

**POSITIONING KIDS:
SO MUCH MORE THAN SMALLER EQUIPMENT!**

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CEUs



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What we will be covering:

- Terminology
- Relationship between positioning and function
- Determining if the young child requires adaptive equipment to provide adequate support
- Determining if existing adaptive equipment is providing adequate support
- Matching need to product



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Learning Objectives

1. The participant will be able to describe a hierarchy of pediatric seating systems.
2. The participant will be able to list 3 clinical indicators that a seating system is no longer meeting a child's needs.
3. The participant will be able to list 3 seating dimensions that can be used to determine if a seating system is outgrown.
4. The participant will be able to match specific child needs to pediatric seating products.

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Terminology

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Seating Systems

- Adaptive Seating Systems
- Adaptive Strollers
- Wheelchair Seating Systems



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Seating Terminology

- Seating Terminology:
 - Primary Support Surfaces
 - Seat
 - Back
 - Footplates
 - Armrests
 - Secondary Support Surfaces
 - Lateral supports – lateral trunk support, lateral pelvic support, etc.
 - Medial supports – medial knee support
 - Posterior supports – head supports
 - Secondary Supports
 - Soft goods / commodity item
 - Pelvic belts
 - Anterior trunk supports
 - Foot straps, shoeholders, etc.



Stealth Products
Diego

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Seating Terminology

- Seating Terminology:
 - Primary Support Surfaces
 - Weightbearing areas
 - Bare minimal seating required
 - Secondary Support Surfaces
 - Keep the user in alignment with the primary support surfaces
 - Secondary Supports
 - Also keep the user in alignment with the primary and secondary support surfaces
 - Angles are critical



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Seating Terminology

- Components are referred to by the location of the surface in relation to the body
 - Medial knee support
 - Lateral trunk support
 - more



Stealth Products
Diego
Lateral trunk support

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Seating System Hierarchy

- Hierarchy of Seating Systems:
 - Linear
 - Generic contours
 - Off-the-shelf cushions and backs
 - Semi-custom
 - Molded



Stealth Solution Cushion



Jay ConfigureFit



Invacare Pin Dot

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Hierarchy of Seating Systems

- Hierarchy of Seating Systems:
 - Linear
 - Less pressure distribution (due to lack of contour)
 - More available growth
 - Less postural support and stability due to decreased contact area
 - Generic contours
 - Off-the-shelf cushions
 - Materials, covers, and contours vary
 - Can be used with external secondary support surfaces (lateral pelvic or knee supports, medial knee support) and secondary supports (pelvic belts)
 - Semi-custom
 - Various strategies to increase pressure distribution through increased contact i.e. Ride Designs
 - Molded
 - Matches client shaped through molding process
 - Most costly, least ability to grow or otherwise modify

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Client Related Terminology

- A Flexible asymmetry (i.e. kyphosis) is referred to as Reducible
- A Fixed asymmetry (i.e. kyphosis) is referred to as Non-Reducible
- Instead of Deformity, we use Asymmetry, Distortion, or even Tendency
 - For example, instead of Windswept Deformity, we use Windswept Tendency



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Development

- Typical Development
 - Children typically begin sitting independently around 6- 8 months
 - Children typically begin crawling / moving around 8 -10 months
 - Independent sitting frees up the baby's hands for play and promotes visual regard of the environment
- Delayed Development
 - Some children are behind or do not achieve these developmental milestones
 - This may be due to a number of factors
 - These children need external support to compensate for the inability to sit so that they are upright and can continue to work on other developmental skills

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Relationship between Positioning and Function

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Poor Positioning

- Poor positioning impacts:
 - Range of motion
 - Orthopedic symmetry
 - Function
 - Including Access to Assistive Technology
 - Breathing
 - Swallow
 - Vision
- Think how this impacts function, vision, breathing, and swallowing



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An Example

- Optimal positioning
 - Think of the change to function, vision, breathing, and swallow



Aspen Seating Orthosis (ASO)

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Determining if the young child requires adaptive equipment to provide adequate support

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How do I determine if the child needs more support?

