On Your Mark, Get Set, Go!
Exploring Pediatric Mobility Equipment
Presented by:
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Objectives
Upon completion of this presentation participants will be able to:

- Identify three (3) reasons as to why mobility is important for development.
- Describe the impact that a cortical visual impairment has on the development of independent wheeled mobility.
- List three (3) strategies for introducing the concept of an adaptive stroller and/or wheelchair to caregivers.
- List three (3) examples of seating and mobility equipment specifically designed for pediatric clients and the clinical application for each item.

Importance of Play & Activity Participation

Piaget's Theory on the Cognitive Development of Children

- Sensory-Motor (0-2)
  - Sensory Curiosity about the world
  - Coordination with motor response
  - Language for demands
  - Object permanence
- Preoperational (2-7)
  - Symbolic thinking
  - Grammar
  - Imagination
- Concrete Operational (7-11)
  - Concepts to concrete situations develop
  - Time, space, and quantity understood
- Formal Operations (11+)
  - Abstract and logical reasoning develop
  - Strategy and planning evolve
  - Concepts learned in one context can be applied in multiple areas

Why Is Play So Important?

- Play is described as the “work” of children.
- Through play, children learn to solve problems, make decisions, persevere, and interact with people and objects in the environment.
- Through play, children develop language symbolic thinking, social skills, and motor skills.
- Without proper seating and positioning, a child may not be able access toys or equipment for play.

Sooo….What's the Big Deal?

Proper Seating Impacts:
- PLAY!
- Access to environment
- Developmental milestones
- Reduction or prevention of risk for injuries in the future
- Respiratory status
- Gastrointestinal function

Mobility Impacts:
- PLAY!
- Cognition
- Decision making
- Social interaction
- Spatial awareness
- Body control in gravity

Items To Keep In Mind

- Children should be allowed to meet recognized milestones, even if his/her positioning is modified
- Should be encouraged to develop stable sitting at an appropriate age
- With controlled movement, body experiences
  - Response to gravity
  - Activation of vestibular system
  - Weight bearing
- Immobile child
  - Minimum experience with gravity
  - Difficult to integrate sensory-motor skills
Overall Goals of Wheelchair Seating & Positioning

• Support postural alignment
  - Provide balance for function
  - Provide base of support for stability
  - Slow down or correct flexible deformity
  - Accommodate fixed deformity
  - Optimize functional tone
  - Inhibit non-functional tone
• Facilitate function
  - Activity related functions
  - Physiological functions
• Increase sitting tolerance
  - Consider comfort over time
• Skin care
  - Protect skin integrity
  - Decrease moisture
  - Consider shearing
  - Repositioning

Positioning For Function

• What posture would our body choose to prepare for activity?
  - Possible variable positions – sitting by itself is hard work!
  - Posture of readiness
  - Posture cannot be maintained all day
• With controlled movement, body experiences:
  - Response to gravity
  - Activation of vestibular system
  - Weight bearing
• Immobile child
  - Minimum experience with gravity
  - Difficult to integrate sensory-motor skills

Positioning For Mobility

• Initial independent mobility
• Wheel is visible to child
• If possible, feet should be visible to the child
• Visualization of cause & effect
• Improved access for short upper extremities
• Consideration of power mobility

Positioning for Clinical Needs

• Respiratory
• Feeding/GI (reflux management)
• Contractures
• Communication (access to a device or for vocal quality)

Building Blocks for Pediatric Seating & Mobility

- Identify Goals
- Evaluation
- Mobility Bases & Seating
- Additional Considerations
- Funding & Documentation

Goals
Slicing Up The “Pie”

Who is fighting for a piece of the pie when it comes to choosing equipment?

What are the goals?

