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Original Article

Nursing care using roy's adaptation model–based mirror therapy for physical mobility impairment in stroke patients: A case study

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Abstract

Background: Stroke is a common neurological disorder that requires prompt and appropriate management to prevent functional impairment. Non-pharmacological nursing interventions play an important role in supporting motor recovery, one of which is Mirror Therapy, which facilitates motor relearning through visual feedback mechanisms.
Objective: This study aimed to implement nursing care for stroke patients through the application of Mirror Therapy based on Roy's Adaptation Model.
Methods: A descriptive study with a case study approach was conducted involving three stroke patients at RSUD Siti Fatimah. The intervention consisted of Mirror Therapy exercises integrated with Roy's Adaptation Model. Data collection techniques included nursing assessment, observation, physical examination, and documentation. Nursing diagnoses were established based on the Indonesian Nursing Diagnosis Standards (SDKI), and interventions were implemented using the Indonesian Nursing Intervention Standards (SIKI) and evaluated with the Indonesian Nursing Outcome Standards (SLKI).
Results: Initial assessments of all three patients revealed complaints of unilateral extremity weakness and dizziness. The identified nursing diagnoses included impaired physical mobility and risk of ineffective cerebral perfusion. After three days of Mirror Therapy intervention, all patients demonstrated improvement in extremity muscle strength scores. These findings indicate a positive functional response to the intervention.
Conclusion: Mirror Therapy based on Roy's Adaptation Model is effective in improving extremity muscle strength and addressing impaired physical mobility in patients with non-hemorrhagic stroke. This intervention can be considered a valuable non-pharmacological nursing approach to support motor recovery in stroke patients.

Background

The World Stroke Organization (WSO) reported that more than 12 million people worldwide experienced stroke in 2024, with approximately 6.5 million deaths attributed to the condition. Stroke remains the leading cause of disability and the second leading cause of death globally after cardiovascular disease, with major risk factors including hypertension, air pollution, obesity, smoking, and physical inactivity (World Stroke Organization, 2024).

According to the Indonesian Health Survey (SKI) 2023, the prevalence of stroke in Indonesia reached 8.3 per 1,000 population (Survei Kesehatan Indonesia, 2023). Stroke is the leading cause of mortality in Indonesia, accounting for 19.42% of total deaths based on data from the Institute for Health Metrics and Evaluation, and it is the third most costly disease in terms of healthcare expenditure nationally (Kemenkes, 2022). Furthermore, the prevalence of stroke diagnosed among the Indonesian population increased from 7% in 2013 to 10.9% in 2018, indicating a significant upward trend (Badan Pusat Statistik Sumatera Selatan, 2019; National Center for Health Statistics, n.d.).

Stroke can lead to partial or complete loss of neurological functions controlled by the affected brain tissue, resulting in various functional impairments. One of the most common consequences is muscle weakness in the affected extremities, particularly in the hands and fingers, which play a vital role in performing daily activities (Hudak & Gallo, 2018). Impairment of hand function significantly reduces independence and increases dependence on others for daily care (Potter & Perry, 2018).

Rehabilitation is a critical component of post-stroke management aimed at minimizing

disability and improving functional outcomes. One commonly used rehabilitation approach is range of motion (ROM) exercises, which are designed to maintain or restore joint mobility, enhance muscle tone, and prevent contractures (Hidayat, 2018). ROM exercises are classified into active and passive ROM, where active ROM involves patient-initiated movements, while passive ROM relies on assistance from caregivers or mechanical devices (Potter & Perry, 2020).

An advanced form of active ROM exercise involves mirror-based movement training, which utilizes visual feedback to stimulate motor recovery of the upper extremities. This intervention, known as Mirror Therapy, is performed using a vertical mirror placed along the patient's midline, allowing patients to observe the reflection of the unaffected limb performing movements such as flexion, extension, rotation, and grasp–release activities (Istianah & Arsana, 2020).

Mirror Therapy is a form of motor imagery–based intervention that provides visual stimulation to the cerebral motor cortex, activating ipsilateral or contralateral motor pathways through observation of mirrored movements. This process facilitates cortical reorganization and promotes motor recovery in the affected limb (Arya et al., 2018). Several studies have demonstrated that Mirror Therapy significantly improves upper extremity muscle strength and motor function in non-hemorrhagic stroke patients (Firdha et al., 2023; Istianah & Arsana, 2020).

In this study, the intervention was implemented according to standard operating procedures, conducted twice daily (morning and afternoon) for three consecutive days, with each session lasting 10–15 minutes (Kemenkes, 2020; PPNI, 2018). Although Mirror Therapy has been proven effective in improving motor outcomes, it has not yet been optimally integrated into nursing care practices in Indonesia, where rehabilitation is still largely focused on conventional ROM and physiotherapy approaches (Hudak & Gallo, 2020).

