

# MAT EVALUATION

#### Assessment to Prescription

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## **CLINICAL HUB TEAM**



#### **BOOK A CONSULTATION**

Clinical@sunrisemedical.com.au (02) 9678 6600





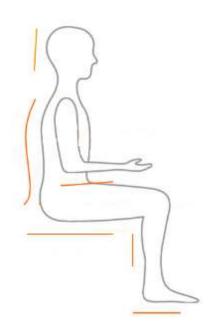
- 1. What is a MAT eval
- 2. Influencers of posture
- 3. Measurements simple measurements essential for wheelchair prescription
- 4. MAT assessment
- 5. Translation of findings
- 6. Seating considerations cushions and backrests



### Who does them?

Who does part of them?

Barriers to completing an assessment?



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## BIOMECHANICS



Biomechanically, people are not built for sitting!

A MAT evaluation is completed to assist in understanding the capacity of a person's seated position.

By determining what position is optimal, the <u>required supports</u> can be identified to <u>support that position</u> and then <u>replicated</u> with a trial of <u>potential equipment.</u>



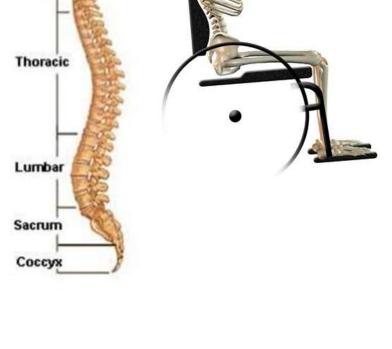
**INFLUENCERS OF POSTURE** 

# 1.ROM2. Body shape and size 3. Muscle tone 4. Gravity 5. Activity / engagement 6. Time spent in the posture 7. Health and emotional state

### POSTURAL ALIGNMENT IN A WHEELCHAIR



- Support functional posture
- Respect available ROM
- Provide contours and angles to promote posture
- Provide seating orientation and angles to promote posture
- Respect and acknowledge tone
- Appreciate pressure fluctuations



Cervica

## THE "LIFE BOX"



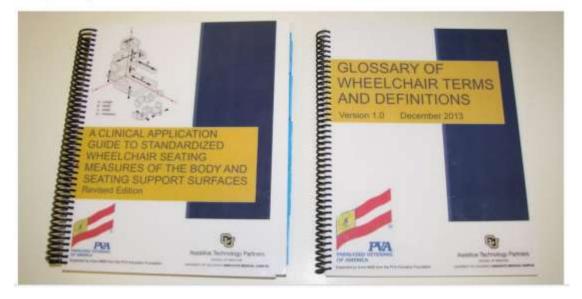
- Physiologic function cannot be compromised
  - Elimination
  - Breathing
  - Swallowing
  - Digestion



### STANDARDISED MEASURES AND TERMS



Guide to Standardized Wheelchair Seating Measures & Glossary of Wheelchair Terms and Definitions are Now Available for Purchase in an Easy to Use Spiral Bound Manual!



Global effort to ensure consistence across all areas of wheelchair and seating prescription.

Waugh, K. et al (2013). Glossary of Wheelchair Terms and Definitions, Version 1.0, December 2013. Denver, CO: University of Colorado Denver (120 pgs.).

## THE GOAL OF SEATING



Each abnormality is either **FIXED** (non reducible) or *FLEXIBLE* (reducible).

When a posture is **FIXED**;

- skeleton does not move; "stuck"
- trial potential equipment that will ACCOMMODATE
- GOAL prevention of further progression.

When a posture is *FLEXIBLE*;

- skeleton moves and deformity may be reversed
- Trial equipment that will help **CORRECT**.
- GOAL 
  restore movement of the skeleton, AND allow greater freedom of movement.

Accurate and standardised measurements and common vocabulary of a person's body and their seated posture is critical to

- ensuring appropriate fit functioning of their
- documenting or
   our wheelc<sup>+</sup>
- comm<sup>r</sup> e and sup





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## THE WHOLE ASSESSMENT



#### **Patient Demographics**

- Age
- Diagnosis / prognosis / co-morbidities
- Medications
- **Special needs** 
  - Respiratory, GI, orthotics
  - Communication devices or other assistive technology

#### Surgical History / plans Physical status

- Strength, neuromotor, tone
- ROM

### Sensation / skin integrity

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## THE ASSESSMENT

## **Cognition / behaviour**

- Integrate, sequence, retain
- Judgement

## **Visual limitations**

### **Performance requirements**

- Home environment
- Types of terrain indoors / outdoors
- Inclines, ramps
- Travel distance

