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The effect of Motor Imagery on neurorehabilitation: A systematic review

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ADMINISTRATIVE INFORMATION

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Amendments - This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 10 July 2026 and was last updated on 10 July 2026.

INTRODUCTION

Review question / Objective What are the effects of Motor Imagery training on neurological rehabilitation outcomes, motor functions, motor capacity in patients with neurological disorders, and in which population Motor Imagery rehabilitation is most frequently used?
Objectives:
- To identify the most frequent neurological population that used Motor Imagery treatment.
- To identify the most effective protocol for different neurological disorders.
- To synthesize current literature and provide evidence-based recommendations.

Rationale Neurological disorders are one of the most challenging to treat, some of them are a leading cause of long-term disability and motor impairments that seriously affect the patient's quality of life. Conventional rehabilitation relies on repetitive movements and exercises to activate neuroplastic changes and drive functional recuperation. However, patients with important motor disability or severe limitations are unable to engage in high intensity physical therapy with repetitive movements, affecting the early stages of recovery.
Motor Imagery, which is defined as the mental simulation of a certain movement without physically producing it, can be a promising tool as an adjuvant to neurorehabilitation. Recent neuroimaging studies have shown that Motor Imagery employs similar networks in the brain as physical movement, such as the primary motor cortex, the pre-motor cortex, the supplementary motor area, and parietal ares. By engaging in these circuits, Motor imagery enhances neuroplasticity, drives cortical reorganization even when there is no physical movement.
Although several studies and clinical trials have examined the use of Motor Imagery in neurorehabilitation, the literature is still diverse regarding the exact protocol; type of Motor Imagery, frequency, duration., and its impact of different disorders.

Accordingly, this systematic review is essential to meticulously synthesize recent evidence, evaluate the quality of current literature, and clarify the clinical efficacy of Motor Imagery in the neurological rehabilitation field. By bridging the gap between clinical neurological physical therapy and neuroscience, this article aims to deliver evidence-based input to leverage Motor Imagery protocols in neurorehabilitation.

Condition being studied Neurological disorders and central nervous system lesions including: Stroke, Parkinson's Disease, Multiple Sclerosis, Hemiplegia, Spinal Cord Injury, and Traumatic brain Injury. These disorders resulted in motor impairments and functional disability.

METHODS

Search strategy We performed a comprehensive and methodically structured search, from March 1st, 2026, to March 31st, 2026, using the electronic databases PubMed, ScienceDirect and Scopus to evaluate the existing literature published between January 2016, and March 31st, 2026. We employed controlled vocabulary terms (MeSH) and free-text keywords combined through Boolean operators (AND, OR). The primary search components include: "Motor Imagery" AND ("Neurorehabilitation" OR "Neurological rehabilitation"). No language filters were applied.

Participant or population Adult patients that have a confirmed diagnosis of a neurological disorder affecting their motor and functional ability.

Intervention Motor Imagery Treatment alone, combined with conventional neurological rehabilitation or other alternative therapies.

Comparator Conventional rehabilitation or other types of interventions without Motor Imagery.

Study designs to be included We included Randomized Controlled Trials as wellas non-Randomized Controlled Trials. We excluded all types of reviews, case reports and meta-analyses.

Eligibility criteria The eligibility criteria was established following the PICOS framework (Population, Intervention, Comparison, Outcomes, Study Design). We included Randomized Controlled Trials and non Randomized Controlled Studies from electronic databases only, that used Motor Imagery as an intervention for patients above the age of 18 years old, that have a confirmed diagnosis of a neurological disorder.

We excluded studies that had patients under the age of 18 years old and patients with musculoskeletal injuries only. We also excluded studies that did not use Motor Imagery as an intervention, studies with no quantified measures, and all types of reviews, meta-analyses, and conference abstracts.

Information sources We retrieved information from electronic databases only, including PubMed, ScienceDirect, and Scopus.

Main outcome(s) The outcomes will be studied based on the quantified measures of motor functions using different scales and tests, gait performance and Motor Imagery ability. This process is still in progress.

Additional outcome(s) Neural correlates of Motor Imagery rehabilitation will be assessed if possible, as well as the evaluation and discussion of additional alternative treatment options combined with Motor Imagery.

Data management After the execution of the literature search strategy, we exported the retrieved citations to Zoteroo, a reference management software, where we identified the duplicate records and removed them. The screening process was made based on the eligibility criteria, records that were not directly relevant were excluded. We then assessed the remaining records for eligibility and excluded the abstract only publications, reviews, and papers that did not meet the inclusion criteria previously specified.
For the data extraction, we developed a standardized form and piloted it in Microsoft Excel to ensure a consistent data collection. For each eligible study we collected data regarding the study design, participant characteristics (gender, age, diagnosis) and the sample size. We also included group allocations as well as a detailed description of the type of intervention (type of Motor Imagery, components of adjuvant interventions, session duration, frequency, and protocol period) and key findings.

Quality assessment / Risk of bias analysis We assessed the internal validity of the included studies using the revised Cochrane Risk of Bias tool for Randomized Controlled Trials (RoB 2). This tool evaluates five domains of bias: randomization process, deviations from intended interventions, incomplete outcome data, measurement of outcomes, and selective reporting. Each trial was categorized as having low risk of bias, some concerns, or high risk of bias.

For the non Randomized Controlled Studies, we used the Risk of Bias in Non-Randomized Studies of Intervention, version 2 (ROBINS-I V2) as an assessment tool. It evaluates six domains: confounding, classification of intervention, selection into the study, missing data, measurement of the outcome, and selection of reported result.

Strategy of data synthesis Narrative synthesis of the data that we categorized based on the diagnosis and rehabilitation methods used.

Subgroup analysis The analysis will be made based on the participant characteristics information, type of Motor Imagery used, type of the other intervention used, as well as the protocol duration, frequency, and duration.
In addition, a comparison between Randomized Controlled Trials and non Randomized Controlled Trials will be analyzed.

Sensitivity analysis A qualitative sensitivity analysis will be conducted to evaluate the consistency of our narrative synthesis. We will compare the primary findings from the high-quality Randomized Controlled Trials against the non Randomized Studies. If conflict emerges regarding the efficacy of Motor Imagery, the differences will be explicitly highlighted and discussed in the final review.

Language restriction We did not apply language filters during the search phase, however the keyword search was conducted in English.

Country(ies) involved Nationality of authors: Tunisian; Azerbaijaini; Turkish. Affiliation: Uskudar University, Clinical neuroscience lab, Istanbul, Turkey.

Keywords Motor Imagery; Neurorehabilitation; Neurological rehabilitation; Neurological disorders.

Dissemination plans The findings of this systematic review will be disseminated through two primary channels to reach clinical, academic, and rehabilitation audiences:
Peer-reviewed publication: the strategy is to submit the final manuscript to a scopus indexed peer-reviewed scientific journal.
As well as Conference Presentation: We will prepare an abstract submission that highlights the findings of this systematic review, and present it as a poster or oral presentation at national and international congresses.
In addition, the final review will be directly linked to this registered protocol via its DOI, ensuring transparent reporting and updating on active academic profiles.

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