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Study on the Impact of Solution-focused Therapy Combined with Teach-back on Activities of Daily Living in Stroke Patients with Hemiplegia

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Abstract

Objective: To observe the impact of solution-focused therapy combined with teach-back on the activities of daily living (ADL) in stroke patients with hemiplegia. Methods: A total of 106 stroke patients with hemiplegia were randomly divided into an experimental group and a control group, with 53 patients in each group. The control group received routine comprehensive rehabilitation nursing, while the experimental group received an intervention using solution-focused therapy combined with teach-back, in addition to routine comprehensive rehabilitation nursing. The Modified Barthel Index (MBI), Lovett muscle strength grading, and Brunnstrom stages were assessed before the intervention and again 21 days after the intervention. Statistical analysis was performed using t-tests and chi-square tests. Results: The Modified Barthel Index in the experimental group significantly increased, particularly in the areas of dressing, toileting, and bed-chair transfer abilities, with statistically significant improvements (all $p < 0.05$). The distal muscle strength of the upper and lower limbs in the Lovett muscle strength grading also showed significant improvement (both $p < 0.05$). Furthermore, the Brunnstrom stages of both the upper and lower limbs showed significant improvement (both $p < 0.05$). Conclusion: Solution-focused therapy combined with teach-back has a significant positive impact on improving the ADL of stroke patients with hemiplegia. It also shows effectiveness in enhancing the Lovett muscle strength grading and Brunnstrom stages. This method is simple and easy to promote.

Keywords: Stroke, Hemiplegia, Activities of Daily Living, Solution-Focused Therapy Combined with Teach-back

1. Introduction

Stroke, also known as cerebrovascular accident (CVA), is a syndrome characterized by local or widespread neurological dysfunction due to acute disturbances in cerebral blood circulation [1]. It is marked by high incidence, recurrence, disability, and mortality rates [2]. China has the

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highest number of stroke patients globally, and stroke is a leading cause of adult disability and death in the country [3]. Among all stroke patients, 75% experience varying degrees of functional impairment, with motor dysfunction being the most common [4]. As the incidence and disability rates of stroke continue to rise, the burden on individuals, families, and society at large is increasing [5-6]. The central nervous system exhibits a certain degree of plasticity, and rehabilitation care can effectively restore neurological function and activities of daily living (ADL). Timely rehabilitation interventions can significantly enhance neural plasticity, thereby accelerating the recovery of motor function [7-8]. However, many patients do not exhibit sufficient health awareness or adherence during rehabilitation, leading to suboptimal outcomes. Fan Xiaoyu and his team [9] emphasized that Teach-back is a strategy that can significantly improve health awareness in stroke patients. It effectively stimulates patients' enthusiasm for learning, subjective initiative, and compliance, ensuring the implementation of rehabilitation training plans and thereby enhancing their daily living skills [10]. Additionally, the solution-focused approach significantly alleviates patients' negative emotions, boosting their self-efficacy and treatment adherence [11]. This problem-solving model emphasizes patients' unique strengths and assists them in setting rehabilitation goals, thereby increasing their motivation and confidence in the rehabilitation process. By combining the interactive and feedback mechanisms of Teach-back, this comprehensive approach can more effectively improve patients' daily living abilities. This study applies the "solution-focused therapy combined with Teach-back" in the rehabilitation care of stroke patients with hemiplegia, evaluating its impact on their activities of daily living.

2. Method

2.1 Study Participants

This study included 106 stroke patients with hemiplegia who were admitted to our hospital between June 2022 and January 2024. All participants provided informed consent. The inclusion criteria were as follows: (1) meeting the stroke diagnostic criteria as outlined in *Neurology*, confirmed by brain CT or MRI; (2) a Glasgow Coma Scale score of ≥8, with stable vital signs; (3) presence of hemiplegic symptoms with muscle strength of ≥3; (4) good auditory and visual abilities, with normal communication skills; (5) informed consent and voluntary participation. The exclusion criteria were: (1) cognitive impairment, intellectual disability, or psychiatric disorders; (2) severe diseases affecting major organs such as the heart, kidneys, or liver, or the presence of tumors or trauma; (3) withdrawal from the study or death.

Eligible stroke patients were sequentially numbered based on their admission order and randomly assigned to either the control group or the experimental group, with 53 patients in each group. A comparison of general demographics and disease-related data, such as disease status and between the two groups showed no statistically significant differences ($p > 0.05$), indicating comparability (see Table 1). Statistical analysis for the general demographic data and disease-related data was performed using t-tests for continuous variables and chi-square tests for categorical variables.