### Transport **Functional skills**

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### THE ASSESSMENT





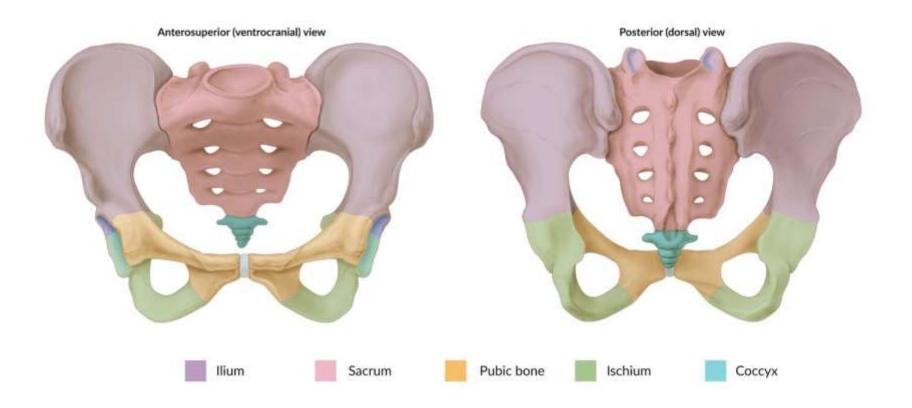
#### **THE ASSESSMENT**





## **KNOW YOUR PELVIS**

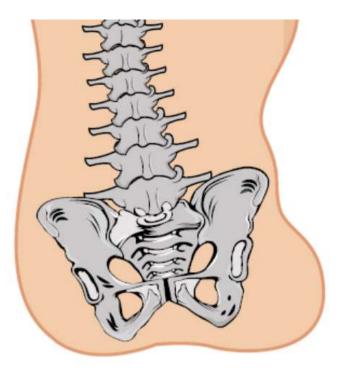




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### **KNOW YOUR PELVIS -POSITIONS**





#### **Pelvic obliquity**

• One side of the pelvis (ASIS) is higher than the other

#### HOW DO WE REDISTRIBUTE PRESSURE?

Flexible - build up under the low side

Fixed – build up under high side

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## **KNOW YOUR PELVIS - POSITIONS**

#### **Pelvic rotation**

- Right side forward rotation to the left.
- This is a left side rotation\*

#### HOW DO WE REDISTRIBUTE PRESSURE?

#### Each action has an equal and opposite reaction

**Flexible –** use of pelvic support belt, build up of forward side (right in this instance), consider corresponding build up of rear opposite side

**Fixed** – use of pelvic support belt, build up of non-forward side (left in this instance), consider corresponding build up of rear opposite side





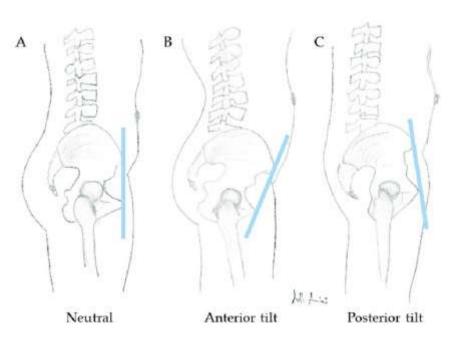
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## **KNOW YOUR PELVIS**



#### Anterior Pelvic Tilt

- PSIS is higher than the ASIS.
- Excessive lordosis of the lumbar and cervical spine, producing a swayback.



#### **Posterior Pelvic Tilt**

- ASIS is higher than the PSIS resulting in the posterior pelvic tilt/sacral sitting posture.
- Excessive thoracic kyphosis producing the "C" shape spine.
- Lordosis curvature of the lumbar and cervical spine "flatten out"



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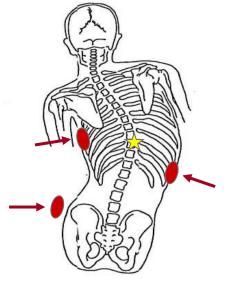
**KNOW YOUR SPINE POSITIONS** 

**Scoliosis-** an abnormal sideways curvature of the spine.

If a **scoliosis curve** gets worse, the spine can also rotate or twist.

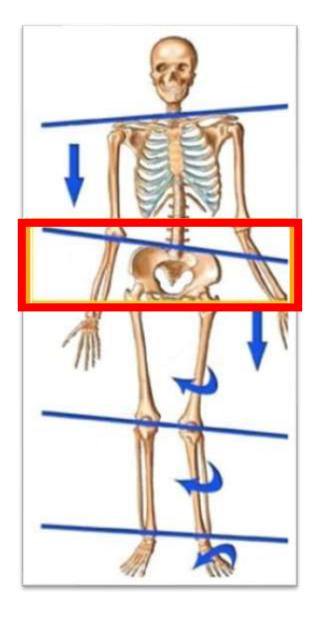
Three Points of Control in the plane of movement

- 1. Apex of primary curve
- 2. Above on opposite side
- 3. Below on opposite side











Establish what tasks need to be accomplished

- For how long
- In what settings



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What's most important most of the time?

## What are the <u>deal breakers</u> for client?

# What are the deal breakers as a therapist?



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### **RECORDING THE MAT ASSESSMENT**



The MAT should be recorded immediately after each assessment phase to prevent confusion.

