## <u>ORIGINAL RESEARCH</u>

# The Impact of Doctor-Nurse Complementary Model Combined with Disease Tracking on Stroke Patients

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#### ABSTRACT

**Objective** • The incidence of stroke worldwide is increasing year by year. With the enhancement of public health awareness, people's demand for the quality of stroke rehabilitation is getting higher and higher, so better quality care measures are needed in the treatment of stroke. Based on this, this paper explores the impact of a new type of nursing care measure, the complementary health care model combined with condition tracking, on stroke patients.

Methods • 238 stroke patients were randomly divided into a conventional group (n=119) and a combined group (n=119). 238 stroke patients were randomly divided into conventional group (n=119) and combined group (n=119). The conventional group received routine care, in which doctors and nursing carried out their own work without cooperation after the patients were admitted to the hospital; the combined group received a complementary health care model and condition tracking, in which doctors and nurses jointly checked the rooms, discussed cases, jointly formulated treatments and nursing care plans, and jointly formulated the patients' discharge and rehabilitation plans after the patients were admitted to the hospital. Before the intervention, at the time of discharge, and 6 months after discharge, the neurological function of the patients in both groups was assessed using the National Institutes of Health Stroke Scale (NIHSS) and the Fugl-Meyer (FMA) scale, the cognitive function of the patients in both groups was assessed using the Montreal Cognitive Assessment (MoCA) scale and the Measured Mental State Examination (MMSE), and the cognitive function of the patients in both groups was assessed using the General Self-Efficacy Scale (GSS) and the Montreal

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#### INTRODUCTION

Strokes are a group of diseases that cause damage to brain tissue due to a sudden rupture of a blood vessel in the brain or a blockage of a blood vessel that prevents blood from flowing to the brain. They are one of the three leading causes of disease-related deaths in humans.<sup>1</sup> Developing countries, represented by China, have the highest stroke burden in the world,<sup>2</sup> with 87% of stroke deaths and 89% of stroke-related disabilities occurring in low- and middle-income countries.<sup>3</sup> Cognitive Assessment (MCA) scale. General Self-Efficacy Scale (GSES) to assess self-efficacy, Exercise Adherence Questionnaire (EAQ) to assess adherence to functional exercise and Specific Quality of Life Scale (SSQoL-12) to assess the quality of life of patients in both groups, and the self-developed satisfaction with nursing care to assess patients' satisfaction with the care model.

**Results** • Before the intervention, there was no difference in the National Institutes of Health Stroke Scale (NIHSS), the Fugl-Meyer Assessment (FMA), the Montreal Cognitive Assessment (MoCA), the Mental State Examination (MMSE), the General Self-Efficacy Scale (GSES), the Exercise Adherence Questionnaire (EAQ) and the Stroke-Specific Quality of Life Scale-12 (SSQoL-12) scores between the two groups (P > .05). At discharge and six months later, NIHSS scores continued to decrease in both groups, with the joint group being lower than the conventional group (P < .05); scores for all other items continued to increase, with the joint being higher than the conventional group (P < .05). Satisfaction with care was higher in the combined group than in the conventional group (P < .05).

**Conclusion** • The complementary healthcare model combined with condition tracking can effectively promote the prognosis of rehabilitation of stroke patients, and has a positive effect in promoting the recovery of neurological and cognitive functions, strengthening self-efficacy, and improving the quality of life, which can be promoted in the clinic.(*Altern Ther Health Med.* 2024;30(10):146-151).

China has the second highest incidence of stroke in the world, with approximately 2.4 million new stroke cases each year, increasing at an annual rate of 8.3%, and more than a third of acute ischaemic stroke patients die or become disabled within three months or a year.<sup>4.5</sup> Patients with chronic stroke may experience symptoms of disability such as limited physical activity, mobility, and limited ability to perform activities of daily living, which are more common in the acute phase and can last for years without effective intervention.<sup>6.7</sup>