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Table 1: Comparative Analysis of Baseline Characteristics between Two Groups

em		Control Group	Intervention Group	χ^2	*p*
Affected Side	Left Side	23	22	0	1
	Right Side	30	31		
Diagnosis	Hemorrhagic	35	40	1.210	0.286
	Ischemic	18	13		

2.2 Intervention Procedures

Control Group: The control group received standard comprehensive rehabilitation nursing, which included basic daily care (e.g., basic nursing, dietary care, condition monitoring, turning exercises, and active and passive limb massage and movement) along with rehabilitation therapy. Routine care involved completing essential treatment and care tasks, followed by ADL (Activities of Daily Living) training conducted by rehabilitation nurses. ADL training was integrated into the patients' daily activities, such as eating, dressing, toileting, and transferring, with assistance from family members or caregivers. The aim was to enhance patients' independent living abilities. This routine care was provided once daily, five times per week.

Experimental Group: In addition to the standard comprehensive rehabilitation nursing, the experimental group underwent an intervention using solution-focused therapy combined with Teach-back health education for three weeks. An intervention team was established, consisting of one physician, one head nurse, four nurses, and one psychologist, with the nurses responsible for implementing the intervention. The team developed an intervention plan and created educational materials on stroke (including text and video), which were reviewed and approved by in-house experts before implementation. The head nurse conducted training sessions for all team members, covering communication techniques and the intervention implementation process, ensuring that the nursing staff could apply the intervention effectively.

The intervention involved weekly sessions lasting 20 to 30 minutes. Nurses engaged in active communication with patients and their families, guiding them to articulate their primary issues and collaboratively setting rehabilitation goals. For example, when addressing difficulties in daily activities such as eating, washing, dressing, and bed-chair transfers, nurses helped patients recall past successes to build confidence. Patients were then encouraged to repeat the learned content in their own words, allowing nurses to assess their understanding and correct any misconceptions. Educational explanations were reinforced with text and video materials, adjusted according to the patient's comprehension, and repeated until the patient fully understood. Throughout the intervention, nurses provided timely feedback and encouragement, and the intervention plan was adjusted as needed based on patient progress. The intervention concluded with a review and optimization of the plan to ensure its scientific validity and effectiveness, further enhancing patients' daily living abilities and rehabilitation outcomes.

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2.3 Evaluation Criteria

Patients were assessed in a quiet, private setting upon admission and again 21 days after the intervention.

Modified Barthel Index (MBI): The Modified Barthel Index (MBI), developed by Shah et al. in 1989, includes ten items: bowel control, bladder control, grooming, feeding, toileting, dressing, transferring, mobility, stair climbing, and bathing. Each item is scored on scales of 15, 12, 8, 3, 0; 10, 8, 5, 2, 0; or 5, 4, 3, 1, 0, with a total score of 100. A score above 60 indicates basic independent living ability; 40 to 60 indicates moderate disability, requiring partial assistance; 20 to 40 indicates severe disability, dependent on others; and 0 to 20 indicates complete disability, fully dependent on others. The MBI is divided into five levels, with higher levels indicating greater independence. The Chinese version of the MBI (MBI-C) was published in 2007, and studies have demonstrated its high reliability and validity in accurately assessing patients' functional status.

Lovett Muscle Strength Grading: The Lovett Muscle Strength Grading scale, developed by Robert W. Lovett in the early 20th century, is widely used in neurology and rehabilitation to assess muscle strength. It categorizes muscle strength into six levels: 0 (no contraction), 1 (slight contraction), 2 (movement without gravity), 3 (movement against gravity), 4 (movement against resistance), and 5 (normal strength). Each level reflects the patient's degree of muscle function.

Brunnstrom Stages: The Brunnstrom stages, introduced by Swedish physical therapist Signe Brunnstrom in the 1960s, describe the six stages of motor function recovery in stroke patients. These stages range from no voluntary movement (Stage 1) to near-normal movement ability (Stage 6), with each stage corresponding to specific motor recovery milestones. The Brunnstrom stages are widely used in clinical practice and research to evaluate stroke patients' progress during rehabilitation.

2.4 Statistical Analysis

Data were recorded and organized using Excel, and statistical analysis was conducted using SPSS 19.0. Measurement data were expressed as mean ± standard deviation (SD), and categorical data were described using frequencies and percentages. The independent samples t-test was used for group comparisons, and the chi-square test was used for categorical data analysis. A p-value of <0.05 was considered statistically significant.

