

# World Journal of *Clinical Cases*

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**ABOUT COVER**

Editorial Board Member of *World Journal of Clinical Cases*, Woon-Man Kung, MD, Associate Professor, Surgeon, Department of Exercise and Health Promotion, College of Kinesiology and Health, Chinese Culture University, Taipei 11114, Taiwan. [nskungwm@yahoo.com.tw](mailto:nskungwm@yahoo.com.tw)

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Retrospective Cohort Study

# Clinical value of precise rehabilitation nursing in management of cerebral infarction

Ya-Na Xu, Xiu-Zhen Wang, Xiao-Rong Zhang

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**Ya-Na Xu, Xiao-Rong Zhang,** Department of Neurology, Wuhan Fourth Hospital, Wuhan 430030, Hubei Province, China

**Xiu-Zhen Wang,** Department of Neurosurgery, The First People's Hospital of Jiangxia District, Wuhan City (Union Jiangnan Hospital of Huazhong University of Science and Technology), Wuhan 430200, Hubei Province, China

**Corresponding author:** Xiao-Rong Zhang, MM, Chief Nurse, Department of Neurology, Wuhan Fourth Hospital, No. 473 Hanzheng Street, Qiaokou District, Wuhan 430030, Hubei Province, China. [zhangxiaorong136@163.com](mailto:zhangxiaorong136@163.com)

## Abstract

### BACKGROUND

Cerebral infarction, previously referred to as cerebral infarction or ischemic stroke, refers to the localized brain tissue experiencing ischemic necrosis or softening due to disorders in brain blood supply, ischemia, and hypoxia. The precision rehabilitation nursing model for chronic disease management is a continuous, fixed, orderly, and efficient nursing model aimed at standardizing the clinical nursing process, reducing the wastage of medical resources, and improving the quality of medical services.

### AIM

To analyze the value of a precise rehabilitation nursing model for chronic disease management in patients with cerebral infarction.

### METHODS

Patients ( $n = 124$ ) admitted to our hospital with cerebral infarction between November 2019 and November 2021 were enrolled as the study subjects. The random number table method was used to divide them into a conventional nursing intervention group ( $n = 61$ ) and a model nursing intervention group ( $n = 63$ ). Changes in the nursing index for the two groups were compared after conventional nursing intervention and precise rehabilitation intervention nursing for chronic disease management.

### RESULTS

Compared with the conventional intervention group, the model intervention group had a shorter time to clinical symptom relief ( $P < 0.05$ ), lower Hamilton Anxiety Scale and Hamilton Depression Scale scores, a lower incidence of total

complications ( $P < 0.05$ ), a higher disease knowledge mastery rate, higher safety and quality, and a higher overall nursing satisfaction rate ( $P < 0.05$ ).

## CONCLUSION

The precision rehabilitation nursing model for chronic disease management improves the clinical symptoms of patients with cerebral infarction, reducing the incidence of total complications and improving the clinical outcome of patients, and is worthy of application in clinical practice.

**Key Words:** Precise rehabilitation nursing model for chronic disease management; Cerebral infarction; Knowledge of disease; Safety and quality

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**Core Tip:** Cerebral infarction is a frequently occurring disease with postoperative sequelae, so internal medicine nursing is critical. This study adopted the principle of random grouping, the nursing mode of routine nursing intervention, and precise rehabilitation intervention for managing chronic diseases to nurse patients with cerebral infarction. It was found that the precise rehabilitation intervention nursing mode for managing chronic diseases reduced the incidence of total complications and improved the clinical efficacy, which is worthy of popularization and application in the clinic.

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## INTRODUCTION

Cerebral infarction, formerly called cerebral infarction or ischemic stroke, refers to ischemic necrosis or softening of localized brain tissue caused by brain blood supply disorders, ischemia, and hypoxia. Cerebral infarction is a sudden brain disease that can occur at any age. The degree of necrosis varies with thrombus location and size, and it is commonly observed in individuals aged 45 to 70 years and older adults.

