Short Term Influences of Transfer Training Among Full Time Pediatric Wheelchair Users: A Randomized Trial

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Publications

- Rice LA, Dysterheft JL, Sanders E & Rice I. Short-term influence of transfer training among full time pediatric wheelchair users: A randomized trial. *J Spinal Cord Med* 2016 Feb 25. Epub 2016 Feb 25.
- Dysterheft JL, Rice IM, Rice LA. Influence of Handrim Wheelchair Propulsion Training in Adolescent Wheelchair Users, A Pilot Study. *Frontiers in Bioengineering and Biotechnology*. 2015;3:68. doi:10.3389/fbioe.2015.00068

Introduction

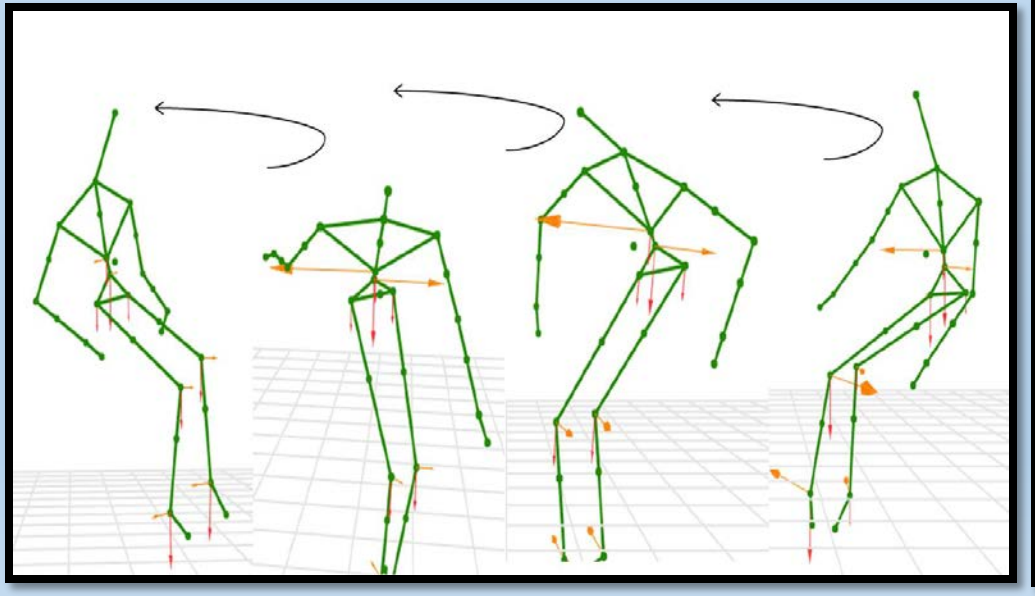
- > 200,000 school-aged children with ambulatory disabilities (Erickson W, et al. 2007)
  - Spinal Cord Injury
  - Spina bifida, muscular dystrophy, and cerebral palsy (CP)
- Manual wheelchair propulsion and transferring
  - independent movement
  - physical activity
  - full life participation