Stroke-related guidelines recommend that early rehabilitation services for hospitalized stroke patients should be provided inan organized, multi-disciplinary stroke care settings.<sup>8,9</sup> After the onset of stroke, rehabilitation plays an important role in helping patients to achieve an optimal level of function and to prevent or slow down future functional decline.<sup>10</sup> With the shift in the medical model to a bio-socialpsychological model, nursing care has shifted from disease care to holistic, person-centered care. This shift in the



direction of care has benefited the care of stroke patients, helping to address the physical and psychological problems of stroke patients during their recovery, and reducing the burden of care and financial burden on family members. Nursing staff are no longer mere executors of medical advice but decision-makers in nursing care, and their nursing work has shifted from carrying out medical advice to providing comprehensive, systematic, planned, holistic care for patients. The healthcare relationship has also evolved from a masterslave relationship to a cooperative, complementary relationship. As a result, the doctor-nurse complementary model is becoming more widely used in clinical care. At the same time, patients and their families experience high levels of physical and psychosocial burden during the postdischarge transition period after stroke survivors are discharged from hospital11,12 and approximately 82% of patients achieve a speedy return to their post-stroke level of functioning through hospital-to-home transitional care.<sup>13</sup> Continuity of disease tracking is a new model of care designed to extend hospital care to the home through a series of behaviors that provide continuous monitoring of the patient's condition and personalized guidance on changes in condition to improve prognosis.14

The Doctor-nurse complementary model combined with disease tracking has been used clinically and has shown good results. It changed the previous dominant-subordinate position of doctors and nurses and effectively strengthened the solidarity between them.<sup>15,16</sup> Based on the significant advantages of the complementary health care model and condition tracking, we believe that the complementary health care model and condition tracking will have significant application in the care of stroke patients. However, the application of this model of care in stroke care has not yet been reported. Based on this, this study prospectively conducted a randomised, parallel-controlled study to investigate the effectiveness of the

complementary care model combined with condition tracking in stroke patients to fill the gap in the field of stroke care. It is reported as follows.

## METHODS

## Study design

A total of 238 patients who met the criteria for stroke admitted to our hospital between January 2021 and January 2022 were included and divided into a conventional group (n=119, receiving conventional care) and a combined group (n=119, adding a complementary model of healthcare combined with disease tracking) using a randomized numeric table approach. The 238 patients were randomly numbered from 0 to 238, with patients with odd numbers of digits in one group and those with even numbers in another. The Medical Ethics Committee of our hospital approved the study.

## Inclusion and exclusion criteria

Patients were included in the study if they met the following criteria: (1) age  $\geq$  18 years; (2) met the diagnostic criteria for ischaemic stroke and were diagnosed for the first time; (3) were hospitalized within ten h of onset; had an expected survival time of  $\geq$  3 months; (4) were treated, stabilized and discharged from hospital; (5) signed an informed consent form.

Patients were excluded if they had any of the following: (1) comorbid cardiac, hepatic, renal or pulmonary disease; (2) comorbid severe hearing or visual impairment; (3) comorbid psychiatric or cognitive dysfunction; (4) no functional deficits due to other factors; (5) concurrent or at least three months participation in other investigational or observational studies.

## Intervention methods

In the conventional group, patients received conventional care. After admission, the doctor visited the patient alone, checked the patient's condition, examined the patient, issued medical advice, and formulated a treatment plan; the nurse provided conventional care, formulated a nursing plan, visited the patient daily, and inspected the patient's condition, handed over shifts, carried out medical advice and gave nursing health education. Patients are discharged from the hospital with routine telephone follow-ups.

The combined group adds a doctor-nurse complementary model combined with disease tracking.

**Doctor-nurse complementary model**: that is, from the patient's admission to treatment to discharge, the main elements of the joint medical and nursing visits, discussion of cases, joint formulation of treatment and nursing plans, joint formulation of patient discharge and rehabilitation plans are as follows:

**Establish a complementary medical and nursing team**: a nursing team is formed by the attending physician and nursing staff. Collect patient information and grasp the basic situation and treatment of the patient. Develop a medical and nursing complementary care plan based on a comprehensive grasp of the

patient's information. Among them, doctors are mainly responsible for treatment and medication, while nursing staff are responsible for the formulation of the nursing programme.

**Complementary health education**: The doctor explains to the patient the causes of stroke, the main treatment methods, the expected treatment objectives, and the prognosis and rehabilitation considerations to raise the patient's awareness of the disease and treatment. Nursing staff provides nursing education to patients, informing them of the importance of cooperating with nursing care, informing them of the precautions to be taken in terms of diet and exercise, and formulating a targeted diet and exercise program for them, etc. Nursing staff provide patients with more information on disease knowledge and the experiences of other patients with good prognoses and answer patients' relevant questions in a timely manner.

**Complementary psychological support**: The doctor calms the patient's negative emotions, such as anxiety and depression, from a professional point of view and gives him/ her targeted guidance advice on the patient's problems. The nursing staff meets the patient's psychological needs to the greatest extent possible according to the doctor's assessment results, listen carefully to the patient's complaints, relieves the patient's psychological pressure, encourages the patient to face treatment and recovery with an optimistic attitude and strengthen their confidence in treatment.