Although cerebral infarction is an acute disease that shows no apparent symptoms prior to its onset, it is generally considered not to require external treatment. However, massive infarcts require minimally invasive procedures, such as stenting[1]. Consequently, it is possible to receive therapeutic support *via* internal medicine, and physicians can perform this treatment. Therefore, internal medicine nursing measures are essential for patients with mild/moderate cerebral infarction[2].

The precision rehabilitation nursing model for chronic disease management is a continuous, fixed, orderly, and efficient nursing model aimed at standardizing the clinical nursing process, reducing the wastage of medical resources, and improving the quality of medical services[3]. It can reduce the negative emotions associated with the disease itself and the treatment of patients. This model aims to deliver patients safe, high-quality, satisfactory, and comprehensive nursing services[4]. In addition, the precision rehabilitation nursing model for chronic disease management has been reported to exhibit potential value and advantages in emergency department nursing, highlighting the potential for the standardization of the emergency nursing process and path to prevent errors and improve nursing efficiency[5].

In this study, 124 patients with cerebral infarction treated at our hospital from November 2019 to November 2021 were selected as research participants to evaluate the value of the precision rehabilitation nursing model for chronic disease management in patients with acute cerebral infarction[6].

## MATERIALS AND METHODS

### Patients

One hundred twenty-four patients with acute cerebral infarction admitted to our hospital between November 2019 and November 2021 were selected as research participants. Using the random number table method, these patients were divided into a conventional nursing intervention group (61 cases) and a model nursing intervention group (63 cases). The conventional intervention group comprised 30 male and 31 female patients aged 33–81 with an average age of  $61.36 \pm 15.18$  years. The model intervention group comprised 28 males and 35 females aged 34–82 with an average age of  $62.15 \pm 18.13$  years. No significant differences were observed in the clinical data between the two groups ( $P > 0.05$ ).

The inclusion criteria were: (1) Meeting the diagnostic criteria for acute cerebral infarction; and (2) patients diagnosed by routine blood, etiology, and imaging examinations. The exclusion criteria were: (1) Visual, hearing, and intellectual impairments that affected the study; (2) other brain diseases; and (3) psychiatric disorders or a history of mental illness.

## Intervention methods

After admission, the patients were administered various treatments, including those for disturbance of consciousness, asthma, and sputum aspiration. Antibiotics were administered according to the instructions provided by the attending physician. The nursing staff paid close attention to changes in patients' vital signs, regularly disinfected the ward, and ensured ventilation.

The model intervention group adopted a precise rehabilitation nursing intervention model for chronic disease management, with patients divided into groups according to their conditions:

**Low-risk group:** (1) Professional nurses conducted health education lectures, provided the patients' families with a homemade health handbook, educated the patients' families on disease development, related causes, treatments, and risk factors, and provided care and encouragement by sharing the story of successful cases; (2) professional caregivers provided the patients' families with psychological counseling and care, while nursing staff counseled the patients' families on the hospital environment, hospital rules, and regulations to improve the relationship between the nurses and patients; (3) nursing staff observed the patient's vital signs and other conditions every two h, instructed the patients' families on how to administer drugs, and advised the patients to rest; and (4) the patients were advised to maintain a balanced diet, avoid spicy foods, consume high-protein foods, and increase their intake of fruits and vegetables.

**Medium- and high-risk groups:** (1) In patients whose condition was severe, nurses helped doctors perform procedures, regulated their nutrition, recorded the patients' vital signs, and communicated with the patient's families to reduce their anxiety; (2) in terms of early preventive intervention, in patients who showed signs of shock, nurses informed the doctor and took the corresponding measures to improve the patients' clinical outcome; and (3) nurses informed the patients' families of the need for patients to adhere to bed rest strictly; however, if physical conditions allowed, nurses instructed the patients to conduct appropriate exercises but to avoid any exercise that may cause dizziness or hypotension.

## Index detection

**Clinical symptoms:** Clinical symptom assessments included time to symptom relief and comparison of hospitalization, disturbance of consciousness, central high fever, and time to paralysis relief.

