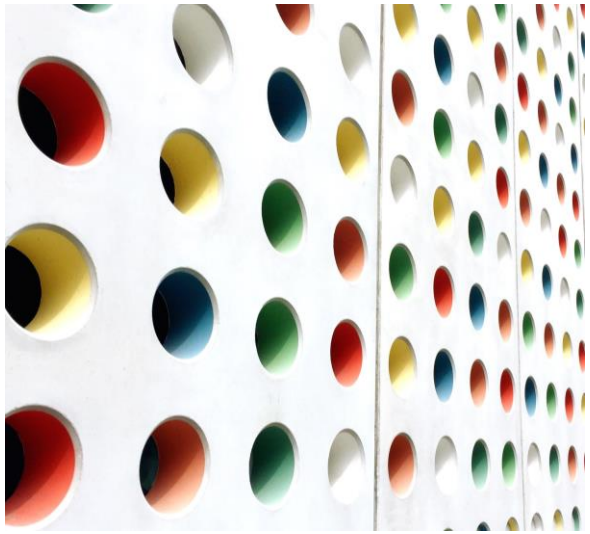

Development of combined M-CIMT and bimanual therapy program for infants in a group setting.

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Program Purpose

Provide an intensive Modified-Constraint Induced Movement Therapy (M-CIMT) experience for infants to increase affected upper extremity function and participation in developmentally appropriate occupations.

Introduction

- According to the American Heart and Stroke Association, childhood stroke is the most common cause for hemiplegia (Roach et al, 2008).
- Stroke occurs in 1 out of 3,500 live births
- 60% have permanent neurological problems (Roach et al, 2008).

Introduction Continued

- Hemiplegia is the most common neurological deficit of a stroke
- Children with hemiplegia often experience negative feedback due to difficulty using the affected upper extremity, leading to learned non-use (Chamudot et al, 2018).
- Learned non-use leads to decreased function in affected extremity.

Why M-CIMT?

A large body of evidence exists regarding the effectiveness of Modified-Constraint Induced Movement Therapy (M-CIMT) and children ages 2 and above.

However only a few studies and two protocols exist for infants under age 2. (Chamudot et al, 2018)

Background

- Constraint Induced Movement Therapy is a treatment technique emphasizing massed practice with the affected upper extremity, while constraining the less affected limb (Case-Smith et al, 2012)
- Participation in CIMT leads to increased motor function in affected extremity and to functional changes within the brain. (Yadav, Borah & Kothari, 2016)
- M-CIMT is designed to avoid the limitations while applying benefits of CIMT within a functional clinical setting.

Background

- Bimanual Intensive Therapy (BIT) is an intervention utilized with patients with hemiparesis to improve performance for tasks requiring both hands.
- BIT focuses on intensive training through functional tasks tailored to their interests, abilities, and functional goals.

Current Literature

- Studies indicate, M-CIMT protocol of 3 hours of treatment time for 3 days, with 5 hours of constraint time for 5 days over 4 weeks provides equal functional upper extremity outcomes compared to traditional CIMT. (Yadav, Borah & Kothari, 2016)
- Studies recommend implementation of M-CIMT if indicated as early as possible due to the neuroplastic nature of the brain and development of the corticospinal tract during the first two years of life (Yadav, Borah & Kothari, 2016)
- M-CIMT participation for individuals with hemiplegia in the first two years of life decreases the opportunity of ingrained learned non-use of paretic limb during participation in daily occupations such as self cares and play.

Current Literature

- Studies have shown CIMT compared to BIT delivered at the same intensities were equally as effective in improving hand function.
- However, CIMT has shown to increase unilateral upper extremity skills, while BIT shows improvements in bimanual function.

Location: Medical rehabilitation outpatient facility within a pediatric day program.

Recruitment: health practitioners known to the facility and marketing promotional flyers placed in local physician offices.

Participants: Ages 3 and under experiencing upper extremity weakness or hemiplegia

Demographics: 2 males, 1 female.

Program Details

Additional Program Details

- Program Length: 3 hours therapy per day / 5 days per week / for 4 weeks.
- Typical Day: 1-2 hours OT, 1-2 hours of co-treament with physical and speech therapy.
- Constraint method: removable splint made of soft casting material and Velcro straps.
- Wearing Schedule: 8 hours per day/ 5 days a week. 7 if tolerated.

Methods: Evaluation

- In-depth caregiver/ guardian interview
- Functional observations
- Modified SHUEE assessment

Shriner's Hospital Upper Extremity Evaluation (SHUEE)

SHUEE:

- Video Based Assessment
- Ages: 3-18 years
- Purpose: evaluate segmental alignment of involved upper extremity during functional tasks
- Components: AROM, PROM, tone, and history of ADL performance

Modifications Made:

- exclusion of functional activities that were not developmentally accessible to the participants.

Methods: Intervention

- Wearing Schedule: 8 hours of total wear based on evidence based research, patient toleration, and caregiver interview.
- Program Schedule: 3 weeks of intensive theme-based unimanual task practice, 1 week of intensive bimanual task practice

Results

Participant 1	Participant 2	Participant 3
R hemi d/t delivery complications	R hemi d/t unspecified causes	R hemi due to CP diagnoses secondary to birthing complications
Self Care: UBD: Max A→ Min A LBD: Max A→ Mod A Shoes: Max A Socks: Max A → Mod A to don	Self Care: UBD: Max A → Mod A LBD: Max A → Min A Shoes: Max A →Mod A don Socks: Max A	Self Care: UBD: Max A→ Min A LBD: Max A Shoes: Max A Socks: Max A
UE ROM: PROM: WFL AROM: -Shoulder Flexion: Increase of 40 degrees -Shoulder Abduction: Increase of 50 degrees -Elbow flexion/extension: WFL	UE ROM: PROM: WFL AROM: Shoulder Flexion: no increase Shoulder Abduction: no increase	UE ROM: PROM: WFL AROM: -Shoulder Flexion: Increase of 25 degrees -Shoulder Abduction: Increase of 30 degrees
SHUEE: SFA: increase in 10 points DPA: increase in 11 points	SHUEE: SFA: increase in 15 points DPA: no difference	SHUEE: SFA: increase 9 points DPA: increase 8 points
Goals Achieved 5/7 goals Partially achieved 2/7 goals	Goals: Achieved 5/7 goals Partially achieved 1/7 goals Did not achieve 1 goal	Goals: Achieved 4/8 goals Partially achieved 4/8 goals

Upper Extremity Range of Motion Results

- Increase of 25-40 degrees of shoulder flexion
- Increase of 30-50 degrees of shoulder abduction

Functional Improvements

100% of participants demonstrated improved upper body dressing skills with incorporation of more affected upper extremity

66% of participants demonstrated improved lower body dressing skills with incorporation of more affected upper extremity

SHUEE Results

Average increase of 11 points in SFA of shuee

Average increase of 6 points in DPA

Goal Achievement Rate

71% of goals set were achieved

29% of goals set were paritally achieved

Only 1 goal was not achieved that was set.

Bottom Line

Engagement in therapeutic services providing M-CIMT for children presenting with hemiplegia as a result of a neurological event is critical for neurodevelopment. Neuro-imaging studies have indicated the brain in stroke patients undergoes neuroplastic changes in function and structure including the primary and dorsal motor cortex. Providing M-CIMT within the first two years of life decreases the opportunity for learned non-use of the affected extremity, promotes optimal neuro-development within corticospinal tract, and increases active participation and performance with daily occupations and environments.

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