- If the child does not have any adaptive seating, you can determine if this is required by determining if this lack of support is impacting function.
- Supportive seating compensates for developmental delays, allowing the child to continue to participate



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Determining if existing adaptive equipment is providing adequate support

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What about the child who already has equipment?

- Perhaps the child is using adaptive seating equipment already
- How do you know if this is meeting their needs?



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How do I know if the child is positioned adequately?

- We will systematically review key points to check
- This is a screening tool to determine if formal seating evaluation is required
- If evaluation is required, refer to a qualified team if you do not perform these evaluations
 - Provide information from your screening
 - See Checklist handout



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Let's start!

- Look at the client how they typically sit in their adaptive seating or seating system on the mobility base



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The Pelvis

- We start with the pelvis as the rest of the body's posture depends on the position of the pelvis

1. Is the pelvis in a neutral position within the seating system?
 - Neutral tilt
 - Neutral obliquity
 - Neutral rotation
 - Find those ASISs

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Pelvic Tilt

- Posterior Pelvic Tilt
 - Leads to trunk kyphosis
- Anterior Pelvic Tilt
 - Leads to trunk lordosis



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Pelvic Obliquity

- One side of the pelvis is higher than the other
- Often seen in conjunction with a lateral scoliosis

Here, seen with posterior pelvic tilt



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Pelvic Rotation

- One ASIS is forward of the other
- May look like a leg length discrepancy



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Pelvis

2. If the pelvis is not in a neutral position, can you correct the pelvis and is the corrected position maintained over time in the current seating system?

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Pelvis

Neck hyperextended

Kyphosis

Posterior Pelvic tilt

Knees too far forward



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Pelvis



Improved posture, but this was **not sustained**

Persistent, though reduced posterior pelvic tilt and kyphosis

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Pelvis



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Trunk

3. Is the trunk upright and midline?

• In multiple planes:

- Sagittal plane – is the client leaning laterally to the side?
- Frontal plane – is the client demonstrating kyphosis or lordosis?
- Transverse plane – is the spine rotated?

• An upright trunk is critical for head balance

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Trunk

• Lateral asymmetry

- One shoulder is often higher than the other
- Check the pelvis for obliquity



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Trunk

• Kyphosis or trunk flexion

- Often seen in conjunction with posterior pelvic tilt
- Vertebrae may be prominent
- Clients who were never ambulatory may not have a natural lumbar curve
- Often related to low tone in trunk



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Trunk

- Lordosis or trunk extension
- Often seen in conjunction with anterior pelvic tilt
- Typically, hyperextension at the lumbar area
- Can be seen with a kyphosis, as well
- Not as common in young children unless spina bifida is present



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Head

4. Is the head upright and midline, balanced over the trunk, without neck hyperextension?
- Sagittal plane – is there lateral flexion?
 - Frontal plane – is the head forward or the neck hyperextended?
 - Transverse plane – is the neck rotated?

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Head

- Lateral Flexion
- May be seen in conjunction with lateral trunk lean



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Head

- Head forward
- Often seen with trunk kyphosis



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Head

- Neck hyperextension



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Head

- Neck rotation
- May be seen in conjunction with spinal rotation



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Lower Extremities

5. Are the Lower Extremities aligned with the pelvis?

- No adduction
- No abduction
- No internal rotation
- No external rotation

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Lower Extremities

- Adduction
- Adduction and internal rotation are often seen as components of extension



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Lower Extremities

- Abduction

A photograph of a young child sitting in a black stroller. The child's legs are spread wide apart, demonstrating abduction. The child is wearing a white long-sleeved shirt and pink pants.

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Lower Extremities

- Internal rotation

A photograph of a child lying on their back on a bed. The child's legs are bent at the knees and rotated inward toward the midline of the body, demonstrating internal rotation. The child is wearing a striped shirt and dark pants.

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Lower Extremities

- External rotation

A photograph of a child sitting in a blue stroller. The child's legs are spread wide apart and rotated outward, demonstrating external rotation. The child is wearing a white shirt and blue shorts.