- **Child**
  - Peer interaction
  - Independence
  - Fun
  - Play
  - Explore
  - Interact
  - Learn - feel, touch, do
  - Looks “cool”

- **Family**
  - Aesthetics (low profile)
  - Acceptability
  - Accessibility
  - Ease of use
  - Comfort

- **Clinician**
  - Good positioning
  - Complimenting therapy goals
  - Easy to use
  - Promote independence
  - Safety

- **Funding Source**
  - Thorough documentation
  - Meeting the criteria

Setting Goals

- **Targeted areas to consider:**
  - Positioning
  - Stability
  - Manage Tone
  - Changes in size
  - Sitting tolerance
  - Skin Integrity
  - Function

Perspective

“I understand why my parents want to see me walk and talk, but it’s exhausting to live in a body that feels like the property of everyone else.”

– Martin Pistorius

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Where Do We Start?

Prior to the evaluation

- Intake Form
  - Goals
  - Funding source
  - Medical Background
  - School and/or therapy history
  - Current level of function

- If contact information is provided, contact should be made to the clients school team and/or outpatient therapists.

- Review any documents provided by the family or referring physician.

- Arrange loaner equipment
Evaluate for Potential, Not a Device!!!

Recommended Flow

- Explain the purpose
- Review goals
- Complete history
  - Medical
  - Rx
  - Surgeries
  - School
  - Therapy
  - Equipment & AT experience
  - Environment & transportation
  - Likes/Dislikes
- Observation
  - Before introductions
  - Current equipment
  - Out of equipment
- Hands-on
  - Skin
  - Mat evaluation
  - Cognitive skills
  - Sensory status
  - Function
- Observation
  - Before introductions
  - Current equipment
  - Out of equipment
- Hands-on
  - Skin
  - Mat evaluation
  - Cognitive skills
  - Sensory status
  - Function

Additional Evaluation Considerations

- Screenings, reports, or formal consultation
  - Physicians – neurologist, ophthalmologist, orthopedic surgeon, physical therapist, etc.
  - Speech Therapist
  - Teacher - classroom aide
  - School therapists – EP
  - Audiologist
- Cognition
  - Ability to following directions (one-step, two-step, multi-step, related, non-related, etc.)
  - Initiation of exploring the environment independently
  - Visual learner vs. auditory learner (supports needed?)
- Auditory status
  - Acuity vs. processing
- Communication Status
  - Verbal vs. non-verbal
  - Picture based vs. word based

Medical Conditions Associated With CVI

- Cerebral Palsy
- Cognitive impairment
- Seizure disorder
- Microcephaly
- Hearing loss
- Memory dysfunction
- Hyper or hyposensitivity to sensory stimulation
- Encephalitis
- Metabolic conditions
- Head injury
- Epilepsy

Additional Evaluation Considerations

- Vision Status
  - Acuity vs. processing
  - Field loss, field neglect, color blind, visual motor, etc.
- Cortical Visual Impairment
  - CVI is a neurological condition that is the leading cause of visual impairment of children in the US.
  - Commonly behaviors associated with CVI include:
    - Require movement to see
    - Visual field preference—see better looking at objects in certain directions (such as left or right periphery)
    - Lack of visual–motor match—look and touch occur as separate functions
    - Light gazing and/or non-purposeful gaze—often need more light to see or will gaze non-purposefully because they can't make sense of what they see

CVI Resources

Dr. Christine Roman-Lantzy

www.littlebearsees.org
Building Blocks for Pediatric Seating & Mobility

- Development
- Identify Goals
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- Additional Considerations
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Time For The Stroller Talk

- When is it appropriate to recommend adaptive seating for a child?
- What is the best way to approach the family?
- What information do you need to have prepared prior to talking with the family?
- Why might a family tell you “no”?

Standard vs. Adaptive

<table>
<thead>
<tr>
<th>Standard Stroller</th>
<th>Adaptive Stroller</th>
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</thead>
<tbody>
<tr>
<td>• Mainstream</td>
<td>• Seating &amp; positioning options.</td>
</tr>
<tr>
<td>• Lower profile</td>
<td>• Durability</td>
</tr>
<tr>
<td>• Standard seating option only</td>
<td>• Storage and accessories for transporting medical equipment</td>
</tr>
<tr>
<td>• Limited recline available in some brands.</td>
<td>• Seating system removable</td>
</tr>
<tr>
<td>• Easily transportable</td>
<td>• Tilt, recline, &amp; transit available</td>
</tr>
<tr>
<td></td>
<td>• Foldable base</td>
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Adaptive Strollers

Seating & Positioning – How Much Support?

