

Guide to Fitting and Measuring for Wheelchairs

General Principles:

- Always take client anatomical measurements in sitting on a flat surface
 - Not in current equipment. The equipment could be contributing to the posture.
 - Not in supine. Clients will be a different size and shape in gravity
- Position client in most optimal, functional posture based on your mat evaluation results
 - Simulate the posture you plan to achieve with the seating system
 - Make certain that the client can maintain this posture for required lengths of time on daily basis
 - Assistance might be required to support client in position and measure at the same time
- Use a stiff measuring tape or calipers to increase accuracy
- Measure both right and left sides as appropriate
- If there is a long delay between initial evaluation and funding approval, re-measure
 - Especially with pediatric clients

HIP WIDTH (A) – determines seat width and affects overall chair width

Measure the widest body part in a frontal plane (usually hips or thighs)

- Bring LEs into midline or slight abduction if possible
- To increase accuracy use straight edges on either side of the body and measure between them
- Consider fixed deformities
 - *Fixed LE abduction* – widest part is at the distal femurs
 - ▶ Order chair to fit this width vs the hip width
 - ▶ Fill in spaces on either side of pelvis/hips with lateral supports
 - *Windswept deformity* - measure from hip on adducted side to knee on abducted
 - ▶ Order chair to fit this width vs the hip width
 - ▶ Fill in at adducted side (knee) and abducted side (hip) with lateral supports
 - *Scoliosis* - measure from apex of spinal curve on convex side to hip on other side
 - ▶ Order chair to fit this width vs the hip width
 - ▶ Fill in space on side of pelvis with lateral pelvic support
 - ▶ Support trunk with lateral trunk supports on either side

What do you do with this measurement? WHEELCHAIR WIDTH

Keep same for active, full time users,

Add 1" for clients that are growing or expected to gain weight

CONSIDER:

- Keep chair as narrow as possible
 - ▶ Narrower seat = better wheel access
 - ▶ Narrower seat = more accessible and maneuverable chair
- Add width to accommodate secondary supports as necessary
 - Lateral pelvic and/or thigh supports
- Add width to accommodate orthotics/prosthetics as necessary
 - If worn while in the chair for significant amounts of time during each day

- Consider body type: where is weight gain likely to go?
- Consider disability
 - Hypertonic CP expend a great deal of energy and typically get long and skinny
 - Spina Bifida tend to get wide trunks and hips, narrower lower limbs
- Consider need to accommodate for potential weight changes
 - New spinal injuries
 - ▶ Muscles might atrophy causing potential decrease in width
 - ▶ Might have a decrease in activity level causing potential increase in weight and width
 - Feeding tube – will always cause increase in client size
 - Debilitating conditions – might cause a potential decrease in width
- Consider potential growth spurts
 - Consider age, gender, family traits
 - Too much growth in a pediatric system can compromise function!

KNEE WIDTH (B) – determines wheelchair front end width

Measure outside of knee to outside of knee at widest body part

- Bring LEs into midline
- Consider fixed deformities
 - *Fixed LE abduction* – widest part is at the distal femurs
 - ▶ Order chair to fit this width vs the hip width
 - ▶ Fill in spaces on either side of pelvis/hips with lateral supports
 - *Windswept deformity* - measure actual width of femurs
 - ▶ Order chair to fit this width vs the hip width
 - ▶ Fill in at adducted side (knee) and abducted side (hip) with lateral supports
- Add width to accommodate secondary supports as necessary
 - Lateral pelvic and/or thigh supports
- Add width to accommodate orthotics/prosthetics as necessary
 - If worn while in the chair for significant amounts of time during each day
- Consider body type: where is weight gain likely to go?

What do you do with this measurement? WHEELCHAIR FRONT END WIDTH

Make sure when ordering rigid chair with inset that legs and shoes will fit between the front rigging of the chair and on the footplate

BUTTOCK TO POPLITEAL (C) – determines seat depth and chair length

Measure the upper leg length

- Distance from popliteal fossa (back of knee) to back of buttocks
- *Must have client positioned in posture that will be utilized when in wheelchair*

What do you do with this measurement? WHEELCHAIR DEPTH

Subtract 1" for general user, subtract 2" for very active users and custom rigid chairs, subtract 2" for clients with tight knees or foot propellers.

