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Very Early Constraint Induced Therapy (VECTORs) for Treatment of Upper Extremity Hemiparesis after Stroke: A Phase II Randomized Controlled Trial of Occupational Therapy Early after Stroke

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Background: Constraint-Induced Movement Therapy (CIMT) is among the most developed therapeutic techniques for motor restoration of upper extremity (UE) hemiparesis after stroke.

Objective: To determine the effect of CIMT compared to traditional bi-manual occupational therapy for stroke related UE hemiparesis.

Methods: VECTORS was a single-blind Phase II trial of CIMT during acute inpatient rehabilitation comparing traditional upper extremity occupational therapy with dose-matched and high-intensity CIMT protocols. Participants were adaptively randomized on rehabilitation admission, and received 2 weeks of study-related treatments. The primary endpoint was the total Action Research Arm Test (ARAT) score on the more affected side at 90 days after stroke onset. A mixed model analysis was performed. Secondary measures included the Wolf Motor Function test (WMFT), the Motor Activity Log, the FIM, and the Stroke Impact Scale (SIS).

Results: 52 participants (mean age 63.9 + 14 yr) were randomized 9.65 + 4.5 days after onset. Mean NIHSS was 5.3 + 1.8; mean total ARAT score was 22.5 + 15.6; 77% had ischemic stroke. Groups were equivalent at baseline on all randomization variables. As expected, all groups improved with time on the total ARAT score. There was a significant time x group interaction ($F = 3.1$ $p < .01$), such that the high intensity CIT group had significantly less improvement at Day ninety. No significant differences were found between the dose-matched CIMT and control groups at Day ninety on primary and secondary outcome measures.

Discussion: CIMT was equally effective but not superior to an equal dose of traditional therapy during inpatient stroke rehabilitation. Higher intensity CIMT resulted in less motor improvement 90 days, indicating an inverse dose-response relationship. We conclude that motor intervention trials should control for dose, and that higher doses of motor training cannot be assumed to be more beneficial, particularly early after stroke.

Contribution to OT Practice: There are few randomized controlled trials of OT interventions for stroke. This study demonstrated that equal intensity treatments produced equal outcomes on all measures in persons treated early after stroke. The study further demonstrated that high intensity treatment resulted in less favorable outcomes that were sustained over time.