**Hamilton Anxiety Scale and Hamilton Depression Scale scores:** The degree of anxiety and depression in family members of patients were assessed using the Hamilton Anxiety Scale[6] (HAMA) and Hamilton Depression Scale[7] (HAMD). The HAMA includes 14 tension, fear, anxiety, and cognitive function items. The HAMD includes 17 items, such as retardation, agitation, mental anxiety, and somatic anxiety. The higher the HAMA and HAMD scale scores, the higher the degree of anxiety and depression.

**Disease knowledge mastery and safety and quality:** The disease knowledge mastery rate of patients' family members was evaluated by referring to our hospital's self-made disease knowledge questionnaire, including nursing care details, disease development mechanism, and related risk factors. The disease knowledge mastery rate is positively correlated with the questionnaire score. The nursing safety formation survey scale was used to evaluate the safety quality, including management traceability, prediction and analysis, risk file construction, education and humanistic care, and another five items.

**Nursing satisfaction:** Nursing satisfaction was evaluated by referring to our hospital's self-made 100-point satisfaction scale, including health education, service attitude, ward management, operation skills, and psychological nursing.

**Occurrence of complications:** The occurrence of complications, such as coma, pulmonary infection, dyspnea, and stress ulcers, was monitored.

## Statistical analysis

SPSS (version 26.0) was used for statistical analyses. Independent sample *t*-tests and paired *t*-tests were used for comparisons between groups and within groups, respectively. Count data are expressed as percentages (%), and the chi-square test was used to compare groups. Statistical significance was set at  $P < 0.05$ .

# RESULTS

## Comparison of time to clinical symptom relief

Compared to the conventional intervention group, the model intervention group had a significantly shorter time to clinical symptom relief ( $P < 0.05$ ) (Table 1).

## Comparison of HAMA and HAMD scores

No significant differences were observed in the HAMA and HAMD scores between the two groups before the intervention ( $P > 0.05$ ). The HAMA and HAMD scores in the two groups after the intervention were lower than before. The HAMA and HAMD scores in the model intervention group were significantly lower than those in the conventional intervention group ( $P < 0.05$ ) (Table 2).

**Table 1 Comparison of clinical symptom relief time (mean  $\pm$  SD, d)**

Group	n	Time of hospital stay	Time of disturbance of consciousness	Time of central hyperthermia	Time of paralysis relief
Routine intervention group	61	9.38 $\pm$ 0.97	8.07 $\pm$ 0.84	5.88 $\pm$ 0.62	6.05 $\pm$ 0.62
Model intervention group	63	7.24 $\pm$ 0.75	5.26 $\pm$ 0.54	3.49 $\pm$ 0.37	3.67 $\pm$ 0.39
t value		13.770	22.230	26.160	25.670
P value		0.001	0.001	0.001	0.001

**Table 2 Comparison of Hamilton Anxiety Scale and Hamilton Depression Scale scores (mean  $\pm$  SD, d)**

Group	n	HAMA		HAMD	
		Before the intervention	After the intervention	Before the intervention	After the intervention
Routine intervention group	61	14.86 $\pm$ 1.51	8.57 $\pm$ 0.89	15.87 $\pm$ 1.62	10.27 $\pm$ 1.05
Model intervention group	63	14.89 $\pm$ 1.48	6.23 $\pm$ 0.64	15.84 $\pm$ 1.68	8.05 $\pm$ 0.83
t value		0.112	16.850	0.101	13.080
P value		0.911	0.001	0.920	0.001

HAMA: Hamilton Anxiety Scale; HAMD: Hamilton Depression Scale.

### Comparison of disease knowledge mastery and safety and quality

Before the intervention, no significant differences were observed between the two groups' disease knowledge mastery or safety and quality ( $P > 0.05$ ). After the intervention, disease knowledge mastery and safety and quality scores were higher. The disease knowledge mastery rate and safety and quality of the model intervention group were significantly higher than those of the conventional intervention group ( $P < 0.05$ ) (Table 3).

### Nursing satisfaction

Compared to the conventional intervention group, the total satisfaction rate with nursing in the model intervention group was significantly higher ( $P < 0.05$ ) (Table 4).

### Complications

The total complication rate in the model intervention group was significantly lower than that in the conventional intervention group ( $P < 0.05$ ) (Table 5).

