



Home-Based Telerehabilitation as an Effective Alternative to In-Clinic Therapy for Stroke Survivors

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Background

- **Stroke** is a leading cause of long-term disability worldwide.
- **Persistent motor impairments** reduce independence and quality of life.
- **Access to rehabilitation** is often limited by:
 - Transportation
 - Cost
 - Geographic distance
 - Limited therapist availability
- **Home-based telerehabilitation** delivers therapy remotely through digital technologies
- **Growing evidence** demonstrates outcomes comparable to traditional in-clinic rehabilitation.

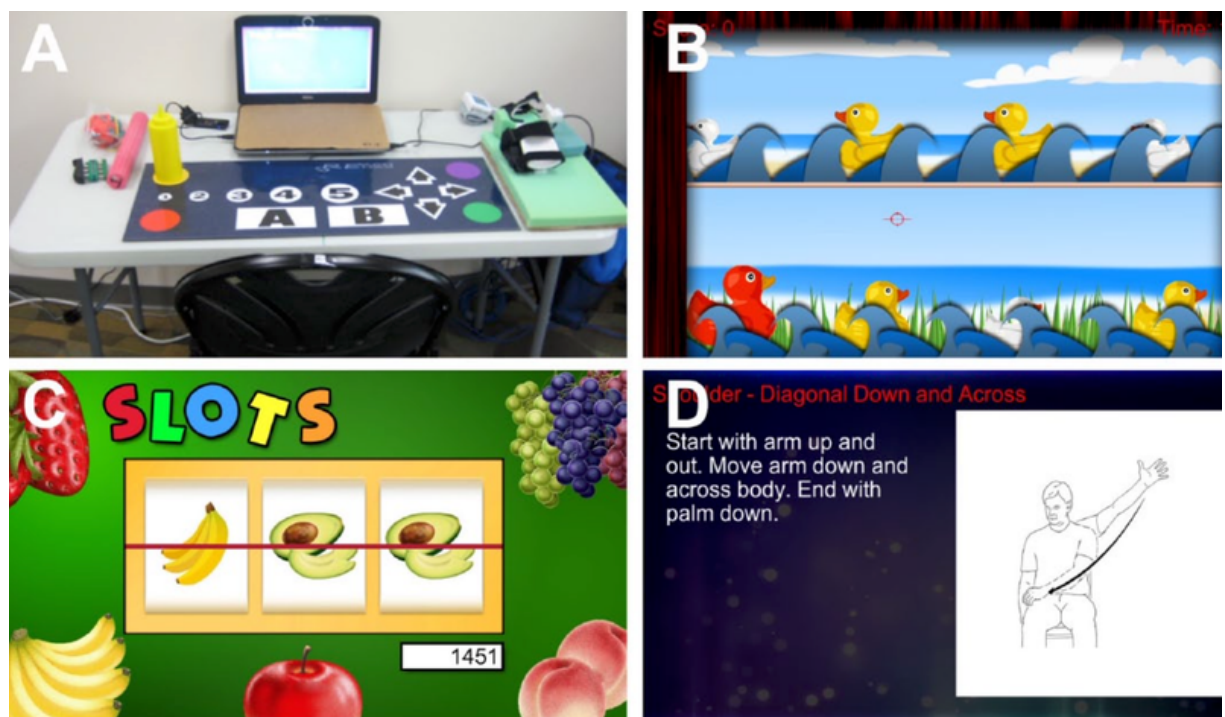


Figure 1. Home-Based Telerehabilitation Systems and Therapeutic Activities
Home-based telerehabilitation uses interactive games, therapeutic exercises, and video-conferencing to deliver individualized stroke rehabilitation in the patient's home (Dodakian et al. 2017).

Why it Matters:

Home-based telerehabilitation has the potential to improve access to rehabilitation for stroke survivors facing transportation, financial, or geographic barriers while maintaining outcomes comparable to conventional therapy.

Objective:

Evaluate the effectiveness of home-based telerehabilitation as an alternative to conventional in-clinic therapy by examining evidence related to:

- Motor recovery
- Neuroplasticity
- Accessibility
- Patient adherence

Methods

Study Design:

This project consisted of a literature review evaluating the effectiveness of home-based telerehabilitation as an alternative to conventional in-clinic rehabilitation for stroke survivors.