Functionality & Design
Stroller To Wheelchair

- Why do some parents hesitate with transitioning from a stroller to a wheelchair?
  - Strollers (even adaptive strollers) look more mainstream
  - Accessibility
    - Home
    - Transportation
  - Ease of getting from point A to point B
  - Acceptance
  - Funding

- Why is it important to move a child from a stroller to a wheelchair?
  - Positioning
  - Age appropriateness
  - Seating
  - Access to the environment

Points to Consider

- Seating compatibility
  - Standard
  - Custom
  - Dynamic options

- Accessories
  - Headrests
  - Upper extremity supports
  - Lower extremity supports
  - Positioning belts
  - Wheel options

- Weight
- Folding options
- Configuration
- Growth

Dynamic Seating for Dependent Manual Wheelchairs

- Who is appropriate for tilt, recline, or elevating leg rest?
  - Consider the client’s:
    - Ability to change position / shift weight
    - Postural stability
    - Physiological risks
    - Problems with homeostatic control
    - Mobility Related Activities of Daily Living (MRADLs) needs
    - Environment demands

Overview of RESNA’s Position Paper – Tilt, Recline, Elevating Legrests

It is RESNA’s position that these features are often medically necessary, as they enable certain individuals to:

- Realign posture and enhance function
- Enhance visual orientation, speech, alertness, and arousal
- Improve physiological processes such as orthostatic hypotension, respiration, and bowel and bladder function
- Improve transfer biomechanics
- Regulate spasticity
- Accommodate and prevent contractures and orthopedic deformities
- Manage edemas
- Redistribute and relieve pressure
- Increase seating tolerance and comfort
- Independently change position to allow dynamic movement

What’s the Big Deal?

“From the time Lily was born with Spina Bifida we knew that she would have many challenges, being paralyzed from the waist down. As she grew and began to finally get strong enough to move around on her own, we could see what an impact mobility had on her brain development.

Not only was she physically able to get herself around in public settings, but she was thinking and using her curiosity.

For us, Lily’s wheelchair has always represented freedom and independence.”

– Melani (Salt Lake City, UT)

Independent Manual Mobility

- Folding vs. Rigid
- Weight and materials
- Standard Configuration vs. Reverse Configuration
- Rear Wheel
  - Vertical Position
  - Seat to floor height
  - Lateral Position
  - Camber
- Casters and Caster Housing
- Back support
- Front rigging
- Arm rests
- Foot plates

Seat Inclination for Postural Support

- Position client so they are sitting “IN” the chair, not “ON” the chair!!

YES!

Optimal Rear Wheel Access

- Tip of middle finger at hub
- 100-120° of elbow extension at top of push cycle
- Good lateral spacing

Rear Wheel Position

- Horizontal position affects:
  - Wheel access/UE position
  - Maneuverability
  - COG/stability
- Lateral position affects:
  - Wheel access/UE position
  - Overall width
- Vertical position affects:
  - Wheel access/UE position
  - STFH
  - Orientation in space
- Camber affects:
  - Wheel access/UE position
  - Maneuverability
  - Stability

Power Assist Systems

- Individuals with limited upper extremity strength
- Individuals with compromised respiratory systems
- Individuals not “ready” for a power mobility device
  - Environment reasons
  - Psychological reasons
Pediatric Power Mobility

What's the Big Deal?

“Power mobility enables toddlers to more independently access their environment which thereby promotes cognitive skill development.”

– Michele, CCC-SLP (Atlanta, GA)

“The power chair is so important to Cameron because it allows him to have independence when he otherwise couldn’t or is broken he can still play with his friends.”

