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Observational Study

Application of a hospital–community–family trinity rehabilitation nursing model combined with motor imagery therapy in patients with cerebral infarction

INTRODUCTION

Cerebral infarction is a common clinical cerebrovascular disease, accounting for approximately 70% of stroke cases. Cerebral infarction can lead to pyramidal tract damage, causing central paralysis and sensorimotor dysfunction in the human body, which is manifested as decreased muscle strength and motor limitations in a particular limb[1-3].

At present, various clinical treatment methods are used to treat patients with cerebral infarction, including conventional drug therapy, acupuncture, rehabilitation therapy, and motor imagery therapy, and each has therapeutic effects with particular advantages[4-6]. Motor imagery therapy is an intervention administered under the guidance of professionals, in which the patient's own imagination is combined with tactile, auditory, visual, and other associative stimuli to promote motor function improvement in patients with cerebral infarction[7].

In recent years, rehabilitation treatment of patients with cerebral infarction has gradually attracted widespread clinical attention. The importance of rehabilitation nursing has also been reflected. Rehabilitation nursing is considered an indispensable part of cerebral infarction treatment. It is particularly important to select a scientific and reasonable rehabilitation nursing model[8,9]. The hospital–community–family trinity rehabilitation nursing model provides continuous nursing services across hospitals, communities, and families for patients by the cooperation of hospitals and community

medical staff, which helps improve the quality of care and promote the rehabilitation of patients[10].

In this study, we explored the application value of a combination of the hospital-community-family trinity rehabilitation nursing model and motor imagery therapy in patients with cerebral infarction, in terms of its effects on balance ability, motor ability, and quality of life of these patients.

MATERIALS AND METHODS

General data

Eighty-eight patients with cerebral infarction who attended our hospital from January 2021 to December 2021 were selected and allocated to a study group and a control group, according to a simple random number table, with 44 cases in each group.

The control group consisted of 21 men and 23 women, aged 39–71 years, with an average age of 55.82 ± 6.15 years. Their body weight ranged from 48 to 79 kg, with an average of 63.79 ± 7.02 kg. In terms of paralysis, 20 cases were affected on the left side and 24 cases on the right side. Ten cases had an education of college degree or above, 23 cases had been educated to junior high school, and 11 cases had an education level of elementary school or below.

The study group consisted of 19 men and 25 women, aged 38–73 years, with an average age of 56.37 ± 5.84. years. Their body weight ranged from 47 to 80 kg, with an average of 64.12 ± 6.80 kg. Twenty-two cases were paralyzed on the left side and 22 cases on the right side. Nine cases had an education of college degree or above, 25 cases had an education up to junior high school, and 10 cases had an education of elementary school or below. Thus, sex, age, site of paralysis, and education level were balanced and comparable between the two groups ($P > 0.05$).

Selection criteria

Patients were included if cerebral infarction was diagnosed by clinical symptoms, brain computed tomography, magnetic resonance imaging, or other imaging examinations; if

they had clear consciousness; if they provided informed consent for participation in this study and signed the consent form; and if they had hemiplegic dysfunction. The exclusion criteria were the presence of mental disorders; abnormal coagulation mechanisms; malignant hypertension; malignant tumors; respiratory failure; cognitive dysfunction; severe infection; and limb dysfunction before the occurrence of cerebral infarction.

Treatments

Both groups continued their interventions for 6 mo.

Control group intervention: The control group was given routine nursing and motor imagery therapy. During the treatment, these patients were assisted to perform turning back and patting. They were given cerebral infarction health education, oral care, dietary intervention, daily exercise, and other routine nursing. Combined with the daily exercise content, the patients were verbally guided to imagine a gait using a fixed step, independent step, and lateral step. Dance videos could be played for square dance enthusiasts to guide them in imagining the dance movements and postural changes and feel the comfort of free exercise. Patients were guided to use their imagination through watching videos of walking on the beach, imagining themselves on the beach by touching and listening, walking on the beach, and feeling the comfort of free walking.

Study group intervention: The study group was given hospital-community-family trinity rehabilitation nursing based on the control group. The trinity rehabilitation nursing model included rehabilitation physicians, specialist nurses, community nurses, head nurses, and others. Unified trinity rehabilitation nursing theory training included education on the purpose, significance, and steps of its implementation. We developed a cerebral infarction health education manual, which was composed of the basic knowledge on cerebral infarction, preventive measures, rehabilitation training, home

care, basic information on hospital–community–family-related responsible persons (telephone, WeChat), and other contents.