- postural presentations;
- the range of movement; and
- flexibility.

How to record?

- take photos / video for all assessment phases whenever possible (with the client's consent)
- Using Talk-to-Text apps
- Use stick figure drawings

https://aci.health.nsw.gov.au/networks/spinal-cord-injury/spinal-seating/module-3/recording-the-mat

### **MAT ASSESSMENT**



	POSTURE:	FUNCTION:	COMMENTS	
HEAD & NECK	Functional     Flexed     Extended     Rotated     Cervical Hyperextension	Good Head Control Adequate Head Control Limited Head Control Absent Head Control		
UPPER EXTREMITY	SHOULDERS Left Right Functional Functional protracted protracted retracted retracted subluxed subluxed	R.O.M. Strength:		
	ELBOWS Left Right Flexed Flexed Extended Extended	R.O.M.	Left Comment: Right Comment:	
WRIST & HAND	Left Right	Strength/Dexterity:	Left Comment: Right Comment:	
TRUNK Functional Limits (WFL)	Anterior/Posterior	Left Right United States State	Rotation Neutral Forward on Left Forward on Right Non-reducible Reducible Partly Flexible Other	
	Anterior/Posterior	Obliquity	Rotation	
PELVIS	Neutral Posterior Anterior	WFL Lower on L Lower on R Fixed Fixed	WFL Forward on L Forward on R Fixed Fiexible	

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POSTURE IN CURRENT SEATING SYSTEM						
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Summary / Comments:



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### MAT STEP 1 – REVIEW CURRENT CHAIR



- Look for areas of high pressure/shear
- What do you like most and least about the posture?
- What does the client like most and least?

#### Create a problem list and a priority list!





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### MAT STEP 2 – SUPINE ASSESSMENT



Assess available movement at the pelvis

- Anterior / posterior pelvic tilt
- Lateral superior / inferior movement
- Rotation

Assess effects on other body segments

Consider tone, spasticity

Assess comfort/ tolerance

Assess ROM lower limbs

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### **CONSIDERATIONS FOR SUPINE MAT EVAL**

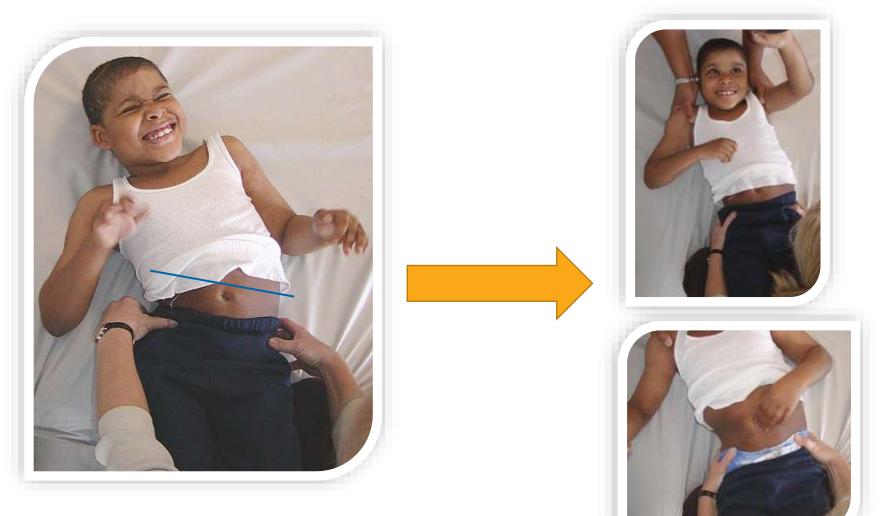


- Plinth is not available a full length transfer board on a soft bed can be used for a short duration. Consider their skin integrity and time taken for completion of this part of assessment
- Current pressure injuries delay supine assessment until such time all wounds have healed
- Urinary catheter should be emptied prior to supine assessment.
- Bariatric clients Monitor breathing
- Spasms may be common for clients with SCI when initially positioned in supine



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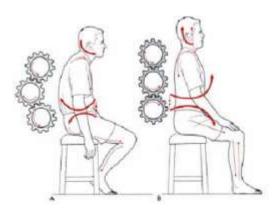




## SUPINE MAT ROM



- Hip flexion
- Hip ab/adduction
- Hip rotation
- Knee extension
- Ankle dorsiflexion