– Katie (Springfield, MO)

Pediatrics & Power

• Children develop thru exploration/stimulation
• Children without physical impairments begin mobility at ~ 9-12 months
• Give children with disabilities the same opportunities
  – Introduction to power mobility as early as possible
  – Time and practice to learn and make mistakes
  – Appropriate supervision
• Marginal ambulation or manual propulsion:
  – Risk of stress/damage to muscles, joints
  – Requires energy and endurance
  – Reduces energy available for other activities

Power: To Whom & Where

WHO?

• Clients with diagnoses that may include:
  – Cerebral Palsy (CP)
  – Muscular Dystrophy (MD)
  – Traumatic Brain Injury (TBI)
  – Spinal Cord Injury (SCI)
  – Spinal Muscular Atrophy (SMA)
• Clients of all ages (pediatrics to geriatrics)
• Long term manual wheelchair users

WHERE?

• Work
• School
• Community mobility
• Vocational use

Is a Client Appropriate For Power?

To be appropriate for power, client does not:

• Need to show a certain set of motor skills
• Need a certain set of cognitive abilities
• Need to show proficiency in all driving skills right away
• Be completely unable to ambulate or propel manually
• Need to be a certain age

So Many Things To Consider...

Proportional vs. Non-proportional

Standard Joystick

Switches

Alternative Joystick

Access point(s)

Adapted Joystick Handle

Confidential and Proprietary Duplication or Distribution Prohibited 10/16/16
Alternative Joysticks

MicroPilot
(Switch-It, Inc.)

Versa Guide
(Switch-It, Inc.)

Touch Drive 2
(Switch-It, Inc.)

MicroGuide
(Switch-It, Inc.)

Switch Drive Control

Big Red – 8”
Jelly Bean – 2 ½”
(Spec – 1 3/8”)
(AbleNet, Inc.)

Micro Light
(AbleNet, Inc.)

Proximity Switches
(Switch-It, Inc.)

Cinco Switch
(Switch-It, Inc.)

Consider A Seating Ladder

Custom made seating – molded

Custom made seating – linear and contoured

Off the shelf seating – customizable

Basic off the shelf seating – non customizable

What’s The Big Deal?

“The first time I saw her sitting in her KidKart I was shocked at how upright she was sitting and how much more engaged she was in her surroundings. It was a wake-up call to her dad and I about how important proper positioning is for Maryn.”

– Kim (Arlington, VA)

“Providing clients with proper seating and positioning is vital for feeding, communication, and socialization!”

– Becky, CCC-SLP (Pensacola, FL)

Off the Shelf Cushions - Customization

Cover Considerations

- Material
- Stretch
- Layers
- Style
### Maintenance & Care

- Concerns about moisture or incontinence?
  - Type of protection needed

- How is the cushion washed/cleaned?
  - Additional covers?

### Backrest Options

### Off the Shelf Backs

### Custom Fabricated Seating: Unique Postures

### Custom Seating Surfaces

<table>
<thead>
<tr>
<th>Type of Insert</th>
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<tbody>
<tr>
<td>Solid seat insert</td>
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<tr>
<td>I seat insert</td>
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<tr>
<td>T seat insert</td>
</tr>
<tr>
<td>Offset seat insert</td>
</tr>
<tr>
<td>Anti-thrust seat insert</td>
</tr>
<tr>
<td>Adjustable split seat insert</td>
</tr>
<tr>
<td>Built-in medial thigh support seat insert</td>
</tr>
<tr>
<td>Contour seat insert</td>
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### Custom Backrest Shapes

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<tr>
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<tr>
<td>Curved back insert</td>
</tr>
<tr>
<td>Grid back insert</td>
</tr>
<tr>
<td>Bi-angular back insert</td>
</tr>
<tr>
<td>Contour back insert</td>
</tr>
<tr>
<td>Adjustable lumbar back insert</td>
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</tbody>
</table>
**Foam Layering**

- Foam Layering used for 3 basic reasons
  - Immersion
  - Pressure relief
  - Increase stability

- Different foam types and thickness are layered to achieve one or all of the above

**Foam In Place**

- Back rest/Carrying Structure
- 1” Sunmate foam
- Loose 4” deep cover
- 1 Unit of liquid soft Sunmate foam.