## DISCUSSION

Although cerebral infarction can result from various causes, the most common is atherosclerosis. This highlights the fact that patients may have previously experienced high blood lipid levels, hypertension, diabetes, and other diseases leading to the arteriosclerosis of large blood vessels, subsequently resulting in blockage due to infarction[7]. However, other risk factors can also cause brain infarction, such as cardiogenic stroke, which is a brain infarction caused by the heart. The most common cause is atrial fibrillation, which can cause an embolus to fall out of the atrium and cause infarction[8]. In addition, other rare causes include vascular factors and clotting mechanisms, for which a cause has yet to be identified [9]. Although cerebral infarction can display specific manifestations, different functional areas can exhibit different symptoms, primarily motor, sensory, and speech. Specific manifestations include poor speech, limb numbness, weakness, pain, sudden dizziness, blurred vision, sudden limb movement, and sudden memory loss, which are the most common symptoms in patients with cerebral infarction[10].

Cerebral infarction often occurs in cold seasons, such as winter and spring, or during sudden changes in climate conditions. In addition, due to the typically advanced age of patients with cerebral infarction, this disease tends to exhibit co-morbidities. As a result, if the optimal treatment period is missed, serious complications can arise, including shock, coma, and even brain death, posing a severe threat to the life of these patients[11]. However, treatment positively affects the prognosis of patients with cerebral infarction, including reasonable and practical nursing intervention measures. Studies have found[12] that effective nursing intervention measures while treating patients with cerebral infarction can improve clinical symptoms and patient recovery. Among these, studies have confirmed[13] that the nursing satisfaction of patients and their families gradually increases with advances in economic development and medical interventions.

**Table 3 Comparison of disease knowledge and safety and quality**

Group	n	Disease knowledge mastery [n (%)]				Safety and quality (mean $\pm$ SD, point)	
		Complete control	Master	Failing to master	Mastery rate of disease knowledge	Before the intervention	After the intervention
Routine intervention group	61 28		23	10	51 (83.61)	8.49 $\pm$ 0.83	14.52 $\pm$ 1.46
Model intervention group	63 39		21	3	60 (95.24)	8.46 $\pm$ 0.87	17.69 $\pm$ 1.83
$\chi^2/t$ value					4.468	0.196	10.640
P value					0.035	0.845	0.001

**Table 4 Statistical data of nursing satisfaction [n (%)]**

Group	n	Very satisfied	Satisfied	Not satisfied	Total satisfaction
Routine intervention group	61 33		19	9	52 (85.25)
Model intervention group	63 44		17	2	61 (96.83)
$\chi^2$					5.140
P value					0.023

**Table 5 Statistical data of complications [n (%)]**

Group	n	In a coma	Lung infection	Dyspnea	Stress induced ulcer	Total complication rate
Routine intervention group	61 2		5	1	2	10 (16.39)
Model intervention group	63 1		1	0	1	3 (4.76)
$\chi^2$						4.468
P value						0.035

Consequently, patients and their families often need more support with routine nursing and instead pursue better care from specialized nurses[14]. As a result, new types of nursing have emerged, among which hierarchical nursing is one example. Hierarchical nursing is a type of nursing that pays close attention to the severity of the patient's disease. Patients are divided into different groups based on the severity of their disease, and different nursing interventions are conducted accordingly. In nursing, pertinence and personalization are important factors, and the nursing plan is more likely to be accepted by the patient depending on the person[15].

This study examined the precision rehabilitation nursing for chronic disease management in patients with cerebral infarction. The results showed that patients undergoing precision rehabilitation nursing for chronic disease management treated their clinical symptoms more effectively[16]. One reason may be the type of nursing that adopts people-oriented principles compared with traditional nursing. The nursing staff conducts the functions of the corresponding nursing mode, which includes a higher level of specialization and a stronger sense of responsibility, such as observing patients' vital signs every 2 hours.

