

Early Intervention and standing

MARY MILES, PT, DPT

At the end of this conference, participants will be able to:

Identify	Identify	Choose
when standing should be incorporated into pediatric practice	the benefits of standing, supported Evidence based Medicine	the appropriate stander for a pediatric client based on their strengths and needs



When should kids begin standing?

What is society telling parents?



Standing early!

Center for Evidence-based Medicine (CEBM) levels of evidence:

- Level 1: highest level of evidence (systematic review of randomized controlled trials (RCT))
- Level 2: pilot survey with reported validity and reliability tools
- Level 3: survey studies w/o validity and reliability tools, but with rigorous analysis
- Level 4: no comparison studies; limited validity and reliability tools and limited analysis i.e. case reports or case studies
- Level 5: lowest level evidence, expert opinion

Why is standing important?

Improved bone density

- Standing at least 1 hour, 5 or more days per week
- Standing at least 7.5 hours per week will cause increases in BMD in weight bearing bones
- Both passive and dynamic standing showed increased BMD, but dynamic standing had greater increases
- "Intermittent loading appears to be a key stimulus during standing, as opposed to increasing the time of standing."

Paley G, Smith B, Glickman L. Systematic review and evidence-based clinical recommendations for dosing of pediatric supported standing programs. *Pediatr Phys Ther.* 2013;25:232-247.

Prevention of Fractures

- The risk for fractures in children with GMFCS levels I-III is similar to typically developing children.
- Risk Fracture for children in GMFCS levels IV-V is increased with certain comorbidities – growth failure and seizure medication
- Good news!
- Positive correlation between standing and fractures of children in GMFCS levels IV-V

Wort UJ, Nordmark E, Wagner P, Duppe H, Westbom L.
 "Fractures in Children with cerebral palsy: a total population study", *Developmental Medicine and Child Neurology*. (March) 2013.

Improved range of motion

- Standing maintained or increased ROM, prevented knee flexion contractures
- When standing programs were stopped, knee ROM decreased
- Standing increased static and dynamic ROM for plantar flexors
- Standing for children as young as 14 months improved hip ROM
- Sustained stretching of longer duration preferable to improve range of motion.
- Standing for 45-60 min daily is optimal to improve hip, knee and ankle ROM

Paley G, Smith B, Glickman L. Systematic review and evidence-based clinical recommendations for dosing of pediatric supported standing programs. *Physical Therapy*. 2013;93(3):31-42.
 119 Pin et al. The effectiveness of passive stretching in children with cerebral palsy. *Devl med and child neuro* 2008; 48:835-840.



Monitoring Hip Joint Integrity

Alpha Angle Measurement versus Acetabular Angles
 Hip Ultrasound -taken when kids under 9 months of age (alpha angle)
 *normal alpha value = 60 degrees or greater
 Xrays- taken once kids approach 9 months (acetabular angles)
 *normal acetabular value = 28 degrees or less.

Hip Dysplasia

- Incidence of 35% in children with CP
- Not just a high tone condition
- Those born breech positioning at higher risk
- Twins/multiple births higher risk

What leads to hip dislocation?

- Spasticity in muscles
- Shortening of psoas and hip adductor muscles in relation to their opposing muscles
- Weakness/imbalance of muscle strength at hips

Larnert P, Risto O, Hagglund G, Wagner P. Hip Displacement in relation to age and gross motor function in children with cerebral palsy. J Child Orthop. 2014 Mar; (2):129-134

Hip Surgery complications

- Complication rate per patient (including failure to cure) was 47.6%
- Higher correlation for complications for those in spica cast
- Higher risk factor for re-subluxation after surgery, for those < 6 years of age, and children with tracheostomy

Larnert P, Risto O, Hagglund G, Wagner P. Hip Displacement in relation to age and gross motor function in children with cerebral palsy. J Child Orthop. 2014 Mar; (2):129-134

Hip surgery risk at age 7

- o Highest for children in GMFCS level V- cumulative risk at age 7 was 47%
- o GMFCS IV- risk was 24%
- o GMFCS III – risk was 23%
- o We Need to be aggressive early with our prevention programs!

Larnert P, Risto O, Hagglund G, Wagner P. Hip Displacement in relation to age and gross motor function in children with cerebral palsy. J Child Orthop. 2014 Mar; (2):129-134.

Hip Joint Integrity

- Weight bearing with abduction can contribute to the development of the acetabulum shape and maintain hip abduction flexibility
- Potential to improve migration percentage with consistent standing in abduction.
- Daily standing in Hip abduction can maintain hip abduction flexibility in children during first five years of development

Hagglund G, et al. Prevention of dislocation of the hip in children with cerebral palsy. 20-year results of a population-based prevention programme. Bone Joint J 2014; 96-B:1546-52.
 Macias L. The effects of the standing programs with abduction for children with spastic diplegia. Pediatr Phys Ther. 2009;17(1):96.
 Macias L, Boger C, Girabent M, StuMartinson C, Himmelmann K. Effect of weight bearing in abduction and extension on hip stability in children with cerebral palsy. Ped Phys Ther. 2011; 150-157.
 Staberg W. Standing Programs to Promote Hip Flexibility in Children with Diplegic Cerebral Palsy. Pediatr Phys Ther. 2015; 243-249.

