



WHEELCHAIR POSITIONING FOR OPTIMAL SEATED ALIGNMENT

AN INTRODUCTION INTO POSTURAL CORRECTION & ACCOMMODATION

PRESENTER: Petra Conaway, PT, DPT, ATP/SMS
DATE: October 2026





FACULTY DISCLOSURE

PETRA CONAWAY, PT, DPT, ATP/SMS

- Clinical Education Specialist, Motion Composites
- Physical Therapist
 - Wheelchair and Seating Specialist @ CIDE, Denver, CO
 - Inpatient/Outpatient SCI rehab @ Craig Hospital, Denver, CO
 - Research in SCI, CVA and CP @ RIC, Chicago, IL
- Czech Republic → England → Illinois → Colorado

p.conaway@motioncomposites.com



MOTION COMPOSITES

MISSION, VISION & VALUES



“LEAD THE EVOLUTION OF
MOBILITY FOR BETTER LIVING”

OUR VALUES



BE PASSIONATE
ABOUT HELPING
OTHERS



SHOW
INITIATIVE



DELIVER
LASTING
RESULTS



FOSTER
COMMUNICATION
AND TEAMWORK



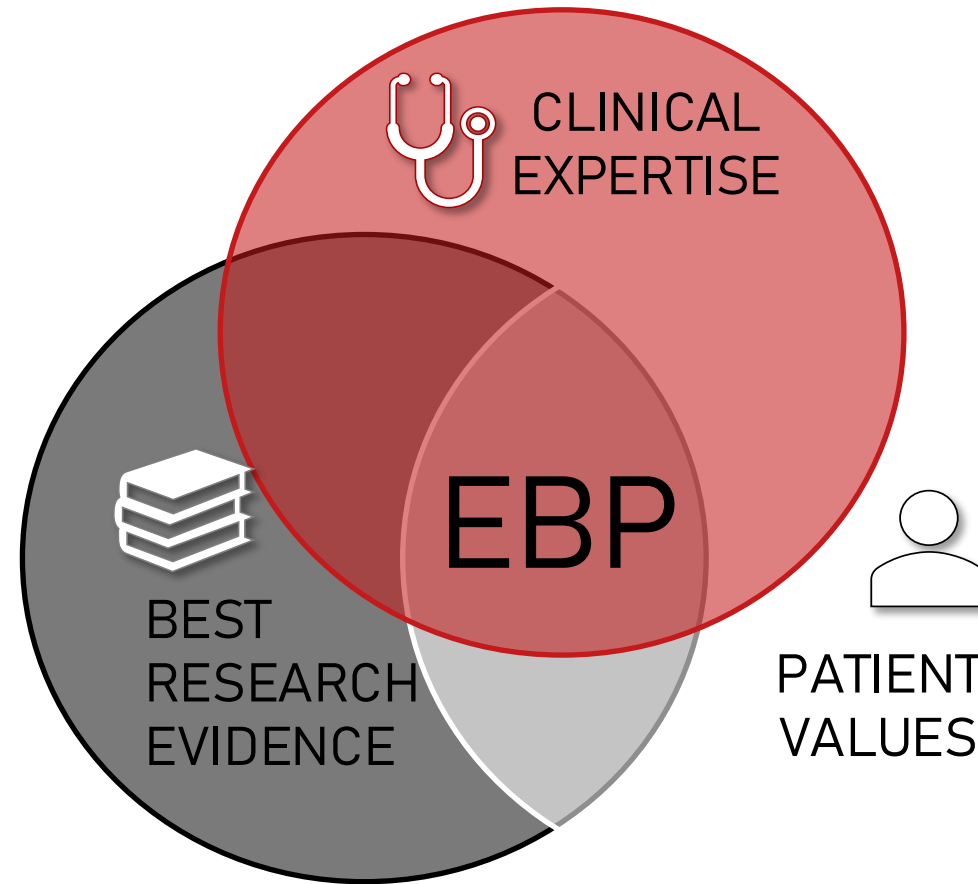
MAKE IT FUN!





EVIDENCE BASED PRACTICE

OUR FOUNDATION



Integrating individual clinical expertise with the best available external clinical evidence from systematic research.

- David Sacket, 1996



LEARNING OBJECTIVES

BY THE END OF THE PRESENTATION, PARTICIPANTS WILL BE ABLE TO:

1. Discuss three clinical implications of optimal postural alignment on the wheelchair user's function.
2. Assess three common postural asymmetries and determine level of intervention required.
3. Determine three appropriate seating interventions for spinal asymmetries to achieve optimal clinical outcomes.

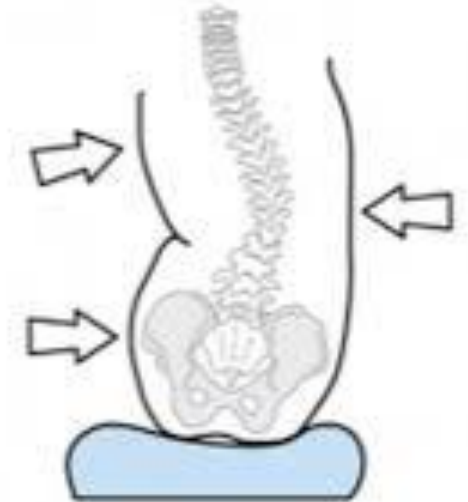


Image: physicaltherapy.com

OPTIMAL SEATED POSTURAL ALIGNMENT

WHY DO WE CARE?

