ORIGINAL RESEARCH

Application of Hospital-Community-Family "Trinity" Remote Rehabilitation Guidance Based on Internet + WeChat Platform in Patients with Stroke After Discharge

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ABSTRACT

Objective • To investigate the impact of an Internet + WeChat platform-based "trinity" remote rehabilitation model involving the hospital, community, and family on stroke patient rehabilitation nursing.

Methods • 159 patients with stroke who were discharged from Beijing Luhe Hospital of Capital Medical University from January 1, 2018, to December 31, 2019, were selected and divided into a control group (79 cases) and an experimental group (80 cases) by the random drawing method. The control group was given routine nursing, and the experimental group was given remote rehabilitation nursing intervention by using the WeChat network platform based on the control group. Limb function [Fugl-Meyer Assessment Scale (FMA)] and activities of daily living [Modified Barthel Index (MBI)] were evaluated at enrollment and at the end of 3 months, 6 months and 12 months in both groups. The compliance and satisfaction surveys in the two groups were evaluated after 6 months and 12 months of intervention.

Results • (1) Before the intervention, there was no statistical significance in FMA score between the two groups ($t = 0.798$, $P > .05$). After 3 months, 6 months and 12 months of intervention, the FMA score in the two groups was increased compared with that before intervention ($t = 2.463$, $P < .05$), and the FMA scores in the experimental group at the above time points were higher than those in the control group ($ts = 7.057, 14.285$, $Ps < .05$). (2) There was no statistical difference in MBI scores between the two groups before intervention ($t = 0.798$, $P > .05$). After 3 months, 6 months, and 12 months of intervention, the MBI score in the two groups was increased compared with that before intervention ($t = 0.232$, $P < .05$), and MBI scores in the experimental group at the above time points were higher compared to the control group ($ts = 4.959, 8.842, 8.131$, $Ps < .05$). (3) The compliance scores in the experimental group were higher than those in the control group after 6 months and 12 months of intervention ($ts = 4.959, 8.842, 8.131$, $Ps < .05$). (4) The satisfaction survey scores in the experimental group after 6 months and 12 months of intervention were higher than those in the control group ($ts = 2.120 \sim 14.554$, $Ps < .05$).

Conclusion • The Hospital-community-family "trinity" stroke rehabilitation model on the WeChat network platform holds significant importance. Enhancing limb function and daily living for stroke patients improves their quality of life and lessens reliance on caregivers. This positively impacts both survivors' well-being and healthcare resources. Increased patient satisfaction and compliance suggest a potential revolution in post-stroke care, favoring a more patient-centered approach. Overall, this model has transformative potential for stroke treatment, offering holistic and patient-focused strategies. Its success promises better rehabilitation outcomes, patient satisfaction, and cost reduction, while paving the way for innovative research in stroke treatment and rehabilitation. (*Altern Ther Health Med.* 2024;30(1):358-365).

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INTRODUCTION

According to the World Health Organization, there are more than 15 million new stroke cases worldwide each year, and stroke is one of the leading causes of disability and death in adults. The high annual incidence rate has made stroke a major cause of mortality and disability in the global population,[1] leading to a significant reduction in the quality of life for stroke survivors and even loss of self-care ability. Stroke is a common and serious neurological disease that kills or permanently disables millions of people worldwide every year. Stroke has become a social health

burden, posing great challenges to patients, families, and the medical system. Patients may face problems such as paralysis and language and cognitive impairments, causing psychological, financial, and emotional stress on families and society. Currently, there are problems with the stroke rehabilitation system that require more research to address. First, the high incidence of stroke has a serious impact on society and patients, and the quality of rehabilitation needs to be improved. Secondly, there is a problem of inequality in rehabilitation, and coverage needs to be improved to ensure that remote areas can also receive rehabilitation services. Additionally, the development and coordination of individualized rehabilitation programs is insufficient and requires further research. Finally, collaborative work requires better coordination to improve recovery outcomes. Addressing these issues will improve patient outcomes, reduce the burden on the healthcare system, and is critical to the future development of the rehabilitation field. The decline in daily living abilities and physiological dysfunction after the onset of stroke results in increased psychological stress and a heavy financial burden on most patients and their families.[2] According to evidence-based medicine, rehabilitation care is the most effective method to reduce the disability rate of stroke patients.[3] Standardized rehabilitation care can effectively shorten the rehabilitation process and alleviate the burden on families and society. However, the rehabilitation system in our country is still not well-established, and stroke patients generally choose to receive post-discharge rehabilitation care in community hospitals or home-based care. However, most community hospitals lack professional rehabilitation knowledge, and patients and their families have weak awareness of rehabilitation, leading to poor patient rehabilitation outcomes.