### **MAT EVALUATION STEP 3**



Sitting assessment

- Sitting balance
- Confirm findings from supine

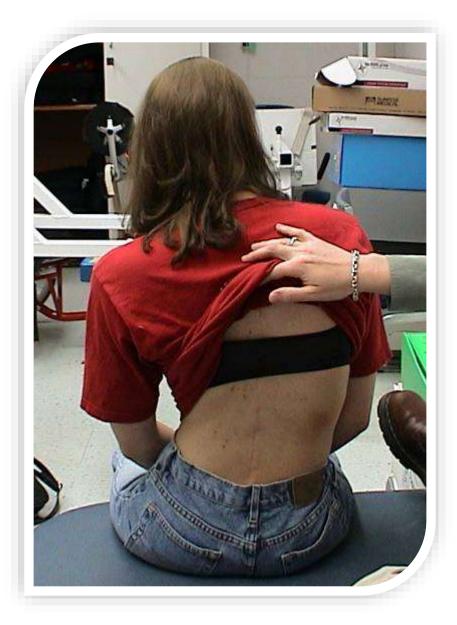












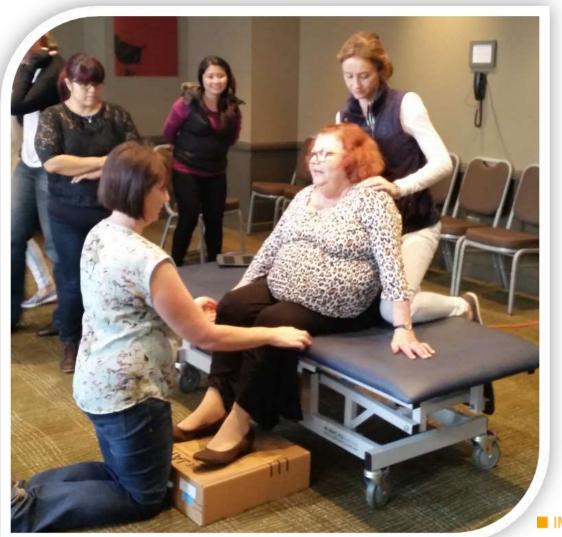
### **MAT EVALUATION STEP 4**



- Simulate postural supports
  - Skin protection
  - Postural support
  - temp/ humidity/ shear at seating interface
- Consider frame type
  - What can you delete from the list of options?
- Configure chair close to what you think the client will need

### HAND SIMULATION







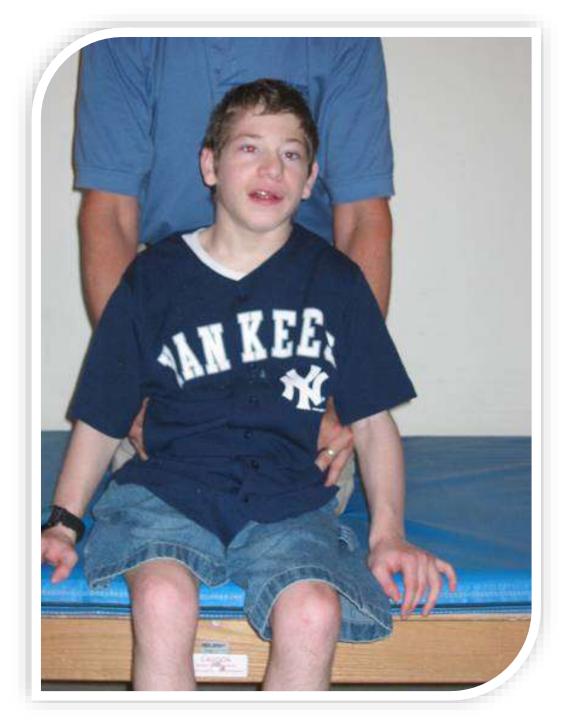
# Simulate correction with lateral support and L build-up