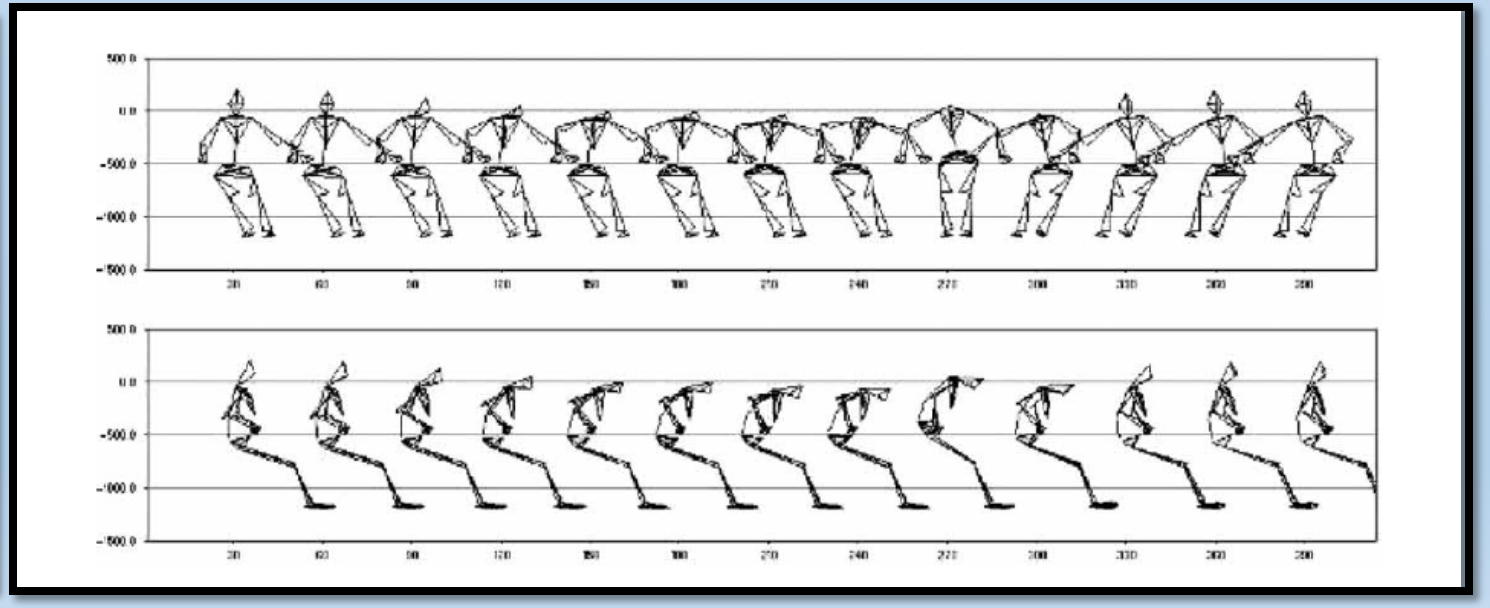
Growth and Maturation in Pediatric Wheelchair users

- Independent mobility is more vital to children then adults
  - cognitive and psychosocial phase of development
- Independent mobility fosters:
  - nervous system maturation
  - increased self-awareness
  - decreased attachment to caregivers
  - increased social interaction
  - and prevent learned helplessness

Transfers

- Manual wheelchair users perform 14-18 transfers per day
- Sitting pivot transfers
  - Most common technique amongst persons with SCI
  - Significant weight supported by the upper limb





Pentland (1991), Dalyan (1991), Gagnon (2008), Finley (1999)