25 peer-reviewed primary research articles



Literature review & analysis



Evidence organized into: motor recovery, neuroplasticity, accessibility, and patient adherence.



Overall conclusions

Results

Motor Recovery:

- Significant improvements in upper- and lower-extremity motor function.
- Increased functional independence following rehabilitation.
- Outcomes were comparable to conventional in-clinic therapy.
- Supports telerehabilitation as an effective alternative for stroke recovery.

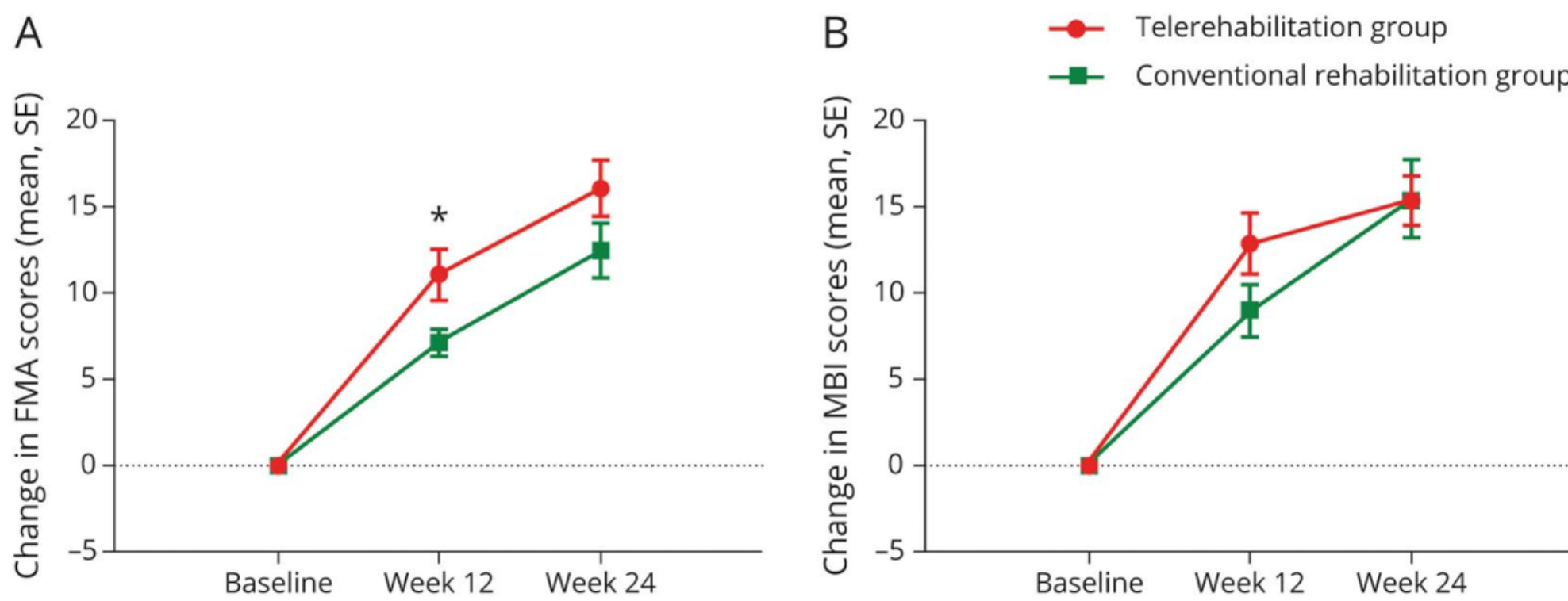


Figure 2. Home-Based Telerehabilitation Improves Motor Recovery and Functional Independence
Changes in Fugl-Meyer Assessment (FMA) and Modified Barthel Index (MBI) scores following home-based telerehabilitation and conventional rehabilitation. Both groups demonstrated improvements in motor function and functional independence, with no significant differences between interventions (Chen et al. 2020).