During hospitalization, a self-made cerebral infarction health education manual was distributed to explain the relevant information on cerebral infarction in plain language, emphasize the importance of rehabilitation training, and enhance patients' attention. We conducted one-on-one rehabilitation training, ensuring that rehabilitation training movements were standard and specific. We also played the rehabilitation training-related videos recorded by team members after completion of their training, conducted consolidation exercises, introduced the rehabilitation training effect, and enhance the confidence of patients' rehabilitation exercises. Before discharge, specialist nurses and rehabilitation physicians developed a continuous rehabilitation plan for patients, effectively communicated with the community nurses at discharge, and elaborated the rehabilitation status of patients during hospitalization and the rehabilitation plan after discharge. Community nurses could modify the rehabilitation training plan in real time according to individual circumstances during the rehabilitation training of patients.

Community outpatient sites were constructed. Community nurses were responsible for providing rehabilitation training guidance to patients and, at the same time, visit the patients once a week for follow-up. The follow-up time was controlled at approximately 30 min each time. The psychological status and rehabilitation status of patients were evaluated, and those with negative emotions were guided. Those with non-standard rehabilitation training movements were also corrected, and patients' families were urged to complete the rehabilitation training plan on time. Patients' families were invited to participate in the rehabilitation nursing process. If the implementation of patients' daily rehabilitation exercise plan was recorded, patients were urged to perform rehabilitation exercises actively every day. Rehabilitation exercise videos were distributed. Patients and their families were encouraged to watch these videos repeatedly. Those with non-standard rehabilitation exercise movements were helped to improve performance of their exercises under the guidance of family members and community nurses. Community activities such as patient exchange meetings and expert

lectures on cerebral infarction rehabilitation exercises were conducted once a month, and patients and their families were invited to participate.

Outcome measures

Motor function was evaluated using the Fugl-Meyer Assessment (FMA), while balance ability was assessed using the Berg Balance Scale (BBS). The FMA scale includes 33 upper limb movements and 17 Lower limb movements, with a total score of 0–100 points. Lower scores indicated more severe dyskinesia. The BBS includes 14 items, with a score of 0–4 points for each item and a total score of 0–56 points, where higher scores indicate a stronger balance ability. These scores were compared between the two groups before and after 6 mo of intervention.

Additionally, we compared the activities of daily living using the Barthel Index (BI) as well as the quality of life using the Stroke-Specific Quality of Life scale (SS-QOL) before and after 6 mo of intervention between the two groups. The BI includes 10 items, including dressing, walking on a flat surface, toileting, bathing, and eating. Each item had a score range of 0–10 points and a total score of 0–100 points, with higher scores indicating better ability to conduct activities of daily living. The SS-QOL had a score range of 0–100 points, with higher scores indicating better quality of life.

We compared the activation status of the primary sensorimotor cortical area (SMC) contralateral to the affected side before and after 6 mo of intervention between the two groups. This included assessment of activation frequency and activation volume, in which the activation volume unit is k.

We also compared the satisfaction with nursing between the two groups. The Quality of Service (SERVQUAL) scale was used to assess patients' satisfaction with nursing, including five items: reliability, empathy, responsiveness, assurance, and tangibles. Each item was scored in a range of 1–5 points, with lower scores indicating worse satisfaction with nursing.

Statistical analysis

SPSS v22.0 software (IBM Corp., Armonk, NY, USA) was used to analyze the data. Measurement data were expressed as mean ± SD, t test and enumeration data as n (%). Data were compared using the χ^2 test. $P < 0.05$ indicated statistically significant differences.

RESULTS

Changes in motor function and balance ability

Before intervention, the FMA and BBS scores in the study group were not significantly different from those in the control group (both $P > 0.05$, Table 1). After 6 mo of intervention, the FMA and BBS scores in the study group were higher than those in the control group (both $P < 0.05$), as shown in Table 1.

Changes in activities of daily life and quality of life

The BI and SS-QOL were not significantly different between the study and control groups before intervention (both $P > 0.05$, Table 2). After 6 mo of intervention, the BI and SS-QOL in the study group were higher than those in the control group (both $P < 0.05$, Table 2).

SMC activation state

Prior to the intervention, no significant difference was observed in activation frequency or activation volume between the study and control groups ($P > 0.05$, Table 3). After 6 mo of intervention, the activation frequency and activation volume in the study group were higher than those in the control group ($P < 0.05$, Table 3).