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Lower Extremities

- Windswept tendency
 - One leg adducted and internally rotated
 - One leg abducted and externally rotated
 - If this is 'corrected', the pelvis will be pulled into rotation



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Seating Dimensions

- The dimensions of the seating system may not fit your client correctly, impacting their posture. The client may have outgrown the seat. How do you know?
- Key measurements include:
 - Back height
 - Seat depth
 - Lower leg length

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Seating Dimensions

- 6. Back Height: with the pelvis in a neutral orientation, is the back at the correct height?



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Back Height

- If the client is in a posterior pelvic tilt, they have slid down and forward and the back height may appear too high
- Back height is determined during the seating evaluation and is based on the amount of support required

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Back Height

- Self-propulsion: usually placed under the scapulae
- If the client uses anterior trunk supports, the height of the back should be at or just above the level of the shoulders
 - Otherwise, the support pulls down the shoulders



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Seating Dimensions

7. Seat depth: with the pelvis in a neutral orientation, is there approximately 1" between the end of the cushion and the back of the knee?



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Seat Depth

- If there is more than 1", the seat depth is too short
- If the back of the knee or calf is contacting the front of the seat, the seat depth is too long
- If you are trying to pull the client into a neutral tilt and the front of the seat is blocking you, the seat depth is too long



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Seat Depth

- Seat depth looks too short, but the client was in posterior pelvic tilt



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Seating Dimensions

8. Lower leg length: with the pelvis in a neutral orientation, is the distance between the top of the seat and the footplate correct?

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Lower Leg length

- If the distal thighs are unweighted, the distance may be too short.
 - Too much pressure is now under the pelvis
 - The footplates need to be lowered



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Lower Leg length

- If the feet are not making full contact with the footplates, the distance may be too long, and the footplates may need to be raised



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Take Home Message:

- It is critical to determine if a client is positioned adequately or requires intervention
- Optimal position is key to limiting loss of range and orthopedic changes, facilitating function and access to AT, and optimizes vision, breathing, and swallowing
- Someone needs to identify the need ... YOU!

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Matching Need to Product

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Pediatric Seating Product Selection

- Pediatric seating products must reflect the needs we have discussed, including:
 - Small sizes
 - Growth in dimension
 - Flexibility in support for changing needs
 - Postural support for function
- Options may be different for adaptive strollers than for wheelchairs
- Let's explore some options!

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Remember the Hierarchy?

- Hierarchy of Seating Systems:
 - Linear
 - Generic contours
 - Off-the-shelf cushions and backs
 - Semi-custom
 - Molded



Stealth Solution Cushion



Jay ConfigureFit



Invacare Pin Dot

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Adaptive Strollers

- Adaptive Strollers have a variety of seating options
- These typically are integrated with the stroller
- Often can be removed and used on a hi-low base



Leggero
Dyno



Leckey Mygo

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Adaptive Strollers

- Many adaptive strollers:
 - Offer little postural support
 - Place the child in a static posterior tilt – dependent position
- Are mainly designed for transport
 - Lightweight, easy to fold
- Are difficult to transfer in and out of
- Are difficult to mount to



Convald EZ Rider

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Adaptive Strollers

- Other Adaptive Strollers:
 - Have more supportive seating
 - Offer frame adjustments
 - Offer tilt and/or recline
 - Support medical equipment



Convald
Trekker

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Adaptive Strollers

- Adaptive Strollers with more seating options:
 - Convaid Trekker
 - Leckey Squiggles and Mygo
 - Leggero Trak and Dyno
 - Sunrise Zippie Voyage



Zippie Voyage



Leckey Squiggles

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Pediatric Linear Seating Systems

- A number of companies manufacture these systems
- Often include plywood base, foam(s), and upholstery
- Typically a variety of secondary support surfaces are available
 - Lateral trunk supports
 - Lateral pelvic supports
 - Medial knee supports
 - More...