- Seated posture directly impacts the wheelchair user's
 - Health & function
 - Comfort
 - Activities of daily living (ADLs)
 - Wheelchair skills acquisition
 - Community participation, work/school
 - Mental & physical well-being
 - Quality of life

(Waugh, 2015)





OPTIMAL SEATED POSTURAL ALIGNMENT

FOR THE WHEELCHAIR USER

STATIC

- Provides optimal base of support during resting periods and upon completion of dynamic tasks

DYNAMIC

- Provides optimal base of support to facilitate proximal stability for distal mobility and independent function

(Minkel, 2024)



STATIC SEATED POSTURE

PRIMARY GOAL:

- Facilitate balanced and symmetrical postural alignment in sitting

CONSIDERATIONS:

- Should not be an exercise or “work” to maintain optimal seated posture
- Seating surfaces should match the user’s anatomy and function
- The equipment should be fitted to the user, not the other way round

(Waugh, 2015)





DYNAMIC SEATED POSTURE



PRIMARY GOAL:

- Facilitate optimal postural alignment to maximize independence with wheeled mobility and ADLs

CONSIDERATIONS:

- The user should be able to function independently without excess effort
- Minimize fatigue and pain, maximize energy efficiency and comfort
- Be cognizant of all activities the user is involved (at home/in the community)

(Waugh, 2015)



WHAT TO LOOK FOR?

- In sitting, people shift their bodies into abnormal postures
 - Seeking stability/comfort
 - Alleviating pain and/or pressure
- Where is the 'abnormal' posture coming from?
 - Pelvis
 - Trunk/spine
- Once you identify the issues, are you going to correct or accommodate?



(Alford & Hon, 2024)



REDUCIBLE VS. NON-REDUCIBLE:

WHAT DOES IT MEAN?

- No longer using “fixed vs flexible” to describe asymmetries
- “Fixed” implies intervention is not needed
- Reducible (Flexible) → Correct it
- Non-reducible (Fixed) → Accommodate it
- Partially reducible → Correct and/or accommodate

(Waugh, 2015)



The background features a faint, light-gray line drawing of a human figure in a seated position, used for ergonomic assessment. On the left, a side profile shows measurements A (seat depth), B (leg length), D (seat width), and E (seat height). On the right, a front view shows measurements F (seat width), G (seat depth), H (back height), I (total height), J (head height), K (chest width), L (chest depth), M (upper arm length), N (lower arm length), O (thigh length), and P (calf length). A solid red horizontal bar is positioned above the main title text.

WHEELCHAIR SEATING EVALUATION & ASSESSMENT



POSTURE in SITTING

			COMMENTS		
P E L V I S	Anterior / Posterior ☐ Neutral ☐ Posterior ☐ Anterior ☐ Non-Reducible (Fixed) ☐ Partly Reducible ☐ Reducible (Flexible) ☐ Self ☐ External Force ☐ Tendency away from neutral	Obliquity (viewed from behind) ☐ WFL ☐ L low (Obliquity) ☐ R low (Obliquity) ☐ Non-Reducible (Fixed) ☐ Partly Reducible ☐ Reducible (Flexible) ☐ Self ☐ External Force ☐ Tendency away from neutral	Rotation - Pelvis ☐ WFL ☐ Right Anterior ☐ Left Anterior ☐ Non-Reducible (Fixed) ☐ Partly Reducible ☐ Reducible (Flexible) ☐ Self ☐ External Force ☐ Tendency away from neutral	Tonal Influence Pelvis: ☐ Normal ☐ Paralysis ☐ Flaccid ☐ Low tone ☐ High tone ☐ Spasticity ☐ Dystonia ☐ Pelvic thrust ☐ Other:	
	Comments				
T R U N K	Anterior / Posterior ☐ WFL ☐ ↑ Thoracic Kyphosis ☐ ↓ Thoracic Kyphosis ☐ ↓ Lumbar Lordosis ☐ ↑ Lumbar Lordosis ☐ Non-Reducible (Fixed) ☐ Partly Reducible ☐ Reducible (Flexible) ☐ Self ☐ External Force ☐ Tendency away from neutral	Left / Right -Scoliosis ☐ WFL ☐ Convex Left ☐ Convex Right ☐ C-curve ☐ S-curve ☐ Multiple Apex curve(s) ☐ Non-Reducible (Fixed) ☐ Partly Reducible ☐ Reducible (Flexible) ☐ Self ☐ External Force ☐ Tendency away from neutral	Rotation – Shoulders and Upper Trunk ☐ Neutral ☐ Left-anterior ☐ Right-anterior ☐ Non-Reducible (Fixed) ☐ Partly Reducible ☐ Reducible (Flexible) ☐ Self ☐ External Force ☐ Tendency away from neutral	Tonal Influence Trunk: ☐ Normal ☐ Paralysis ☐ Flaccid ☐ Low tone ☐ High tone ☐ Spasticity ☐ Dystonia ☐ Pelvic thrust ☐ Other	
H I P S	Position ☐ Neutral ☐ ABduct ☐ ADduct ☐ Non-Reducible (Fixed) ☐ Partly Reducible ☐ Reducible (Flexible) ☐ Tendency away from neutral ☐ Dislocated ☐ Subluxed	Windswept ☐ Neutral ☐ Right ☐ Left ☐ Non-Reducible (Fixed) ☐ Partly Reducible ☐ Reducible (Flexible) ☐ Self ☐ External Force ☐ Tendency away from neutral	Tone/Movements LE ☐ Normal ☐ Paralysis ☐ Flaccid ☐ Low tone ☐ High tone ☐ Spasticity ☐ Dystonia ☐ Rocks/extends at hip ☐ Kicks into knee extension ☐ Pushes legs downward into footrests ☐ Spasms/tremors with or after movement		
K N E E S & F E E T	KNEES WFL ☐ L ☐ R Limitations ☐ L ☐ R Non-Reducible (Fixed) ☐ L ☐ R Partly Reducible ☐ L ☐ R Reducible (Flexible) ☐ L ☐ R Tendency away from neutral ☐ L ☐ R Edema ☐ L ☐ R	FEET/ANKLES WFL ☐ L ☐ R Limitations ☐ L ☐ R Non-Reducible (Fixed) ☐ L ☐ R Partly Reducible ☐ L ☐ R Reducible (Flexible) ☐ L ☐ R Tendency away from neutral ☐ L ☐ R Edema ☐ L (fig. 8 in.) / ☐ R (fig. 8 in.)	Dorsi-Flexed ☐ L ☐ R Plantar Flexed ☐ L ☐ R Inversion ☐ L ☐ R Eversion ☐ L ☐ R	EDEMA SCALE 1+ (barely detectible) 2+ (slight indentation, 15 sec. to rebound) 3+ (deeper indentation, 30 sec. to rebound) 4+ (> 30 sec. to rebound)	