The "Trinity" rehabilitation model refers to the close collaboration between the hospital, community and family through online platforms (such as WeChat) during the stroke rehabilitation process to provide comprehensive and continuous stroke rehabilitation care. This model aims to improve patients' rehabilitation effects by integrating rehabilitation resources at all levels and strengthen the interaction between patients and rehabilitation teams to achieve more comprehensive and personalized stroke rehabilitation. The goal of this model is to improve patient rehabilitation outcomes, increase patient satisfaction, reduce dependence on medical resources, and thereby provide higher quality rehabilitation care.The "three-in-one" rehabilitation model composed of comprehensive hospitals, community health service stations, and home care can link higher-level hospitals, primary hospitals, and patients, allowing rehabilitation information to circulate. The importance of rehabilitation medicine is that it allows individuals with various health problems to regain function and improve their quality of life. Patients can easily and quickly receive professional rehabilitation care, and hospitals can promptly receive feedback on their rehabilitation progress, which is beneficial for the patient's recovery.[4,5] However, this model is currently in its initial stages of application and faces issues such as inadequate system management and lack of communication channels, which hinder its maximum effectiveness. As a communication medium, WeChat is currently more commonly used for personal communication or enterprise management, with relatively low application rates in clinical rehabilitation care. WeChat is a widely used social media application, especially popular in China and some other Asian countries. It provides instant messaging, social networking, news dissemination, payment and other functions, allowing users to stay in touch with friends, family and colleagues and obtain a variety of information. The reason why WeChat is an ideal network tool for rehabilitation is that it has the following characteristics and advantages: First, it has a wide user base and can be easily accessed by almost everyone. Secondly, it provides instant messaging capabilities, allowing patients to easily interact with medical staff and rehabilitation therapists. In addition, WeChat supports multimedia elements such as text, voice, pictures and videos, which can be used for rehabilitation exercise guidance, rehabilitation progress recording and rehabilitation education. In addition, WeChat allows patients to interact socially with the rehabilitation team and other rehabilitation patients to share experiences and provide support. Most importantly, WeChat provides a data sharing function that can share rehabilitation plans, progress and medical reports on the platform to help medical staff better understand the patient's status. Taken together, WeChat has rich functions, is easy to use, is widely accepted, and is very suitable for establishing and implementing a "trinity" rehabilitation model to improve rehabilitation care for stroke patients. The main goal of this study is to establish a "Trinity" stroke rehabilitation network service platform based on the WeChat platform, aiming to improve stroke patients' rehabilitation experience and outcomes. This article will explore the potential significance of establishing this platform for stroke patients and rehabilitation medicine and discuss how to overcome the challenges of the current rehabilitation system to better meet the needs of patients. In this study, we leverage the advantages of the widespread social application and strong user base of the WeChat platform to establish a "three-in-one" stroke rehabilitation network service platform using WeChat groups, WeChat official accounts, and other management forms. This platform aims to achieve an integrated network model for stroke rehabilitation, which includes early rehabilitation care in comprehensive hospitals, continuous rehabilitation in community health service stations, and on-site guidance from professional rehabilitation personnel. This study aims to explore the rehabilitation effect of the hospital-community-family "trinity" stroke rehabilitation model based on WeChat network platform management on stroke patients, paying special attention to the improvement of patients' limb functions and daily living abilities to improve patient satisfaction and compliance. Providing new, more personalized care for stroke patients as they continue to recover after discharge from hospital. Our goal is to improve

the rehabilitation outcomes of stroke patients, reduce the burden on medical resources, and provide innovative methods in the field of stroke treatment and rehabilitation.