Studies have shown that patients with cerebral infarction are more challenging to treat and care for, owing to their older age, poorer understanding and communication skills, and poor treatment compliance[17]. In addition, patients' families tend also to have a poor understanding of the disease, making them prone to anxiety and depression. Using health education lectures and manuals, nurses can improve the degree of disease knowledge of the family members of patients, which is conducive to patients' families grasping the potential causes of accidents to avoid adverse events[18]. In this study, the precision rehabilitation nursing model for chronic disease management was found to represent a better nursing intervention system through the conducting of lectures and the distribution of manuals to meet the needs of patients with cerebral infarction, strengthen the disease knowledge of the patient's families, and reduce nursing risks. In addition, this nursing model can effectively improve the clinical symptoms of patients, thereby reducing the incidence of anxiety and depression among the patients' family members. Safe and efficient nursing measures can also improve nursing safety[19]. In this study, the precise rehabilitation nursing mode for chronic disease management was found to take a more patient-centric approach compared to conventional nursing through the use of hierarchical care programs, which helped to improve the quality of nursing safety. Enhancing the understanding of patients' family members on disease led to better cooperation with medical staff, thereby reducing the intervention time and improving nursing efficiency and safety and quality, as well as nursing satisfaction, establishing a positive feedback loop.

Many patients with cerebral infarction suffer from extensive sequela due to their inability to be independent. The most direct source of this sequela is patients' inability to maintain personal hygiene, which can lead to bacterial growth, followed by the development of bedsores and infection. As a result, many of these patients require assistance from their family members to wash and change their clothes frequently[20]. In addition, due to hemiplegia, oral hygiene poses another challenge, as patients often cannot brush their teeth. To address this, a sterilized gauze dipped in warm, boiled saline water can scrub the oral cavity once each morning and evening.

Patients with cerebral infarction can also benefit from exercise, going outside, and exposure to daylight. In this respect, rehabilitation comprises physical activities conducive to recovering or improving physical function. Except for in severe cases, which optimally require rest, patients with less severe injuries do not require complete cessation of physical exercise. Physical exercise is essential in healing and promotes functional recovery[21]. For patients with cerebral infarction, rehabilitation training mainly aims at nerve stimulation to restore physical function. The main exercises involve functional exercise of the limbs, as patients with cerebral infarction often experience hand shaking, resulting in an inability to grasp objects. In these cases, there is a need to restore hand function through specific rehabilitation exercises, including repeatedly grasping an object. These exercises can be supplemented with therapeutic methods, such as massage and acupuncture.

In patients with cerebral infarction suffering from language disorders, medical staff and family members should focus on speech exercises encouraging them to speak, including exercises aimed at correct pronunciation[22]. By promoting the improvement and recovery of language through persistent speech function recovery training, patients with cerebral infarction can regain normal functions more quickly. Additionally, physiological changes in patients with cerebral infarction due to sudden losses in hand and foot movement can often trigger a deterioration in their psychological state, including the development of anxiety, irritability, panic, and fear[23]. Damage to the mental state of patients is detrimental to their recovery since this quickly affects endocrine function. Furthermore, since patients with cerebral infarction tend to be advanced in age, their psychological bearing capacity may be low, and they may even feel that there is no need for treatment, resulting in a further decline in their psychological state about treatment.

Another critical factor in treating patients with cerebral infarction is ensuring good communication between patients and their doctors and family members. First, doctors must communicate with patients with cerebral infarction regarding the clinical details of their disease. Precisely, they should convey that cerebral infarction is not rare and relatively easy to cure[24]. Despite the long treatment cycle, cerebral infarction can be cured if carried out by the corresponding scientific standards. Second, patients' family members should encourage them to talk about any feelings of depression or anxiety and listen to their needs in order to improve their confidence in treatment, thereby strengthening patient compliance. In cases of poor patient compliance, family members may feel the need to reprimand patients; however, this is something to avoid[25]. Patients need to feel valued and cared for to instill an enthusiasm for their treatment. A positive mental outlook can have a significant beneficial effect on treatment. Therefore, patients' family members can play an essential role in their recovery by encouraging a positive attitude.