Nursing satisfaction

In the study group, the SERVQUAL scores for the reliability of nursing, empathy, reactivity, assurance, and tangibles were significantly higher than those of the control group (all $P < 0.05$), as shown in Table 4.

DISCUSSION

In this study, we showed that combining a hospital–community–family trinity rehabilitation nursing model and motor imagery therapy enhanced the motor function and balance ability of patients with cerebral infarction, with concomitant changes in the relevant SMC area. This led to improvement in their abilities to conduct activities of daily life as well as in their quality of life and resulted in a higher degree of nursing satisfaction.

Cerebral infarction has a high mortality and disability rate. It can cause neurological deficits after onset, which result in motor, language, and other dysfunctions, to different degrees, which markedly impacts the daily activities and quality of life of patients[11,12]. Promoting the rehabilitation of patients with cerebral infarction has become a crucial topic among clinicians and researchers worldwide. Patients and their families anticipate a scientific and practical rehabilitation nursing model that can reduce the disability rate of stroke and improve the self-care ability of these patients[13-15].

Previous studies have shown that motor imagery therapy can enhance compensatory function at the site of brain injury, activate the central nervous system in specific regions, increase blood flow in functional areas of the brain, promote neurotransmitter release, and reduce limb motor dysfunction[16,17]. With the development of rehabilitation medicine, rehabilitation nursing has emerged as a discipline that combines modern rehabilitation concepts with early nursing to promote the maximum functional recovery of patients[18]. The hospital–community–family trinity rehabilitation nursing model provides continuous and comprehensive nursing services for patients, which can significantly eliminate adverse factors of rehabilitation and improve the quality of nursing care[19,20]. In this study, we endeavored to apply the hospital–community–family trinity rehabilitation nursing model in combination with motor imagery therapy in patients with cerebral infarction. After 6 mo of intervention, the FMA and BBS scores in the study group were significantly higher than those in the control group ($P < 0.05$), indicating that the above nursing model could improve the motor function and balance ability of patients with cerebral infarction. This may be because the hospital–

community–family trinity rehabilitation nursing model not only imparts cerebral infarction knowledge and functional exercise training to patients during hospitalization but also handles patients *via* community nurses after their discharge from the hospital. Patients' families are invited to participate in the rehabilitation nursing process. Patients receive continuous rehabilitation nursing guidance and supervision, which can improve their motor function and balance ability and promote their rehabilitation.

Moreover, after 6 mo of intervention, the activation frequency and activation volume in the study group were higher than those in the control group ($P < 0.05$), suggesting that the use of a combination of the hospital–community–family trinity rehabilitation nursing model and motor imagery therapy in patients with cerebral infarction enhances the patients' rehabilitation. In this study, repeated drills of motor scenarios in the brain by means of motor imagery therapy could induce the brain to control the trunk muscle groups on the affected side, activate dormant synapses, and enhance compensation for the brain injury site.

Consequently, combined application of hospital–community–family trinity rehabilitation nursing model and motor imagery therapy helped patients obtain continuous and complete professional guidance and care after discharge, correct inaccurate rehabilitation exercise behavior, improve the effect of rehabilitation exercise, and promote the rehabilitation of patients.

After 6 mo of intervention, the BI and SS-QOL scores in the study group were higher than those in the control group ($P < 0.05$), which showed that the application of this combined rehabilitation and therapy in patients with cerebral infarction could significantly improve the ability to conduct activities of daily as well as the quality of life of patients. In addition, we compared the nursing satisfaction of the two groups and found that the reliability, empathy, reactivity, assurance, and tangible scores of the study group were higher than those of the control group ($P < 0.05$). This suggests that the hospital–community–family trinity rehabilitation nursing model combined with motor imagery therapy is suitable for clinical application in patients with cerebral infarction.

The study was limited by the short observation time. Thus, the effect of the above intervention program on the long-term prognosis of patients with cerebral infarction needs to be explored further and confirmed by prolonging the follow-up time.

CONCLUSION

In summary, the application of a combination of the hospital–community–family trinity rehabilitation nursing model with motor imagery therapy in patients with cerebral infarction can improve the motor function and balance ability of patients, cause corresponding changes in the SMC area on the affected side, improving their abilities to conduct the activities of daily life and quality of life of patients, and resulting in a high degree of patient satisfaction with nursing care. In addition, based on the hospital–community–family trinity rehabilitation nursing model, nursing staff are required to ensure close linkage between hospitals, communities, and patients' families and provide continuous and complete professional care to patients.