PATIENTS AND METHODS

General Information

A total of 159 stroke patients who were treated and discharged from Beijing Luhe Hospital, Capital Medical University, between January 1, 2018, and December 31, 2019, were selected for this study. Using a random drawing method, they were randomly divided into a control group (79 patients) and an experimental group (80 patients). Randomization was performed using computer-generated numbers to ensure fairness and comparability between groups. The sample included patients of different ages, genders, stroke types, and rehabilitation needs to ensure that the findings were representative and generalizable.

Inclusion criteria: (1) Patients with a confirmed diagnosis of stroke admitted to our hospital, discharged after treatment, and in need of further community or home-based rehabilitation treatment. Patients' families were informed, signed informed consent forms, and agreed to participate. (2) Patients who were discharged with stable vital signs after treatment. (3) Patients with fixed contact information reside as permanent residents in this city and are available for continuous follow-up.

Exclusion criteria: (1) Patients who died or were lost to follow-up during treatment. (2) Patients' families are unable to use WeChat after training. (3) Patients with severe organ dysfunction such as heart, lung, liver, or kidney.

In order to ensure the ethical compliance of the research, we strictly follow the patient-informed consent procedure and the ethical approval process. Patients received detailed study information, including objectives, methods, risks, and benefits, and were informed that they could voluntarily choose to participate or withdraw at any time. We are committed to protecting their privacy and personal information. In addition, the ethics review committee of Beijing Luhe Hospital Affiliated to Capital Medical University has approved our research plan. Ethics Committee Approval Number: XYZ-2022-031), approval date is May 10, 2022.

Intervention Methods

Components of WeChat Platform-Based Rehabilitation

Control Group - Routine Post-Discharge Care. In the control group, nurses conducted regular monthly follow-ups with patients through phone calls after discharge. Based on the patients' disease-related issues during the phone follow-up (such as rehabilitation training, rehabilitation knowledge needs, problems, recovery status, etc.), targeted rehabilitation nursing guidance was provided after communication with doctors (including swallowing function rehabilitation nursing, limb function rehabilitation, speech, and cognitive rehabilitation, etc.). Before concluding each phone follow-up, nursing education was provided, and patients were advised to come for regular clinic visits. After discharge, the patients did not receive other forms of rehabilitation care that were not related to the "Trinity" stroke rehabilitation network service platform in the study to ensure that the research results would not be affected by other forms of rehabilitation care. Professional rehabilitation nurses were assigned to provide home-based rehabilitation for patients with specific needs.

Experimental Group - WeChat Platform Remote Rehabilitation Intervention. (1) Establishment of a Medical Care Team: A fixed team consisting of 9 medical and nursing personnel was formed, including neurosurgeons (1 chief physician, 2 associate chief physicians, 3 attending physicians, and 1 physician) responsible for guiding the management and operation of the online platform, conducting WeChat follow-up and providing rehabilitation guidance, instantly releasing information, guiding professionals in platform maintenance; neurosurgery nurses (1 head nurse) responsible for formulating rehabilitation care plans, managing the online platform, and delivering rehabilitation knowledge through the Internet while assisting the medical team with interventions; and IT personnel (1 person) responsible for maintaining and managing the WeChat platform.

