Motor Imagery Can Be Incorporated Into a Stroke Rehabilitation Program

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The most common and widely recognized impairment caused by a stroke is motor and sensory impairment. This can be defined as a loss or limitation of muscle control, movement, mobility or sensual control. Motor and sensorial impairments after a stroke typically affect the control of movement in the arm and leg on one side of the body, and is seen in about 80% of patients. Approximately two-thirds of stroke survivors have initial mobility deficits, and more than 30% of survivors cannot walk independently six months after a stroke. After a stroke, a person may experience complete or partial damage to their senses, including those responsible for light touch, pain, temperature, proprioception, vibration, foot pressure, stereognosis, and two-point discrimination. Among patients with gait disturbances evaluated for stroke, most experience proprioception loss. Approximately 36-54% of stroke patients experience varying degrees of loss of joint position sense. Additionally, disturbances in touch, vision, and hearing are also observed. Loss of superficial sensation in the forefoot and loss of plantar pressure sensation can affect patients' ability to bear weight on their forefoot and cause problems with activities such as sitting up and walking.[1, 2]

Therefore, much of the focus of stroke rehabilitation, particularly the work of physiotherapists, is on recovering physical independence and functional ability during activities of daily living. The ultimate goal of therapy is commonly to improve sensorial integration, walking function and balance. During the rehabilitation process, therapeutic exercises and neurophysiological approaches are used to help patients regain motor function. For many years, fundamental neurophysiological approaches such as the Bobath Concept, Margaret Johnstone Approach, and Brunnstrom Technique have long been used in stroke rehabilitation to help patients achieve functional gains. In recent years, contemporary approaches such as Constraint-Induced Movement Therapy (CIMT), Virtual Rehabilitation (VR), robotic-assisted rehabilitation, task-focused training, Mirror Therapy, and PANat (Pro-Active Neurorehabilitation approach integrating air splints and other tools) have increasingly been preferred by physical therapists due to their evidence-based outcomes and adaptability to individual patient needs. [3, 4]

Parallel to these developments, motor imagery strategies has also been preferred to accelerate neuroplasticity. Motor imagery (MI) is an increasingly popular and widely studied technique in stroke rehabilitation, particularly for improving motor function in patients with impaired movement. MI (motor imagery) is a technique that uses imagination to teach movement to individuals who have suffered a stroke. Based on the principles of mental practice, MI has also begun to be used in stroke rehabilitation in recent years. Two concepts frequently emerge when examining mental exercises. The first is movement observation (MO), and the second is motor imagery (MI). MI is defined as imagining a task without performing it. Movement observation (MO) is based on an individual watching a specific movement performed by a third person or played back from a video recording. Motor imagery (MI) is the conscious mental representation of a movement without physically performing it. MI is defined as the mental rehearsal or simulation of movement and is considered a dynamic cognitive process. Research using advanced brain imaging techniques has revealed that brain regions responsible for planning, executing, and regulating movement become active during both physical movement and motor imagery. These structures include the premotor area, parietal lobe, basal ganglia, anterior cingulate cortex, and cerebellum. Motor imagery has several clinical applications in stroke rehabilitation, particularly in enhancing motor recovery. One of its most notable effects is improving motor function, particularly in recovering upper limb movements, which are often impaired after a stroke. When combined with physical therapy, motor imagery can also increase muscle strength by reinforcing the neural activation patterns associated with movement. It also supports brain reorganization by stimulating motor-related areas of the brain and promoting neuroplasticity, which is essential for recovery. After a stroke, the areas of the brain responsible for movement may be damaged. However, studies have shown that imagining movements activates the same brain regions as performing them. As a therapeutic approach, motor imagery is safe and cost-effective, making it accessible to a wide range of patients. Furthermore, it can be self-administered or guided by therapists and can be enhanced through the use of technology, enabling flexible, individualized rehabilitation

programs. Systematic reviews and randomized controlled trials (RCTs) provide moderate evidence that motor imagery (MI) is effective in improving upper limb function, particularly in individuals recovering from subacute or chronic stroke. The therapeutic benefits are significantly enhanced when MI is combined with physical practice, as this integrated approach proves more effective than physical training alone. Optimal outcomes are typically achieved through regular and consistent practice, with sessions conducted three to five times per week, each lasting approximately 20 to 30 minutes. This structured routine supports the reinforcement of neural pathways involved in motor control and facilitates more meaningful functional recovery. The effectiveness of motor imagery in stroke rehabilitation largely depends on the patient's ability to accurately imagine movements, a skill that not all individuals possess or can easily develop. To ensure its success, proper training and assessment are necessary, often involving tools such as the Kinesthetic and Visual Imagery Questionnaire to evaluate a patient's imagery capabilities. It is also important to recognize that motor imagery is not a replacement for physical therapy; rather, it serves as a complementary approach that enhances the overall rehabilitation process when used alongside conventional therapeutic interventions.[5,6,7] Therefore, motor imagery (MI) may facilitate the reorganization of motor networks in patients who have had a stroke by enhancing neural activation in specific cortical and subcortical regions, as well as modulating functional connectivity within motor-related pathways. It is thought that these neurophysiological changes contribute to improvements in motor function and overall recovery. [8, 9]

Conclusion: In summary, motor and sensory impairments are among the most common consequences of stroke, significantly affecting patients' mobility, independence, and quality of life. Traditional neurophysiological rehabilitation approaches have long aimed to restore functional movement, and recent advancements have introduced more dynamic and cognitively engaging strategies such as motor imagery (MI). MI offers a promising adjunct to conventional therapy by engaging the brain's motor networks through mental simulation of movement, thereby promoting neuroplasticity and functional recovery. Evidence from clinical research, including systematic reviews and randomized controlled trials, supports the use of MI—particularly when combined with physical practice—for improving upper limb function in individuals with subacute or chronic stroke. While the effectiveness of MI may vary depending on a patient's ability to mentally visualize movement, its accessibility, low cost, and adaptability make it a valuable tool in modern stroke rehabilitation. As part of a comprehensive, individualized rehabilitation plan, motor imagery has the potential to enhance recovery outcomes and contribute meaningfully to restoring patients' independence in daily activities. Motor imagery can be incorporated into the standard rehabilitation programme to enhance cognitive processes and target motor function in appropriate stroke cases. In this context, it is recommended that physical therapists increase their experience in this area and use this technique.

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