Ki Mobility Axiom CS



Therafin

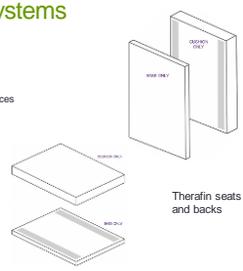
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Pediatric Linear Seating Systems

- Pros
 - Customizable
 - Dimensions
 - Height, width of seat, back, secondary support surfaces



Stealth Products Lateral Trunk Support Pad



Therafin seats and backs

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Pediatric Linear Seating Systems

- Pros
 - Customizable
 - Shape
 - Generic contours
 - I.e. antithrust seat
 - I-back
 - Lag length discrepancy
 - Bi-angular back

The image shows two diagrams of pediatric linear seating systems. On the left is the 'Therafin' system, which includes a 'BI-ANGULAR BACK' component. On the right is the 'Therafin I Back' system, showing a more complex frame structure. Below these are two exploded views of a seat cushion, labeled '100% FOAM' and '100% FOAM WITH ANTI-THRUST'. The text 'Therafin' is centered below the left diagram.

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Pediatric Linear Seating Systems

- Pros
 - Materials
 - Upholstery
 - Incontinence liners
 - Built-in growth
 - Can accommodate change
 - Adjustable

The image shows diagrams and photos of pediatric linear seating systems. On the right is a diagram of a seat with a brown incontinence liner, labeled 'Therafin'. Below it are two exploded views of a seat cushion, labeled '100% FOAM' and '100% FOAM WITH ANTI-THRUST'. On the left are two photos: one of a seat's internal mechanism and another of a black seat cushion. The text 'Therafin' is centered between the photos and the diagrams.

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Pediatric Linear Seating Systems

- Cons
 - Heavy
 - Depending on materials and upholstery
 - Pressure relief is not as great as other options
 - Air flow / heat dissipation is not as great
 - Not as much contact for
 - Stability
 - Pressure distribution
 - Usually mount on MWCs and PWCs, not usually on adaptive strollers
 - Cannot be used on hi-low base

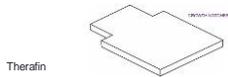
The image shows a photograph of a 'Jay ConfigureFit' wheelchair, which is a specialized pediatric wheelchair with a high back and various adjustable components. The text 'Jay ConfigureFit' is centered below the image.

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Growth

How do you grow a linear seating system?

- Seat Depth:
 - Posterior seat can be positioned behind back initially and moved forward as needed.
 - Anti-thrust shell will also move forward when the seat is moved forward.
 - Care must be taken to ensure the medial contour and anti-thrust shell are in the correct location if seat and back are positioned to allow for maximum growth.



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Growth

How do you grow a linear seating system?

- Seat Width:
 - External lateral pelvic supports can be placed on top of the cushion surface using off-set hardware and then moved out as the child grows.
 - By moving in the lateral pelvic supports, the lateral contours of the seat may no longer be in relation to the child.
 - Ensure that width of chair is not overly wide, particularly for self-propellers



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Growth

How do you grow a linear seating system?

- Back Height:
 - The lower portion of the back can be mounted behind the rear of the cushion (though this limits seat depth growth) or just on top of the cushion. As the child grows, the back can be raised, as long as contact with the posterior pelvis (PSIS) is maintained.



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Growth

How do you grow a linear seating system?

- Back Width:
- Lateral trunk support pads can be placed inside dimensions of back and then moved out for growth using I back, T back, or offset hardware
- Ensure that width of chair is not overly wide, particularly for self-propellers



Therafin

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Pediatric Linear Seating Systems

- Manufacturers
 - AEL
 - Freedom Designs
 - Ki Mobility
 - Aviom CS
 - Sunrise Medical
 - AES Li'l Kiddos
 - Jay ConfigureFit
 - Therafin



Jay AES



Freedom Designs

AEL



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Pediatric Generic Contours

- Off the shelf cushions
- Off the shelf backs
- Seating Systems
 - Many are similar to linear systems which include generic contours



Comfort Company Acta-Back



Comfort Company Acta-Embrace

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Off the Shelf Cushions and Backs

- More commonly used in adults
- Why?
 - No growth
 - Not always available in pediatric sizes
 - Usually mount on MWCs and PWCs, not usually on adaptive strollers
 - Cannot be used on hi-low base

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Off the Shelf Cushions

- Off-the-Shelf Cushions have generic contours
 - Positioning
 - Skin Protection
 - Combination



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Off the Shelf Cushions

- Modifications are not always available, but may include
 - Asymmetrical seat depth
 - Pelvic wedges
 - Anterior wedge
- Can be used with separate secondary support surfaces
 - i.e. lateral pelvic / thigh supports, medial knee support
- Often include incontinence cover and washable outer cover