3. Results

3.1 Activities of Daily Living (ADL)

Before the intervention, there was no statistically significant difference in the Modified Barthel Index (MBI) scores between the two groups ($p > 0.05$). In the control group, there was no statistically significant difference in MBI scores before and after the intervention ($p > 0.05$). However, in the experimental group, the MBI scores increased significantly after the intervention compared to before, and the post-intervention MBI scores were significantly higher than those in the control group (all $p < 0.05$). Additionally, in the experimental group, the post-intervention

scores for dressing, toileting, and bed-chair transfer were significantly higher than the pre-intervention scores (all $p < 0.05$), as shown in Table 2.

Table 2: Comparative Analysis of Barthel Index Scores Pre- and Post-Intervention between Two Groups

Item	Before Intervention		*t*	*p*	After Intervention		*t*	*p*
	Control Group	Intervention Group			Control Group	Intervention Group		
Feeding	7.17±2.92	7.68±2.66	0.937	0.351	8.09±2.51	8.74±2.06	1.438	0.154
Bathing	1.49±1.66	1.47±1.39	0.063	0.950	1.60±1.65	2.13±1.40	1.773	0.079
Grooming	2.98±1.46	3.09±1.63	0.376	0.708	3.34±1.41	3.75±1.22	1.617	0.109
Dressing	4.75±2.83	5.43±2.86	1.227	0.223	5.45±2.83	6.62±2.42	2.286	0.024
Bowel Control	9.89±0.46	9.77±1.15	0.662	0.509	9.89±0.46	9.92±0.38	0.454	0.651
Bladder Control	8.98±2.84	9.79±1.20	1.690	0.094	9.70±1.20	9.92±0.38	1.306	0.195
Toileting	4.19±3.21	4.70±3.02	0.841	0.402	4.94±3.15	6.70±2.45	3.194	0.002
Bed Transfer	7.38±5.05	8.30±4.67	0.988	0.326	8.64±4.62	11.43±2.8	3.756	0.000
Walking Distance (45 m)	6.40±6.05	6.60±5.21	0.189	0.850	8.17±5.52	9.74±4.86	1.549	0.124
Climbing Stairs	1.36±2.75	1.04±2.36	0.644	0.521	1.75±3.33	2.09±3.21	0.533	0.595
Total Score	55.3±21.9	57.0±20.4	0.430	0.668	61.5±21.0	71.0±15.2	2.654	0.009

3.2 Comparison of Lovett Muscle Strength Grading between the Two Groups before and after the Intervention

Before the intervention, there was no statistically significant difference in Lovett muscle strength grading between the two groups ($p > 0.05$). In the control group, there was no statistically significant difference in Lovett muscle strength grading before and after the intervention ($p > 0.05$). However, in the experimental group, the Lovett muscle strength grading improved significantly after the intervention compared to before, and the post-intervention Lovett muscle strength grading was significantly higher than that of the control group (all $p < 0.05$). Specifically, in the experimental group, the distal muscle strength grading of both the upper and lower limbs improved significantly after the intervention compared to before (all $p < 0.05$), as shown in Table 3.

Table 3: Comparative Analysis of Lovett Muscle Strength Grades Pre- and Post-Intervention between Two Groups

Item	Before Intervention		*t*	*p*	After Intervention		*t*	*p*
	Control Group	Intervention Group			Control Group	Intervention Group		
Upper Proximal	9.89±0.46	9.77±1.15	0.662	0.509	3.25±1.22	3.68±1.18	1.852	0.067
Upper Distal	8.98±2.84	9.79±1.20	1.690	0.094	2.87±1.52	3.45±1.38	2.074	0.041
Upper Proximal	4.19±3.21	4.70±3.02	0.841	0.402	3.72±0.92	3.91±0.98	1.015	0.313
Upper Distal	7.38±5.05	8.30±4.67	0.988	0.326	3.15±1.44	3.72±1.27	2.136	0.035

3.3 Comparison of Brunnstrom Stages between the Two Groups before and after the Intervention

Before the intervention, there was no statistically significant difference in Brunnstrom stage levels between the two groups ($p > 0.05$). In the control group, there was no statistically significant difference in Brunnstrom stage levels before and after the intervention ($p > 0.05$). However, in the experimental group, the Brunnstrom stage levels improved significantly after the intervention compared to before, and the post-intervention Brunnstrom stage levels were significantly higher than those of the control group (all $p < 0.05$). Additionally, in the experimental group, the Brunnstrom stage levels for both the upper and lower limbs were significantly higher after the intervention compared to before (all $p < 0.05$), as shown in Table 4.