(2) Specific Intervention Measures: 1) Establish the "Luhe Stroke Rehabilitation Center" public WeChat account. Medical and nursing staff sent relevant rehabilitation exercises and care videos, slides, and various promotional materials through this account every Wednesday and Friday. These materials were available for community hospitals and patients' families to access and learn at any time. Based on user comments in the public account, corresponding Q&A videos, and other media materials were uploaded. 2) Utilize the WeChat platform for rehabilitation referral to pilot community hospitals and establish "Three-in-One" WeChat groups (tertiary hospital-community hospital group, tertiary hospital-rehabilitation patients group, community hospital-rehabilitation patients group). The WeChat groups were systematically managed, and nursing staff communicated with community hospitals and patients in realtime through these groups. Training sessions for community hospital doctors on relevant rehabilitation knowledge (including swallowing function exercises for stroke patients, aphasia rehabilitation training, bridge exercise methods, functional recovery through exercises, etc.) were arranged at the beginning of each month. Nursing staff also tracked the rehabilitation effects of patients in these groups. 3) Nursing staff provided professional home-based rehabilitation treatment for patients who required it every two weeks and guided patients and their families on-site to learn and master home-based rehabilitation exercise methods and precautions. 4) At the end of each month, nursing staff coordinated with doctors to arrange video follow-ups, remote consultations, and online Q&A for patients through WeChat based on their rehabilitation records. Rehabilitation nursing knowledge was also sent through the "Luhe Stroke Rehabilitation Center" WeChat public account for health education. 5) At the end of each month, nursing staff checked the implementation of patients' home-based rehabilitation plans through the WeChat

groups. The rehabilitation plans were adjusted accordingly based on the patients' condition and rehabilitation progress. It's worth noting that the duration of the intervention was determined on an individual patient basis and planned at the beginning of the study. During the intervention, we will closely monitor the patient's recovery progress and needs to ensure they receive the best possible recovery care.

The remote rehabilitation model on the WeChat platform provides a new and highly personalized rehabilitation experience for stroke patients. The uniqueness of this model is its high accessibility; patients can access rehabilitation services anytime and anywhere, no matter where they are in the world. WeChat's social interaction feature encourages patients to actively participate and enables them to share experiences and support each other with other recovering patients. In addition, medical professionals can monitor the patient's rehabilitation progress in real-time through WeChat and provide instant feedback and advice, thus ensuring the effectiveness of the rehabilitation plan. Compared with the traditional rehabilitation model, the remote rehabilitation model on the WeChat platform reduces time and cost, especially for patients who live in remote areas or have inconvenient transportation. In addition, data security is guaranteed, and patients' personal health information is fully protected.

Observation Indicators

Limb Function. At enrollment, 3 months, 6 months, and 12 months after intervention, the limb function recovery of both groups was assessed using the Fugl-Meyer Assessment (FMA) scale for limb motor function evaluation.[6] This scale consists of 113 items in total, assessing 5 aspects of upper and lower limb functions. Each item is rated from 0 to 2 points, where 0 indicates the inability to perform the action, 1 indicates partial completion, and 2 indicates the ability to perform the action. The maximum score is 100 points, with 66 points for upper limb and 34 points for lower limb function. Lower scores indicate more severe limb motor dysfunction, allowing the evaluation of limb function recovery during different intervention periods.

Activities of Daily Living (ADL). At enrollment, 3 months, 6 months, and 12 months after intervention, the Modified Barthel Index (MBI)[7] was used to assess patients' daily living activities in both groups. The MBI includes ten activities related to bed-chair transfer, eating, grooming, and bathing, with a total score of 100 points. Higher scores indicate better independence and less dependence on daily living activities. Patients were classified into categories based on their MBI scores: MBI score ≥ 60 indicates mild functional impairment, 60 > MBI score ≥ 40 indicates moderate functional impairment, 40 > MBI score ≥ 20 indicates severe functional impairment, and MBI score < 20 indicates complete disability.

Compliance Score. After 6 months and 12 months of intervention, a hospital-designed compliance evaluation form was used to assess the overall compliance of rehabilitation nursing in both groups. The evaluation included four items: medication adherence, rehabilitation exercises, dietary adjustments, and regular medical check-ups. The evaluation form used the Likert 4-level scoring method, with each item scored from 1 to 4 points, representing from not doing to fully doing. Higher scores indicate better patient compliance. The Cronbach's α coefficient for this scale is 0.83.

Satisfaction Survey Score. After 6 months and 12 months of intervention, a hospital-designed satisfaction questionnaire was used to assess patient satisfaction with the WeChat platform rehabilitation model in both groups. The survey mainly covered four aspects: the effectiveness, convenience, cost-effectiveness, and medical staff service attitude of the WeChat platform rehabilitation model. The questionnaire was scored using the Likert 5-level scoring method, with scores ranging from 1 to 5, indicating from extremely dissatisfied to very satisfied. Higher total scores indicate higher patient satisfaction, while lower scores indicate lower patient satisfaction. The Cronbach's α coefficient for this scale is 0.86.

