Focused Question
What is the comparison of effectiveness between constraint-induced movement therapy (CIMT) and bilateral treatment of equal intensity for chronic upper-extremity (UE) dysfunction caused by a cerebrovascular accident (CVA) using the Wolf Motor Function Test (WMFT) and the Canadian Occupational Performance Measure (COPM) to determine between-group differences?


Clinical Bottom Line:
The critical therapeutic factor in this study was treatment intensity rather than constraint. Restriction of using the unimpaired extremity and forced use of the affected extremity is generally necessary but may be accomplished through other methods such as intense cueing of bilateral UE use post-CVA (Hayner, Gibson, & Giles, 2010). CIMT and bilateral groups received the same frequency, duration, and intensity of treatment with a focus on functional activities. CIMT is effective in increasing UE movement and chronic UE dysfunction post-CVA. WMFT and COPM scores showed significant improvements in both groups across time.

The authors of this study used onsite clinic visits that included morning and afternoon meetings focused on reporting home program components. Home programs had no minimum frequency but were strongly encouraged. Functional activities completed within the clinic were routine, purposeful, repetitive, and designed to promote active range of motion (ROM). Morning activities included stretching and warm-up activities (e.g., balloon volleyball). Afternoon activities focused on lunch preparation, clean-up, a craft activity, and table games. Participants were encouraged to dedicate as much time as possible to the home program.

There were a couple limitations of this study. First, a small sample size was used. Second, moderate effect sizes were noted.

In the future, research that addresses the limitations in this study should be conducted to ensure that occupational therapy interventions are affected by treatment intensity. Once these studies
are performed, occupational therapists will have increased evidence to support the interventions they deliver.

RESEARCH OBJECTIVE(S)
List study objectives.

The primary objective was to compare the effectiveness between CIMT and bilateral treatment with equal intensity, duration, and frequency for chronic UE dysfunction following a CVA.

DESIGN TYPE AND LEVEL OF EVIDENCE:
Level I, randomized controlled trial, with stratification by severity of UE dysfunction, 6-month follow-up, 2-group comparison design.

Limitations (appropriateness of study design):
Was the study design type appropriate for the knowledge level about this topic? Circle yes or no, and if no, explain.

YES/NO

SAMPLE SELECTION
How were subjects selected to participate? Please describe.
Participants were recruited through offering a free clinic at Samuel Merritt University, at clinics in the vicinity, and at a local support group. Participants were prescreened by telephone to determine eligibility and invited to an in-person screening and study orientation if they passed the phone interview. In-person screening included Mini-Mental State Examination, author-developed balance assessment, and participants had to place affected hand on table.

Inclusion Criteria
Participants were considered if they were 18 to 100 years old and had English-language skills. Participants had to be at least 6 months’ post-CVA with related UE dysfunction (no minimum criterion for wrist or finger extension though trace movement in hand was required and must be able to successfully place affected hand on table) and had endurance to participate in therapy 6 hours per day for 10 consecutive weekdays. Participants had to walk without an ambulatory aid.

Exclusion Criteria
Participants were excluded if they were unable to refrain from smoking and had a self-report of being unable to tolerate regular diet.

SAMPLE CHARACTERISTICS

\[ N = 12 \]

| % Dropouts | 1 |
| #/ (%) Male | 5 / 42% |
| #/ (%) Female | 7 / 58% |
Ethnicity                  Not reported.

Disease/disability diagnosis    Cerebrovascular accident (CVA).

Check appropriate group:

<table>
<thead>
<tr>
<th>Group Range</th>
<th>20–50/study group</th>
<th>51–100/study group</th>
<th>101–149/study group</th>
<th>150–200/study group</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>&lt;20/study group</code></td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**INTERVENTION(S) AND CONTROL GROUPS**

*Add groups if necessary.*

**Group 1: Constraint-Induced Movement Therapy (CIMT)**

**Brief Description**

Participants wore padded mitt on unaffected hand and practiced functional activities solely using affected UE. Participants were given the least amount of assistance necessary for task performance such as the use of a universal cuff for self-feeding and scrub brush with suction cups for hand washing. Tasks were designed to promote active ROM and were routine, purposeful, and meaningful. Tasks involved repetition and daily performance such as cutting vegetables, setting the table, eating, and hand washing. Mornings consisted of stretching and warm-up activities (e.g., balloon volleyball). Lunch was an important aspect of therapy because participants worked together to retrieve equipment and ingredients to prepare the meal and set the table. Afternoons consisted of meal clean-up, a craft activity, or table games. Participants were encouraged to devote time to their home program and to report the time back each day but were not given a minimum requirement for home program.

**Setting**

Intervention took place at Samuel Merritt University occupational therapy clinic in Oakland, CA, and continued independently in home.

**Who Delivered?**

3 occupational therapy researchers, 7 second-year MOT students, and 4 first-year MOT students.

**Frequency?**

Morning and afternoon meetings focused on reporting home program components and time spent at home performing tasks with constraint. 6 hours of occupational therapy for 10 consecutive weekdays and home practice with no minimum frequency required.

**Duration?**

10 days of treatment and follow-up testing 6 months after posttest.