Finally, patients with cerebral infarction are at increased risk of lung infections, which can lead to either mild lung infection or death if not treated adequately. Long periods of bed rest can reduce the immune system's ability to fight off infection, making it easy to develop lung infection. In this respect, the daily monitoring of a patient's respiratory condition is fundamental since, in the case of symptoms of lung infection, timely medical treatment is necessary to avoid the development of respiratory or lung disease[26].

## CONCLUSION

This study showed that chronic disease management administered through precision rehabilitation nursing can effectively improve the clinical symptoms of patients with cerebral infarction, reduce anxiety and depression in the patients' families, and improve their understanding of the disease, thereby improving safety and quality, as well as nursing satisfaction, and reducing the incidence of adverse events. This study had limitations, such as a small sample size, a single study subject, and geographical restrictions regarding the patients enrolled. Therefore, future studies with an increased sample size, including multicenter study participants, will be needed to verify these findings.

## ARTICLE HIGHLIGHTS

### Research background

Cerebral infarction refers to local brain tissue ischemia, necrosis, or softening due to brain blood supply disorders, ischemia, and hypoxia. Minimally invasive procedures such as stenting are required for massive infarcts. Therapeutic support can be provided *via* internal medicine and internal medicine nursing measures are extremely important for patients with mild/moderate cerebral infarction.

### Research motivation

Through precise evaluation and data analysis, more personalized rehabilitation programs can be developed to improve the rehabilitation effect and quality of life of patients with cerebral infarction.

### Research objectives

To analyze the value of the precise rehabilitation care model for chronic disease management in patients with cerebral infarction.

### Research methods

The precise rehabilitation nursing model can develop a more accurate and personalized rehabilitation program through the comprehensive evaluation and data analysis of patients to control their condition, reduce complications, and improve their rehabilitation effect.

### Research results

The disease knowledge mastery rate was higher in the model intervention group, indicating a better understanding of the disease and treatment by patients.

### Research conclusions

The precise rehabilitation nursing model for the management of chronic diseases can significantly improve the clinical symptoms of patients with cerebral infarction, reduce the incidence of various complications, and improve the clinical prognosis of patients.

### Research perspectives

Future studies with an increased sample size that include multicenter study participants will be needed to verify the findings of this study.

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## FOOTNOTES

**Co-first authors:** Ya-Na Xu and Xiu-Zhen Wang.

**Author contributions:** Xu YN and Wang XZ designed the research; Zhang XR, Xu YN, and Wang XZ contributed new reagents/analytic tools; Zhang XR, Yana Xu, and Wang XZ analyzed the data; Xu YN and Wang XZ wrote the paper; all authors were involved in the critical review of the results and have contributed to, read, and approved the final manuscript. Xu YN and Wang XZ contributed equally to this work as co-first authors. The reasons for designating Xu YN and Wang XZ as co-first authors are threefold. First, the research was performed as a collaborative effort, and the designation of co-corresponding authorship accurately reflects the distribution of responsibilities and burdens associated with the time and effort required to complete the study and the resultant paper. This also ensures effective communication and management of post-submission matters, ultimately enhancing the paper's quality and reliability. Second, the overall research team encompassed authors with various expertise and skills from different fields, and the designation of co-first authors best reflects this diversity. This also promotes the most comprehensive and in-depth examination of the research topic, ultimately enriching readers' understanding by offering various expert perspectives. Third, Xu YN and Wang XZ contributed efforts of equal substance throughout the research process. The choice of these researchers as co-first authors acknowledges and respects this equal contribution while recognizing the spirit of teamwork and collaboration in this study. In summary, we believe that designating Xu YN and Wang XZ as co-first authors is fitting for our manuscript as it accurately reflects our team's collaborative spirit, equal contributions, and diversity.

**Institutional review board statement:** The study protocol was approved by Wuhan Fourth Hospital, and all the families have voluntarily participated in the study and have signed informed consent forms.

**Informed consent statement:** All study participants, or their legal guardian, provided informed written consent prior to study enrollment.

**Conflict-of-interest statement:** The authors declare no conflict of interest for this paper.

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**Country/Territory of origin:** China

**ORCID number:** Xiao-Rong Zhang 0009-0007-7337-2744.

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