Repeated participation in arm constraint movement therapy group supports positive changes in children with one sided paralysis as a result of an acquired brain injury

Success is the Sum of Repeated Efforts: An Evaluation of Repeated Trials in a Modified Constraint Therapy Group for Children with Acquired Brain Injury (ABI)

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Background
- Constraint-Induced Movement Therapy (CIMT) mitigates the effects of learned non-use by practicing repetitive movements using the affected upper extremity (UE), while the unaffected UE is restrained by a cast or splint
- CIMT has been modified for children by decreasing the practice intensity and using a cast or splint worn for a few hours daily
- Helping Hand is a group-based modified CIMT (mCIMT) program at Holland Bloorview
- There is evidence supporting the use of group-based mCIMT in children with ABI to achieve functional goals in the areas of occupational performance and UE function
- To date, the effectiveness of repeated annual group-based CIMT intervention for children with ABI has not been studied

Objectives
- Examine the effect of repeat participation in Helping Hand on UE function and occupational performance in children/youth with hemiplegia following an ABI

Methods
- Study design: Pre-test, post-test retrospective design
- Intervention: 2 week program, 4 hours daily, constraint on the unaffected UE; program content emphasizes shaping and repetitive task practice through play and self-care activities
- Assessments:
  - Upper Extremity Function
    - Hand grip strength (hand dynamometer/modified sphygmomanometer)
    - The Assisting hand Assessment (AHA): assesses bilateral arm and hand use in play-based activities
    - The Quality of Upper Extremity Skills Test (QUEST): evaluated quality of UE function including dissociated movement, grasp, weight-bearing and protective extension
  - Occupational Performance
    - Canadian Occupational Performance Measure (COPM): a semi-structured interview to identify occupational performance issues

Results
- Participant characteristics:
  - 13 participants (8 male, 5 female)
  - Mean age 6.8 years (age range 3.8 to 13.1 years)
  - Mean months post injury to first trial of program is 14
  - range is 3 to 34 months

- Significant improvement: pre-post intervention (year 1 and year 2), and after repeat participation (pre year 1 to post year 2)
- AHA
  - Significant improvement: pre-post intervention (year 1 and year 2), and after repeat participation (pre year 1 to post year 2)
  - Significant decline: decreased performance when not participating in program (post year 1 to pre year 2)
- QUEST
  - Significant improvement: pre-post intervention (year 1), and year 1 pre to year 2 pre, and after repeat participation (pre year 1 to post year 2)
- COPM
  - Significant improvement: pre-post intervention (year 1 and year 2), and after repeat participation (pre year 1 to post year 2)
  - Significant decline: decreased performance when not participating in program (post year 1 to pre year 2)

Discussion
- Preliminary evidence supporting repeat participation in group-based mCIMT for children with hemiplegia following ABI
- Performance (UE and activities of daily living) is declining year to year when not participating in the program, with repeat participation, performance continues to improve
- Other factors may contribute to the positive outcomes of this study including age, time post injury at time of participation, specific diagnosis
- Next steps include exploring outcomes for participants considering the effects of timing, age, type of acquired brain injury and participants who participate more than twice
- Limitations of study include a small sample size, non-blinded assessors, no control group and limited follow-up data

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