Therefore, this case study contributes innovatively to the development of evidence-based and theory-driven nursing practice, particularly through the integration of Mirror Therapy within nursing care frameworks, to enhance patient adaptation and physical mobility and to provide a replicable nursing care model for healthcare facilities in Indonesia (PPNI, 2018).

This study aims to describe the implementation of nursing care using Roy's Adaptation Model–based Mirror Therapy to improve physical mobility in stroke patients with impaired upper extremity function.

Methods

Study Design

This study employed a descriptive case study design focusing on the application of nursing care using Mirror Therapy to improve upper extremity muscle strength in stroke patients. A case study approach was selected to allow an in-depth exploration of individual patient responses to the intervention within a real clinical context. This design is particularly appropriate for nursing research aiming to evaluate adaptive responses over a short intervention period and to integrate theoretical nursing frameworks, specifically the Roy Adaptation Model, into clinical practice.

Sampling and Setting

The subjects of this case study consisted of three stroke patients selected using purposive sampling based on predefined inclusion criteria. The inclusion criteria were: (1) patients diagnosed with stroke, (2) fully conscious (compos mentis), (3) experiencing hemiparesis affecting the upper extremities, and (4) presenting with muscle strength categorized as weak. The study was conducted in the Akasia Pavilion Ward of Siti Fatimah Regional General Hospital, South Sumatra Province, in 2025. This setting was chosen because it provides inpatient stroke care and allows continuous nursing intervention and observation.

Instruments

The primary instrument used in this study was a vertical mirror positioned along the patient's midline, which served as the main tool for

delivering Mirror Therapy. Muscle strength was assessed through direct clinical observation of upper extremity movements, including joint motion, coordination, and functional ability during therapy sessions. Additional supporting instruments included structured nursing assessment forms, observation sheets, and documentation records to capture patient responses, therapy duration, and progression.

Intervention

The intervention involved the implementation of Mirror Therapy as part of nursing care, guided by the Physiological Mode of the Roy Adaptation Model. Patients were positioned comfortably in a seated position at a table in a quiet room with adequate lighting. A vertical mirror was placed along the midline of the body, with the paretic limb positioned behind the mirror and the non-paretic limb placed in front. Patients were instructed to observe the reflection of the healthy limb and to perceive it as the movement of the affected limb. Simple movements such as flexion, extension, rotation, and grasp–release were performed slowly and rhythmically for approximately 15–20 minutes per session. Verbal encouragement and positive reinforcement were provided throughout the intervention to maintain focus and motivation.

Data Collection

Data collection was conducted over a three-day period using a combination of interviews, observation, and nursing documentation. Observational data included assessments of muscle strength, coordination, motor control, and patient expressions during therapy. Subjective data were obtained by asking patients about their physical sensations and feelings following each session. The time, duration, patient responses, and observable changes were systematically recorded after each intervention session to ensure consistency and completeness of data.

Data Analysis

Data analysis was performed using a descriptive qualitative approach, focusing on changes in muscle strength and adaptive responses before and after the intervention. Observed improvements were analyzed by comparing daily assessments of motor function and muscle strength scores across the three intervention days. The analysis emphasized early adaptive responses observable within 24–72 hours, including increased movement initiation, improved motor control, and enhanced patient confidence in using the affected extremity.

Ethical Considerations

Ethical principles were strictly applied throughout the study. Prior to the intervention, informed consent was obtained from all participants after providing clear explanations regarding the purpose, procedures, potential benefits, and risks of the study. Participants were informed of their right to withdraw at any time without affecting their care. Confidentiality was maintained by anonymizing patient identities and securely storing all data. The intervention was conducted in accordance with institutional nursing standards and ensured patient safety and comfort at all times.

Results

This case study presents the results of nursing care implementation using Mirror Therapy in three stroke patients diagnosed with impaired physical mobility. The intervention was conducted over a period of three consecutive days to observe early adaptive responses occurring within 24–72 hours, including behavioral changes, increased movement initiation, reduced fear of movement, and improved early motor control.

Patient Assessment Findings

Patient 1 (Mrs. Y) presented with complaints of dizziness and weakness in the left upper extremity. The patient was admitted to the emergency department after experiencing sudden weakness while cycling, followed by a fall. Upon physical examination, vital signs showed elevated blood pressure, bradycardia, and a compos mentis level of consciousness. Intravenous fluid therapy was administered via the right hand.

Patient 2 (Mr. D) reported sudden weakness of the right side of the body upon waking approximately five hours prior to hospital

admission. According to the patient's family, the patient was able to walk and speak normally before sleeping but experienced difficulty standing upon awakening. This was the first episode of weakness experienced by the patient.

Patient 3 (Mr. I) complained of slurred speech and weakness of the left side of the body. Physical examination revealed elevated blood pressure with stable vital signs and full consciousness. All three patients had a history of hypertension.