Table 4: Comparative Analysis of Brunnstrom Stage Scores Pre- and Post-Intervention between Two Groups

Item	Before Intervention		*t*	*p*	After Intervention		*t*	*p*
	Control Group	Intervention Group			Control Group	Intervention Group		
Upper Limb	7.17±2.92	7.68±2.66	0.937	0.351	3.92±1.42	4.49±1.38	2.076	0.040
Handl	1.49±1.66	1.47±1.39	0.063	0.950	3.77±1.68	4.32±1.63	1.696	0.093
Lower Limbl	2.98±1.46	3.09±1.63	0.376	0.708	4.09±0.98	4.55±1.01	2.335	0.021

4. Discussion

4.1 Significant Improvement in Dressing, Toileting, and Bed-Chair Transfer Abilities as Measured by the Modified Barthel Index (MBI)

The results in Table 2 indicate that the Modified Barthel Index (MBI) scores significantly improved in the experimental group after the intervention, with marked enhancements in dressing, toileting, and bed-chair transfer abilities. Research suggests that Teach-back, an interactive health education method, ensures that patients accurately understand and master caregiving knowledge and skills through repetition and clarification, thereby enhancing their self-care abilities [12]. The solution-focused approach, by emphasizing patients' strengths and

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potential, helps them set specific, achievable goals, which in turn boosts their confidence and self-efficacy [13]. Following the intervention, patients exhibited increased core muscle strength, improved trunk control, balance, support, and posture, which contributed to better upper and lower limb function. This led to significant improvements in their ability to dress, transfer between bed and chair, and use the toilet, thereby enhancing their overall daily living capabilities. Therefore, the combination of these two methods provides clear educational content while also stimulating patient engagement and participation, leading to more effective improvements in daily living skills.

4.2 Improvement in Distal Muscle Strength of Upper and Lower Limbs as Measured by Lovett Muscle Strength Grading

The results in Table 3 show a significant improvement in distal muscle strength of the upper ($p < 0.041$) and lower limbs ($p < 0.035$) in the experimental group after the intervention. The solution-focused approach, by focusing on patients' personal goals and rehabilitation progress, provides individualized rehabilitation plans that keep patients highly engaged and motivated during training, thereby promoting muscle strength recovery [14]. Furthermore, regular feedback and adjustments to the rehabilitation plan allow patients to optimize their training content, leading to further improvements. The enhancement of distal muscle strength in the upper limbs is crucial for activities such as dressing and toileting, while the improvement in lower limb strength supports bed-chair transfers and posture control. These gains are likely related to the repetition and practice facilitated by the Teach-back method, which strengthens patients' understanding and execution of rehabilitation exercises. Consequently, combining these two methods enhances patients' confidence and self-efficacy, leading to more effective improvements in distal muscle strength of the upper and lower limbs.

4.3 Improvement in Upper and Lower Limb Function as Measured by Brunnstrom Stages

The results in Table 4 indicate that the Brunnstrom stage levels for both upper and lower limbs improved significantly in the experimental group after the intervention, with statistically significant differences compared to pre-intervention levels (all $p < 0.05$). Literature suggests that the Teach-back method, through repeated health education and skills training, effectively enhances patients' mastery of rehabilitation knowledge, thereby promoting functional recovery [15]. The intervention strengthened patients' neural control, resulting in improved Brunnstrom stages for both upper and lower limbs. However, the improvement in hand function was slower, as fine motor recovery in the hands requires extensive cortical control, making it more challenging and slower to achieve functional outcomes. This may be due to the complex neural control and high coordination required for fine motor skills in the hands. The solution-focused approach encourages active patient participation in the rehabilitation process, setting realistic goals, and providing continuous support and encouragement, thereby enhancing overall functional recovery [16]. Therefore, the combination of these two methods not only provides clear educational content but also effectively improves the functional recovery of both upper and lower limbs.

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5. Conclusion

In the prolonged rehabilitation process of stroke, the patient's self-care ability is crucial. Caregivers should appropriately encourage patients to participate in self-care training to enhance independence, reduce dependency, and facilitate their reintegration into family and society. The "solution-focused therapy combined with Teach-back" approach helps to stimulate the patient's intrinsic motivation and strengthens their active participation in rehabilitation training. However, this study has limitations, including insufficient attention to potential psychological and social adaptation issues in patients, as well as a relatively small sample size. Future research should address these concerns by expanding the sample size and incorporating multi-center collaborations to better inform stroke rehabilitation care and develop new treatment strategies.

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