### **SITTING BALANCE**

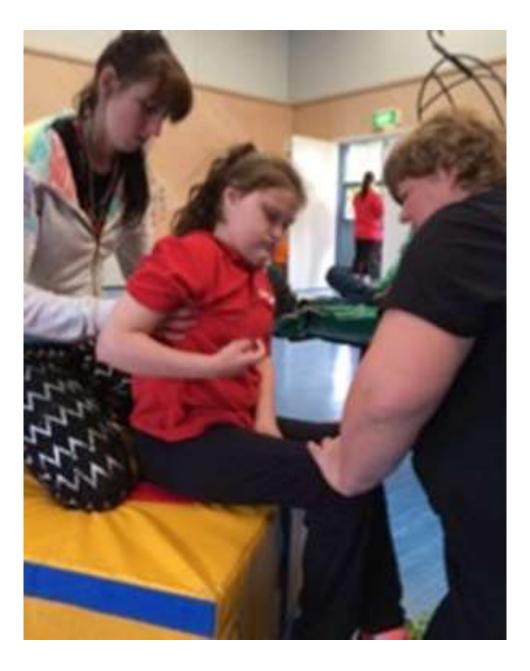






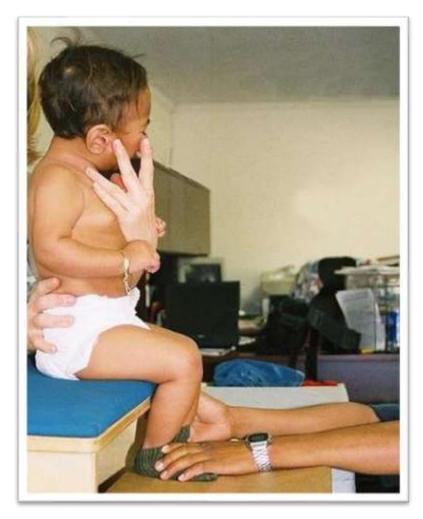






### MAT – STEP 4 SIMULATION







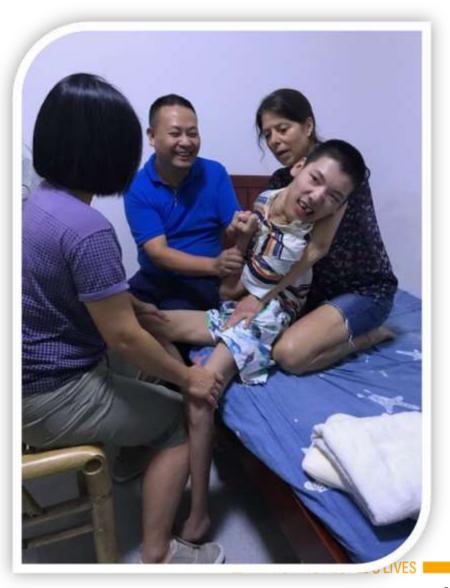
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### SIMULATION



Remember – everywhere you have a hand, a knee and a support surface will need to be replaced with a piece of equipment.

Consider the force you are using and level of support you are providing. Make sure it is real for a day of sitting.



### **INTERACTIVE - MAT**



- 1. Supine assessment
- Assess pelvic and trunk mobility
- Assess ROM lower limbs
  - Hip flexion
  - Hip external / internal rotation
  - Hip abduction / adduction
  - Knee extension
  - Ankle dorsiflexion
- 2. Sitting assessment
- 3. Simulation

### **MEASURING GUIDE**





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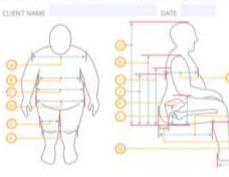
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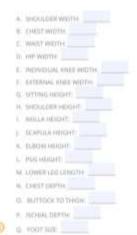
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www.SummarPlaticacill.z

EDUCATION IN MOTION

### Bariatric Wheelchair Assessment Measuring Guide





### HEFERENCES .

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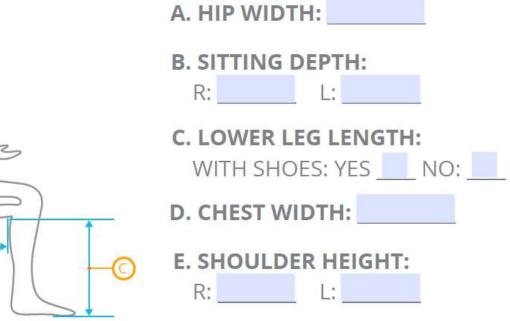
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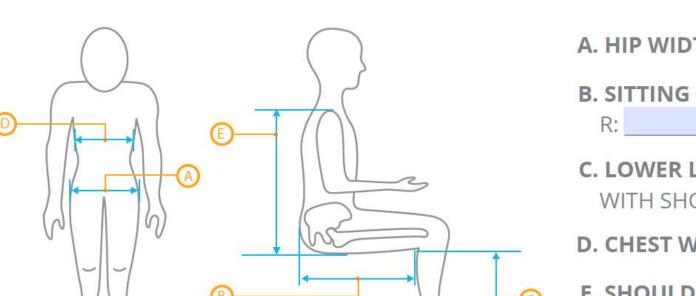
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STEPS

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### **KEY 5 MEASUREMENTS**







### INTERACTIVE – BODY MEASUREMENTS









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IJ	Shoulder positioning	Ebox and Fanaam Position	Brist and Handgrip	





- Consider the client and clinician's safety and reduce risks accordingly
- Use a set of calipers where possible for ease and maintaining personal distance
- Use a hard measuring tape to reduce the risk of incorrect measurements due to curvatures of the body
- Use a ruler or chopstick placed in the popliteal fossa to assist with measuring seat depth
- Measure left and right sides of the lower body to rule out any anomalies (for complex or visually asymmetrical clients)
- Use Talk-to-Text software / app to record measurements
  - Use an Angle Finder app to measure joint angles

HANDY HINTS

### **POST ASSESSMENT – SEATING / CUSHION CHOICE**



- 1. Posture
- 2. Pressure Distribution
- 3. Cushion design principles
- 4. Microclimate control
  - moisture
  - heat





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### **POSTURE - PELVIC OBLIQUITY**





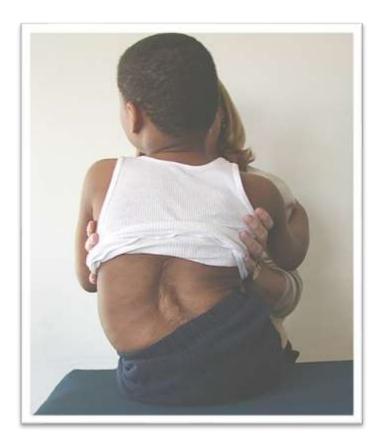
the misalignment of the pelvis, typically where one ASIS is higher than the other.



