

Article

Effect Analysis of Pathway Nursing for Elderly Patients with Cerebral Infarction under Multidisciplinary Collaboration

Jing Zhang^{1,*}, Jie Liu¹ and Yingying Zhong¹

¹ Deyang People's Hospital, Deyang, China

* Correspondence: Jing Zhang, Deyang People's Hospital, Deyang, China

Abstract: Objective To evaluate the effect of multidisciplinary collaborative pathway nursing on elderly patients with cerebral infarction. Methods Elderly patients with cerebral infarction admitted to our hospital were randomly divided into two groups. The control group received standard care, while the observation group was managed by a multidisciplinary team consisting of neurology, rehabilitation, nursing, nutrition, pharmacy, and psychology professionals. Based on a timeline framework, standardized nursing interventions-including acute-phase monitoring, early rehabilitation, prevention of complications, medication and nutritional management, and follow-up care-were implemented. Functional recovery, complication rates, and hospital-related indicators were compared between the two groups. Results Before intervention, there were no statistically significant differences in scale scores between the two groups ($P > 0.05$). After intervention, the observation group showed lower levels of neurological deficit, higher scores in motor function, daily living ability, cognition, and self-management, as well as lower rates of complications, shorter rehabilitation initiation time, shorter hospital stays, and lower medical costs compared to the control group. Patient satisfaction was also significantly higher in the observation group ($P < 0.05$). Conclusion Multidisciplinary collaborative pathway nursing promotes recovery in elderly patients with cerebral infarction, reduces complications, shortens hospitalization duration, and improves patient satisfaction, making it worthy of clinical promotion.

Keywords: cerebral infarction; elderly patients; multidisciplinary collaboration; pathway nursing; neurological function

1. Introduction

Cerebral infarction is an acute cerebrovascular disease with high rates of disability and mortality among the elderly. It rapidly leads to ischemic and hypoxic necrosis of brain tissue upon onset, often resulting in long-term [1] sequelae such as hemiplegia, aphasia, and cognitive impairment. Elderly patients frequently have comorbid conditions like hypertension and diabetes, require prolonged bed rest, and are at high risk for pulmonary infections, deep vein thrombosis, and pressure ulcers. The complex needs [2] of these patients cannot be adequately met by single-discipline medical care and nursing. Traditional nursing practices primarily focus on carrying out physician orders, lack systematic planning, involve late rehabilitation intervention, and suffer from poor communication across specialties, leading to redundant or missed interventions. Pathway-based nursing uses time as the vertical axis and nursing interventions as the horizontal axis, standardizing and proceduralizing clinical and nursing activities to ensure clear temporal sequencing and measurable outcomes. By incorporating a multidisciplinary collaboration model, rehabilitation, nutrition, pharmacy, and psychological support can work synergistically to achieve comprehensive patient care [3]. This study primarily evaluates the impact of this model on functional recovery, complication control, and hospital efficiency in elderly stroke patients, providing valuable insights for clinical practice.

Received: 21 June 2026

Revised: 07 August 2026

Accepted: 19 August 2026

Published: 26 August 2026



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2. Materials and Methods

2.1. General Information

A total of 100 elderly patients with cerebral infarction admitted to the Department of Neurology were selected as study subjects and randomly divided into a control group and an observation group, each consisting of 50 cases, using a random number table method. Inclusion criteria: patients meeting clinical diagnostic criteria for cerebral infarction, confirmed by head CT or MRI, aged ≥ 60 years, experiencing first-time onset, with time from onset to hospital admission < 24 hours, stable vital signs, conscious or mildly drowsy, and having provided informed consent either personally or through their family members. Exclusion criteria: patients with intracerebral hemorrhage, subarachnoid hemorrhage, or intracranial space-occupying lesions; those with a history of stroke and significant residual functional impairment; those with severe heart, liver, or kidney dysfunction or malignant tumors; those with severe cognitive impairment or mental disorders preventing cooperation in assessment and training; and those whose condition worsened during hospitalization requiring transfer to another department or hospital. The control group included 28 males and 22 females, with a mean age of (70.42 ± 6.35) years. The observation group consisted of 26 males and 24 females, with a mean age of (69.87 ± 6.58) years. There were no statistically significant differences between the two groups regarding gender, age, time from onset to admission, infarct location, comorbidities, educational level, or other baseline characteristics ($P > 0.05$), indicating comparability.

