Cerebral Palsy and Gait Training
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Methods
• EBSCOhost and google scholar databases
• Search terms:
  – “gait training”
  – “children with CP”
  – “partial body weight supported treadmill training”
  – “functional electrical stimulation and gait training”
• EBSCOhost = 170 results
• Google scholar = 1,100 since 2010

PICO Question
• Does partial body weight supported treadmill training or FES result in greater improvements in gait mechanics in children with CP?

Why?
• Common diagnosis
• Direction for treatment

Methods (cont)
• Filtered to 14 articles for a lit matrix
  – Flagged articles including either FES or PBWSTT used with children with CP in the last 10 years
  – Higher level evidence preferred
  – RCT’s, case studies, few systematic reviews

P – Gait Characteristics of Children with CP
• Characteristics of Gait Pattern
  – Less coordinated
  – Decreased walking speed
  – Shorter stride length
  – Decreased push off
  – Lack of postural reactions & impaired balance
• Changes in timing & sequencing of muscle activation
  – Excessive co-contraction
  – Imbalance in opposing muscles
  – Excessive muscle tone
I-FES Training

- Why use FES:
  - Assists muscles in overcoming locomotor deficiencies
- Where applied:
  - Gastrocsoleus alone or along with tibialis anterior
- Results
  - Positive results on gait of some children with CP
  - Improvements:
    - Increased ankle DF at initial foot contact or heel strike
    - Increased swing phase DF & improved prepositioning at initial contact

PBWSTT Parameters

- 2-6x/wk for 6-12 weeks
- Typically 20-30 minutes = improvements
- Variations in BW supported from 30-40% or based on ability to maintain certain posture
- All mentioned decreased support amount

I- FES Training

- Where applied
  - Bilateral gluteus medius
- Outcome Measures
  - 3D gait analysis via Optical Capture System & walkway, looking at step width, velocity, step length, stride length
  - Muscle tone of hip adductors (via Modified Ashworth Scale)
- Results
  - Continuous bilateral FES to gluteus medius muscles during gait in children with CP improved temporal-spatial parameters & reduced hip adductor tone

PBWSTT Parameters

- GMFCS
  - Self-selected walking speed
  - training intensity
  - time and distance walked
- GMFM
  - Standing and walking scores
  - step length
  - gait speed
- PEDI
  - all domains
  - Endurance
  - functional gait (velocity)

Improvements with PBWSTT

- GMFCS
- GMFM
- PEDI

I-Treadmill Training

- Naturally selects sensorimotor pathways to produce most efficient gait pattern
- Reduces anxiety about falling
- Encourages motor control

C-FES vs. PBWSTT

- Both interventions has been shown to positively affect various aspects of gait impairments for children with various forms of CP.
- Few studies directly compared interventions
- Novak, McIntyre et al ranked both interventions equally
Limitations

- low level evidence
- Variability in protocols and outcome measures
- Small sample sizes
- CP presentations and GMFCS levels vary greatly
- Limited RCT’s

O-Conclusion

- Reviewed literature presented both positives and negatives for FES and PBWSTT
- No clear cut result supporting success with specific intervention for specific presentation
- FES would be a more feasible option for clinics and families due to cost and ease of an FES machine compared to BWSTT

Future Studies

- Limit confounding variables by performing RCT on similar presentations of CP
- Larger scale studies with higher levels of evidence
- Difficulty due to variety in presentation

References