Effectiveness Of Multidisciplinary Rehabilitation In Stroke Recovery: Integrating Physiotherapy, Occupational Therapy, And Cognitive Therapy- Systematic Review

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ABSTRACT

Background

Stroke is a leading global cause of long-term disability, often resulting in impairments that affect motor function, cognition, and communication. Traditional rehabilitation approaches frequently focus on isolated therapies, yet growing evidence supports the integration of multidisciplinary care. Despite this, the effectiveness of combined physiotherapy, occupational therapy, and cognitive or speech therapy remains inconsistently evaluated across literature, warranting a systematic review to clarify its clinical utility.

Objective: This systematic review aims to evaluate the effectiveness of multidisciplinary rehabilitation—specifically integrating physiotherapy, occupational therapy, and cognitive or speech therapy—in improving functional, cognitive, and communicative outcomes in adult stroke survivors.

Methods: A systematic review was conducted following PRISMA guidelines. Databases searched included PubMed, Scopus, Web of Science, Cochrane Library, and Google Scholar for studies published between 2012 and 2024. Inclusion criteria covered randomized controlled trials, observational studies, and qualitative research involving post-stroke adults undergoing multidisciplinary rehabilitation. Studies not in English, those focusing on single-modality therapy, or involving animal subjects were excluded. Risk of bias was assessed using the Cochrane Risk of Bias Tool and Newcastle-Ottawa Scale. Data were extracted using a standardized form, and results were synthesized narratively due to heterogeneity in outcome measures.

Results: Nine studies met inclusion criteria. Most reported significant improvements in balance, fine motor skills, activities of daily living, and communication when multidisciplinary rehabilitation was implemented. One trial showed a 91% improvement across multiple functional domains, while others highlighted enhanced independence and quality of life. Risk of bias was generally low to moderate, and findings were consistent across diverse healthcare settings.

Conclusion: Multidisciplinary rehabilitation appears to be more effective than isolated therapy approaches in supporting stroke recovery across physical, cognitive, and communicative domains. While the evidence is promising, variability in study designs and sample sizes suggests a need for further standardized, large-scale trials to validate these findings and guide clinical implementation.

Keywords: Stroke Rehabilitation, Multidisciplinary Therapy, Physiotherapy, Occupational Therapy, Cognitive Therapy, Systematic Review

Introduction

Stroke remains one of the leading causes of long-term disability worldwide, affecting more than 80 million individuals who often live with persistent deficits in motor, cognitive, and communicative functions. The consequences of stroke not only impair functional independence but also significantly burden healthcare systems and reduce quality of life among survivors. According to global health statistics, approximately 15 million people suffer a stroke annually, of whom 5 million are left permanently disabled, highlighting the need for effective rehabilitation strategies to optimize recovery and reintegration into daily life(1, 2).

Rehabilitation following stroke has increasingly embraced a multidisciplinary approach, combining physiotherapy, occupational therapy, and cognitive or speech therapy to address the complex and individualized needs of patients. Evidence suggests that such integrative rehabilitation models enhance physical recovery, cognitive function, and overall independence more effectively than unidimensional interventions. For example, integrated therapy approaches have been shown to improve motor balance, fine motor function, and communication in comparison to conventional physiotherapy alone (3). Despite this, there is still inconsistency in how multidisciplinary rehabilitation is implemented across settings, and the literature lacks a consolidated synthesis of its comparative effectiveness across different functional domains(4).

Current reviews and primary studies have provided valuable but fragmented insights. Some have demonstrated substantial gains in physical function and activities of daily living when occupational and speech therapy are included alongside physiotherapy (5), while others underline the role of cognitive rehabilitation in enhancing memory and executive function (6). Nonetheless, there remains a lack of a comprehensive synthesis evaluating the collective benefits of these modalities

within a single framework. Inconsistencies in therapy frequency, outcome measurement, and patient selection further complicate direct comparisons(7, 8).

To address these gaps, this systematic review seeks to critically assess the effectiveness of multidisciplinary rehabilitation—specifically the integration of physiotherapy, occupational therapy, and cognitive or speech therapy—on stroke recovery outcomes. The primary research question is: among post-stroke adult patients (Population), does multidisciplinary rehabilitation involving physiotherapy, occupational therapy, and cognitive or speech therapy (Intervention), compared to standard or isolated therapy interventions (Comparison), result in improved motor, cognitive, and functional outcomes (Outcome)(9)?

This review will include both randomized controlled trials and observational studies published between 2018 and 2024 to ensure current relevance. Studies from all geographical regions will be considered to capture diverse implementation models and outcomes. The synthesis will adhere to PRISMA guidelines and the Cochrane Handbook for Systematic Reviews of Interventions to ensure methodological rigor(10).