REFERENCES

1 **Zhen C**, Wang Y, Wang H, Li D, Wang X. Multiple cerebral infarction linked to underlying cancer: a review of Trousseau syndrome-related cerebral infarction. *Br J Hosp Med (Lond)* 2021; **82**: 1-7 [PMID: 34076507 DOI: 10.12968/hmed.2020.0696]

2 **Okuda Y**, Aoike F. Functional recovery of patients with intracerebral haemorrhage and cerebral infarction after rehabilitation. *Int J Rehabil Res* 2021; **44**: 222-225 [PMID: 34034286 DOI: 10.1097/MRR.0000000000000476]

3 **Fu J**, Zeng M, Shen F, Cui Y, Zhu M, Gu X, Sun Y. Effects of action observation therapy on upper extremity function, daily activities and motion evoked potential in cerebral infarction patients. *Medicine (Baltimore)* 2017; **96**: e8080 [PMID: 29049194 DOI: 10.1097/MD.0000000000008080]

4 **Li MH**, Lu H, Du YH, Lu LX, Meng ZH. [Acupotomy combined with Xingnao Kaiqiao acupuncture therapy in treatment of sensory impairment in the recovery stage of

cerebral infarction: a randomized controlled trial]. *Zhongguo Zhen Jiu* 2021; **41**: 9-12 [PMID: 33559434 DOI: 10.13703/j.0255-2930.20200107-0002]

5 **Chang MC**, Park SW, Lee BJ, Park D. Relationship between recovery of motor function and neuropsychological functioning in cerebral infarction patients: the importance of social functioning in motor recovery. *J Integr Neurosci* 2020; **19**: 405-411 [PMID: 33070518 DOI: 10.31083/j.jin.2020.03.175]

6 **Morishita S**, Hokamura K, Yoshikawa A, Agata N, Tsutsui Y, Umemura K, Kumada T. Different exercises can modulate the differentiation/maturation of neural stem/progenitor cells after photochemically induced focal cerebral infarction. *Brain Behav* 2020; **10**: e01535 [PMID: 31989796 DOI: 10.1002/brb3.1535]

7 **Morioka S**, Osumi M, Nishi Y, Ishigaki T, Ishibashi R, Sakauchi T, Takamura Y, Nobusako S. Motor-imagery ability and function of hemiplegic upper limb in stroke patients. *Ann Clin Transl Neurol* 2019; **6**: 596-604 [PMID: 30911582 DOI: 10.1002/acn3.739]

8 **Chen L**, Han Z, Gu J. Early Path Nursing on Neurological Function Recovery of Cerebral Infarction. *Transl Neurosci* 2019; **10**: 160-163 [PMID: 31637046 DOI: 10.1515/tnsci-2019-0028]

9 **Cao D**, Chu N, Yu H, Sun M. Role of comprehensive nursing care in improving the prognosis and mood of patients with secondary cerebral infarction after craniocerebral injury. *Am J Transl Res* 2021; **13**: 7342-7348 [PMID: 34306503]

10 **Frakking T**, Michaels S, Orbell-Smith J, Le Ray L. Framework for patient, family-centred care within an Australian Community Hospital: development and description. *BMJ Open Qual* 2020; **9** [PMID: 32354755 DOI: 10.1136/bmjoq-2019-000823]

11 **An X**, Zeng L, Shen L, Jiang Y. Influences of a hierarchical nursing model on rescue outcomes and nursing quality of patients with acute cerebral infarction. *Am J Transl Res* 2021; **13**: 6498-6506 [PMID: 34306390]

12 **Liao Y**, Ye T, Liang S, Xu X, Fan Y, Ruan X, Wu M. Clinical nursing pathway improves disease cognition and quality of life of elderly patients with hypertension and cerebral infarction. *Am J Transl Res* 2021; **13**: 10656-10662 [PMID: 34650739]

13 **Jiang X**, Gu Q, Jiang Z, Liao X, Zou Q, Li J, Gan K. Effect of family-centered nursing based on timing it right framework in patients with acute cerebral infarction. *Am J Transl Res* 2021; **13**: 3147-3155 [PMID: 34017483]

14 **Li Z**, Shang N, Fan G, Li M, Zang Z. Effect of nursing based on the hopeless self-esteem theory plus multi-dimensional intensive nursing for elderly patients with acute cerebral infarction complicated with depression. *Am J Transl Res* 2021; **13**: 8450-8457 [PMID: 34377342]

15 **Liu Y**, Qu M, Wang N, Wang L. Effects of an evidence-based nursing intervention on neurological function and serum inflammatory cytokines in patients with acute cerebral infarction: A randomized controlled trial. *Restor Neurol Neurosci* 2021; **39**: 129-137 [PMID: 33935121 DOI: 10.3233/RNN-201080]