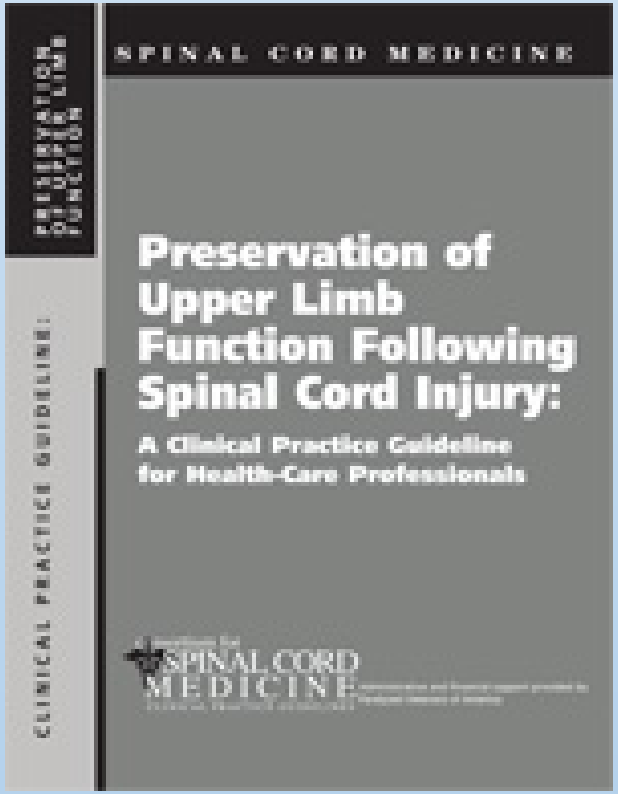
Transfers

- 65% of W/C users with shoulder dysfunction reported pain interfered with transfer performance.
- 8.1% of falls are related to transfers
  - Injuries
  - Extended bed rest
- Once pain and/or injury occurs, treatment is often ineffective
- ***Injury prevention key***

Dalyan (1999), Silfverskiold (1991), Lundqvist (1991), Burnham (1994), Sie (1992)

Transfer Recommendations

- Alternate which arm leads
  - Horizontal reaction forces are highest in the trailing arm
- Avoid a position of impingement
  - forward flexion/internal rotation /abduction
- Perform a level transfer when possible
  - Limb on the higher surface perform more work
- Use a handgrip when possible
  - Keeps the carpal tunnel in a neural position



Clinical Practice Guidelines for Preservation of Upper Limb Function (2005) Gagnon(2008), Neer (1983)

Pediatric Transfer Training

- Limited transfer training provided to pediatric wheelchair users
- Training is essential to/for:
  - Provide mobility to move independently and explore (short term)
  - Foster growth and development (short term)
  - Enhance participation with peers (short term)
  - Appropriate psychosocial development (short term)
  - Develop good life-long habits (long term)

Swatzky, et al (2012), Furumasu, et al (2004)

Purpose

- Examine the preliminary feasibility of the structured transfer-training intervention to improve short-term transfer skills among pediatric wheelchair users.
- Examine if pediatric wheelchair users respond to training in a similar manner as adults and if they can benefit from the same training techniques.
- *Hypothesis: short-term exposure to a structured training intervention would lead to improvements in transfer skills with results similar to that of adults*

Methodology

- Design:
  - randomized clinical trial
  - A convenience sample (n=14)
  - University of Illinois at Urbana-Champaign (UIUC) during a Wheelchair Basketball skills camp in July 2014.
- Inclusion Criteria :
  - 1) 8-18 years old
  - 2) self-report independent use of a manual wheelchair as their primary means of mobility
  - 3) at least 2 years post onset of disability requiring wheelchair use;
  - 4) free of any traumatic upper extremity injury or disability that would be exacerbated by physical activity.

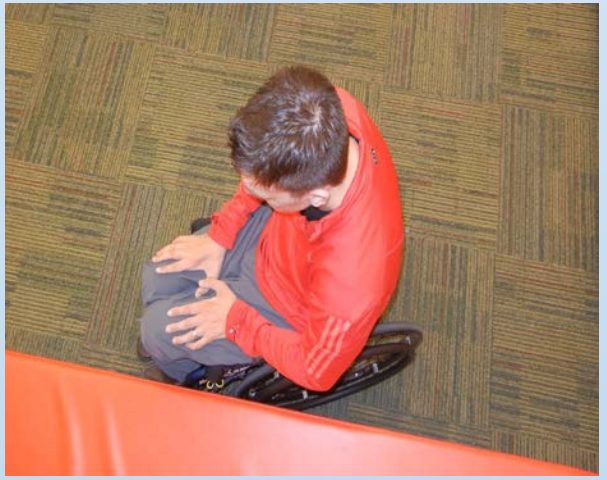
Methodology

Randomization	
IG (7)	CG (5)
Transfer Assessment #1 (all)	
10 Minute Rest (all)	
Transfer Assessment #2 (all)	
Transfer Education Intervention (IG only)	20 minute rest (CG only)
Transfer Assessment #3 (all)	