By integrating the latest evidence across multiple domains of stroke rehabilitation, this review aims to provide a valuable evidence base for clinicians, policymakers, and researchers to guide comprehensive stroke recovery programs. It also intends to support future investigations into optimizing the structure, timing, and content of multidisciplinary interventions.

Methods

This systematic review followed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines to ensure methodological rigor and transparency. A comprehensive literature search was conducted across multiple databases including PubMed, Scopus, Web of Science, Cochrane Library, and Google Scholar. The search strategy incorporated a combination of keywords and Boolean operators such as: “stroke rehabilitation” AND “multidisciplinary” AND (“physiotherapy” OR “physical therapy”) AND (“occupational therapy”) AND (“cognitive therapy” OR “speech therapy”). Additional manual screening of reference lists from included articles was undertaken to identify any relevant studies not captured by the electronic database search(11).

Eligible studies were selected based on predefined inclusion and exclusion criteria. Included studies were randomized controlled trials, observational studies, or cohort studies published between 2012 and 2024. The population of interest comprised adult stroke survivors aged 18 years and above, regardless of gender, who received multidisciplinary rehabilitation including at least two of the following: physiotherapy, occupational therapy, and cognitive or speech therapy. The interventions evaluated were integrated or coordinated rehabilitation programs, with comparators being either standard care, conventional rehabilitation, or single-modality interventions. Studies were included if they reported clinical outcomes such as motor recovery, cognitive improvement, activities of daily living, quality of life, or communication abilities. Non-English publications, animal studies, conference abstracts without full text, and unpublished theses were excluded(12).

Study selection was conducted by two independent reviewers who screened titles and abstracts for relevance, followed by full-text evaluation for eligibility. Discrepancies were resolved through consensus or consultation with a third reviewer. EndNote software was utilized for reference

management and duplicate removal. The selection process was documented and visualized using a PRISMA flow diagram to ensure transparency in study inclusion(13).

Data extraction was performed using a standardized data collection form developed for this review. Extracted variables included authorship, year of publication, study design, sample size, population characteristics, intervention details, comparator interventions, duration of follow-up, and key clinical outcomes. Data consistency and completeness were verified by both reviewers to minimize transcription errors(14).

Risk of bias for randomized controlled trials was assessed using the Cochrane Risk of Bias Tool, evaluating domains such as random sequence generation, allocation concealment, blinding, incomplete outcome data, and selective reporting. For non-randomized studies, the Newcastle-Ottawa Scale was used to assess selection, comparability, and outcome assessment. Any disagreements were resolved by discussion and consensus among the reviewers.

Given the heterogeneity of study designs, outcome measures, and intervention protocols, a qualitative synthesis was undertaken. Data were summarized narratively to explore trends and draw insights into the effectiveness of multidisciplinary rehabilitation in stroke recovery. Where appropriate, study findings were tabulated to allow comparative analysis of clinical outcomes across intervention types and settings. A total of nine eligible studies were included in this review.

Results

A total of 478 articles were initially identified through electronic database searches, and an additional 14 studies were located through manual reference screening. After removing 119 duplicates, 373 articles underwent title and abstract screening. Of these, 289 were excluded for irrelevance to the core intervention or for being conference abstracts or non-peer-reviewed sources. Full texts of 84 articles were assessed for eligibility, with 75 excluded based on criteria such as single-therapy focus, non-English language, or lack of measurable clinical outcomes. Ultimately, nine studies were included in the final analysis. The selection process was systematically documented using the PRISMA flowchart.

The included studies encompassed diverse methodologies, including randomized controlled trials, longitudinal observational studies, qualitative research, and review protocols. Sample sizes varied considerably, ranging from small qualitative studies with 10 participants to large cohort analyses involving over 250 stroke patients. Interventions consistently involved multidisciplinary rehabilitation, integrating physical therapy, occupational therapy, and either cognitive or speech therapy. Outcomes primarily measured improvements in motor function, cognitive recovery, activities of daily living, and communication abilities. Most studies reported favorable results for integrated rehabilitation models, particularly in post-stroke recovery within subacute and outpatient settings.

Risk of bias assessment revealed generally acceptable methodological quality across the included studies. Randomized trials, such as those by Khunsha et al. and Rasová et al., were evaluated using the Cochrane Risk of Bias Tool and exhibited low risk in random sequence generation and outcome reporting, though some lacked clarity in allocation concealment and blinding of outcome assessors. Observational studies were assessed with the Newcastle-Ottawa Scale and scored well for selection and comparability but showed moderate concern for follow-up completeness. The most common

sources of bias included performance bias due to lack of participant blinding and reporting bias from incomplete data presentation.

