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Wheelchair Seating: The Mat Assessment

Michelle L. Lange, OTR/L, ABDA, ATP/SMS

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Learning Outcomes

1. The participants will be able to list 3 components of a mat assessment.
2. The participants will be able to describe the appropriate steps in assessing available hip and knee flexion for a seated position.
3. The participants will be able to describe where postural support is required in a wheelchair seating system based on the mat assessment.

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What we are covering in this course:

- What is the Mat Assessment?
- Goals
- Components
- Supine
- Sitting
- Translation to seating recommendations

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What is the Mat Assessment?

- The starting point of a wheelchair seating assessment is the mat assessment or mat exam.
- It is critical to remove the client from their current seating and perform a full physical assessment of available range, postural tendencies, postural support needs, optimal seated angles, and any orthopedic asymmetries which need to be accommodated.

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Goals

- The goals of the mat assessment are:
  - To determine available range for a seated posture
  - To determine where support surfaces are required
  - To determine seated angles
  - What we can support with our hands, the seating system can also support

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Mat Exam Components

- The components of the mat exam include the following:
  - Muscle Tone
  - Muscle Strength
  - Range of Motion
  - Reflexes
  - Movement patterns
  - Postural Control

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Mat Exam Components

1. Describe reflexes and influence on body movements and posture
2. Describe muscle tone and influence on body movements and posture
3. Note any range of motion limitations
   Particularly those impacting seating
4. Note any orthopedic asymmetries

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Mat Exam Documentation

- Look for causes, not just symptoms
  - Your justification is to address the cause
  - i.e. poor trunk control, leading to trunk kyphosis…

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Mat Exam

- Why not just evaluate the client in the wheelchair?
  - Supine eliminates influence of gravity
  - By removing that support in sitting, it is easier and clearer to see what is going on
- How about using a bed?
  - The bed surface is too soft for this assessment

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Muscle Tone

- Muscle tone can be measured several ways
- Why do we measure this?
- Muscle tone can “pull” the body into undesirable postures and impair function
- Certain seated postures can inhibit or “break up” tone

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Muscle Tone

- How do we measure muscle tone?
  - Modified Ashworth Scale most common tool

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Muscle Strength

- Muscle strength can be measured several ways, as well
- Why?
- Impaired strength may be a justification for an ultralight MWC, power assist wheels or a PWC
- Impacts ability to self propel, sometimes more so over distance or varied terrain
  - Cardiovascular status, as well

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Range of motion

- It can take a long time to do a full ROM exam
- Usually only necessary to look at key areas
- Can the pelvis be placed at neutral without spinal movement?
- Are there any fixed ROM losses? Spinal or pelvic asymmetries?
- Can the knees be extended without posterior pelvic tilt? How far?

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Postural control

- Always examine the client in supine and sitting at the edge of the mat
- Why?
- Supine eliminates gravity so you can check range, tone, strength and alignment without gravitation forces
- Sitting allows the evaluator to start "simulating" angles and support surfaces
  - What you can support with your hand, can be accomplished in a seating system

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The Mat Assessment

Supine

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CONTINUED

Supine

- Begin with the client in supine on the mat table, as tolerated
- Use pillow under head, as needed

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Supine

- In Supine, note:
  - Range of motion
  - Muscle tone
  - Flexibility
  - Alignment

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Supine

- Starting with hips extended, slowly begin to flex one hip while keeping a hold of the client's pelvis with your other hand
- Can the pelvis be placed in neutral?
- Determine how far the hip can be flexed without the pelvis moving into a posterior tilt
  - This determines seat to back angle
- Keep the knee extended to at least 90 degrees as you flex the hip

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Supine

- If the client cannot tolerate a supine position, attempt to perform this assessment in sidelying
- Gravity is still eliminated
- Examine the top hip and then roll to the other side, as tolerated

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Measurements

- The following measurements are often taken in supine:
  - Range of motion
    - Bilateral hip flexion with knee at 90 degrees
    - Bilateral knee extension
    - Ankle flexion
  - Body dimensions
    - Chest width
    - Hip width
    - Seat depth

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Supine Examination

- Video of determining available hip flexion

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The Mat Assessment

Sitting

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Sitting

- Next, position the client in sitting at the edge of the mat table
- Preferably with support under feet
- This may require one person behind the client and one in front
- If you can only be behind the client, place a rolling mirror in front of the client so you can observe posture from that angle

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Sitting

- Attempt to correct the pelvis to a neutral alignment and support it there
  - Tilt, rotation, obliquity
  - Clinician's flexed leg behind the pelvis is helpful