### **PELVIC OBLIQUITY**







## **PELVIC OBLIQUITY**



### POTENTIAL CLINICAL FACTOR

- Scoliosis
- Abnormal reflexes in trunk / lower limbs
- Asymmetrical
  - muscle tone (trunk or lower limbs)
  - trunk muscle strength
  - soft tissue or muscle mass
  - pelvic, femur bone structure
  - hip flexion range of motion
- Limited hip AB / ADduction
- Limited hip internal / external rotation
- Unilateral hip or pelvic pain

### POTENTIAL EQUIPMENT FACTOR

- Poor base of support
- Footplates, seat-to-back angle or front frame angle may not match client's available range of motion
- Seat shape does not support trochanters
- Wheelchair too wide / narrow
- Seat / back provides insufficient lateral pelvic support
- Joystick or wheel location inappropriate
- Armrests too low

### PELVIC OBLIQUITY -MANAGEMENT



**REDISTRIBUTE PRESSURE** 

Flexible obliquity - build up under the low side

Pelvic obliquity pads 
Fluid supplement pads 
Fluid overfill

Fixed obliquity – build up under high side

### POSITIONING PARTS FOR PELVIC OBLIQUITY



# 1/2" Build-Up

### Fluid Supplement

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1" Build-Up

## USING A FLUID SUPPLEMENT SUNRISE









### **CUSHIONS TO CONSIDER**





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### **POSTURE – POSTERIOR PELVIC TILT**





# Front of the **pelvis** rises and the back of the **pelvis** drops



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## **POSTERIOR PELVIC TILT**



### POTENTIAL CLINICAL FACTORS

- Low or absent tone in trunk
- Low tone or poor muscle control in pelvis or trunk
- Atypical (high, low, or fluctuating) tone in trunk or lower limbs
- Atypical reflexes in trunk or lower extremities
- Limited hip flexion
- Decreased lumbar lordosis
- Decreased pelvic / lumbar spine range of motion
- Decreased hamstring range of motion

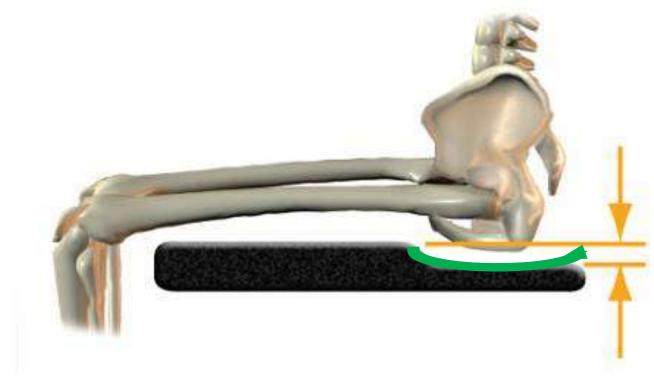
### POTENTIAL EQUIPMENT FACTORS

- Seat depth is too long
- Tight hamstrings Footplate position and front frame or leg rest hanger angle
- Footplates are too high /low
- Lack of posterior pelvic and sacral support
- Back support angle is too
   acute
- Seat-to-floor height too high for foot propulsion
- Armrests are too low