- Common Mods
  - Lateral Supports
  - I style back
  - Curved wood
  - Custom base foam

**“Hybrid” Option - ShurShape**

- What is it? What is the process?
  - Chopped up foam pieces in a large vacuum sealed bag (one for the seat and one for the back).
  - Glue is poured in the bag to mix with the foam. Next a suction machine is hooked up to the bag and the glue/foam concoction is molded to the client.
  - A “dry run” can be done by using the suction without the glue to determine how the system will impact the client.

- Things to keep in mind
  - Slight adjustments can be made while mold is setting.
  - Carrying structure enable specific seat depth, back height and angle adjustments to accommodate an optimum fit to the wheelchair base.
  - Can do a dry mold
  - The foam can be cut away or modified in the field by a seating professional.
  - Mixture must be mixed thoroughly.

**Custom Molded Seating**

- In some cases it is easier to attain consistent positioning/targeting with a mold needing less adjustment or repositioning after transfer.

- Molding systems allow direct involvement of the clinician in the final shape as opposed to taking measurements.

- Molds eliminate moveable, adjustable parts – can be positive

- Molds eliminate adjustment and fine tuning – can be negative

**Quick Public Service Announcement**

- Does immersion and envelopment occur when we see these things on top of the well thought out prescription?
  - Incontinent pads
  - Slings
  - Diapers
  - The list goes on......!!!!

- We MUST take this on as part of our role!
- Educate the consumer and caregiver!

**Lateral Thoracic & Pelvic Pads**

- Thoracic
- Curved
- Pelvic
- Tapered
Horizontal and Vertical Bar Mounts

- Basic anterior posterior adjustment
- Moderate strength
- Low Cost
- Most durable mounting option available (HD)
- Increased of anterior adjustment
- Not commonly used ??

Goosenecks

- Good anterior posterior adjustment without a protruding horizontal rod
- Good durability
- Aesthetic appeal
- Some versions have a flip back option

Headrest Pad Considerations

Headrest Pad & Component Options

Additional Options

Building Blocks for Pediatric Seating & Mobility

- Identify Goals
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- Funding & Documentation
Be sure to ask “How does the chair grow?”

Growth Considerations for Mobility Bases

- What is too much growth?
- Chair frames
  - Should have both width, depth and seat to floor height change capability
- Quick Adjustments
  - Moving the back post
  - Growing the cross brace, or strut tubes
  - Swapping side frames (height)
- More Involved Adjustments
  - Adjustment kit
  - New frame

WAIT... Don’t Forget The Most Important Parts!

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Critical Questions

- Who is the funding source?
- What is the client’s medical history?
  - Diagnosis (primary, secondary, etc.)
  - Surgeries (previous and upcoming)
  - Medications (past, present, future)
- What equipment has the patient had?
  - Not just wheelchairs
  - When was it received, why does it no longer meet their needs (medical - primary)? Who funded the equipment?

The Funding Source

- The reviewers are required to ensure that the coverage criteria/rules are met.
- The budget must be managed through these decisions.
- How do you learn the coverage criteria for all the funding sources?
Documentation

- Is your evaluation completed electronically or hand-written?
- Letter of medical necessity?
- Template or not?
- Important documentation reminders:
  - Your clients are individuals
  - Proof-read!
  - Contradictions

Suggested Resources

- RESNA.org
  - Position papers
  - Wheelchair Service Provision Guide
- NRRTS.org
  - Webinars
  - Directions Magazine
- Mobility Management Magazine -
  https://mobilitymgmt.com/Home.aspx
- NCART.US
- Go Baby Go - http://sites.udel.edu/gobabygo/

Questions???

Thank You For Participating!
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www.EducationInMotionBlog.com