16 **Ji EK**, Wang HH, Jung SJ, Lee KB, Kim JS, Jo L, Hong BY, Lim SH. Graded motor imagery training as a home exercise program for upper limb motor function in patients with chronic stroke: A randomized controlled trial. *Medicine (Baltimore)* 2021; **100**: e24351 [PMID: 33546067 DOI: 10.1097/MD.0000000000024351]

17 **Fernandez-Gomez E**, Sanchez-Cabeza A. [Motor imagery: a systematic review of its effectiveness in the rehabilitation of the upper limb following a stroke]. *Rev Neurol* 2018; **66**: 137-146 [PMID: 29480509]

18 **Guerra ZF**, Lucchetti ALG, Lucchetti G. Motor Imagery Training After Stroke: A Systematic Review and Meta-analysis of Randomized Controlled Trials. *J Neurol Phys Ther* 2017; **41**: 205-214 [PMID: 28922311 DOI: 10.1097/NPT.0000000000000200]

19 **Lawler K**, Taylor NF, Shields N. Family-assisted therapy empowered families of older people transitioning from hospital to the community: a qualitative study. *J Physiother* 2019; **65**: 166-171 [PMID: 31204293 DOI: 10.1016/j.jphys.2019.05.009]

20 **Warkentin N**, Wilfling D, Laag S, Goetz K. Experiences of family caregivers regarding a community-based care- and case-management intervention. A qualitative study. *Health Soc Care Community* 2022; **30**: e204-e212 [PMID: 33978280 DOI: 10.1111/hsc.13430]

Table 1 Motor function and balance ability (mean ± SD, points)

Group	FMA		BBS	
	Pre-intervention	After 6 mo of intervention	Pre-intervention	After 6 mo of intervention
Study group (n = 44)	61.58 ± 5.79	78.96 ± 8.44[a]	26.45 ± 4.16	41.89 ± 5.44[a]
Control group (n = 44)	60.87 ± 6.12	70.52 ± 7.68[a]	25.74 ± 5.30	34.62 ± 5.19[a]
t value	0.559	4.906	0.699	6.432
P value	0.578	0.000	0.486	0.000

[a]P < 0.05 *vs* before intervention in the same group. FMA: Fugl-Meyer Assessment, measuring motor function; BBS: Berg Balance Scale, measuring balance ability.

Table 2 Activities of daily living and quality of life ($\bar{x}$ ± s, points)

Group	BI		SS-QOL	
	Pre-intervention	After 6 mo of intervention	Pre-intervention	After 6 mo of intervention
Study group (n = 44)	59.86 ± 7.15	78.59 ± 8.33[a]	55.47 ± 6.32	80.17 ± 7.19[a]
Control group (n = 44)	60.82 ± 6.74	70.81 ± 7.52[a]	56.22 ± 5.67	72.18 ± 8.50[a]
t value	0.648	4.599	0.586	4.761
P value	0.519	0.000	0.560	0.000

[a]$P < 0.05$ *vs* before intervention in the same group. BI: Barthel's index, measuring activities of daily living; SS-QOL: Stroke-Specific Quality of Life, measuring quality of life.

Table 3 Sensorimotor cortical area activation status

Group	Activation frequency, *n* (%)		Activation Volume (k), (mean ± SD)	
	Pre-intervention	After 6 mo of intervention	Pre-intervention	After 6 mo of intervention
Study group (*n* = 44)	11 (25.00)	40 (90.91)[a]	105.39 ± 34.51	185.48 ± 44.63[a]
Control group (*n* = 44)	12 (27.27)	29 (65.91)[a]	108.91 ± 36.44	149.60 ± 42.75[a]
χ^2/t value	0.059	8.122	0.465	3.851
P value	0.808	0.004	0.643	0.000

[a]$P < 0.05$ *vs* before intervention in the same group.

Table 4 Satisfaction with nursing care

Group	Reliability	Empathy	Reactivity	Assurance	Tangibility
Study group (*n* = 44)	4.15 ± 0.39	4.26 ± 0.31	4.55 ± 0.20	4.37 ± 0.25	4.18 ± 0.37
Control group (*n* = 44)	3.80 ± 0.41	3.75 ± 0.43	4.12 ± 0.29	3.81 ± 0.37	3.65 ± 0.49
t value	4.103	6.382	8.097	8.319	5.726
P value	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001

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