Wheelchair and Seating Evaluation: Jessica Presperin Pedersen, Jill Sparacio, Mike Babinec, Julie Piriano (2003, 2007, 2014, 2018)

BACKGROUND INFORMATION



- **CLIENT HISTORY**
 - Medical/Health
 - Equipment
 - Environment(s)
- **CLIENT CONCERNS**
 - Past & present experience
 - Wheelchair assessment process
 - Equipment
- **CLIENT'S GOALS**
 - Functional - ADLs/MRADLs
 - Equipment



PHYSICAL ASSESSMENT

In client's equipment

- SEATED POSTURE = *SUPPORTED SITTING*:
 - Observe postural tendencies
 - Note fit of equipment
- FUNCTIONAL MOBILITY:
 - Transfers
 - Wheelchair propulsion
 - Other ADLs (reaching, etc.)





PHYSICAL ASSESSMENT

Out of client's equipment



- SEATED POSTURE = *UNSUPPORTED SITTING:*
 - Use a firm surface for accurate assessment
 - Observe client's seated posture without the influence of external support
 - Is it different from the user's posture in their wheelchair?
 - If so, why (person's anatomy vs poorly fitted equipment)



POSTURE & BALANCE

Pelvis & Spine



- Observe any postural asymmetries
- Palpate the pelvic landmarks and spinous processes to help determine the direction of asymmetries
- Assess static and dynamic sitting balance
- Note any postural tendencies





STRENGTH & RANGE OF MOTION (ROM)



- ROM/FLEXIBILITY

- Pelvis
- Trunk
- Lower extremities
 - Hips
 - Knees
 - Ankles

- ROM/STRENGTH

- Upper extremities
 - Shoulders
 - Elbows
 - Wrists
 - Grasp/Grip



TONE & MOVEMENT PATTERNS

- Diagnosis dependent
- Impact postural tendencies and/or asymmetries
- Abnormal tone
 - Hypertonia (Spasticity/Rigidity)
 - Hypotonia (Flaccidity)
 - Mixed tone
- Abnormal movement
 - Dystonia
 - Athetosis





SENSATION & SKIN INTEGRITY



Impaired Sensation

Ability to weight shift

Selection of seating components

Skin Integrity

Intact or impaired sensation

History of or current pressure injuries



SUPINE MAT ASSESSMENT

A KEY ELEMENT TO YOUR WHEELCHAIR ASSESSMENT

- **BENEFITS OF SUPINE EVALUATION**
 - Eliminates gravity
 - Helps you assess pelvic position and movement
 - Isolates pelvic/lumbar movement from the hip joint
 - Isolates hip ROM limitation vs hamstring tightness
- **CONSIDER:**
 - Do findings from supine position match seated position?
 - How can you apply your findings to facilitate optimal seated posture?





COMMON ASSESSMENT FINDINGS & INTERVENTIONS

(Lange, 2021; Lange, 2019; Waugh, 2015)





HOW DO WE VIEW POSTURAL ASYMMETRIES?

