

Importance of Early Mobility

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What we will be covering:

- Barriers to early mobility intervention
- Physiological demands of forms of mobility
- Impact of early mobility on:
 - Motor development
 - Intellectual development
 - Psychosocial development
 - Vision



Poll #1

- If you are currently recommending power wheelchairs for young children, how young do you start?
 - 12-24 months
 - 24-36 months
 - 3-5 years
 - 5 years and older



Importance of Early Mobility

- Early mobility has been linked through research to key developmental milestones
- Despite this, power wheelchairs are often not explored or approved for young children
- Education is key



Importance of Early Mobility

- RESNA Pediatric Power Mobility Position Paper
 - Compilation of expert opinion and summary of related research
 - Intended for education, reimbursement and to direct research
 - Available at www.resna.org or www.permobilus.com (under education)



Independent Mobility

- This information is specific to power mobility
- However, much of the research supports developmental impact from any form of independent mobility, including:
 - Manual wheelchairs
 - Gait trainers
 - Walkers



Barriers

- Power Mobility is often not recommended for very young children due to:
 - Concerns for motor development
 - Concerns that the child will not understand or be unsafe
 - Concerns about funding



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Barriers

- Historically, older children were considered candidates
- Use of a power wheelchair was seen as a failure of therapy
 - Wiart, Darrah 2002



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Early Mobility and Physiology

- Sometimes, the physical demands of an activity are too great for the activity to be functional
- Physiological importance
 - Demands of ambulation
 - Demands of manual wheelchair propulsion
 - Demands of power mobility
 - Mobility and exercise

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Physiology: Demands of Ambulation

- Ambulation requires a specific level of gross motor control, coordination, balance, strength and endurance



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Physiology: Demands of Ambulation

- Ambulation may not be functional if the client cannot walk long distances, over varied terrain and without falling in a timely manner without undue fatigue
- This is also true for assisted ambulation, using a gait trainer or walker

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Physiology: Demands of Ambulation

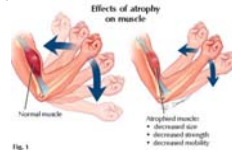
- Physiological demands are prioritized by the body over functional demands
- Medically fragile children may require all available physical resources for breathing, circulation and digestion
- Power mobility conserves energy for physiological demands



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Physiology: Demands of Manual Wheelchair Propulsion

- Manual wheelchair propulsion requires:
 - UE strength and coordination
 - Hand grip
 - Head and trunk control
 - Endurance
 - Higher oxygen consumption than typical ambulation
 - Luna-Reyes, et al, 1988



Physiology: Demands of Manual Wheelchair Propulsion

- Manual wheelchair propulsion may not be functional if the child cannot self-propel in a timely manner long distances, over varied terrain, up and down inclines and without undue fatigue and effort.
- Efficiency = time + effort
 - Too much time and effort means decreased efficiency



Physiology: Demands of Power Mobility

- Power mobility requires:
 - Access to the drive controls
 - Sufficient endurance to use the controls throughout the day



Physiology: Mobility and Exercise

- Mobility and exercise are not the same
- Mobility must be efficient and functional
- Exercise is a separate activity as it results in fatigue



Impact of Early Mobility on:

- Motor Development
- Intellectual Development
- Psychosocial Development
- Vision



Motor Development

- Impact on other forms of mobility
 - Research has demonstrated that kids who use a power wheelchair are more likely to attempt any form of independent mobility (i.e. crawling, gait trainer)
 - Butler, C., Okamoto, G.A., & McKay, T.M. (1983). Powered mobility for very young disabled children. Dev Med Child Neurology, 25(4), 472-474.



Motor Development

- Impact on other forms of mobility
 - Research has demonstrated use of power mobility does not reduce gross motor functions
 - Bottos, Molcati, 2001



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Motor Development

Bottom line:

- Kids who use power wheelchairs at a young age are not less likely to walk or become lazy

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Poll #2

- How often do you meet resistance over impact on motor development?
 - Less than 10% of the time
 - 10-25%
 - 25-50%
 - 50% or more

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Intellectual Development

- Cognition/Learning
 - Research has demonstrated that early mobility has strong links to learning
 - Kids who are independently mobile have increased opportunities to explore and interact with the environment
 - Butler, C. (1986). Effects of powered mobility on self-initiated behaviors of very young children with locomotor disability. *Developmental Medicine & Child Neurology*, 28: 325-332.