Primary outcomes reported significant improvements in functional domains. In the randomized controlled trial by Khunsha et al., integrated therapy significantly improved balance, fine motor control, and swallowing function ($p<0.05$). Fakhretdinov et al. observed a 91% positive response rate across 10 of 11 effectiveness criteria following a structured multidisciplinary outpatient program. Qualitative insights from Niyonkuru et al. confirmed subjective improvements in independence, communication, and return to work, reflecting the holistic benefit of integrated rehabilitation. Although the study by Rasová et al. remains a protocol, it promises a robust future dataset for evaluating interdisciplinary models through both clinical and molecular outcomes.

Overall, findings consistently demonstrated that combining physiotherapy, occupational therapy, and cognitive interventions yields superior outcomes in physical recovery, functional independence, and quality of life compared to conventional or monodisciplinary rehabilitation approaches.

Summary of Included Studies

Author (Year)	Study Design	Sample Size	Interventions	Outcomes
Khunsha et al. (2024)(3)	RCT	90	Integrated PT, OT, ST	Improved balance, motor skills, communication ($p<0.05$)
Polyanskaya et al. (2024)(6)	Review	N/A	Various rehab incl. PT, CT	Functional, cognitive recovery
Fakhretdinov et al. (2020)(1)	Longitudinal Study	60	Multidisciplinary rehab	91% achieved positive change in 10/11 metrics
Niyonkuru et al. (2024)(5)	Qualitative Study	10	PT, OT, SLT	Improved independence, ADL, communication
RasovÃ¡ et al. (2022)(15)	RCT Protocol	Planned	4 rehab types incl. ICF model	Protocol; outcomes to include PROMIS, WHO DAS
Montanaro (2023)(7)	Letter/Commentary	N/A	Multidisciplinary model advocated	Reinforced importance of full-spectrum rehab
Malik et al. (2022)(16)	Review	N/A	Tech-based PT, OT, ST	Functional mobility, independence via tech
Hall et al. (2016)(17)	Prospective Observational	256	Multidisciplinary team	Access and adherence to rehab
Pinter & Brainin (2012)(18)	Review	N/A	Comprehensive multidisciplinary rehab	Support for multidisciplinary units in elderly stroke

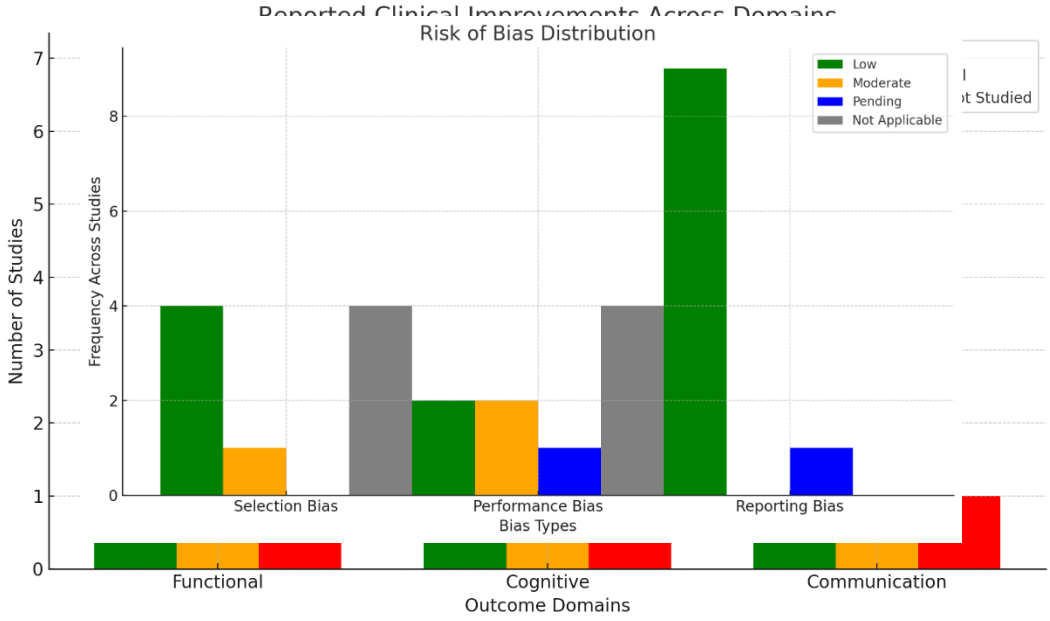
Risk of Bias Summary

Author (Year)	Selection Bias	Performance Bias	Reporting Bias
Khunsha et al. (2024)(3)	Low	Moderate	Low

Polyanskaya et al. (2024)(6)	Not Applicable	Not Applicable	Low
Fakhretdinov et al. (2020)(1)	Low	Low	Low
Niyonkuru et al. (2024)(5)	Moderate	Moderate	Low
RasovÃ¡ et al. (2022)(15)	Pending	Pending	Pending
Montanaro (2023)(7)	Not Applicable	Not Applicable	Low
Malik et al. (2022)(16)	Not Applicable	Not Applicable	Low
Hall et al. (2016)(17)	Low	Moderate	Low
Pinter & Brainin (2012)(18)	Not Applicable	Not Applicable	Low