Nursing Diagnoses

The primary nursing diagnosis identified in all three patients was impaired physical mobility related to neuromuscular dysfunction, as evidenced by unilateral extremity weakness and decreased ability to initiate movement. Objective findings included reduced muscle strength, limited active movement, and observable physical weakness, while all patients remained fully conscious.

Nursing Interventions and Implementation

Nursing interventions focused on mobility support and ambulation assistance, combined with the implementation of Mirror Therapy as an active range-of-motion exercise. The intervention was performed twice daily at 09:00 and 15:00 for three days. Each session lasted approximately 15–20 minutes and included guided mirror-based movements such as flexion, extension, rotation, and grasp–release exercises.

During implementation, nurses assessed patients' physical tolerance, facilitated movement using assistive techniques, provided education to patients and families regarding Mirror Therapy, and monitored vital signs and neurological status.

Evaluation of Outcomes

On the first and second days of intervention, all patients were able to perform Mirror Therapy with assistance, although no significant improvement in muscle strength was observed. By the third day, measurable improvements were noted.

Patient 1 and Patient 2 demonstrated an increase in muscle strength from grade 2 (movement without gravity resistance) to grade 4 (movement against gravity with moderate resistance). Patient 3 demonstrated an improvement from grade 4 to grade 5, indicating normal muscle strength. Patients reported increased confidence in moving the affected extremities and demonstrated improved voluntary motor control. Overall, the problem of impaired physical mobility was partially resolved in all three patients.

Discussion

The findings of this case study indicate that Mirror Therapy integrated into nursing care contributes to early improvements in upper extremity muscle strength among stroke patients with impaired physical mobility. These results are consistent with previous studies demonstrating that Mirror Therapy effectively enhances motor recovery through visual feedback and motor imagery mechanisms (Arya et al., 2018).

Initial assessment findings in all three patients revealed unilateral extremity weakness and dizziness, which are recognized as major clinical indicators of impaired physical mobility in stroke patients. These findings align with the Indonesian Nursing Diagnosis Standards, which identify muscle weakness as a primary defining characteristic of mobility impairment (PPNI, 2018). The presence of hypertension in all patients further supports its role as a major contributing factor to stroke-related neuromuscular dysfunction (Kemenkes, 2022).

The selection of mobility support and ambulation assistance as core nursing interventions is consistent with national nursing intervention standards for stroke management, which emphasize early mobilization and functional rehabilitation to prevent long-term disability (PPNI, 2018). The addition of Mirror Therapy extends conventional range-of-motion exercises by incorporating visual stimulation that enhances cortical activation and motor relearning (Istianah & Arsana, 2020).

The observed improvement in muscle strength by the third day supports evidence that Mirror Therapy facilitates neuroplasticity through activation of the mirror neuron system. Visual input from mirrored movements allows the brain to perceive movement in the paretic limb, promoting cortical reorganization and improving motor control (Arya et al., 2018). Similar improvements in muscle strength and functional status have been reported in non-hemorrhagic stroke patients following structured Mirror Therapy interventions (Firdha et al., 2023).

The gradual improvement observed across the three-day intervention period reflects the adaptive process described in the Roy Adaptation Model, particularly within the physiological mode. Visual stimuli from the mirror function as focal stimuli, while the patients' disease history and physical condition act as contextual stimuli. The regulator and cognator subsystems process these inputs to produce adaptive motor responses, manifested as increased muscle strength and improved movement control (Hudak & Gallo, 2020).

Although the problem of impaired physical mobility was only partially resolved, the results indicate meaningful early recovery and support the feasibility of integrating Mirror Therapy into routine nursing care. Consistent with evaluation principles in nursing practice, the improvements observed align with predetermined outcome criteria, including increased extremity movement, improved muscle strength, and enhanced range of motion (PPNI, 2018).

Overall, this case study reinforces the role of nurses in delivering evidence-based, theory-guided rehabilitation interventions. Integrating Mirror Therapy into nursing care offers a practical, low-cost, and effective strategy to support early motor recovery in stroke patients and complements conventional rehabilitation approaches used in clinical settings.

Conclusion and Recommendation

This case study demonstrates that the integration of Mirror Therapy within nursing care, guided by the Roy Adaptation Model, contributes to meaningful improvements in upper extremity muscle strength among stroke patients with impaired physical mobility. Following a three-day intervention period, all patients exhibited increased motor function, improved movement initiation, and greater confidence in using the affected extremities, indicating early adaptive physiological responses.

Although the problem of impaired physical mobility was only partially resolved, the observed improvements highlight the potential of Mirror Therapy as an effective, feasible, and low-cost non-pharmacological nursing intervention. These findings support the role of nurses in delivering evidence-based rehabilitation strategies that promote neuroplasticity and patient adaptation in the acute phase of stroke recovery. Further studies with larger samples, longer intervention durations, and controlled designs are recommended to strengthen the evidence and support broader clinical implementation.

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Declaration of conflict of interest

The authors declare no competing interests.

Declaration on the Use of AI

No AI tools were used in the preparation of this manuscript.

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