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Pediatric Constraint Induced Movement Therapy vs. Bimanual Training for Hemiplegia

Heather Duyck, OTS

1 Ask: Research Question

Which is more effective: Bimanual training or pediatric constraint induced movement therapy for children with Hemiplegia?

2a Acquire: Search Terms

Patient/Client group: Children with unilateral hemiplegia
Intervention: Intensive training of the involved UE
Comparison: Pediatric Constraint Induced Movement Therapy (pCIMT) vs. Bimanual Training (BIT)
Outcome: Unimanual capacity, bimanual performance, spontaneous use, daily functioning

2b Acquire: Selected Articles

De Brito Brandao et al. (2012): A randomized controlled trial (RCT) that compared CIMT and HABIT (hand arm bimanual intensive training) in relation to the children's self-care performance and caregivers' perception of children's performance on functional goals.

Deppe et al. (2013): A RCT that examined the effectiveness of kid-CIMT vs IBT (intensive bimanual training) for both motor functions and spontaneous use of the affected upper limb. Investigated the impact of age and impairment severity on treatment outcome.

Sakzewski et al. (2012): A matched-pairs randomized trial comparing the effectiveness of BIT with CIMT on upper limb activity limitations, unimanual capacity, and bimanual performance.

3a Appraise: Study Quality

De Brito Brandao et al. (2012): Suggestive: Small n-size (n=16). Results need careful interpretation because neither the researcher nor the parents were blind to the children's group allocation.

Deppe et al. (2013): Suggestive: Moderately-small n-size (n=47). Compares BIT with kid-CIMT, rather than true CIMT. Includes etiologies other than congenital hemiplegia. Limitation in study being unable to procure a significant sample size of 60 children, instead only having 47.

Sakzewski et al. (2012): Preponderant: Fairly large n-size (n=63), matched pairs trial, can be generalized to children with congenital hemiplegia. Limitation in lack of inclusion of other etiologies.

3b Appraise: Study Results

The findings of these studies suggest that there are small differences between the two treatment approaches when considering the parent's satisfaction of performance on functional goals, the child's isolated motor functions, bimanual performance, and level of severity (see table 1.) The findings also indicate that while age is not correlated with improved treatment outcome, severity is moderately correlated, especially in the CIMT group. These studies indicated that spontaneous use of the affected side, self-care abilities, independence, and motor function yielded similar and non-significant differences between the two groups. Each study reinforced their finding of task specific practice and its importance in improving functional goals.

4 Apply: Conclusions for Practice

Based on the findings, the occupational therapist would find it an effective use of time to consider each child on a case by case basis, while emphasizing task specific practice for optimal improvement. Considerations should include: parent's selected functional goals and participation in treatment, child's level of severity, needed improvement in isolate or bimanual performance, and a desire for improvement in unpracticed goals. Because the differences in treatment are so similar in effectiveness, the therapist can make judgment based on client goals, caregiver goals, and level of impairment. Due to the often required bimanual movements in a child's life, the occupational therapist may consider using a combination approach of CIMT and BIT. While this approach is not yet fully researched, it may have great implications for future practice.

Case

Sarah is a five year old girl diagnosed with congenital hemiplegia from cerebral palsy. Her right side is affected, and she has no intellectual disabilities. While her parents want her to start first grade in the fall, they are worried about her ability to do well in the classroom because she is right handed. As her occupational therapist, you are interested in whether pediatric constraint induced movement therapy (pCIMT) or bimanual training (BIT) would be a more effective treatment plan for Sarah.

Table 1. Comparison of pCIMT and BIT

Treatment Goals	pCIMT	BIT
Isolated Motor Function	X	
Bimanual Performance		X
Increased Severity of Impairment*	X	
Task Specific Practice		X
Success in Unpracticed Goals		X
Caregiver Perception of Improvement		X

*X" indicates a p-value ≤ 0.05 demonstrating an increased effectiveness in treatment
 *Severity of impairment determined by the Modified Ashworth Scale

There are small differences between pCIMT and BIT in children with hemiplegia, and these reflect specificity of practice

de Brito Brandao, M. C., Gordon, A. M. & Mancini, M. C. (2012). Functional impact of constraint therapy and bimanual training in children with cerebral palsy: A randomized controlled trial. *American Journal of Occupational Therapy*, 66, 672-681. doi:10.5014/ajot.2012.004622

Deppe, W., Thuemmler, K., Fleischer, J., Berger, C., Meyer, S. & Wiedemann, B. (2013). Modified constraint-induced movement therapy versus intensive bimanual training for children with hemiplegia – a randomized controlled trial. *Clinical Rehabilitation*, 27(10), 909-920. doi:10.1177/0269215513483764

Sakzewski, L., Ziviani, J., Abbott, D. F., Macdonell, R. A., Jackson, G. D., & Boyd, R. N. (2011). Randomized trial of constraint-induced movement therapy and bimanual training on activity outcomes for children with congenital hemiplegia. *Developmental Medicine and Child Neurology*, 53, 313-320. doi:10.1111/j.1469-8749.2010.03859.x

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