Neuroplasticity:

- Increase connectivity between bilateral primary motor cortices (M1).
- Greater connectivity correlated with improved motor recovery.
- Demonstrates cortical reorganization associated with rehabilitation.
- Supports the biological basis for functional recovery.

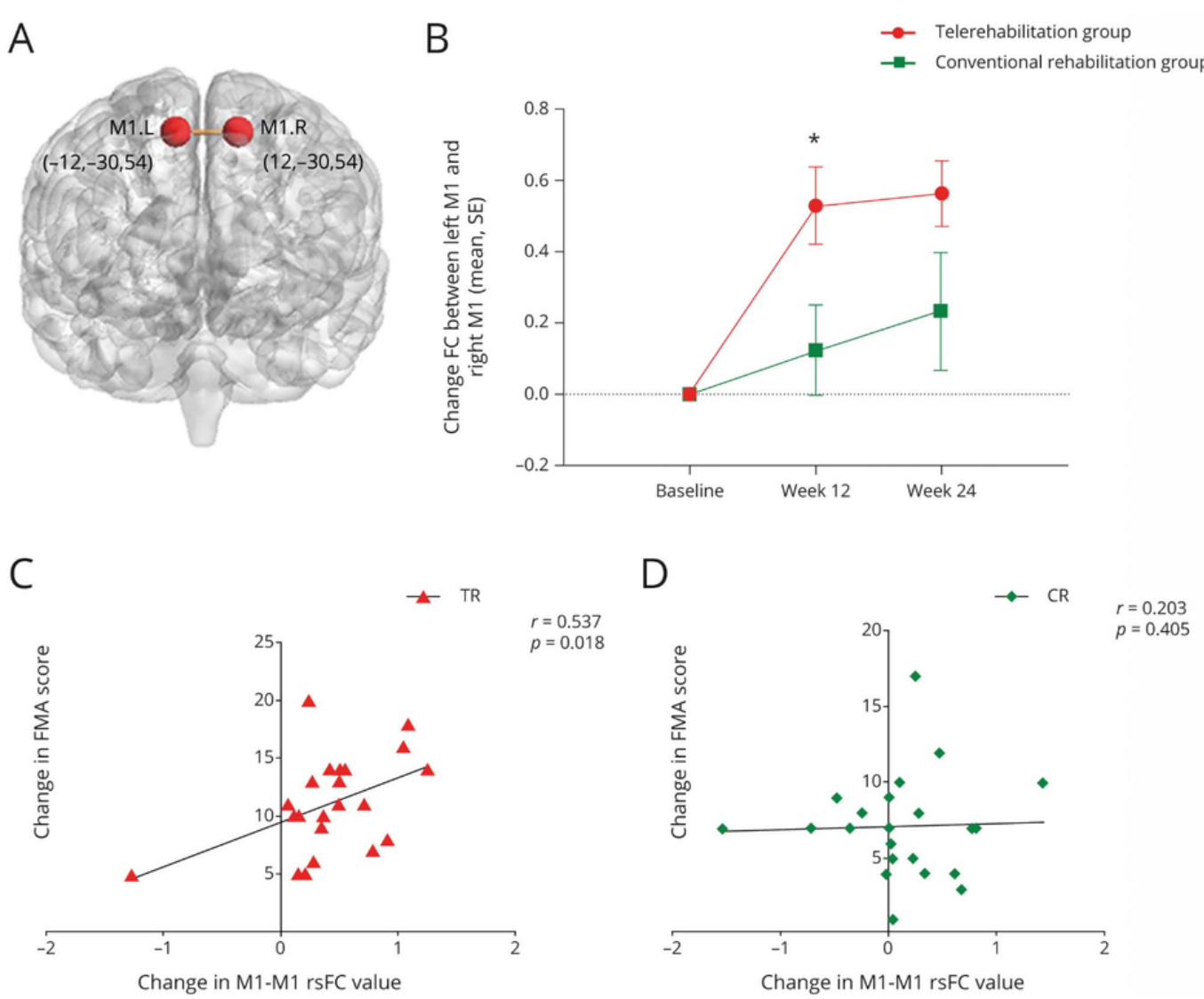


Figure 3. Home-Based Telerehabilitation Enhances Neuroplasticity Following Stroke
(A) Location of the left (M1.L) and right (M1.R) primary motor cortices used for resting-state functional connectivity analysis. (B) Changes in interhemispheric M1-M1 functional connectivity from baseline to Weeks 12 and 24 in the telerehabilitation (TR) and conventional rehabilitation (CR) groups. (C) Correlation between changes in M1-M1 functional connectivity and improvements in Fugl-Meyer Assessment (FMA) scores in the TR group, demonstrating a significant positive association. (D) Correlation between changes in M1-M1 functional connectivity and FMA scores in the CR group, demonstrating no significant association (Chen et al. 2020).

Accessibility:

- Reduced travel burden for stroke survivors.
- Average savings:
 - 2,775 travel miles
 - 46 driving hours
 - \$1,152 in travel expenses
- Expands rehabilitation access for rural and mobility-limited patients.

Visit, Travel, And Potential Cost Avoidance	Mean ± SD
Average Time with RVTRI (d)	99.2 ± 43.3
Average Number of Sessions Received	15.2 ± 6.0
Average Number of Telerehabilitation Sessions Received	11.3 ± 5.9
Average Number of Face-To-Face Sessions Received	3.9 ± 2.6
Average Roundtrip Miles Per Visit Saved*	179.8 ± 182.7
Average Total Number of Miles Saved†	2,774.7 ± 3,197.4
Average Total Driving Hours Saved	46.3 ± 53.3
Average Travel Expense Saved (\$) [‡]	1,151.50 ± 1,326.90

*Roundtrip mileage from patients' home residence to closest local Department of Veterans Affairs (VA) hospital for each visit.
†Roundtrip miles per visit × number of telerehabilitation sessions received through RVTRI program.
‡Total number of miles saved × \$0.415 (per mile travel reimbursement rate to eligible Veterans by VA for 2010-2011).
RVTRI = Rural Veterans TeleRehabilitation Initiative, SD = standard deviation.

Table 1. Home-Based Telerehabilitation Reduces Travel Burden
Comparison of travel distance, driving time, and transportation expenses between home-based telerehabilitation and conventional rehabilitation, demonstrating reduced travel burden for participants receiving home-based care (Levy et al. 2015).

