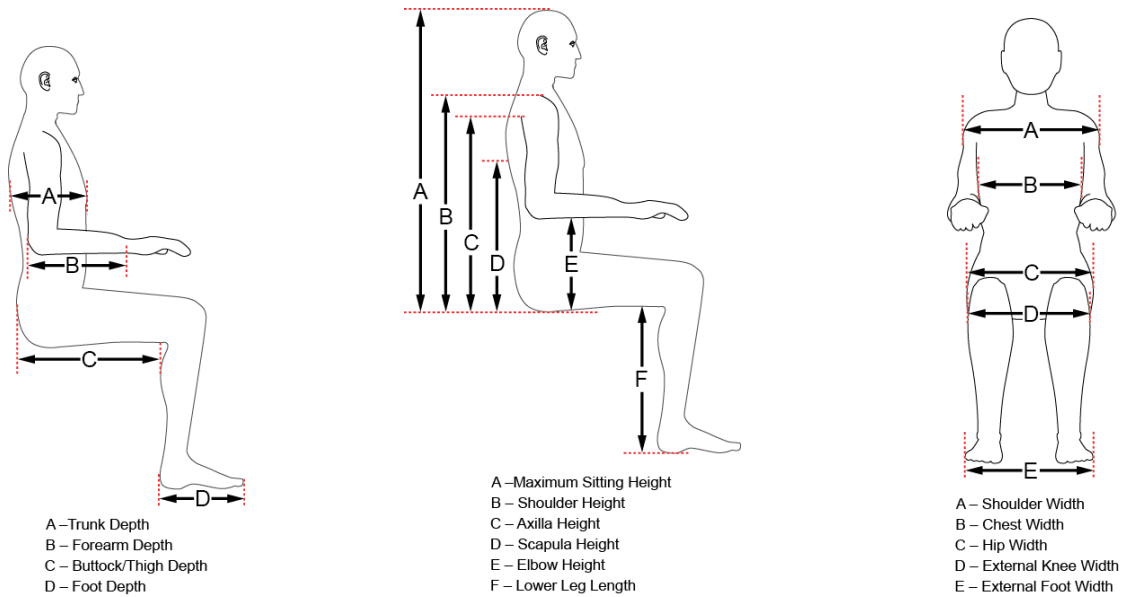
Waugh, K. and Crane, B. (2018). Standardized Terms and Measures. In M. Lange & J. Minkel (Eds.), *Seating and Wheeled Mobility: a Clinical Resource Guide* (pp. 317-332). Thorofare, NJ: Slack Incorporated.

### **Basic measurement set for relative body segment angles**

The three relative body segment angles pictured in Figure 11 (below) provide a basic set of measures that can quantify a person's sitting position from a side view, and help determine the corresponding relative angles of the wheelchair seating system. Documenting these primary angles should become standard practice when assessing any individual with postural support needs for a wheelchair.

- **Thigh to trunk angle:** The relative angle between the thigh and the trunk, viewed from the side. The angle that is above the thigh is measured.
  - **Right** \_\_\_\_\_ **Left** \_\_\_\_\_
- **Thigh to lower leg angle:** The relative angle between the thigh and the lower leg, viewed from the side. The angle that is behind the lower leg is measured.
  - **Right** \_\_\_\_\_ **Left** \_\_\_\_\_
- **Lower leg to foot angle:** The relative angle between the lower leg and the foot, viewed from the side. The angle that is above the foot is measured.
  - **Right** \_\_\_\_\_ **Left** \_\_\_\_\_





**Figure 3: Common Linear Body Measures**

**Basic measurement set for the hands-free sitter**

For a person who sits symmetrically with simple seating needs (i.e. the hands-free sitter), the following basic set of linear measures should be taken:

- Hip width \_\_\_\_\_
- Chest width \_\_\_\_\_
- Shoulder width \_\_\_\_\_
- External knee width (if wider than hip width) \_\_\_\_\_
- Buttock/ thigh depth
  - Right \_\_\_\_\_ Left \_\_\_\_\_
- Lower leg length
  - Right \_\_\_\_\_ Left \_\_\_\_\_
- Elbow height
  - Right \_\_\_\_\_ Left \_\_\_\_\_
- Shoulder height\*
  - Right \_\_\_\_\_ Left \_\_\_\_\_
- Maximum sitting height

\*Scapula height or axilla height can be taken as an alternative to shoulder height, depending on the planned style of back support, to help determine desired back support length and height.

Joint range of motion	Relative Body Segment Angles	Relative Support Surface Angles	Wheelchair Frame Feature requirement
Max Hip Flexion	Thigh/Trunk angle	Seat/Back support angle	
Popliteal Angle	Thigh/Lower leg angle	Seat/LL support angle	

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### **Professional Associations**

RESNA, The Rehabilitation Engineering and Assistive Technology Society of N. A.  
1700 N. Moore St. Suite 1540, Arlington, VA 22209 (703)524-6686. [www.resna.org](http://www.resna.org)

### **Web Sites**

1. [www.newmobility.com](http://www.newmobility.com) – New Mobility magazine – for and about people with disabilities

2. [www.wheelchairskillstesting.ca](http://www.wheelchairskillstesting.ca) – Wheelchair Skills Testing – Test and methods for training people on the skills to use both manual and power wheelchairs.
3. <http://www.seating.ie/> - European Seating Symposium – Study Days between a Conference presented every other year. June 2016
4. <http://sitsite.socialstyrelsen.dk/Nordic-Seating-Symposium.391.aspx> - Nordic Seating Symposium – presented every 3 years in a Nordic country.
5. <http://www.rstce.pitt.edu/index.html> - University of Pittsburgh Continuing Education Site.

International Seating Symposium – presented every year:

2017 - Nashville, TN - <http://www.rstce.pitt.edu/index.html>

2018- Vancouver, BC -

<http://www.interprofessional.ubc.ca/ISS2014/default.asp>