2.2. Method

The control group received standard neurology nursing care. The assigned nurse conducted admission assessments, administered antiplatelet therapy, improved circulation, and performed dehydration and intracranial pressure reduction treatments as prescribed by the physician. The nurse monitored changes in consciousness, pupils, blood pressure, and oxygen saturation, provided oral, skin, and catheter care, instructed patients on medication adherence and proper diet, assisted with limb function exercises once the condition stabilized, and provided verbal education and information about follow-up appointments upon discharge.

The observation group implemented pathway nursing under multidisciplinary collaboration based on this foundation.

Form a multidisciplinary team. The team is led by one neurologist, and includes one rehabilitation physician, two rehabilitation therapists, four specialty nurses, one dietitian, one clinical pharmacist, and one psychological counselor. The head nurse serves as the case manager. All team members undergo two weeks of intensive training prior to starting work, followed by assessment to ensure competence in pathway management concepts, scale usage, and key points of early rehabilitation techniques. The team holds weekly joint ward rounds and discussions, and initiates ad hoc meetings whenever deviations occur during pathway implementation, updating the pathway chart accordingly.

Develop a standardized care pathway. Create a pathway chart with hospitalization duration as the vertical axis and assessment, rehabilitation training, complication prevention, medication guidance, nutritional support, and health education as the horizontal axes. Keep one copy in the medical record and provide another in illustrated format to the patient and family. The responsible nurse reviews each item daily; any uncompleted items are documented on a variation form and reported to the case manager. The phased implementation plan includes the following: On admission day, specialty nurses complete vital sign monitoring, NIHSS scoring, fall and pressure ulcer risk assessments, as well as swallowing and nutritional screening within 30 minutes. A rehabilitation physician conducts the initial functional assessment and sets treatment goals within 24 hours. A clinical pharmacist reviews the patient's medication history, while a psychological counselor performs an initial emotional screening. Days 1--2 constitute the acute care phase, during which patients are assisted to turn and receive back tapping every 2 hours, with the head of the bed elevated at 30 and oral hygiene intensified

to reduce aspiration risk. For patients with swallowing difficulties, dietitians develop pureed diets or enteral nutrition plans. Patients at high risk for thrombosis perform ankle pumps and intermittent pneumatic compression therapy. Once vital signs stabilize, proper limb positioning and passive joint mobilization begin. Days 3–5 mark the initiation of rehabilitation, including twice-daily bed exercises such as turning over, bridging, sitting balance, and active-assisted upper-limb movements—each session lasting 20–30 minutes, without causing noticeable fatigue. Bladder function training and bowel management are incorporated. The clinical pharmacist provides bedside education on medication timing and adverse reaction recognition. The psychological counselor uses listening and relaxation techniques to alleviate anxiety and depression. From day 6 until discharge, the focus shifts to functional enhancement, emphasizing sit-to-stand transitions, standing balance, walking, and daily living activities, along with hand function and speech therapy. Dietitians adjust dietary plans based on changes in blood glucose and lipid levels. Nurses use demonstration and feedback methods to teach family members position transfer and safe caregiving techniques. On discharge day, a written home rehabilitation prescription is provided, including illustrated exercise instructions, medication lists, dietary recommendations, and warning signs for relapse. After discharge, a case manager follows up via phone and WeChat for three months, assessing adherence to rehabilitation and monitoring blood pressure and glucose records.

2.3. Observation Indicators

Degree of neurological deficit: assessed using the National Institutes of Health Stroke Scale (NIHSS), with a total score of 42 points; higher scores indicate more severe deficits.

Limb motor function: assessed using the simplified Fugl-Meyer Assessment (FMA), with a total score of 100 points; higher scores indicate better motor function.

Activities of Daily Living: Assessed using the Modified Barthel Index (MBI), with a total score of 100 points; higher scores indicate stronger self-care ability.

Cognitive function: assessed using the Montreal Cognitive Assessment (MoCA), with a total score of 30 points; higher scores indicate better cognitive function.

Self-management ability: assessed using the Self-Care Ability Scale (ESCA), with a total score of 172 points; higher scores indicate better self-management capacity.

(6) Complications: Count the number of cases of pulmonary infection, deep vein thrombosis in the lower extremities, pressure injuries, falls or bed falls, and constipation during hospitalization, and calculate the overall incidence rate.

Hospitalization-related indicators: Record the time of rehabilitation intervention, length of hospital stay, and total hospital costs.

(8) Nursing satisfaction: On the day of discharge, a self-designed questionnaire was used to assess satisfaction, categorized into four levels: very satisfied, satisfied, neutral, and dissatisfied. Satisfaction rate was calculated as the percentage of patients in the first two categories relative to the total number of patients in the group.

