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Effect of small group treatment of the modified constraint induced movement therapy for clients with chronic stroke in a community setting

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ABSTRACT

This study investigated the effects of the group treatment component of the modified constraint induced movement therapy (mCIMT) protocol for clients with chronic stroke in a community setting. A within-subjects longitudinal study was conducted to which eight participants with chronic stroke being treated in a community setting in Hong Kong were recruited. Ten 3-h group sessions were conducted on two occasions within a four-week period, with four participants per group. Participants' less-affected hands were restrained in a mitt, with a target of wearing it for 4 h per weekday. Laboratory based tests and the Motor Activity Log (MAL) were used repeatedly to measure participants' hemiparetic upper extremity functions and the use of the limb in real-life on four measurement occasions: at baseline (four weeks before training), pre-test (one day before training), post-test (one day after training), and follow-up (four weeks after training). The Wilcoxon signed-rank test showed participants' baselines were stable four weeks before the intervention. The Friedman test found significant differences between pre-test, post-test and follow-up in the Box and Block Test (BBT), the total score, grasp and pinch subscores of the Action Research Arm Test (ARAT), and the Hong Kong Version of the Functional Test for the Hemiplegic Upper Extremity (FTHUE-HK), the Wolf Motor Function Test (WMFT), and the MAL. All these gains were maintained during the 1-month follow-up. The small group treatment component of the mCIMT was found to be effective, feasible, and capable of improving both

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motor performance and functional use of the affected upper extremity for patients with chronic stroke in a community setting.

1. Introduction

Rehabilitation of the hemiparetic upper extremity (UE) of clients after stroke is a common challenge faced by clinicians. Research has shown that about 70–80% of clients suffering from stroke present with such an impairment (Pang, Harris, & Eng, 2006), leading to difficulties with activities of daily living (ADL) and community integration. Different treatment approaches have been used to tackle this, including functional training, neurofacilitation techniques, strength training, repetitive bilateral arm training, robot-aided exercise training, constraint induced movement therapy (CIMT), and so on.

CIMT is a treatment approach whose signature protocol was developed by Taub (Morris, Taub, & Mark, 2006), who states that it is a therapeutic package consisting of different components and subcomponents. Its key constituents include (i) repetitive and task-oriented training; (ii) adherence-enhancing behavioral strategies; and (iii) constraining the use of the less-affected UE. This signature therapy combines the last-named component for 90% of the patient's waking hours for two weeks, with 6 h per day of training on the affected arm during this period.

The rationale of CIMT is based on tackling learned non-use to bring about functional reorganization of the primary motor cortex. It posits that only a portion of motor deficit derives from the damage to the nervous system, with the remainder resulting from the damage-induced phenomenon known as learned suppression of movement (Taub, Uswatte, Mark, & Morris, 2006). Taub and colleagues have proposed another mechanism and explained how a combination of restraint and training can overcome learned non-use and induce motor recovery through CIMT (Taub et al., 2006). The major components of CIMT include both restraint of the less-affected UE, but also intensive training using a technique called shaping. Shaping targets the desirable motor movement or outcome through small and progressive steps (Taub et al., 1994) and allows successful gains to be achieved by a relatively small amount of motor improvement. These inputs from CIMT could increase patients' motivation and limb use through practice and reinforcement. Eventually, the therapy encourages further movement and reward for using the more-affected arm and as a result, learned non-use is permanently reversed.

A review of the literature showed that there are 15 randomized control trials (RCT) in the field of CIMT covering different stages post stroke, including three RCTs covered acute stage of stroke with less than 14 days of post onset (Boake et al., 2007; Dromerick, Edwards, & Hahn, 2000; Page, Levine, & Leonard, 2005); five RCTs covered sub-acute stage of stroke with more than 1 month but less than 1 year post onset (Alberts, Butler, & Wolf, 2004; Page, Sisto, Johnston, & Levine, 2002; Page, Sisto, Levine, Johnston, & Hughes, 2001; Wolf et al., 2006; Brogardh & Sjolund, 2006); 7 RCTs covered the chronic stage of stroke with more than 1 year after stroke (Page, Sisto, Levine, & McGrath, 2004; Sterr et al., 2002; Suputtitada, Suwanwela, & Tumvitee, 2004; van der Lee et al., 1999; Wittenberg et al., 2003; Wu, Chen, Tang, Lin, & Huang, 2007a; Wu, Chen, Tsai, Lin, & Chou, 2007b). All studies reported effectiveness in reducing impairment and improving activity levels in the target group (Bonaiuti, Rebasti, & Sioli, 2007) across acute, sub-acute, and chronic stroke clients. It is becoming increasingly apparent that the rationale behind CIMT is that repeatedly induce the use of the paretic arm in "task-specific" functions to enhance motor recovery in patients with stroke, is "intensive practice". However, the 6–9 h per day treatment protocol may conflict with day-to-day treatment schedules. Furthermore, CIMT is a labor intensive therapy, with sessions usually carried out in one-to-one or one-to-two therapist-patient ratios in order to provide proper shaping and monitoring. As a result, there is a trade-off between benefits and resources when applying CIMT, such as seen in the use of the modified version (mCIMT). Researchers have modified the original treatment protocol and examined its effects at different levels of intensity, through varying the session duration, frequency, and total treatment duration (Page et al., 2001, 2002, 2004; Wu et al., 2007b). Another way of tackling CIMT's practicality is the use of the group approach, which can be found in three studies in the literature (Brogardh & Sjolund,