IG = Intervention Group, CG = Control Group

Transfer Training

- IG participants received training after Transfer Assessment #2
  - CG participants = 20 minute rest break
- Training Protocol
  - 9 minute video
    - Upper extremity/hand placement
    - Body positioning
    - Conservation Techniques
    - Movement strategies
  - One-on-one instruction by a Physical Therapist
    - Participant specific recommendations
    - Feedback on performance



Outcome Measures

- *Transfer Assessment Instrument (TAI)*
- Assessment of transfer quality and consistency
- Valid and reliable among individuals among full time wheeled mobility device users
- Intended to be used for ALL wheelchair users performing ALL types of transfers
- Score: 0 – 10
    - 0 = poor quality
    - 10 = high quality

TAI Scoring & Analysis

- Each time point, composed of two transfer sets, were scored independently and averaged to produce a final transfer score per time point
- Mann-Whitney Tests (non-parametric)
- Emphasis on effect size
  - small (d ≤.2), moderate (d ~. 5), and large (d ≥ .8)

Results: Demographics

Demographic Information					
Variable		All Participants	IG (n = 7)	CG (n = 5)	p-value
Age m (SD)		15.69 (1.44)	15.43 (1.72)	15.80 (1.10)	.681
Years Using a Wheelchair m(SD)		10.77 (3.83)	9.43 (4.16)	11.80 (3.03)	.305
Gender n (%)	Male	8 (66.7)	4 (57.1)	4 (80.0)	.550
	Female	4 (33.3)	3 (42.9)	1 (20.0)	
Disability Type n (%)	Amputation	2 (15.4)	1 (14.3)	1 (20.0)	.882
	Cerebral Palsy	1 (7.7)	0 (0.0)	1 (20.0)	
	SCI	3 (23.1)	2 (28.6)	1 (20.0)	
	Charcot-Marie-Tooth	1 (7.7)	1 (14.3)	0 (0.0)	
	Spina Bifida	5 (41.7)	3 (42.9)	2 (40.0)	

Results

- No significant differences among TAI scores pre-intervention
  - Transfer Assessment #1 $p = 0.755$
  - Transfer Assessment #2 $p = 0.876$
- Significant difference in IG TAI scores compared to CG, post-intervention
  - $P = 0.030$
- Age & years wheelchair use not correlated TAI
- Intervention produced results similar to those in adults(% change)

Rice, et al (2013)

Discussion

- First assessment of pediatric focused transfer intervention
- Well tolerated intervention
- Essential for the development of good life-long habits
  - Small changes may be substantial due to repetitive nature of transfers
- Program may be used by clinicians or independently by families of pediatric wheelchair users(practical approach)

Limitations

- Small sample size
- Age of participants
- Physical activity levels
- *Additional testing planned*
- TAI not validated among pediatric wheelchair users
  - *No other validated tools available to objectively assess transfers*
- Evaluator knowledge of group allocation
  - *Evaluator will be blinded in future studies*

Conclusion

- Transfer skills improved after exposure to intervention
- Findings similar to adult wheelchair users
- First step in the development of an evidenced based transfer training program for pediatric wheelchair users

Thank you!

Questions?