The above scale was independently completed by two fixed personnel who were not involved in group assignment or nursing implementation, before intervention (within 24 hours of admission) and after intervention (on the day of discharge), with the average score taken.

2.4. Statistical Analysis

Data were analyzed using SPSS 26.0 statistical software. Continuous variables, after normality testing and found to follow a normal distribution, were expressed as mean $\pm$ standard deviation ($\bar{x} \pm s$). Between-group comparisons were performed using independent samples t-tests, while within-group comparisons before and after intervention were conducted using paired samples t-tests. Categorical data were presented as frequencies and percentages, and between-group comparisons were analyzed using χ^2 tests. A P-value < 0.05 was considered statistically significant.

3. Results

3.1. Comparison of Neurological Function, Motor Function, and Activities of Daily Living between the Two Groups

There were no statistically significant differences in the scores between the two groups before intervention ($P > 0.05$). After intervention, the NIHSS score in the observation group was lower than that in the control group, while the FMA and MBI scores were higher, with all differences being statistically significant ($P < 0.05$), as shown in Table 1.

Table 1. Comparison of Nihss, FMA, and MBI Scores Before and After Intervention between the Two Groups ($\bar{X} \pm s$, Points)

Group	Number of cases	NIHSS before intervention n	After NIHSS intervention n	Before FMA intervention n	After FMA intervention n	Before MBI intervention n	After MBI intervention n
Control group	50	12.86 $\pm$ 2.47	7.94 $\pm$ 1.85	42.35 $\pm$ 6.28	58.62 $\pm$ 7.15	45.72 $\pm$ 8.36	63.48 $\pm$ 9.24
Observation group	50	13.05 $\pm$ 2.39	5.32 $\pm$ 1.61	41.87 $\pm$ 6.54	67.94 $\pm$ 7.83	44.96 $\pm$ 8.71	74.15 $\pm$ 9.86
t-value	-	0.391	7.554	0.374	6.215	0.445	5.583
P-value	-	0.697	<0.001	0.709	<0.001	0.657	<0.001

3.2. Comparison of Cognitive Function and Self-Management Ability between the Two Groups

There was no statistically significant difference in scores between the two groups before intervention ($P > 0.05$). After intervention, scores in both groups increased compared to pre-intervention levels, with the observation group showing higher scores than the control group, and the difference was statistically significant ($P < 0.05$), as shown in Table 2.

Table 2. Comparison of MoCA and ESCA Scores Before and After Intervention between the Two Groups ($\bar{X} \pm s$, Points)

Group	Number of cases	Before MoCA intervention	After MoCA intervention	Before ESAC intervention	After ESAC intervention
Control group	50	19.34 $\pm$ 2.85	22.68 $\pm$ 3.14	92.46 $\pm$ 10.37	108.73 $\pm$ 11.24
Observation group	50	19.16 $\pm$ 2.92	25.42 $\pm$ 3.06	91.85 $\pm$ 10.62	123.56 $\pm$ 12.08
t-value	-	0.312	4.419	0.291	6.355
P-value	-	0.756	<0.001	0.772	<0.001

3.3. Comparison of Complication Occurrence between the Two Groups

The total incidence of complications in the observation group was lower than that in the control group, and the difference was statistically significant ($P < 0.05$), as shown in Table 3.

Table 3. Comparison of Complications during Hospitalization between the Two Groups [N(%)]

Group	Number of cases	Pulmonary infection	Deep vein thrombosis of the lower extremities	Pressure injury	Falls or bed falls	Constipation	Overall incidence rate
Control group	50	5	3	3	2	4	17(34.00)
Observation group	50	2	1	1	0	2	6(12.00)

χ^2 value	-	-	-	-	-	-	6.832
P-value	-	-	-	-	-	-	0.009

3.4. Comparison of Two Groups of Hospitalization-Related Indicators

The rehabilitation intervention time and hospital stay in the observation group were shorter than those in the control group, and the hospital costs were lower ($P < 0.05$), as shown in Table 4.

Table 4. Comparison of Rehabilitation Intervention Duration, Hospital Stay, and Hospital Costs between the Two Groups ($\bar{X} \pm s$)

Group	Number of cases	Rehabilitation intervention time (h)	Length of hospital stay (days)	Hospitalization costs (in ten thousand yuan)
Control group	50	48.62 $\pm$ 8.75	16.84 $\pm$ 3.27	2.86 $\pm$ 0.54
Observation group	50	26.34 $\pm$ 6.18	13.26 $\pm$ 2.95	2.41 $\pm$ 0.47
t-value	-	14.706	5.749	4.445
P-value	-	<0.001	<0.001	<0.001

3.5. Comparison of Satisfaction Levels between the Two Groups of Nursing Care

In the control group, 20 patients were very satisfied, 19 were satisfied, 7 were generally satisfied, and 4 were dissatisfied, resulting in a nursing satisfaction rate of 78.00% (39/50). In the observation group, 31 patients were very satisfied, 16 were satisfied, 2 were generally satisfied, and 1 was dissatisfied, yielding a nursing satisfaction rate of 94.00% (47/50). The difference between the two groups was statistically significant ($\chi^2 = 5.316$, $P = 0.021$).

