



A Scoping Review: Identifying Strategies for Remote Delivery of the Constraint-Induced Movement Therapy Protocol Used for Adults and Pediatrics

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Introduction

- The constraint-induced movement therapy (CIMT) protocol was developed by Edward Taub, PhD based on the Theory of Learned Nonuse and Use-Dependent Cortical Reorganization.
- CIMT has shown high evidence on increasing use and improving motor function of the upper extremity (UE) affected by a neurologic conditions such as stroke¹.
- The signature protocol contains three components²:**
 1. Repetitive and task-oriented training through shaping and task practice
 2. Administration and participation in the transfer package
 3. Restraining of the less affected UE for 90% of the waking hours
- Although CIMT is recommended by stroke guidelines, implementations face barriers such as cost, therapist/client availability, and transportation which should be of huge concern for occupational therapists^{3,4}.
- Telerehabilitation can open more opportunities that make rehabilitation accessible for patients that face transportation obstacles, which hinders occupational performance.⁵
- Telerehabilitation offers a potential solution, but research on remote CIMT delivery remains limited.
- AIM:** To investigate strategies for remote delivery methods of the CIMT protocol and potential differences in the delivery of protocols used for adults and pediatrics.

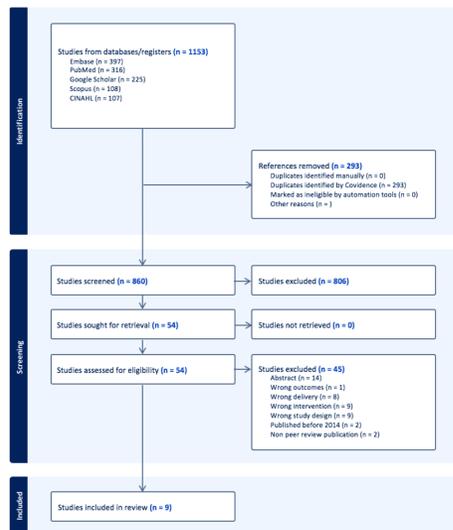
Methods

- This review followed the PRISMA-ScR recommendations.
- Databases Searched:** CINAHL, Embase, Google Scholar, PubMed, and Scopus
- Selection Criteria:** studies published in English in the past 10 years, focus on upper extremity, remote delivery of the CIMT protocol. Reviews and qualitative studies were excluded.
- Data collection and analysis:**
 - Articles were screened and data extractions was done using Covidence. Delivery system, structure of the treatment protocol, an overall results were descriptively reported.
 - Quality appraisal was performed using the Cochrane Risk of Bias visualization tool (RoBvis) and the Joanna Briggs Institute (JBI) critical appraisal and risk of bias tool.

Results

- Of 1,153 articles, nine met inclusion criteria: six involved adults with stroke, and three involved children with cerebral palsy, shown in Figure 1.
- None of the studies showed a high risk of bias, while noting risk of bias was assessed using a generic tabling format due to various study types used.

Figure 1. PRISMA Extension for Scoping Review Study Selection Flowchart



Results (cont.)

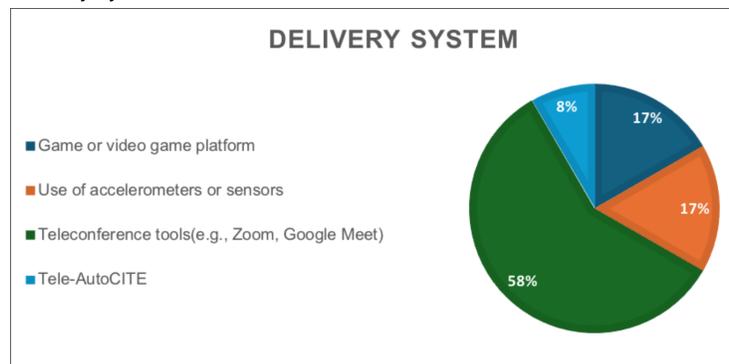
- Study characteristics were described by intensity, frequency, and duration of treatment through remote delivery listed in Table 1.