### POSTERIOR PELVIC TILT -MANAGEMENT

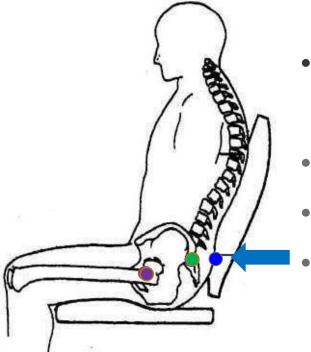


Anterior shaping / contouring of the cushion



### MANAGEMENT FOR FLEXIBLE PPT

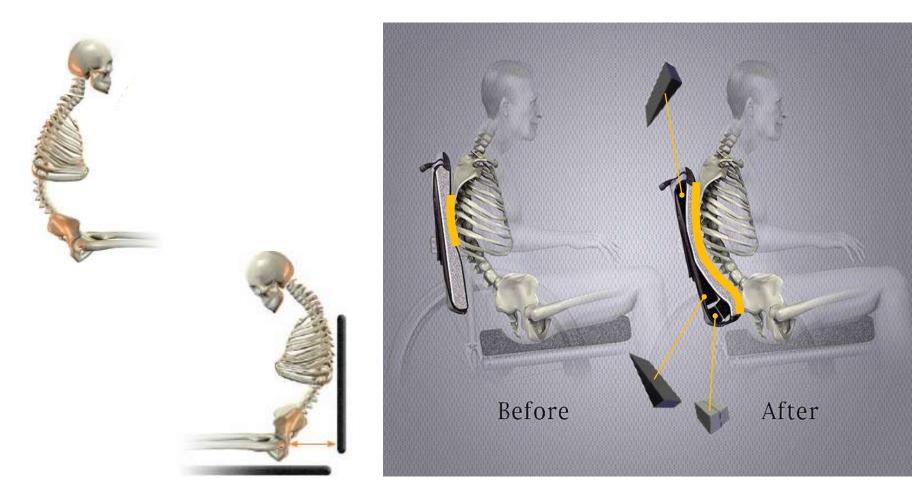




- Find the PSIS as the Pivot Point of the Back support
  - Set the height of the back
  - Set the back Angle
  - Add positioning components at front of cushion

### MANAGEMENT FOR FIXED PPT





### CUSHIONS & BACKS TO CONSIDER



Cushions:

- Union
- Fusion
- J2
- GS





Backrests:

- Jay Fit
- J3
- With spine align kit



### **J3 SPINE ALIGN KIT**



JAY 3



### **POSTURE - PELVIC ROTATION**



# One ASIS is positioned more forward relative to the other ASIS



# Asymmetrical fixed postures and positions require asymmetrical solutions!

### **PELVIC ROTATION**



### POTENTIAL CLINICAL FACTOR

- Scoliosis
- Asymmetrical hip flexion
- Asymmetrical muscle tone in trunk
- Femoral or lower leg length discrepancy
- Posterior hip subluxation
- Limited hip abduction or adduction range of motion
- Asymmetrical muscle mass in the posterior pelvic area
- Unilateral foot propulsion

### POTENTIAL EQUIPMENT FACTOR

- Seat-to-back angle too closed
- Back support too low
- Arm support too low
- Back does not match shape
   of posterior trunk
- Head support mounted too
   far forward or too low
- Wheel set up incorrect for hand propulsion

## **PELVIC ROTATION**

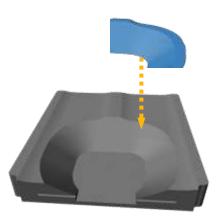






## **FIXED ROTATION**





- Adjust well shape to match pelvic shape
  - Reduction ring
  - Fluid supplement pads



Cushions: Fusion J2 X2 GS

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# **POSTURE - SCOLIOSIS**

SUNRISE MEDICAL.

Sideways curvature of the spine

#### POTENTIAL CLINICAL FACTOR

- Compensation for pelvic obliquity and / or pelvic rotation
- Asymmetrical muscle tone or strength in the trunk muscles
- Decreased trunk balance
- Structural spinal deformity
- Asymmetrical upper extremity strength during manual wheelchair propulsion
- Inability to hold the head in midline

#### POTENTIAL EQUIPMENT FACTOR

- Back does not match shape of posterior trunk
- Back does not support posterior pelvis
- Back does not provide enough
   lateral support
- Wheelchair does not provide solid base (sling upholstery) for pelvic stability
- Upper extremity support is too low, too high, or too wide
- Joystick or wheel location inappropriate

### SCOLIOSIS RESULTING FROM PELVIC OBLIQUITY

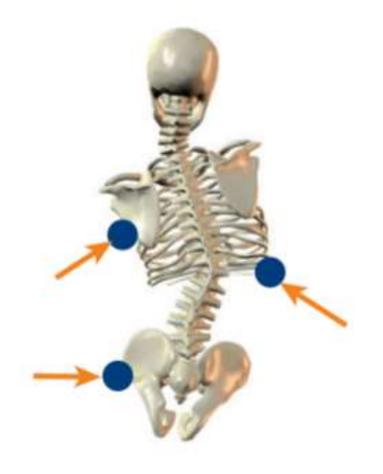


Contact provided to maintain or correct

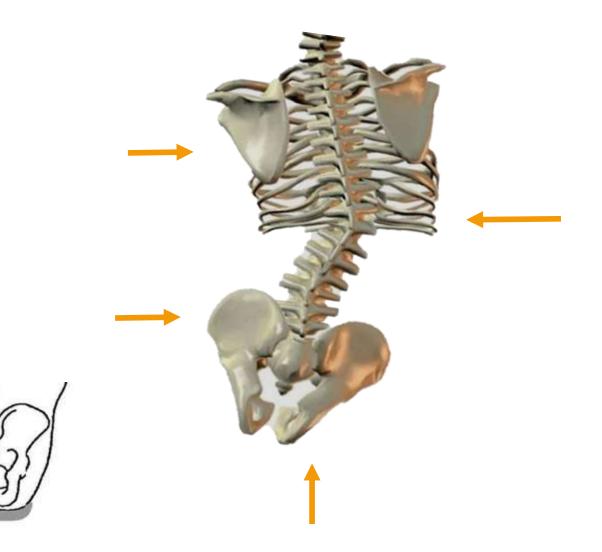
Three Points of Control

- Apex of primary curve
- Above on opposite side
- Below on opposite side
- In the plane of movement