CONSIDER:

- Actual seat depth ordered depends on user's functional and postural needs
- 1 - 2" shorter provides:
 - Appropriate depth for clients requiring maximum pressure distribution / LE support
- > or = 2" shorter:
 - Accommodates tight knee angles - tight hamstrings or knee flexion contractures
 - Allows foot propulsion – allows LE(s) to pull through under the seat
 - Provides shorter chair for increased maneuverability
 - Accommodate tight front hanger angles used for comfort or positioning
- *Leg length discrepancies* - accommodate as appropriate:
 - < 2" - no need to accommodate – order wheelchair depth according to the shorter leg. Can overhang cushion
 - ≥ 2 " - accommodate through cushion
Order seat sling for shorter side, prescribe cushion for the longer leg and cut down for the shorter side. Need rigid bottom cushion
- *Solid backs* – must consider effect on seat depth, i.e.:
 - A 16" deep seat with back upholstery provides 16" of usable seat depth
 - A 16" deep seat with a Jay 3 back mounted provides only 15" of usable seat depth.

POPLITEAL TO BOTTOM OF FOOT (D) – determines hanger length and available front seat height range

Measure from back of knee to heel

- Position client in optimal hip/knee position with foot well supported and shoes on, that are typical height
- *Fixed ankle contractures:*
 - Measure to bottom of heel and use angle adjustable footplates to accommodate height difference between front and back of foot

What do you do with this measurement? LEG LENGTH OF WHEELCHAIR

- To determine actual footrest length needed:
 - *Remember to consider cushion height- subtract cushion height from this measurement*
 - *Consider ground clearance needed*
 - ▶ Minimum 2" of clearance is recommended
 - ▶ If user can perform wheelies, footrest clearance can sometimes be < 2"

FOOT SIZE (E): – determines appropriate foot support
measure depth of shoe (depth required for support)
measure from outside of right shoe to outside of left shoe

What do you do with these measurements? FOOTPLATE SIZE/INSET OF RIGID CHAIR

- Make sure that shoes fit comfortably on footplate and between frame of chair
 - Proper foot support will aid in postural stability
- For paralyzed clients, a tighter front end might aid in keeping legs in place.
- To determine footplate angle - measure ankle angle with hip and knee in optimal sitting posture
 - For ankle deformities – use angle adjustable footplates to avoid:
 - ▶ Poor LE postures
 - ▶ Pressure points and increased pressure over ball or lateral aspect of foot

CHEST WIDTH (F)

Measure chest width at widest point

What do you do with this measurement? BACK SUPPORT WIDTH

- Consider fixed vs flexible scoliosis: measure in the posture that the client will be able to attain/maintain
- Add width to accommodate secondary supports as necessary
 - Lateral pelvic and/or thigh supports are usually 1” thick
- Add width to accommodate orthotics/prosthetics as necessary
 - If worn while in the chair for significant amounts of time during each day

SHOULDER WIDTH (G)

Measure from acromion to acromion

What do you do with this measurement? BACK SUPPORT SIZE

- Consider fixed vs flexible scoliosis: measure in the posture that the client will be able to attain/maintain
- Use to determine placement of attachment points for anterior trunk support straps
 - Should be positioned over medial clavicle
- Straps too lateral:
 - Straps come over shoulders right at the ends causing impingement of structures (tendons, bursae, nerves) between humeral head and acromion process
- Straps too medial:
 - Straps too close to neck area causing impingement of critical structures at neck

CHEST DEPTH (H)

Measure chest depth at location of lateral supports

What do you do with this measurement? LATERAL SUPPORT SHAPE/LENGTH

- Consider fixed vs flexible rotations/kyphosis: measure in the posture that the client will be able to

attain/maintain

- Longer pads might be needed for:
 - ▶ Rotation that brings the chest forward on one side
 - ▶ “Barrel chest” or high degree of support required
- Consider mounting locations and location of hardware / SA hardware as it relates to pad size.