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Intellectual Development

- When children move independently, they must face **spatial problems** such as:
 - Not colliding with obstacles
 - Not falling off the edge of stairs
 - Remembering how to get from place to place
 - Kermoian, 1997



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Intellectual Development

- Infants who do not have functional mobility:
 - **Cannot locate hidden objects (Object Permanence)**
 - Are not wary of heights
 - Are more dependent than peers on vision to control their posture (rather than vestibular and proprioceptive input)
 - Bai, Bertenthal, 1992; Campos, Bertenthal, Kermoian, 1992, 1996; Higgins, Campos, Kermoian, 1996; Kermoian, 1997; Kermoian, Campos, 1988



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Intellectual Development

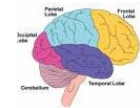
- Older children who do not have functional mobility have:
 - Decreased map reading skills
 - Difficulty remembering how to get from one place to another
 - Difficulty estimating tight spaces
 - Simms, 1987; Stanton, Wilson, Foreman, 2002



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Intellectual Development

- Experience increases brain development
 - Stiles, 2000
- Onset of mobility improves brain function
 - Bell, Fox, 1997



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Intellectual Development

Bottom line:

- Kids who use power wheelchairs at a young age develop **foundational skills** for better learning in the future

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Psychosocial Development

- Decreased rate of “learned helplessness”
- Formulates sense of identity, confidence and reduces apathy and depression
- McDermott and Akina (1972), Kohn (1977), Butler (1991)



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Psychosocial Development

- Mobility impacts a child's ability to learn and participate by increasing independence
- Biringen, et al, 1995; Compos, Kermoian, Zumbahlen, 1992



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Psychosocial Development

- Learned helplessness is firmly established by age 4 in children without functional mobility
- Butler, 1991

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Psychosocial Development

- Children with disabilities engage in more solitary and adult play than peers
- When they play with peers, they take on lower status roles
- Doubt, McColl, 2003; Missiuma, Pollock, 1991; Tamm, Skar, 2000)



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Psychosocial Development

- Children with power mobility:
 - Become more active and engaged in the world
 - Butler, 1996
 - Initiate movement and interaction more frequently
 - More exploratory, more curious
 - More persistent when frustrated



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Psychosocial Development

- This independence may account for:
 - Increased vocalizations
 - Improved sleep habits
 - Improved disposition
 - Increased participation in educational programs
 - Increased ability to interact with peers
 - Deitz, Swinith, White 2002; Furumasu, Guerette, Tefft, 2004

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Psychosocial Development

Bottom Line:

- Kids who use power wheelchairs at a young age are **more independent, participate more, engage more and view themselves as more capable.**

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Visual Development

- Perceptual skills, particularly depth perception, develop with independent mobility, **typically around the crawling stage**
 - Perceptual skills are important for learning, i.e. reading and math
 - Kermoian, R. & Campos, J. (1988). Locomotor experience: a facilitator of spatial cognitive development. *Child Development*, 59: 908-917.



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Visual Development

- Infants lacking vision have significant motor delays
- Prechtl, et al, 2001

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Visual Development

- Independent mobility provides visual experience for:
 - Cortical development
 - Spatial relationship comprehension
 - Development of depth perception
 - Nawrot, 2003



Visual Development

Bottom Line:

- Kids who use power wheelchairs at a young age develop better vision and visual perceptual skills which are important in **cortical development, mobility and learning**



Poll #3

- Please mark the areas you see a difference in after a child receives power mobility:
 - Motor
 - Cognitive
 - Psychosocial
 - Visual



Resources

- Access to Independence Website
 - Resources
- AbleNet Blogs
 - www.ourremarkablestories.com



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