**Complementary medication guidance**: The doctor informs the patient of the importance of medication and drug knowledge, and the nursing staff informs the patient of the importance of compliance with medical advice so that the patient understands the impact and significance of medication compliance on his or her condition. The nursing staff should closely observe changes in the patient's signs after the medication is administered and report any adverse reactions to the doctor in a timely manner if they develop.

**Complementary rehabilitation training**: The doctor informs the patient of the exercise methods that can be used for home rehabilitation, the principles of the relevant exercise methods, and the prevention and management of complications. The nursing staff refine the doctor's recommendations and formulate a targeted rehabilitation plan for the patient according to his or her situation, including the methods to be used for rehabilitation training, frequency, and precautions. The patient's family is also instructed to assist and supervise the patient's rehabilitation training.

**Disease tracking**: After the patient is discharged from the hospital, the doctor, nurse, patient, and family members will jointly form a WeChat group, with the head nurse as the group leader, and the designated nurse will compile one to two tips related to rehabilitation training and send them to the group every day, so as to keep an eye on the patient's recovery in the group. The doctors and nurses are involved in the follow-up of the patients, once a week by Weibo, once a month by telephone, once every three months by outpatient visits, and once every six months by home visits. During the follow-up visits, we observe the rehabilitation effect of the patients and correct any wrong rehabilitation behavior in time.

#### Measures

Neurological functioning scores: The National Institutes of Health Stroke Scale (NIHSS)17 and the Fugl-Meyer Assessment(FMA)18 were used to assess neurological functioning in both groups before the intervention, at discharge and six months after the intervention. The NIHSS scale includes consciousness, language, motor function, and sensory deficits. The total score is 42. 0 to 1 is normal, 2 to 4 is mild neurological dysfunction, 5 to 15 is moderate neurological dysfunction, 16 to 20 is severe neurological dysfunction, and 21 to 42 is very severe neurological dysfunction. The FMA is a sequential scale that scores patients according to the degree to which they can perform tasks, including five dimensions: motor function, sensory function, balance, joint range of motion and joint pain, with a total score of 0-226, with higher scores indicating better neurological function.

**Cognitive functioning scores**: Cognitive impairment was assessed before the intervention, at discharge, and six months after discharge using the Montreal Cognitive Assessment (MoCA) scale <sup>19</sup> and the Mental State Examination (MMSE) scale.<sup>20</sup> The MoCA includes dimensions such as attention, memory and executive functioning, with a total score of 0-30 and 26-30 being normal. A total score of 30, with 27-30 being normal, 21-26 being mild mental retardation, 10-20 being moderate mental retardation, and 0-9 being severe mental retardation.

**Self-efficacy and functional exercise adherence scores:** Before the intervention, at discharge and six months after discharge, the self-efficacy of both groups was assessed using the General Self-Efficacy Scale (GSES)<sup>21</sup> with a total score of 10-40, with higher scores indicating greater self-efficacy. Adherence to functional exercise was assessed using the Exercise Adherence Questionnaire (EAQ).<sup>22</sup> The scale consists of four dimensions: frequency, duration, intensity and adherence, each of which is scored from 1 to 4, with a total score of 4 to 16.

**Quality of life scores**: the Stroke-Specific Quality of Life Scale-12 (SSQoL-12) <sup>23</sup> was used to assess the quality of life of both groups before the intervention, at discharge and six months after discharge. The scale consists of 12 dimensions, divided into two domains, physical and psychosocial, with a score range of 0 to 100 for each domain, with higher scores indicating better quality of life.

Satisfaction with care: Six months after discharge, patients (or their families) were assessed for their satisfaction with nursing care in terms of quality of care and attitude towards nursing care using our self-developed nursing care satisfaction questionnaire. The questionnaire was divided into five levels: very satisfied, satisfied, average, dissatisfied and very dissatisfied. Very satisfied is 90-100 points, satisfied is 70-89 points, fair is 60-69 points, dissatisfied is 50-59 points, and very dissatisfied is 0-49 points. Satisfaction with nursing care was calculated = (number of very satisfied + number of satisfied)/ total  $\times$  100%.