SAGITTAL

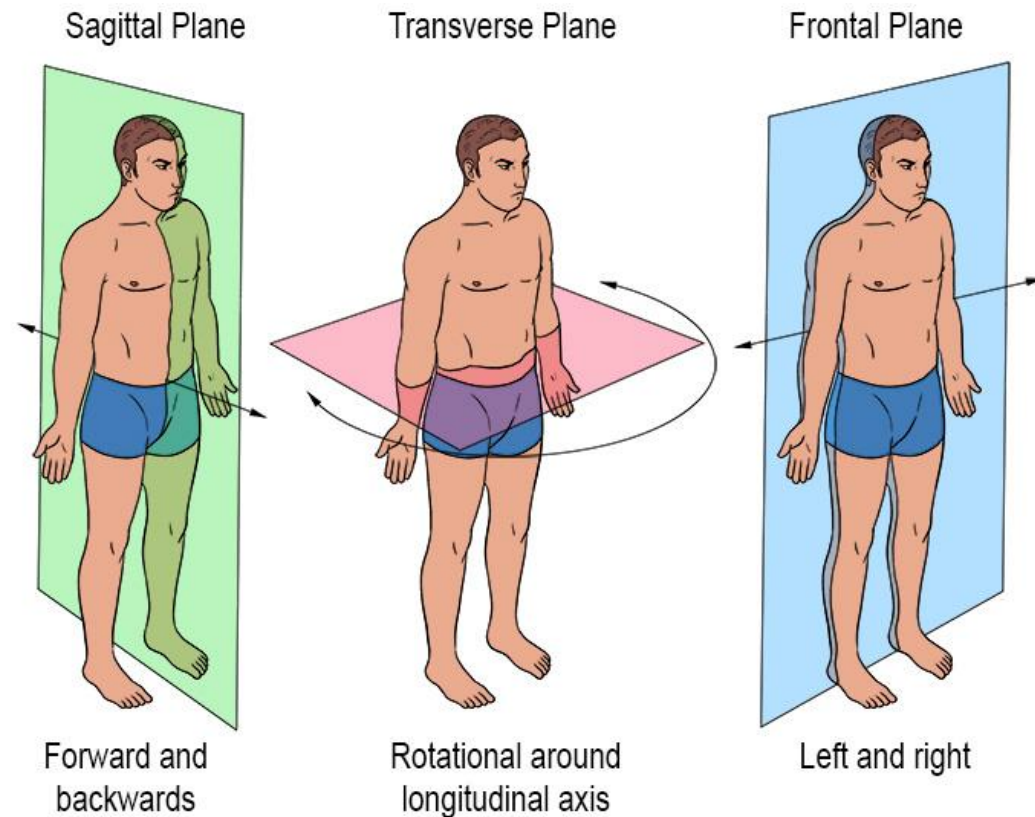
- Pelvic tilt
- Kyphosis or lordosis

TRANSVERSE

- Pelvic rotation
- Spinal rotation

FRONTAL

- Pelvic obliquity
- Scoliosis



POSTURE IN SITTING: THE PELVIS



POSTURE in SITTING

POSTURE in SITTING				COMMENTS
P E L V I S	Anterior / Posterior  ☐ Neutral ☐ Posterior ☐ Anterior ☐ Non-Reducible (Fixed) ☐ Partly Reducible ☐ Reducible (Flexible) ☐ Self ☐ External Force ☐ Tendency away from neutral	Obliquity (viewed from behind)  ☐ WFL ☐ L low (Obliquity) ☐ R low (Obliquity) ☐ Non-Reducible (Fixed) ☐ Partly Reducible ☐ Reducible (Flexible) ☐ Self ☐ External Force ☐ Tendency away from neutral	Rotation - Pelvis  ☐ WFL ☐ Right Anterior ☐ Left Anterior ☐ Non-Reducible (Fixed) ☐ Partly Reducible ☐ Reducible (Flexible) ☐ Self ☐ External Force ☐ Tendency away from neutral	Tonal Influence Pelvis: ☐ Normal ☐ Paralysis ☐ Flaccid ☐ Low tone ☐ High tone ☐ Spasticity ☐ Dystonia ☐ Pelvic thrust ☐ Other:
	Comments			



POSTERIOR PELVIC TILT



- **PRESENTATION**

- 'Sacral sitting'
- Often associated with kyphosis
- Strongly influenced by hip ROM limitations/tight hamstrings
- Increased pressure under sacrum/coccyx
- Tendency to slide forward

- **ASSESSMENT**

- Palpate the ASIS & PSIS
- Palpate the coccyx with respect to the sagittal plane
- Note if reducible or non-reducible
- Observe pressure distribution

POSTERIOR PELVIC TILT

Interventions

TRUNK WEAKNESS/
HYPOTONIA

- **SUPPORT THE POSTERIOR PELVIS**

- Solid back support/seat cushion
- Biangular back support
- Posterior wedges/cantles in seat cushion

LIMITED ROM/
TIGHT HAMSTRINGS

- **ADJUST**

- Seat to back angle
- Seat depth



Image: Ride Designs

SLIDING FORWARD/
EXTENSOR THRUST

- **CONSIDER**

- 60° pelvic belt
- Anterior wedge under seat cushion
- Antithrust seat cushion

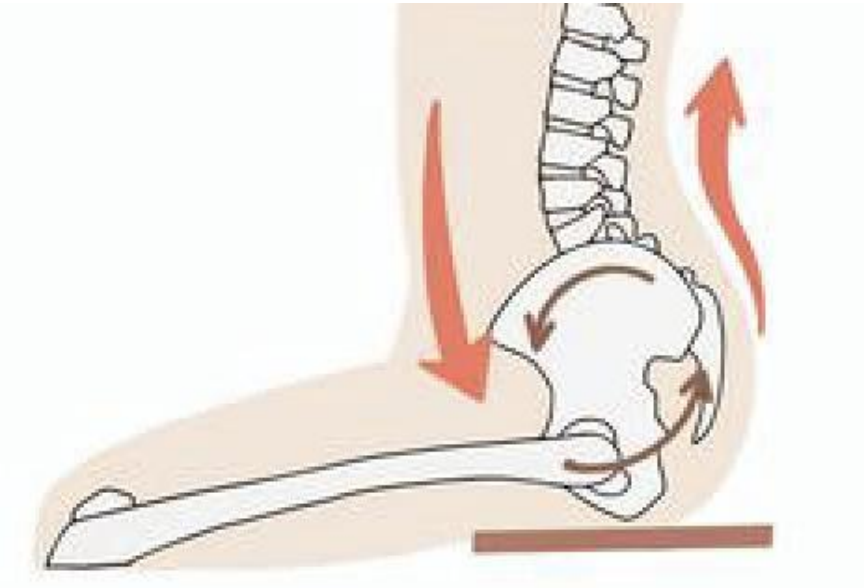


Image: <https://www.seatingdynamics.com/2017/11/15/bread-butter-dynamic-backs-pelvic-positioning-belts/>





ANTERIOR PELVIC TILT



- **PRESENTATION**

- Often associated with lordosis
- Increased lumbar & thoracic extension
- May appear to lean forward in their seat
- May see no contact with back support

- **ASSESSMENT**

- Palpate the ASIS & PSIS
- Palpate lumbar spine
- Reducible or non-reducible
- Pressure distribution



ANTERIOR PELVIC TILT

Interventions



Image: Ride Designs

TRUNK WEAKNESS/HYPOTONIA LORDOSIS

Provide support to the posterior pelvis - Alternative back support - Biangular back	Optimize positioning of the pelvic belt - Adjust angle of pull - 4-point pelvic belt	Consider anterior trunk support - Chest strap - Shoulder harness - Abdominal binder	Adjust seat to back angle - Optimize contact with back support
--	---	--	---



PELVIC OBLIQUITY

- PRESENTATION

- Pelvis dropped to one side (one side higher or lower than the other)
- Asymmetrical shoulders
- Increased lateral trunk lean
- One leg may appear shorter than the other

- ASSESSMENT

- Palpate the iliac crest, ASIS & PSIS
- Observe spinal alignment
- Reducible or non-reducible
- Pressure distribution
- Measure leg length for discrepancy