Key Findings

- Home-based telerehabilitation produced **motor recovery outcomes comparable to conventional rehabilitation** across multiple studies.
- Functional MRI findings suggested that home-based telerehabilitation promotes **neuroplastic changes** associated with motor recovery.
- Delivering rehabilitation at home **reduced transportation barriers, travel time, and associated costs**, improving access to care.
- High levels of patient participation and adherence demonstrate the **feasibility of home-based rehabilitation** for stroke survivors.

Take Home Message:

Home-based telerehabilitation is an effective, accessible, and patient-centered alternative to conventional in-clinic rehabilitation, with the potential to improve access to stroke rehabilitation without compromising clinical outcomes.

Future Directions

- Conduct **larger multicenter randomized controlled trials** to strengthen the evidence base for home-based telerehabilitation.
- Evaluate **long-term functional outcomes** to determine whether improvements in motor recovery and functional independence are maintained over time.
- Develop **standardized telerehabilitation protocols** to improve consistency across rehabilitation programs.
- Expand access to home-based telerehabilitation in **rural and underserved communities** to reduce disparities in stroke rehabilitation.
- Investigate integrating **wearable sensors, artificial intelligence (AI), and virtual reality (VR)** to personalize rehabilitation and improve patient engagement.

Looking ahead:

Continued advances in digital health technologies and expanded access to telehealth have the potential to make home-based telerehabilitation an increasingly effective, personalized, and widely available option for stroke rehabilitation.

Acknowledgements

I would like to sincerely thank Dr. Jutta Heller for her guidance, mentorship, and support throughout this project. I am also grateful to my family and friends for their encouragement during my academic journey here at UWT. This project is dedicated to my grandfather, whose stroke recovery inspired my interest in stroke rehabilitation and motivated my research on improving access to home-based rehabilitation for stroke survivors.



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