BACK HEIGHT (I, J, K)

I- measure from seat surface to top of shoulders

J - measure from seat surface to inferior angle of scapula

K - measure from seat to axilla

What do you do with these measurements? WHEELCHAIR BACK SUPPORT HEIGHT

- Individual back height and back angle depend on:
 - Height of client
 - Shape of client’s back
 - Need for postural support and balance
- Need for scapular support vs UE freedom of movement
- During the MAT assessment, you can use your hands to support their back and posture to determine required back height
 - *One rule of thumb* - back support should end either above or below inferior angle of the scapula, but never right at inferior angle to promote normal shoulder/scapula rhythm
 - Clients with good trunk control may require back support to below the inferior angle, more complex need clients may need full support to the top of shoulders.
- If using back upholstery, add thickness of cushion or solid seat to get total height needed
- If replacing upholstery with solid back support, request back at height needed - the back will be mounted at the top of the cushion – so no height will be lost.
- If using an anterior trunk support, the back support should come to the top of the shoulders (measurement I plus cushion thickness)
 - Allows the straps to come straight over top of shoulders
- If using tilt in space chair, back support height should come to the top of the shoulders to give enough support while tilted.

TOP OF SHOULDERS TO OCCIPUT (L)

Measure from top of shoulders to occiput

What do you do with these measurements? HEAD SUPPORT AND MOUNT HEIGHT

- Consider head position throughout the day as well as when tilted

SEAT TO ELBOW (M)

Measure from seat surface to bottom of elbow with UE in optimal position

(arm at functional height and elbow bend)

What do you do with these measurements? ARMREST HEIGHT

- Add cushion height to obtain height of the actual armrests (from seat rails)

SEAT TO PSIS (N)

Measure from seat surface PSIS

- This support is the key to pelvic stability and a rigid support at this location will improve pelvic position

What do you do with these measurements? SACRAL SUPPORT LOCATION

- Add cushion height for location of sacral support height

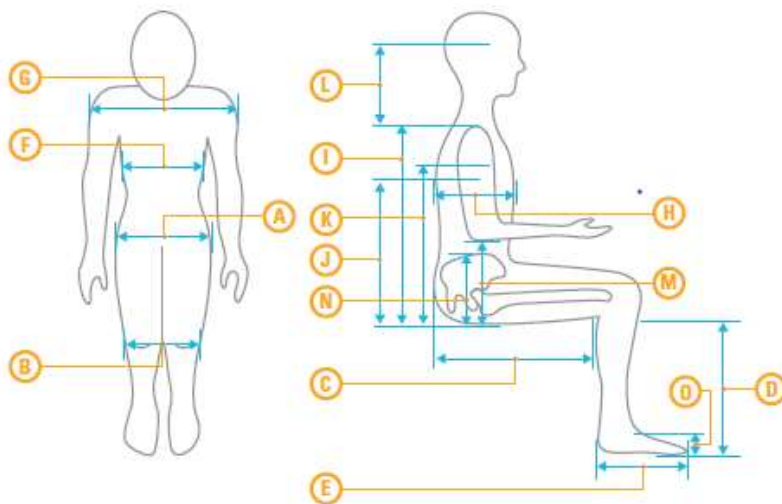
FOOT HEIGHT

Measure height of shoe

What do you do with these measurements? - FOOT POSITIONER SIZE



CLIENT NAME _____ DATE _____



- A. HIP WIDTH _____
- B. WIDTH AT KNEE _____
- C. BUTTOCKS TO POPLITEAL:
R _____ L _____
- D. POPLITEAL TO BOTTOM OF FOOT
WITH SHOES? Y / N _____
- E. FOOT LENGTH _____
- F. CHEST WIDTH _____
- G. SHOULDER WIDTH _____
- H. CHEST DEPTH _____
- I. SEAT TO TOP OF SHOULDER:
R _____ L _____
- J. SEAT TO INFERIOR ANGLE OF SCAPULA:
R _____ L _____
- K. SEAT TO AXILLA:
R _____ L _____
- L. TOP OF SHOULDERS TO OCCIPUT _____
- M. SEAT TO ELBOW:
R _____ L _____
- N. SEAT TO PSIS _____
- O. FOOT HEIGHT _____