PELVIC OBLIQUITY

Interventions

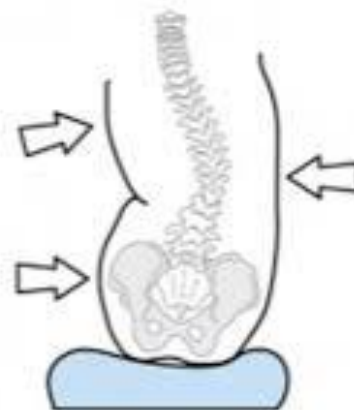


Image: physicaltherapy.com

INTERVENTION	REDUCIBLE	NON-REDUCIBLE
Correct with foam/wedges to seat cushion/back support	• Build up the lower side to correct the obliquity and even out the pelvis	• 'Fill in' the higher side to accommodate a more even weight distribution
Lateral trunk supports	• 3-point control to support spinal scoliosis and pelvic obliquity	• N/A (will require custom seating)
Custom contoured seating	• If partially reducible and cannot be accommodated with off-the-shelf seating	• To facilitate most neutral postural alignment and even pressure distribution

PELVIC ROTATION



- **PRESENTATION**

- Pelvis shifted forward on one side
- Asymmetrical shoulders
- Increased lateral trunk lean
- One leg may appear shorter than the other

- **ASSESSMENT**

- Palpate the iliac crest, ASIS & PSIS
- Observe spinal alignment
- Reducible or non-reducible
- Pressure distribution
- Measure leg length for discrepancy

PELVIC ROTATION

Interventions

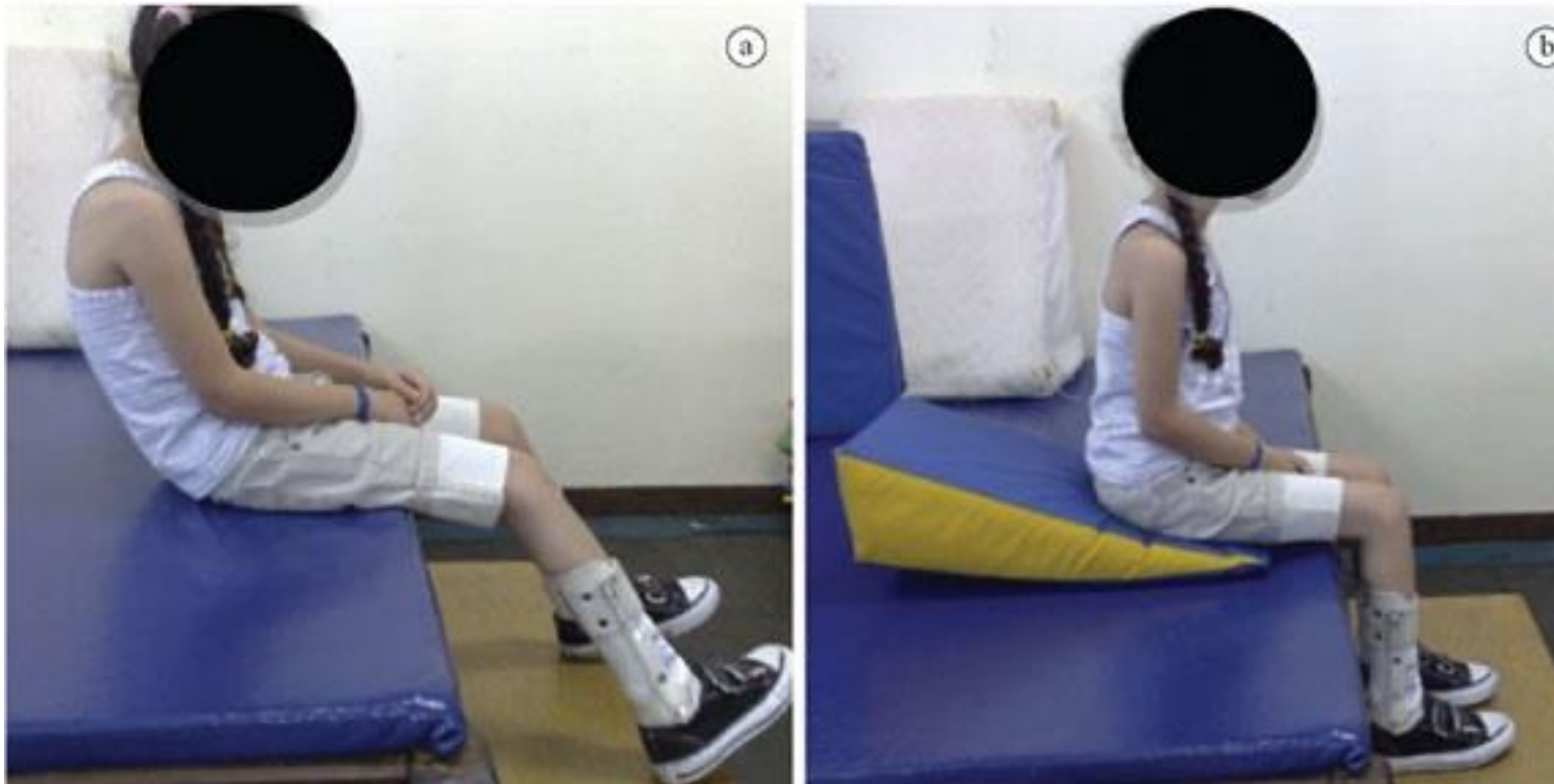


Image: Ride Designs



INTERVENTION	REDUCIBLE	NON-REDUCIBLE
Align the pelvis to neutral & accommodate any LE asymmetries	• For reducible rotation and ROM limitations in the hips	• N/A (will require custom seating)
Facilitate flexed position	• E.g., hip ABD/flexion, knee flex and ankle DF to minimize abnormal tone	• N/A (will require custom seating)
Custom contoured seating	• Consider a custom seat cushion (e.g., split seat depth) for partially-reducible asymmetries	• To facilitate most neutral postural alignment and even pressure distribution