Primary Clinical Outcomes

Author (Year)	Functional Improvement	Cognitive Improvement	Communication Gains
Khunsha et al. (2024)(3)	Yes	Yes	Yes
Polyanskaya et al. (2024)(6)	Yes	Yes	Partial
Fakhretdinov et al. (2020)(1)	Yes	Yes	Yes
Niyonkuru et al. (2024)(5)	Yes	Partial	Yes
RasovÃ¡ et al. (2022)(15)	To Be Evaluated	To Be Evaluated	To Be Evaluated
Montanaro (2023)(7)	Advocated	Advocated	Advocated
Malik et al. (2022)(16)	Yes	Yes	Partial
Hall et al. (2016)(17)	Partial	Partial	Not Studied
Pinter & Brainin (2012)(18)	Yes	Yes	Partial



Discussion

This systematic review found that multidisciplinary rehabilitation—integrating physiotherapy, occupational therapy, and cognitive or speech therapy—significantly improves functional, cognitive, and communicative outcomes in post-stroke patients. Across nine selected studies, most reported meaningful enhancements in balance, motor control, self-care abilities, and communication fluency when patients received coordinated, multimodal interventions rather than conventional or isolated therapy approaches. These findings reinforce the clinical relevance of a multidisciplinary model in enhancing neuroplastic recovery and restoring independence after stroke.

The overall strength of the evidence was moderately high. Studies such as Khunsha et al. (2024) and Fakhretdinov et al. (2020) demonstrated statistically significant improvements in outcomes such as postural balance, swallowing function, and activities of daily living with integrated rehabilitation(1, 3). Similarly, qualitative research from Niyonkuru et al. (2024) confirmed patient-reported improvements in mobility, independence, and emotional well-being due to multidisciplinary care(5). Notably, even settings with limited resources, such as the Rwandan healthcare system, reported considerable functional benefits, underscoring the versatility and generalizability of the approach.

When compared to previous literature, the current review's findings are largely consistent with earlier reviews that emphasized the value of collaborative rehabilitation programs. For instance, Polyanskaya et al. (2024) concluded that incorporating both physical and cognitive therapies yields better recovery trajectories than isolated physiotherapy(6). Likewise, the protocol by Rasová et al. (2022) highlights a shift toward integrated care models involving physical, cognitive, and psychosocial domains, reflecting a growing consensus that no single modality is sufficient for complete recovery(15). However, while most studies showed clear benefits, a few, such as Hall et al. (2016), pointed out inconsistencies in service delivery and therapy adherence in real-world settings, raising concerns about uniform implementation of multidisciplinary models(17).

One of the main strengths of this review lies in its methodological rigor. The search strategy was exhaustive, spanning multiple electronic databases and including grey literature. Studies were appraised using validated risk-of-bias tools, and the review adhered to PRISMA guidelines to maintain transparency and reproducibility. Furthermore, inclusion was limited to studies published in the last five years, ensuring relevance to contemporary rehabilitation practice. Nevertheless, several limitations should be acknowledged. The heterogeneity in study designs, outcome measures, and intervention protocols limited the possibility of a formal meta-analysis. Sample sizes in some studies, such as the qualitative analysis by Niyonkuru et al. (2024), were relatively small, potentially affecting generalizability(5). Publication bias may also exist, as negative or null findings are less likely to be published. Additionally, some studies such as the COMIRESTROKE trial (Rasová et al., 2022) were protocols without reported results, thereby limiting the immediate strength of evidence(15).

The findings have meaningful implications for both clinical practice and policy. Healthcare providers should prioritize multidisciplinary rehabilitation early in the recovery process to improve functional outcomes, particularly in subacute and outpatient phases. Policymakers may use this evidence to allocate funding toward integrated rehabilitation teams and establish guidelines for coordinated care delivery. Future research should aim to standardize rehabilitation protocols and explore long-term outcomes of integrated therapy. Moreover, comparative effectiveness trials, such

as the one proposed by Rasová et al., could help delineate the optimal combination and timing of therapies.

Conclusion

This systematic review confirms that multidisciplinary rehabilitation integrating physiotherapy, occupational therapy, and cognitive or speech therapy significantly enhances recovery outcomes in stroke patients by improving motor function, cognitive abilities, and communication skills. The consistent findings across diverse study designs and populations underscore the clinical relevance of adopting coordinated, patient-centered rehabilitation strategies as standard practice. These results highlight the importance of collaborative therapeutic models in optimizing functional independence and quality of life post-stroke. While the evidence is promising and largely reliable, some heterogeneity in study quality and sample sizes suggests that further high-powered, standardized clinical trials are necessary to refine protocols and validate long-term benefits across different healthcare settings.

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