Seating & Wheelchair Angles

THIGH TO TRUNK ANGLE

Seat-to-Back Support Angle

Assessment Goals

During the range of hip flexion, with the spine in its optimal alignment, the assessment identifies the point at which hip range of motion (ROM) is exceeded and pelvis rotates rearward.

Technical Considerations

Consider altering the seat-to-back support angle to accommodate client's hip ROM.

GREATER THAN 90°

Greater than 90°

- Pelvis may rotate rearward, trunk becomes kyphotic and hips can slide forward.
- Body mass behind the center of gravity - client has greater probability of sliding.
- Extensor tonal patterns may be triggered.

LESS THAN 90°

Less than 90°

If seat to back support angle is less than flexion can tolerate, the pelvis may rotate rearward and client may slide forward or pelvis may anteriorly rotate creating trunk instability.

THIGH TO LOWER LEG ANGLE

Seat-to-Lower Leg Support Angle

Assessment Goals

With the pelvis in its optimal position and thighs loaded, maintain lower leg in best position for loading the foot while respecting hamstring range relative to seating.

Technical Considerations

Seat-to-lower leg support angle can be altered by the hanger angle, seat depth, footplate placement on the hanger as well as use of calf strap or pad.

Greater than 90° If the thigh to lower leg angle is greater than hamstring range can tolerate with the pelvis in optimal alignment, hamstring tightness may pull pelvis forward, pelvis may rotate rearward and client could slide out of chair. It may be more difficult to properly load feet. Chair is longer which may affect maneuverability.

GREATER THAN 90°

Less than 90° If the seat to lower leg support angle is less than quadriceps range can tolerate - pelvis may be pulled into an anterior tilted postion with compensating trunk hyperextension and imbalance.

- More difficult to properly load feet.
- May need higher seat height to avoid caster interference.

LESS THAN 90°

Note: 90° is used as a reference only. All angles should be a direct translation of the body angles found during clinical assessment.

ORIENTATION

Assessment Goals

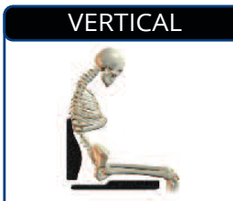
Orientate the client and seating/mobility system in a position relative to gravity, providing optimal functionality and ability to stay upright in the system.

Technical Considerations

Consider mobility base selection

- Seat frame angle adjustability
- Overall length of frame
- Seat-to-floor height
- Ability to interface with seating

VERTICAL



Vertical

- Client may be unable to hold head/trunk upright against gravity.
- Position may require excessive muscle activity.
- Up to 25 degrees of posterior tilt may offer postural stability.
- 45-55 degrees of posterior tilt required for pressure distribution.

TILTED

Tilted

- Client may pull forward - away from the back support.
- Visual orientation may be negatively impacted.
- Consider safe swallow position.
- Consider effect on function.

LOWER LEG TO FOOT ANGLE

Foot Support Angle

Assessment Goals

With the pelvis, thighs and lower leg in optimal alignment, maintain foot in its best position for loading as close to neutral as is possible.

Technical Considerations

Footplate angle.

GREATER THAN 90°

Greater than 90°

- Consider adjusting the footplate angle to accommodate decreased ROM at the ankle joint
- May require higher seat height.
- Consider influence on tonal patterns and abnormal reflexes.

LESS THAN 90°

Less than 90°

- Consider stretch on achilles tendon.
- Consider foot weight loading and stability.
- May require higher seat height.
- Consider influence on tonal patterns and abnormal reflexes.

REFERENCES:

Waugh, K. and Crane, B. (2013). A clinical application guide to standardized wheelchair seating measures of the body and seating support surfaces (rev. Ed.). Denver, CO. University of Colorado Denver. Available from: *http://www.ucdenver.edu/academics/AssistiveTechnologyPartners/resources/WheelchairSeating/Pages/WheelchairGuideForm.aspx*

Waugh, K. and Crane, B. (2013). Glossary of wheelchair terms and definitions. Denver, CO. University of Colorado Denver. Available from: *https://www.ncart.us/uploads/userfiles/files/glossary-of-wheelchair-terms.pdf*

Zwick, D. (2014). How Posture Goes Wrong: Body Shape Distortion in Cerebral Palsy. Available from: *https://www.omicsonline.org/open-access/how-posture-goes-wrong-body-shape-distortion-in-cerebral-palsy-2157-7595.1000e115.php?aid=25348*