EXAMPLE OF ABNORMAL PELVIC ALIGNMENT



This Photo by Unknown Author is licensed under CC BY-NC

POSTURE IN SITTING: THE TRUNK



TRUNK	Anterior / Posterior	Left / Right -Scoliosis	Rotation – Shoulders and Upper Trunk	Tonal Influence Trunk:
	 ☐ WFL ☐ ↑ Thoracic Kyphosis ☐ ↓ Thoracic Kyphosis ☐ ↓ Lumbar Lordosis ☐ ↑ Lumbar Lordosis	 ☐ WFL ☐ Convex Left ☐ Convex Right ☐ C-curve ☐ S-curve ☐ Multiple Apex curve(s)	 ☐ Neutral ☐ Left-anterior ☐ Right-anterior	☐ Normal ☐ Paralysis ☐ Flaccid ☐ Low tone ☐ High tone ☐ Spasticity ☐ Dystonia ☐ Pelvic thrust ☐ Other
	☐ Non-Reducible (Fixed) ☐ Partly Reducible ☐ Reducible (Flexible) ☐ Self ☐ External Force ☐ Tendency away from neutral	☐ Non-Reducible (Fixed) ☐ Partly Reducible ☐ Reducible (Flexible) ☐ Self ☐ External Force ☐ Tendency away from neutral	☐ Non-Reducible (Fixed) ☐ Partly Reducible ☐ Reducible (Flexible) ☐ Self ☐ External Force ☐ Tendency away from neutral	

MOST COMMON SPINAL ASYMMETRIES



SCOLIOSIS
ROTATION



KYPHOSIS
FORWARD HEAD
POSTURE



LORDOSIS

KYPHOSIS



- PRESENTATION

- Excessive curvature of upper or lower back
- Commonly presents with forward head posture
- Posterior pelvic tilt
- Increased pressure on sacrum/coccyx

- ASSESSMENT

- Observe from sagittal plane
- Palpate the thoracic or lumbar spine
- Reducible or non-reducible
- Pressure distribution



KYPHOSIS

Interventions



TRUNK WEAKNESS/ HYPOTONIA

- **ANTERIOR VS POSTERIOR BACK SUPPORT**
 - Chest harness vs solid back
 - Tilt-in-space wheelchair

HYPERTONIA/ TIGHT HAMSTRINGS

- **ADJUST**
 - Seat to back angle
 - Seat depth
 - Rear wheel positioning
 - Tilt-in-space wheelchair

SLIDING FORWARD

- **CONSIDER**
 - Pelvic belt adjustment
 - Anterior wedge under seat cushion
 - Antithrust seat cushion

HABITUAL

- **CLIENT EDUCATION**
 - Postural re-education
 - Optimize wheelchair and seating configuration

LORDOSIS

- PRESENTATION

- Exaggerated inward curve of lumbar and/or cervical spine
- Often associated with anterior pelvic tilt
- Pronounce S-shape of spine in sagittal plane
- Increased pressure on pubic symphysis

- ASSESSMENT

- Observe from sagittal plane
- Palpate the lumbar spine, ASIS, and PSIS
- Reducible or non-reducible
- Pressure distribution



Image: Courtesy of Kelly Waugh, MPT, ATP/SMS



LORDOSIS

Interventions



TIGHT HIP FLEXORS

- **PROVIDE OPTIMAL LUMBAR BACK SUPPORT**
 - Biangular back
 - Lumbar foam wedges

HYPERTONIA

- **ADJUST**
 - Seat to back angle
 - Seat depth
 - Pelvic belt angle

NON-REDUCIBLE ASYMMETRIES

- **CUSTOM CONTOURED SEATING**
 - Tilt-in-space wheelchair



Image: <https://www.activemobility.com.au/adapta3-back-support>



SCOLIOSIS



Image: Courtesy of Kelly Waugh, MPT, ATP/SMS

- **PRESENTATION**

- Asymmetrical shoulders and hips
- 'S' or 'C' shape spinal curve
- Asymmetrical rib cage
- Lateral trunk lean
- Limited spinal ROM

- **ASSESSMENT**

- Observe from frontal and transverse plane
- Palpate the thoracic or lumbar spine
- Palpate rib humps/spinal rotation
- Reducible or non-reducible
- Pressure distribution



SCOLIOSIS

Interventions



INTERVENTION	REDUCIBLE	NON-REDUCIBLE
Provide optimal back & pelvic support	• Add foam wedges • Consider external lateral trunk supports • Adjust seat to back angle • 3-points of control	• N/A
Custom contoured seating	• Consider a custom seat cushion or back support for partially-reducible asymmetries	• To facilitate most neutral postural alignment and even pressure distribution

EXAMPLE OF ASYMMETRIC TRUNK ALIGNMENT



POSTURE IN SITTING: THE HIPS



H I P S	Position	Windswept	Tone/Movements LE
	   ☐ Neutral ☐ ABduct ☐ ADduct ☐ Non-Reducible (Fixed) ☐ Partly Reducible ☐ Reducible (Flexible) ☐ Tendency away from neutral ☐ Dislocated ☐ Subluxed	   ☐ Neutral ☐ Right ☐ Left ☐ Non-Reducible (Fixed) ☐ Partly Reducible ☐ Reducible (Flexible) ☐ Self ☐ External Force ☐ Tendency away from neutral	☐ Normal ☐ Paralysis ☐ Flaccid ☐ Low tone ☐ High tone ☐ Spasticity ☐ Dystonia ☐ Rocks/extends at hip ☐ Kicks into knee extension ☐ Pushes legs downward into footrests ☐ Spasms/tremors with or after movement

Wheelchair and Seating Evaluation: Jessica Presperin Pedersen, Jill Sparacio, Mike Babinec, Julie Piriano (2003,2007, 2014, 2018)



WINDSWEPT ASYMMETRY

- PRESENTATION

- Asymmetric posture in the transverse plane
- Potential rotation of trunk
- One side of pelvis more forward than the other
- One leg may appear shorter/longer than the other