#### Table 1. Demographics and basic information

	Combined Group	Conventional		
	(n = 119)	Group (n = 119)	$\chi^2/t$	P value
Age,years, mean ± SD	61.53±2.35	61.67±2.44	0.451	.653
Female, Male, n (%)	56(47.06)/63(52.94)	54(45.39)/65(54.62)	0.068	.795
Education, level, n (%)			0.022	.989
Basic education	42 (35.29)	43(36.13)		
Secondary education	48(40.34)	47 (39.50)		
Bachelor or above	29 (24.37)	29 (24.37)		
Type of stoke, n (%)				
Hemorrhagic	47 (39.50)	48(40.34)	0.018	.895
Ischemic	72(60.50)	71 (59.66)		
Side of stoke,n(%)			0.068	.795
Left	55 (46.22)	57 (47.90)		
Right	64 (53.78)	62(52.10)		





 $^{a}P < .05$  compared with the same group

 ${}^{b}P < .05$  compared with the conventional group





 $^{a}P < .05$  compared with the same group

 ${}^{\mathrm{b}}P < .05$  compared with the conventional group

Note: P < .05 indicates a statistically significant difference between the two compared.

**Figure 4.** Self-efficacy and functional exercise compliance scores. A) GSES. B) EAQ.



 $^{a}P < .05$  compared with the same group

 $^{b}P < .05$  compared with the conventional group.

Note: P < .05 indicates a statistically significant difference between the two compared.

Figure 5. Quality of life scores. a) Physical. b) Psychosocial.



\*P < .05 compared with the same group

#P < .05 compared with the conventional group

Note: P < .05 indicates a statistically significant difference between the two compared.

#### Statistical processing

Data were analyzed using the SPSS 21.0 statistical package developed by IBM, USA, for social sciences. The results of this study contain both count data and measured data. Therefore. Therefore, the Kolmogorov-Smirnov test was used to test the normal distribution of the data. Statistical data were expressed as [n (%)] and compared using the chi-square test; measurement data were expressed as  $(x \pm s)$  and compared using the *t* test, ANOVA and LSD test. Differences were indicated as statistically significant at P < .05.

## RESULTS

## **Demographics and Basic Information**

There were no differences in demographic and basic information between the two groups (P > .05, Table 1).

#### Neurological function score

Before the intervention, the NIHSS and FMA scores of the two groups were compared, and the difference was not statistically significant (P < .05). At the time of discharge and six months after discharge, the NIHSS scores of both groups continued to decrease, and the scores at both time points were lower in the combined group than in the conventional group (P < .05, Figure 2A); the FMA scores of both groups continued to increase, and the scores at both time points were higher in the combined group than in the conventional group (P < .05, Figure 2B).

## **Cognitive function score**

Before the intervention, there was no difference in MoCA scores and MMSE scores between the two groups (P > .05). At discharge and six months after discharge, MoCA scores and MMSE scores continued to rise in both groups, with the combined group being higher than the conventional group at both time points (P < .05, Figure 3A-B).

#### Self-efficacy and functional exercise adherence scores

Before the intervention, there was no difference in GSES scores and EAQ scores between the two groups (P > .05). At discharge and six months after discharge, GSES scores and EAQ scores continued to rise in both groups, with the combined group being higher than the conventional group at both time points (P < .05, Figure 4A-B).

## Quality of life score

Before the intervention, there was no difference in all SSQoL-12 scores between the two groups (P > .05). At discharge and six months after discharge, all SSQoL-12 scores were higher in both groups, with the combined group being higher than the conventional group at both time points (P < .05, Figure 5A-B).

#### Satisfaction with care

Satisfaction with care was higher in the combined group than in the conventional group (P < .05, Table 2).

Table 2. Satisfaction with care [n(%)]							
	Combined Group (n = 119)	Conventional Group (n = 119)	$\chi^2$	P value			
Very satisfied	0(0.00)	5(4.20)					
Satisfied	3(2.52)	9 (7.56)					
Fair	5(4.20)	18(15.13)					
Dissatisfied	48(40.34)	40 (33.61)					
Very dissatisfied	63 (52.94)	47 (39.50)					
Very satisfied +Satisfied	111 (93.28)	87 (73.11)	17.309	.000			

#### DISCUSSION

This study shows that the doctor-nurse complementary model combined with disease tracking can reduce neurological and cognitive impairment, enhance self-efficacy and compliance with functional exercise, and improve quality of life in stroke patients. Patients with stroke can benefit significantly from the doctor-nurse complementary model combined with disease tracking.