**Group 2: Bilateral Treatment**

**Brief Description**

Received repetitive and intrusive cuing to use both hands during all activities (even tasks normally performed unilaterally). Tasks were designed to promote active ROM and were routine, purposeful, and meaningful.
Many tasks involved repetition and daily performance such as cutting vegetables, setting the table, eating, and hand washing. Mornings consisted of stretching and warm-up activities (e.g., balloon volleyball). Lunch was an important aspect of therapy because participants worked together to retrieve equipment and ingredients to prepare the meal and set the table. Afternoons consisted of meal clean-up, a craft activity, or table games. Participants were encouraged to devote time to their home program and to report the time back each day but were not given a minimum requirement for home program.

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**Intervention Biases:** *Circle yes or no and explain, if needed.*

- **Contamination**
  - YES/NO: Both groups received some form of intervention.

- **Co-intervention**
  - YES/NO: NR, no mention of whether clients received other therapies.

- **Timing**
  - YES/NO: Short treatment duration with intervention lasting 10 days.

- **Site**
  - YES/NO: There was a significant difference between groups in carry through of home program, which may have affected the outcomes.

- **Use of different therapists to provide intervention.**
  - YES/NO: Yes, numerous researchers or students were used to implement interventions and the type of instruction, varying types of group activities, and encouragement may have affected the outcomes.

**MEASURES AND OUTCOMES**

Complete for each relevant measure when answering the evidence-based question:
Name of measure, what outcome was measured, whether the measure is reliable and valid (as
reported in article--yes/no/NR [not reported]), and how frequently the measure was used.

<table>
<thead>
<tr>
<th>Measure</th>
<th>Details</th>
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<tr>
<td>The Wolf Motor Function Test (WMFT)</td>
<td>measures fine and gross UE motor function determined by quality of movement and speed of movement on 15 tasks;</td>
</tr>
<tr>
<td>Reliability</td>
<td>excellent interrater reliability and test–retest reliability of &gt;.90 when used for individuals with CVA with UE dysfunction;</td>
</tr>
<tr>
<td>Validity</td>
<td>NR</td>
</tr>
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<td>Frequency</td>
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<td>Canadian Occupational Performance Measure (COPM)</td>
<td>participants self-rate goals of therapy on 10-point scale describing Performance and Satisfaction With Performance;</td>
</tr>
<tr>
<td>Reliability</td>
<td>excellent test–retest reliability when used after CVA, was 0.89 for Performance response and 0.88 for Satisfaction With Performance;</td>
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<tr>
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</tr>
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Measurement Biases

Were the evaluators blind to treatment status? Circle yes or no, and if no, explain.

YES/NO: Lack of explanation as to why evaluators were not blinded.

Recall or memory bias if yes, explain.

YES/NO

Others (list and explain):

None.

RESULTS

List results of outcomes relevant to answering the focused question.

Include statistical significance where appropriate ($p < 0.05$).

Include effect size if reported.

No significant difference was found between the CIMT and bilateral group other than the bilateral group being significantly longer post-CVA. The WMFT and COPM scores showed significant improvements across time in both groups. CIMT and bilateral group did not differ significantly on pretest assessments. The WMFT pretest score ($M = 40.83$) was significantly worse than the posttest ($M = 46.83, p = .009$) and the follow-up test scores ($M = 49.42, p = .008$) across all groups (Hayner, Gibson, & Giles, 2010). The posttest score was significantly worse than the follow-up test score ($p = .022$). The effect sizes for functional level (0.608), trials (0.689), and trial × functional level (0.223) are large, significant improvement in function from pretest to posttest and from posttest to follow-up but did not differentiate between the CIMT or bilateral group.
Was this study adequately powered (large enough to show a difference)? Circle yes or no, and if no, explain.

**YES** NO Discussion of Type II error when power was low is present.

Were appropriate analytic methods used? *Circle yes or no, and if no, explain.*

**YES** NO

Were statistics appropriately reported (in written or table format)? *Circle yes or no, and if no, explain.*

**YES** NO In written and tablet format

**CONCLUSIONS**

State the authors’ conclusions that are applicable to answering the evidence-based question.

No difference was found between the effects of CIMT and bilateral treatment on total WMFT scores. The bilateral group practiced at home more often potentially due to their ability to carry out functional activities with their unaffected hand. All groups improved from pretesting to posttesting for both self-assessed Performance and Satisfaction With Performance on the COPM (Hayner, Gibson, & Giles, 2010). The gains made on the COPM and the WMFT were mostly sustained at follow-up testing.

Significant improvement in UE motor function post-CVA from intensive occupational therapy in both CIMT and bilateral groups. Treatment intensity appears to be the critical therapeutic factor rather than physical constraint of unimpaired hand.

Further research is needed with consideration for use of a control group and further control of treatment intensity, frequency, and duration. Considering that intensity of CIMT has been a controversial factor, the findings of this study may suggest a benefit to intense occupational therapy intervention for individual’s post-CVA.

This work is based on the evidence-based literature review completed by Jamie Garnto, OTS, and Kelly Erickson, PhD, OTR/L, Faculty Advisor, College of St. Scholastica.


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