Comfort Company Acta-Embrace
Adjustable Technology Insert
Moldable

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Off the Shelf Cushions

- Pros
 - Often light weight
 - Important for self-propellers
 - Removes easily for transport / folding
 - More options to address pressure
 - Flat or contoured



Stealth Solution SPP Cushion



Stimulite Contoured Pediatric Cushion

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Off the Shelf Cushions

- Cons
 - Contours are generic
 - Some pressure relieving strategies reduce stability for posture and function
 - Usually lack of growth
 - Not as customizable as linear seating systems
 - Can be lost
 - Cushion
 - Cover
 - Can be accidentally placed in mobility base backwards



Invacare Matrix Kidabra VI cushion

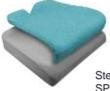
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Off the Shelf Cushions

- Manufacturers
 - Invacare / Matrix
 - Jay Medical / Sunrise Medical
 - Permobil
 - Comfort Company
 - Roho
 - Stealth Products
 - Stimulite



Permobil Vicair Adjuster X



Stealth Zen SP

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Off the Shelf Backs

- Off-the-Shelf Backs have generic contours
 - Some accept separate lateral trunk supports
 - Some have deep contours to provide more trunk support
 - Various heights available
- Adjustments
 - Angle adjustment separate from back cane adjustment
- Modifications
 - May be able to add material under upholstery, as needed



10\" W x 10\" L Acta-Embrace®

REAR VIEW FRONT VIEW SHELL & WING VIEW

Comfort Company Acta-Embrace

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Off the Shelf Backs

- Pros
 - Often light weight
 - Important for self-propellers
 - Removes easily for transport / folding
 - Flat or contoured top
 - Various heights



Jay Zip Back

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Off the Shelf Backs

- Cons
 - Contours are generic
 - May not support external lateral pads
 - Usually lack of growth
 - Not as customizable as linear seating systems



Jay Zip Back

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Off the Shelf Manufacturers

- Invacare / Matrix
- Jay Medical / Sunrise Medical
- Permobil
 - Comfort Company
- Stealth Products
 - True Forming Back
 - ADI



Matrix Elite



Stealth Products True Forming Back

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Pediatric Generic Contoured Seating Systems

Stealth Products Diego

- 3 sizes
- Postural support: minimal to moderate
- Fits on many bases
 - i.e. some adaptive strollers, manual and power wheelchairs
- One piece unit
- Adjustable to provide required level of postural support and growth
- Crash tested



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Hybrid Solution

- Ride Designs Cushions are a highly customizable 'off-the-shelf' cushion
- Actually molded to the client
- Stable
- Lightweight
- Can offload ITs



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Pediatric Molded Seating Systems

- Most molded seating systems will accommodate a small child
- Several manufacturers offer warranty for set amount of time to accommodate growth

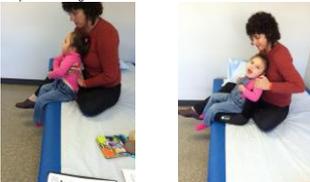


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Pediatric Molded

- Pros:
 - Maximum contact for stability, postural control, and pressure distribution
 - Can be useful for children with low tone trunks or profound muscle weakness
 - Can be used to minimize orthopedic changes
 - May optimize function

Aspen Seating Orthosis (ASO)



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Pediatric Molded

- Cons:
 - Expensive
 - Lack of easy growth and modification
 - May be hot and restrict movement

Certified Rehab Services



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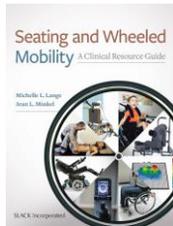
Take Home Message:

- It is critical to determine if a client is positioned adequately or requires intervention
- Optimal position is key to limiting loss of range and orthopedic changes, facilitating function and access to AT, and optimizes vision, breathing, and swallowing
- Someone needs to identify the need ... YOU!

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One More Resource...

- Seating and Wheeled Mobility: a Clinical Resource Guide
- Edited by Michelle L. Lange, OTR/L, ABDA, ATP/SMS and Jean L. Minkel, PT, ATP
- Available from SLACK, Inc.



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