- IDENTIFICATION

- Palpate iliac crests, ASIS, PSIS
- Observe for rib hump and/or winging scapula
- Reducible or non-reducible
- Pressure distribution



Image: <https://community.paraplegie.ch/en/wiki-en/daily-life-mobility/seating-position-in-the-wheelchair>

WINDSWEPT ASYMMETRY

Interventions



ADJUST PELVIC ALIGNMENT	CONSIDER EXTERNAL SUPPORT	CUSTOM CONTOURED SEATING
• May not be able to achieve neutral if non-reducible asymmetry • Align LEs to facilitate functional position and optimal visual field	• Lateral hip guides • Medial knee guides	• To accommodate non-reducible asymmetry



Image:
http://www.r82.com/media/632034/spex_accessories.pdf

EXAMPLE OF ASYMMETRIC HIP ALIGNMENT

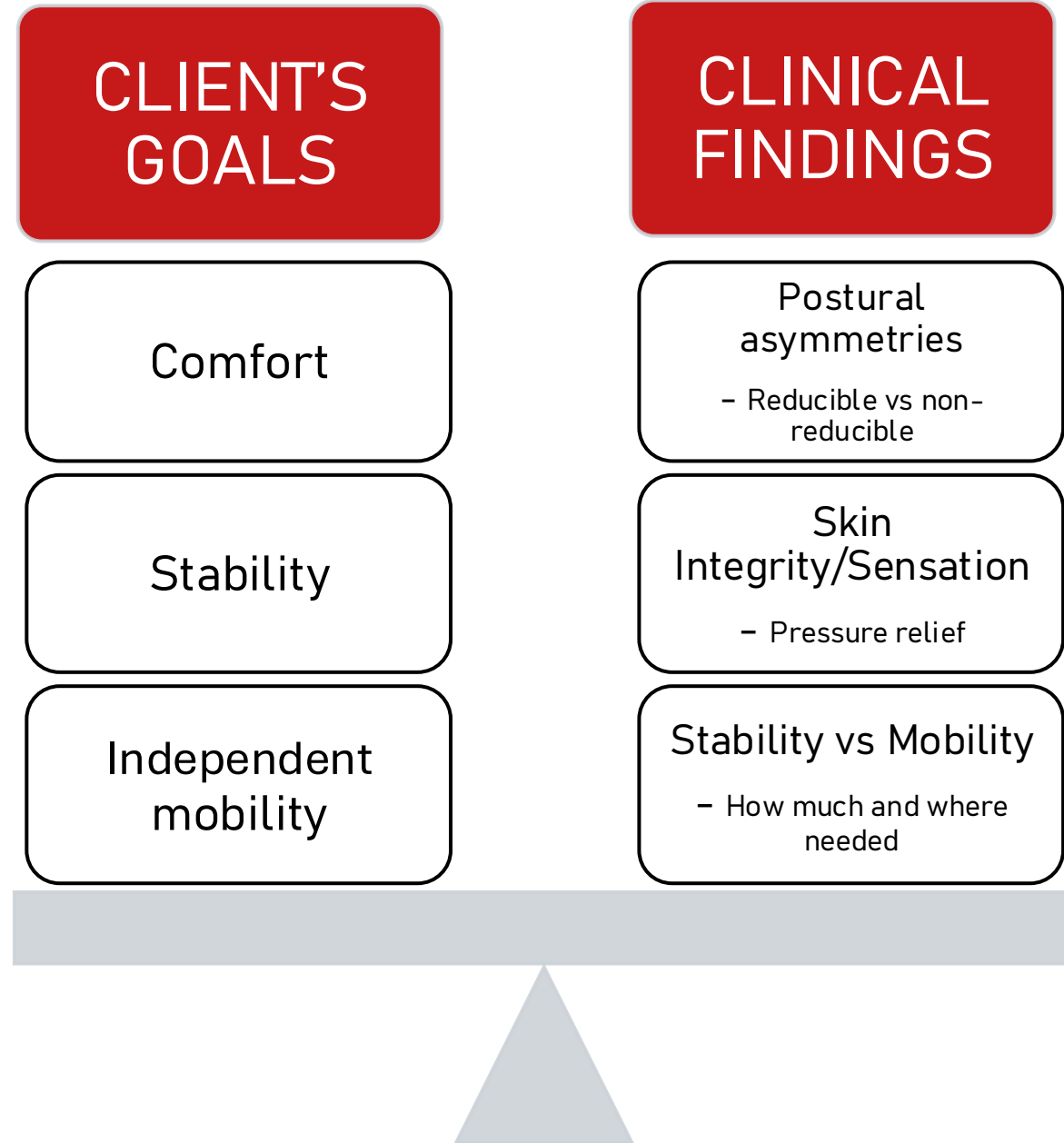


OTHER CONSIDERATIONS FOR LOWER EXTREMITY ALIGNMENT



	HIPS	KNEES	ANKLE & FOOT
Limitation	• Abduction/Adduction • Internal/External Rotation	• Flexion • Extension	• Dorsiflexion (most common) • Plantarflexion, inversion and eversion
Assess	• Abd/Add ROM • Postural tendency • Abnormal tone and movement	• Flex/Ext ROM • Postural tendency • Abnormal tone and movement	• ROM • Postural tendency • Abnormal tone and movement
Intervention	• Lateral pelvic supports • Lateral thigh supports • Medial knee supports	• Anterior knee supports • Adjust seat/lower leg <i>OR</i> seat/back support angle (consider hamstring tightness)	• Foot straps • Alternative foot support, e.g. foot box

HOW TO CHOOSE YOUR INTERVENTION





CASE STUDY: ANNA



ANNA: AGE 15

- Cerebral palsy
- Dystonia
- Multiple hip surgeries for relocation
- Partially reducible scoliosis and kyphosis
- Utilizes multiple mobility devices
 - Power Wheelchair
 - Manual Wheelchair
 - Reverse Platform Rolling Walker
 - Tennis chair