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Sitting

- Provide support to the trunk to bring to upright
- Lean the client back slightly, look for a point of head balance
- Available range, trunk control and head control/balance will help determine seat to back angle
- Seat to back angle will also be determined by available hip flexion

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Sitting

- Once you have provided support required to facilitate a seated position, note the following:
  - Seated angles
  - Where support is required (where your hands are)
  - Position of the hips, trunk, extremities and head
  - Trunk and head control
  - Asymmetries

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Sitting Examination

- Video of determining where support is needed for upright sitting

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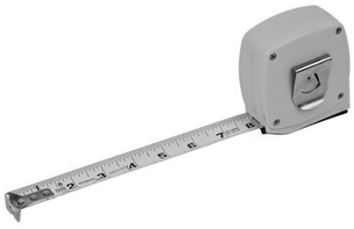
Measurements



- The measurements are often done by the supplier, as they are ultimately responsible for any error in final seating system dimensions

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Dimensional Measurements

- Body dimensions are measured to determine the exact sizes of primary support surfaces and secondary support components
- Accuracy is essential!
- Too small: can lead to pressure
- Too big: can lead to poor posture and function

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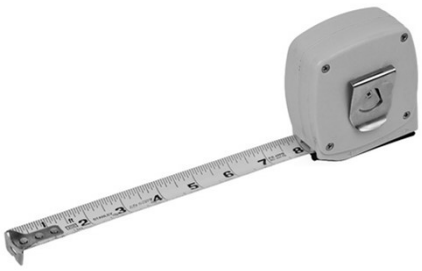
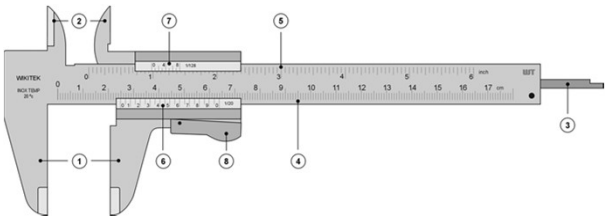
Measurement Tools

- Measuring Tape
  - Metal
- Calipers





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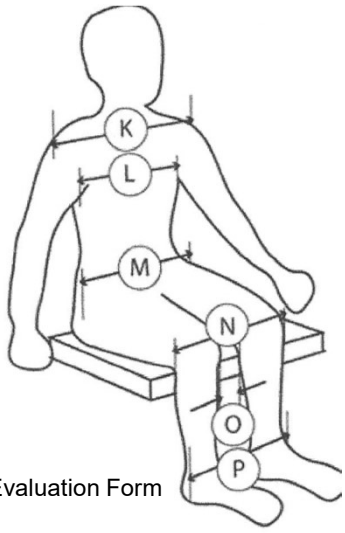
Sitting

- Measurements commonly taken in sitting:
  - Shoulder width
  - Chest width
  - Chest depth
  - Hip width
  - Between knees
  - Upper leg length
  - Lower leg length
  - Foot length



Wheelchair and Seating Evaluation Form

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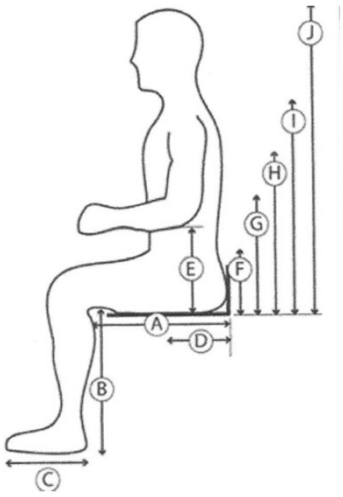
Sitting

- Measurements commonly taken in sitting:
  - Seat to:
    - Top of head
    - Occiput
    - Axilla
    - Top of shoulder
    - Acromion process
    - Inferior angle of scapula
    - Elbow
    - Iliac crest



Wheelchair and Seating Evaluation Form

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The Mat Assessment

Translation to wheelchair seating system

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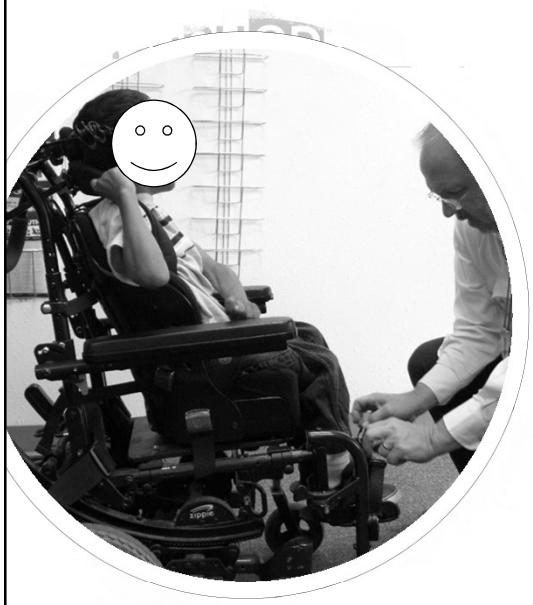