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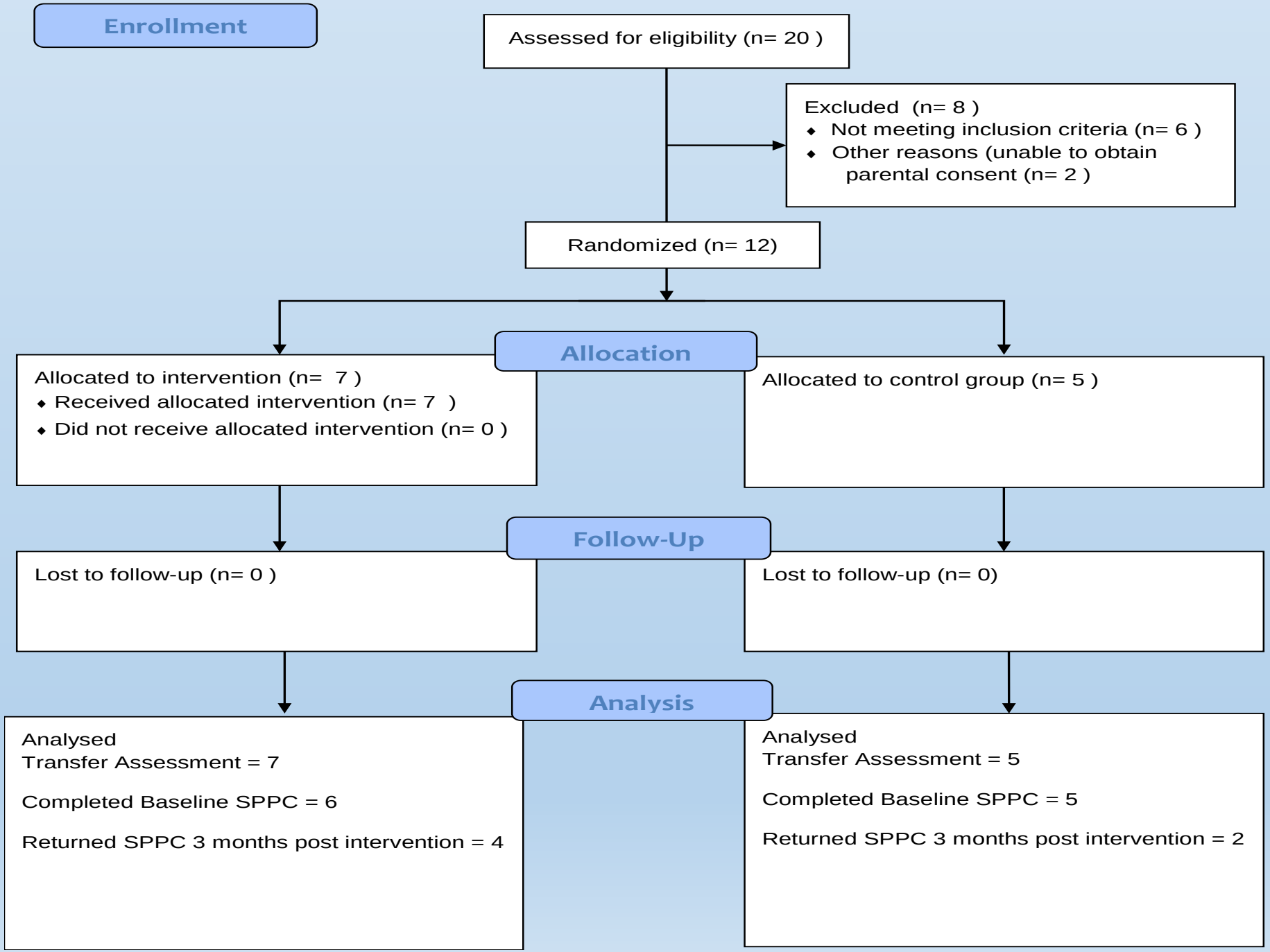
Enrollment
Assessed for eligibility (n= 20)
Excluded (n= 8)
Not meeting inclusion criteria (n= 6)
Other reasons (unable to obtain parental consent (n= 2)
Randomized (n= 12)
Allocation
Allocated to intervention (n= 7)
Received allocated intervention (n= 7)
Did not receive allocated intervention (n= 0)
Allocated to control group (n= 5)
Follow-Up
Lost to follow-up (n= 0)
Lost to follow-up (n= 0)
Analysis
Analysed
Transfer Assessment = 7
Completed Baseline SPPC = 6
Returned SPPC 3 months post intervention = 4
Analysed
Transfer Assessment = 5
Completed Baseline SPPC = 5
Returned SPPC 3 months post intervention = 2