4. Discussion

The rehabilitation process for elderly patients with cerebral infarction is influenced by factors such as lesion extent, comorbidities, nutritional status, medication adherence, and psychological condition, resulting in clearly interdisciplinary nursing needs. Under conventional nursing models, care primarily focuses on monitoring vital signs and executing medical orders, while interventions from rehabilitation, nutrition, pharmacy, and psychology are mostly delivered through ad hoc consultations-passive, fragmented, and lacking continuity-which often leads to missed opportunities during the critical rehabilitation window. This study integrates the concept of multidisciplinary collaboration with pathway-based nursing, consolidating scattered professional resources into a unified, executable, traceable, and evaluable nursing framework through fixed teams, standardized processes, and scheduled time points. As a result, interventions from various disciplines shift from being reactive "after-the-fact" additions to proactive, integrated components within [4] the care process.

The study results show that, after intervention, the NIHSS scores in the observation group were lower than those in the control group, while FMA and MBI scores were higher. This outcome is closely related to the strict timing constraints imposed by pathway-based care on rehabilitation. The pathway protocol specifies functional assessment and initiation of rehabilitation within 24 hours of admission, following stabilization of vital signs. As a result, patients in the observation group began rehabilitation earlier than those in the control group, enabling them to receive systematic positioning and passive joint mobilization training during the period of peak neural plasticity. This significantly reduced the risk of complications such as disuse atrophy, joint contractures, and shoulder-hand syndrome. Rehabilitation therapists and specialized nurses collaborated under a unified framework, each responsible for different aspects of training [5] during specific phases. Patients progressed from bedridden status to sitting, then to assisted walking, with their ability to move from bed to bedside and eventually to assisted ambulation continuously improving throughout hospitalization.

Improvement in cognitive function and self-management abilities should not be overlooked. The MoCA and ESCA scores of the observation group were higher than those of the control group after intervention, indicating that the effect of this model extends beyond physical aspects. The health education items in the pathway have clear temporal sequences and content requirements; nurses deliver education through daily small doses, repeated reinforcement, and feedback confirmation, thereby avoiding the problems associated with traditional intensive education-such as excessive information volume and poor memory among elderly patients. Early involvement of psychological counselors and sharing of experiences by fellow patients help alleviate anxiety related to prognosis, and improved emotional states subsequently encourage patients to actively participate in rehabilitation training. Bedside guidance provided by clinical pharmacists enables patients to clearly understand medication names, dosing schedules, and identification of adverse reactions, a process that itself contributes to the development of self-management skills.

The reduced incidence of complications is a result of preventive care measures being implemented earlier. Pathway-based nursing quantifies key elements such as repositioning intervals, head-of-bed angle, frequency of oral care, number of ankle pumps, and swallowing function screening, incorporating them into routine shift checks. This transforms preventive actions from individual, experience-based practices into standardized, mandatory items, thereby reducing the likelihood of oversight. Dietitians develop personalized dietary plans based on swallowing screening results, lowering the risk of aspiration and improving patients' nutritional status, thus providing essential support for tissue repair and immune recovery. A mechanism involving variation documentation and team discussions enables timely identification and correction of implementation deviations, forming a continuous quality improvement loop [6]. Faster functional recovery and fewer complications together shorten hospital stays, while reduced needs for anti-infective and anticoagulant treatments and additional tests directly lower overall hospital costs. Higher nursing satisfaction in the observation group may be attributed to patients and families using simplified pathway charts, enabling clear understanding of daily care plans and rehabilitation goals. Continued follow-up by case managers also ensures continuity of care after discharge, reducing caregiver anxiety.

5. Conclusion

In summary, pathway-based nursing under multidisciplinary collaboration can promote neurological and motor functional recovery in elderly patients with cerebral infarction, enhance their self-care ability, cognitive function, and self-management skills, reduce the incidence of complications during hospitalization, shorten hospital stay and rehabilitation intervention time, lower hospital costs, and improve patient satisfaction with nursing care. This model is therefore worthy of clinical promotion and application.

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