Table 1. Data Characteristics

	Author	Delivery System	Intensity	Frequency	Duration (w)
Adults	Borstad, et al. (2018)	Recovery RAPIDS - Xbox 360 Kinect sensor and accelerometers.	3h/day	5 days/wk	2
	Gauthier, et al. (2021)	Recovery RAPIDS through gaming technology.	5 hr/day + 1.5 hr of home game play	4 visits	3
	Saygili, et al. (2024)	Tele-CIMT via Zoom or Skype.	1.5 hr/day	5 days/wk	3
	Shamweel, et al. (2024)	Telerehabilitation via phone and videoconference.	40 min/day plus 4 hr/day of wearing restraint	3 days/wk	4
	Smith, M.A., et al. (2020)	Tele-CIMT via either Google Hangout or Adobe Connect.	1 hr/day remote session + 1-1.5 hr/day of in-person	5 days/wk	6
	Uswatte, G., et al. (2021)	Tele-AutoCITE, a portable tool that included Internet-based audio-visual monitoring.	3.5 hr/day	5 days/wk	2
Pediatrics	Reidy, et al. (2023)	Hybrid telehealth Infant CIMT model via remote methods.	2 hr/day for 20 sessions	18 treatment days	4
	Rezek, et al. (2020)	Tele-rehabilitation via Zoom application.	1.5 hr/day	7 days/wk	8
	Svensson, K., et al. (2024)	Remote Baby-mCIMT via video conference.	30 min /day	6 days/wk	2 6-wk periods, 6 wk break in between

- Among the 9 studies included, the most common theme used was the use of teleconferencing tools like Zoom or Google Meet described in Figure 2.

Figure 2. Delivery Systems Used



- Of all outcome measures used, only two studies had outcome measures that had no significant change where all other studies had significant changes in outcome measures used described in Table 2.

Table 2. Outcome Measures and Significance in Changes

Studies	WMFT	MAL	ARAT	BKT	Pinch	Grip	Touch	STREAM	9-HPT	FM-UE	FIM	QUEST	AHA	Mini-AHA	HAI
Borstad, et al. (2018)	+	+	+	NS			NS								
Gauthier, et al. (2021)	+	+													
Reidy, et al. (2023)												+	+	+	
Rezek, et al. (2020)												+			
Saygili, et al. (2024)	+	+			+	+		+	+	+	+				
Shamweel, et al. (2024)	+	+									+				
Smith, et al. (2020)	+	+									+	+			
Svensson, et al. (2024)															NS
Uswatte, et al. (2021)	+	+													

Discussion and Future Research

- When looking at the significance of the outcome measures, two of the nine included articles had no significant changes among outcome measures used.
- Both groups, adults and pediatrics, showed significant improvements in motor function of the affected UE.
- When compared to the EXCITE trial, noted to be the largest in-person randomized-controlled trial on the CIMT protocol⁶, all studies included had similar or higher improvements on the pre- to post-treatment MAL scores for amount of use (AOU) and quality of movement (QOM).
- Findings indicate that remote participation was higher than in-person participation, which could be linked to barriers such as transportation, accessibility, and costs.
- The cost-effectiveness of the CIMT protocol was assessed and noted to find 67% of people who received a CIMT program achieved the minimally clinically important difference (MCID) or full marks on the Action Reaction Arm Test (ARAT) compared to the 53.1% in the usual care group.⁷
- The findings in this review leads to the conclusion that the remote delivery of the CIMT protocol is feasible for participants in need of treatment.
- Based on findings and knowledge of the cost-effectiveness of this treatment, insurances should consider providing reimbursement opportunities for clients in need of this intensive form of therapy.

Limitations

- Due to lack of information regarding this specific topic, risk of bias was evaluated through a combination of assessment tools due to the different types of articles used in this review which concludes that this quality appraisal did not follow a standardized quality appraisal.
- This review included articles within the last 10 years and only in English, which could lead implications on findings.

Conclusion

- Remote delivery of CIMT is feasible and can achieve positive motor outcomes for both adults and children; however, future research is required to strengthen evidence and improve implementation.
- Future research is also required to ensure feasibility with upper extremity function and overall quality of life.

References



Acknowledgement & Contact information

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