ASSESSMENT FINDINGS

	Left Side	Right Side
Top of Shoulder	19	20
Inferior Angle of Scapula	13	14
Buttock to Popliteal	15	16
Knee to Heel	15	15
Shoulder Width	16	
Trunk Width	13	
Hip Width	13	

Scoliosis: currently reducible
Rotation
Pelvic Obliquity



Kyphosis: reducible
with support

GOALS FOR ANNA



MOBILITY GOAL

- Self-propel ultralightweight manual wheelchair



PRESSURE DISTRIBUTION & LATERAL SUPPORT

- Correct and accommodate scoliosis, rotation and kyphosis
- Doesn't want tall back on manual chair - blocks her function
- Easy maneuverability
- Would prefer upholstery

BASE OF SUPPORT

- Comfort
- Skin/joint health
- Noommel
- Independent sitting & active lifestyle
 - Must accommodate for limitations
 - hip flexion limitation and obliquity

ASSESSMENT & BACK SUPPORT TRIALS



MEASUREMENTS & FINDINGS

- Asymmetrical inferior angle of scapula
 - Right: 13"
 - Left: 14"
- Back length selection: 9 or 13"
 - To allow for placement above PSIS and below inferior angle of scapula
- Trials: NXT Optima
 - 13" length (no photo)
 - 9" length, regular contour and deep



Tension Adjustable



Optima 13"
std depth (3" contour)



Optima 9"
deep depth (6" contour)



Optima 9"
std depth (3" contour)



ASSESSMENT & SEAT CUSHION TRIALS

MEASUREMENTS & FINDINGS

- Hip width 13"
 - Selected based on growth pattern, diagnosis, dystonia, function, client goals
- Pelvic obliquity
 - Left side ½" higher
- Trial seat cushion
 - Vicair Adjuster
 - Accommodates for pelvic obliquity
 - Allow accommodation as needed

BENCH ASSESSMENT



TRIAL SEAT CUSHION



FINAL RECOMMENDATIONS



NXT OPTIMA 9"
STD 3" CONTOUR



VICAIR
ADJUSTER



KEY TAKEAWAYS

- Many back selections could meet Anna's needs
- Important to remember
 - Client input
 - Comfort
 - Function
 - Aesthetics
 - Balance with clinical findings
 - Correction
 - Protection
 - Accommodation



THANK YOU!



MOTION
COMPOSITES

For more information contact:

Education@MotionComposites.com

REFERENCES

- Alford, L. & Hon, C. (2024). General positioning strategies and seating interventions by body location. In M. L. Lange & J. L. Minkel, *Seating and wheeled mobility: Clinical resource guide* (2nd edition., pp. 5-29). Routledge.
- Cohen, L. P., & Gefen, A. (2017). Deep tissue loads in the seated buttocks on an off-loading wheelchair cushion versus air-cell-based and foam cushions: Finite element studies. *International Wound Journal*, 14(6), 1327-1334. doi:10.1111/iwj.12807
- Hamstra, C. , Jones, D. (2025). Considerations When Working with the Geriatric Population. In M. Lange & J. Minkel (Eds.) *Seating and Wheeled Mobility: A Clinical Resource Guide* (2nd ed., pp. 493-514). Routledge. <https://doi.org/10.4324/978100352637>
- Lange., M. (2022, September 9). Bread and butter: Dynamic backs and pelvic positioning belts. *Seating Dynamics*. <https://www.seatingdynamics.com/2017/11/15/bread-butter-dynamic-backs-pelvic-positioning-belts/>
- Lange, M. (2021). Positioning for function: The trunk and extremities. ContinuED. Accessed on June 16th, 2025. www.physicaltherapy.com
- Lange, M. (2019). Wheelchair seating interventions. ContinuED. Accessed on June 10th, 2025. www.physicaltherapy.com.
- Medola, F. O., Elui, V. M. C., Santana, C. D. S., & Fortulan, C. A. (2014). Aspects of Manual Wheelchair Configuration Affecting Mobility: A Review. *Journal of Physical Therapy Science*, 26(2), 313-318. doi: 10.1589/jpts.26.313
- Minkel, J. (2024). Seating and mobility evaluations for persons with long-term disabilities: Focusing on client assessment. In M. L. Lange & J. L. Minkel, *Seating and wheeled mobility: Clinical resource guide* (2nd edition., pp. 5-29). Routledge.

REFERENCES *continued*

- Nace, S., Tiernan, J., & Ní Annaidh, A. (2019). Manufacturing custom-contoured wheelchair seating: A state-of-the-art review. *Prosthetics and Orthotics International*, 43(4), 382–395. <https://doi.org/10.1177/0309364619836028>
- Pedersen, J. P., Smith, C., Dahlin, M., Henry, M., Jones, J., McKenzie, K., Roussel, H., & Yingling, L. (2019). Wheelchair backs that support the spinal curves: Assessing postural and functional changes. *Archives of Physical Medicine and Rehabilitation*, 100(10). <https://doi.org/10.1016/j.apmr.2019.08.442>
- Rehabilitation Engineering & Assistive Technology Society of North America [RESNA] (2013). RESNA Position on the Application of Wheelchairs, Seating Systems, and Secondary Supports for Positioning vs Restraint. <https://www.seatingdynamics.com/wp-content/uploads/2017/07/7-Restraint-Position-Paper-Final-version-1.6.14.pdf>
- Waugh, K. (2015). Wheelchair seating for postural control and function: Principles, assessment & intervention. November 7–8, 2015. Craig Hospital. Seiden Grant Course.
- Waugh, K. & 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
- Wicaksono, Y. A., Herdiman, L., & Susmartini, S. (2020). Cushion seat design on manual wheelchair for people with paralysis using value engineering method to improve activity comfort: A preliminary study. *Journal of Physics: Conference Series*, 1450, 012114. doi:10.1088/1742-6596/1450/1/012114