What if standing early in abduction made the difference?



Improved motor skills

- 11 articles reviewed ranging from level 2 to 5
- 2 studies showed improved base of support and increased walking speed; additionally, one of these studies also showed improved stride length, stride time, stance phase time, and double support time
- 2 different studies showed standing improved scores on the gross motor function measure (GMFM)
- 1 study showed improved scores on standardized testing when positioned in a stander

Paleg G, Smith B, Glickman L. Systematic review and evidence-based clinical recommendations for dosing of pediatric supported standing programs. *Pediatr Phys Ther.* 2013;25:232-247.



Functional Play

Reduce spasticity

- 2 studies of level 2 quality:
- Showed a decrease in lower extremity spasticity
- Decrease in tone in triceps surae and tibialis anterior after 30 min of standing, reduction in tone lasted up to 35 minutes after standing session ended

Paleg G, Smith B, Glickman L. Systematic review and evidence-based clinical recommendations for dosing of pediatric supported standing programs. *Pediatr Phys Ther.* 2013;25:232-247.

Standing and constipation

- Single study design with child standing 30-45 min 5 days per week. No prior history of using a stander. History of constipation, needing enema 100% of time to evacuate before study began. AB design, 14 days baseline with 21 days of standing intervention.
- During regular use of the standing frame, the student evacuated spontaneously (no enema needed). Pain with evacuation was eliminated when the student used the standing frame.

Rivi E., Filippi M, Fornasari E, Mascia M, Ferrari A, Costi S. Effectiveness of standing frame on constipation in children with cerebral palsy: a single subject design. *Occup Ther Int*

Improved self-esteem and socialization

- 2 studies showed improved interactions with peers and caregivers
- 1 survey showed educational therapists felt standing helped to promote social interaction



Paleg G, Smith B, Glickman L. Systematic review and evidence-based clinical recommendations for dosing of pediatric supported standing programs. *Pediatr Phys Ther*. 2013;25-332-247.



Choosing a Stander

Who Provides the stander?

Schools - IEPs

Private insurance - Medicaid

Loaning libraries

Will the stander be needed long term?

Dosing Summary

- Building Bone density/prevention of fractures: 60 min daily
- Maintain or improve range of motion/flexibility: 45 min daily
- Improve or maintain Hip Integrity: 45 min daily
- Reduce Spasticity 30 min standing = 35 min tone reduction

Paleg G, Smith B, Glickman L. Systematic review and evidence-based clinical recommendations for dosing of pediatric supported standing programs. *Pediatr Phys Ther.* 2013;35:337-347

References

Doucort et al. Effects of Passive versus dynamic loading interventions on bone health in children who are nonambulatory. *Pediatr Phys Ther.* 2013;25:248-255

Gilson S, Sprad J, Miller C. The use of standing frames for contracture management for nonmobile children with cerebral palsy. *Dev J Neuro Rehabil Research.* 2009; 33:310-323

Galleguillos B, Gonzalez devesa M. Effects of a dynamic versus a static prone stander on bone mineral density and behavior in four children with severe cerebral palsy. *Pediatr Phys Ther.* vol 14 (3); Spring 2002:38-46.

Haggard G. et al. Prevention of dislocation of the hip in children with cerebral palsy: 20-year results of a population-based prevention programme. *Bone Joint J* 2014; 96-B:1366-1372

Kate D. et al. "Can using standers increase bone density in non-ambulatory children?" *American Acad of Cerebral palsy and Dev med.* 2004.

Larnert P, Balto O, Haglund G, Wagner J. Hip Displacement in relation to age and gross motor function in children with cerebral palsy. *J Child Orthop.* 2014 Mar; (2):129-134

Mancini L. The effects of the standing program with abduction for children with spastic diplegia. *Pediatr Phys Ther.* 2013;15(1):96.

Mancini L, Egan C, Gribben M, Shubert W. Standing Program to Promote Hip Flexibility in Children with Diplegic Cerebral Palsy. *Pediatr Phys Ther.* 2015; 243-249.

Paleg G, Smith B, Glickman L. Systematic review and evidence-based clinical recommendations for dosing of pediatric supported standing programs. *Pediatr Phys Ther.* 2013;25:232-237.

TW Fu et al. The effectiveness of passive stretching in children with cerebral palsy. *Dev med and child neuro* 2004; 46:855-862

Bal C, Papp M, Farnsworth E, Mancini M, Ferreri A, Conti S. Effectiveness of standing frame on participation in children with cerebral palsy: a single subject design. *Occup Ther Int.* 2014; 17:51-61

Shubert W. Correlations related to weight-bearing progress in children with developmental disabilities. *Phys Ther* 1993;73:80.

Wang H, Nordmark E, Wagner J, Dugas H, Weerdestein L. "Fractures in Children with cerebral palsy: a trend population study". *Developmental Medicine and Child Neurology.* (March) 2013