Translation

- The support required to maintain an upright seated position on the edge of mat table is similar to the support that will be required in a seating system
- The body angles that optimize trunk and head control define the wheelchair seating system angles
- Measure
- Take photos!
- Remember, what we can support with our hands, the seating system can also support

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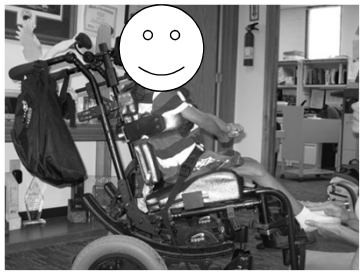
Case Study



- Taylor
- Age 8 years
- Cerebral palsy
- Significant extension throughout
- MWC with LSS

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Mat Exam - Supine

- Taylor's position in the current seating system was assessed and documented
- Taylor was then evaluated in supine

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Mat Exam - Supine

- Results:
  - Taylor had adequate range of motion in his hips and knees to maintain a seated position
  - He required support to maintain his pelvis in neutral as he has a very strong tendency toward a posterior pelvic tilt
  - He also required strong support to maintain hips and knees in a flexed position. The ideal angle of the hips and knees was ascertained to reduce overall extension

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Mat Exam - Sitting

- Taylor had adequate range of motion to be placed in a symmetrical alignment
- He had a strong tendency for flexion of his left side, leading to lateral scoliosis, left lateral neck flexion and pelvic obliquity (high on left)

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Mat Exam - Sitting

- Results:
  - With adequate support posteriorly and laterally, Taylor could be positioned in a neutral and upright sitting position
  - He also required hip and knee flexion to be maintained, limiting his overall extension
  - He required well distributed and intimate contact to maintain this position
    - Molded seating

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An Example

- Taylor – he isn't usually that upset!

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Case Study

- Riley
- Age 3
- Post group B strep meningitis
- Adaptive stroller with adaptive seating

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Mat Exam - Supine

- Riley had adequate ROM at the hips and knees for a seated posture
- Subluxed left hip
- Lateral scoliosis developing
  - Possible to correct nearly to midline, but hypermobility to the right side
  - She assumes exaggerated right trunk flexion during sleep
  - ATNR

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Mat Exam - Sitting

- Sitting on edge of mat
- Flexible kyphosis
  - Mild fixed kyphosis
- Use of hands to determine where pressure/contact is required to achieve upright
  - Posterior pelvis
  - Posterior mid-thoracic
  - Posterior head
  - Anterior trunk

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An Example

Riley

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Conclusion

- The Mat Assessment is a critical part of a wheelchair seating assessment
- This determines available range, postural support needs, and seated angles
- Improves outcome of wheelchair seating system

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2. Jones, D. A., & Rader, J. (2015). Seating and Wheeled Mobility for Older Adults Living in Nursing Homes. Topics in Geriatric Rehabilitation, 31(1), 10-18.
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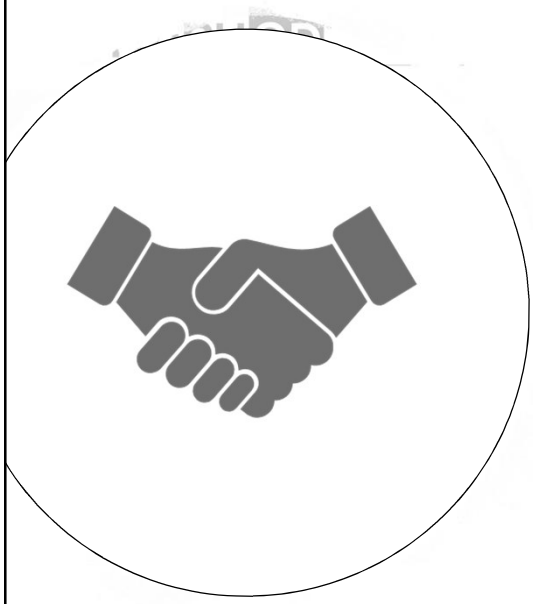

Thank you!

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Contact Information:

- Michelle L. Lange, OTR/L, ABDA, ATP/SMS
- MichelleLange1@outlook.com
- www.atilange.com

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