Need to monitor key points for increased pressure



### **KEY POINTS OF CONTROL**





#### JAY 3 BACK REST - 5 SUPPORT SHAPES



- posterior and lateral pelvic and lateral thoracic stability.
- Fitting the back to the user not the user to the back

Posterior (PA) - 2.2" of lateral thoracic support
Posterior Lateral (PL) - 3" of lateral thoracic support
Posterior Deep (PD) - 6" of lateral support
Posterior Deep Lateral (PDL) - 6" of lateral thoracic support
Posterior Deep Contour (PDC) - 6" of lateral pelvic support

## **4 SUPPORT HEIGHTS**





Support level: Low Thoracic, Mid Thoracic, Upper Thoracic, Shoulder High

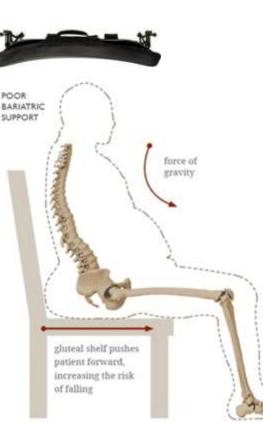
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## JAY 3 PLUS – BARIATRIC







- allowing proper positioning without interference.
- optional lower vanity shell extension that can pivot to accommodate adipose tissue
- Accommodating up to 227kg
- widths of up to 26",
- TH 2-point or FS 4-point hardware
- features a 2.2" deep contour to provide for non-restricted movement.

# **4 HARDWARE OPTIONS**





•SH - Easy to install, 2-point, quick-release hardware that allows for numerous attaching positions

•RH - 25% lighter than SH hardware and optimized for ultra lightweight wheelchairs without compromising adjustability

•TH - 2-point, quick-release hardware optimized for tilt-in-space wheelchairs, with a lengthened attachment pin and 226kgs weight capacity

•4-Point - Quick-release hardware that withstands greater force by distributing across four mounting locations

### PRESSURE DISTRIBUTION -SKIN INTEGRITY



PRIMARY RISK FACTORS	SECONDARY RISK FACTORS
History of pressure injury	Poor nutrition
Inability to change position	Muscle atrophy
Abnormal sensation	Aging skin
Time sitting	Excessive body heat
Asymmetric Postures	Disease
Incontinence	Impaired circulation
	Reduce cognition
	Smoking

MAT eval – Assessment to Prescription Crash Course 101

IMPROVING PEOPLE'S LIVES



## **CLINICAL HUB TEAM**



#### **BOOK A CONSULTATION**

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### **USEFUL LINKS**



ACI Spinal Cord seating module https://aci.health.nsw.gov.au/networks/spinal-cord-injury

PDF of "Glossary of Wheelchair Terms and Definitions" https://www1.ucdenver.edu/docs/librariesprovider38/clinic-documents/seatingguide/glossary-of-wheelchair-terms-and-definitions-version1-0.pdf?sfvrsn=f01e30b9\_2

Sunrhine Medical - Cushion Microclimate https://www.sunrisemedical.com.au/education-in-motion/resources/how-tomanage-microclimate-1

Sunrine Medical - Jay Cushion properties https://www.sunrisemedical.com.au/education-in-motion/resources/cushionproperties-1

Sunrise Medical – Seating and wheelchair angles https://www.sunrisemedical.com.au/education-in-motion/resources/seating-andwheelchair-angles

Sunrise Medical – Seating Shapes http://www.sunrisemedical.ca/getattachment/Education-in-Motion/Resources/Seating/Seating-Shapes/MK-129538 Rev-B Seating Shapes.pdf.aspx?lang=en-CA



Sunshine Medical <u>-</u> Cushion material selection https://www.sunrisemedical.com.au/education-in-motion/resources/cushion-materialselection

Sunshine Medical – Cushion design principles https://www.sunrisemedical.com/education-in-motion/resources/seating/cushiondesign-principles

ACI Basic MAT eval form <u>https://aci.health.nsw.gov.au/\_\_data/assets/pdf\_file/0004/312745/AF2.3\_MAT\_Assessme\_nt.pdf</u>

Sunrise Medical – Wheelchair measuring guide https://www.sunrisedice.com/asset-bank/assetfile/56020.pdf

Sunrise Medical – Pelvic and Spinal postures https://www.sunrisedice.com/asset-bank/assetfile/54909.pdf

ACI health – Seating and Postural issues https://www.aci.health.nsw.gov.au/\_data/assets/pdf\_file/0017/156221/m07\_seating\_p osture\_issues.pdf