In this study, the combined group had better neurological and cognitive function scores at discharge and six months after the intervention compared to the conventional group. This is explained by the fact that the doctor-nurse complementary model changed the previous dominant-subordinate position of doctors and nurses and effectively strengthened the solidarity between them. Complementary health care model combined with condition tracking nursing model follows the concept of patient-centred care, in which health care focuses on the physiological and psychological needs of patients, and jointly helps patients to master stroke-related knowledge, treatment methods and precautions, etc., and combines psychological support, rehabilitation training, etc., so as to optimize the physical and mental state of patients and improve their adherence to medication, rehabilitation training, etc., and thus reduce the damage to neurological function and cognitive function. The patients will be able to optimise their physical and mental state, improve their compliance with medication and rehabilitation training, and reduce the damage to neurological and cognitive functions. At the same time, disease tracking allows patients to enjoy professional care even after discharge from the hospital. It helps to promote active exercise and good diet and exercise habits in accordance with the rehabilitation program, thus contributing to a sustained recovery of neurological and cognitive functions.

Studies have shown that nurses play an important role in the recovery of stroke patients by encouraging them to perform meaningful tasks and achieve good functional outcomes,<sup>24,25</sup> and he results of the present study show the same results as previous studies and build on them by placing greater emphasis on the role of the physician. In the doctornurse complementary model combined with disease tracking, nursing staff and doctors work together to encourage patients to face treatment and recovery in a professional and humanistic way and to develop individualized rehabilitation plans for patients to implement. The combination of online and offline follow-ups after discharge allows patients to seek medical and nursing assistance for problems in the rehabilitation process, which helps patients receive continuous support and improve their self-efficacy and compliance with functional exercises, thus achieving the best

rehabilitation results. In this study, self-efficacy scores and functional exercise compliance scores were higher in the combined group than in the conventional group at both time points after the intervention, confirming the positive impact of the doctor-nurse complementary model combined with disease tracking on improving self-efficacy and functional exercise compliance in stroke patients.

This study further showed that all quality of life scores were higher in the combined group after the intervention compared to the conventional group, indicating that the doctor-nurse complementary model combined with disease tracking helped to improve the quality of life of stroke patients. Improving quality of life is one of the key goals of current care delivery. The majority of stroke patients survive after effective treatment but still have sequelae such as reduced ability to perform activities of daily living and incoordination of limb functions, which can lead to anxiety and irritability, resulting in a lower overall quality of life in the prognosis period. The doctor-nurse complementary model combined with disease tracking provides care for stroke patients from the time of admission to six months or even a year after discharge and covers rehabilitation assistance, psychological support, diet and exercise guidance, health education and other aspects of the patient's physical and psychological health, effectively helping patients to optimize their physical and mental state in terms of both cognition and behavior, thereby effectively improving their quality of life. It is clear that the complementary health care model combined with medical follow-up has a potentially beneficial impact on stroke patients in the long term and can promote good long-term outcomes. However, further studies are needed to demonstrate whether this model of care can reduce the risk of recurrence of stroke.

In this study, the combined group achieved 93.28% patient satisfaction with care, much higher than the conventional group (73.11), indicating that the doctor-nurse complementary model combined with disease tracking is more acceptable to stroke patients and has some practical clinical applicability.

#### Limitations

Firstly, the small number of study participants included in this study will, to some extent, reduce the representativeness of the study findings. Secondly, this is a single-center trial. Therefore, the generalization of the study findings to other populations remains to be validated. Thirdly, the doctornurse complementary model combined with disease tracking measures was summarised by the researchers in this study based on clinical experience and relevant literature, and to some extent lacked systematicity and comprehensiveness, and further studies need to be conducted subsequently to improve them.

#### CONCLUSION

The complementary healthcare model combined with medical tracking can help to promote the recovery of neurological and cognitive functions of stroke patients,

improve patients' self-efficacy, strengthen the compliance of functional exercises, improve the quality of life and satisfaction with nursing care, and the overall effect is significant, which has a positive impact on the rehabilitation of stroke patients. At the same time, future research can explore the specific effects of the complementary health care model combined with medical tracking on one aspect of stroke patients, such as neurological function, in order to deepen the understanding of the specific benefits of this care model in the care of stroke patients. The results of all the studies show that the complementary care model combined with medical tracking has a positive impact on stroke patients and has the value of being widely used in clinical practice. This model of care is not limited by medical conditions and requires only the concept of collaboration between healthcare professionals, which makes this model of care more suitable for clinical promotion.

#### CONFLICTS OF INTEREST

The authors report no conflict of interest

#### AUTHOR CONTRIBUTIONS

Jie Yu and Linlin Liu have equal contributions to this work

#### AVAILABILITY OF DATA AND MATERIALS

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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Not applicable.

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