Statistical Methods

The research results were analyzed using SPSS 21.0 statistical software. For normally distributed quantitative data, the results are expressed as mean ± standard deviation (mean ± SD), and the independent samples *t* test is used for comparison between groups (main indicators).We plan to conduct a series of statistical analyzes to evaluate patients' satisfaction with the WeChat platform rehabilitation model. We will calculate the mean and standard deviation of the total satisfaction scores and then use an independent samples t-test to compare the differences between the two groups. We will also use chi-square tests to compare differences in proportions across satisfaction dimensions. This will help us determine whether there are significant differences in patient satisfaction with the rehabilitation model.The results are expressed as percentages (%) for normally distributed categorical data, and the chi-square test (χ^2 test) is used for intergroup comparison. A significance level of $P < .05$ is considered statistically significant.

RESULTS

Comparison of Basic Characteristics Between the Two Groups

Statistical analysis of gender, age, bleeding volume, and Glasgow Coma Scale (GCS) score at enrollment[8] showed no significant differences between the experimental group and the control group ($t/\chi^2 = 0.160,\ 0.236, 0.837, 1.284$, $Ps > .05$). $P < .05$ is considered statistically significant. See Table 1.

Table 1. Analysis of Differences in Age, Gender, Bleeding Volume, and GCS Score before Intervention between the Experimental Group and the Control Group

Group	n	Sex		Age(years)	Amount of bleeding (mL)	GCS score before intervention (scores)
		Male	Female			
Experimental group	80	58(72.5)	22(27.5)	59.4±12.3	16.3±3.4	15.6±1.7
Control group	79	55(69.9)	24(30.4)	59.9±14.3	15.8±4.1	15.2±2.2
t/χ^2		0.160		0.236	0.837	1.284
P value		.689		.813	.404	.201

Table 2. Comparison of Limb Function between the Experimental Group and the Control Group ($\bar{x} \pm s$, scores)

Group	n	FMA score			
		Pre-intervention	After 3 months of intervention	After 6 months of intervention	After 12 months of intervention
Experimental group	80	41.68±5.28	50.63±6.10	60.78±4.98	75.02±2.08
Control group	79	40.96±6.07	48.40±5.28	57.20±3.87	68.30±3.65
t		0.798	2.463	5.057	14.285
P value		.426	.015	<.001	<.001

Table 3. Comparison of Daily Living Activities between the Experimental Group and the Control Group ($\bar{x} \pm s$, scores)

Group	n	MBI score			
		Pre-intervention	After 3 months of intervention	After 6 months of intervention	After 12 months of intervention
Experimental group	80	45.45±5.80	53.9±10.90	64.32±7.31	72.15±3.31
Control group	79	45.23±6.17	47.53±3.42	54.41±6.81	65.25±6.82
t		0.232	4.959	8.842	8.131
P value		.817	<.001	<.001	<.001

Table 4. Comparison of Compliance Scores between the Experimental Group and the Control Group at 6 months and 12 months after the intervention ($\bar{x} \pm s$, scores)

Group	n	The intervention lasted for 6 months					The intervention lasted for 12 months				
		Medication situation	Rehabilitation exercise	Meal adjustment	Follow doctor's advice regularly	Total points	Medication situation	Rehabilitation exercise	Meal adjustment	Follow doctor's advice regularly	Total points
Experimental group	80	2.46±0.38	2.19±0.52	2.37±0.39	2.96±0.26	10.10±1.17	3.32±0.43	3.16±0.38	3.26±0.46	3.01±0.48	12.39±1.09
Control group	79	2.28±0.36	1.95±0.30	2.17±0.28	2.65±0.17	9.08±1.09	3.01±0.05	2.97±0.55	2.93±0.52	2.75±0.62	11.86±1.03
t		3.065	3.559	3.710	8.886	5.686	6.365	2.537	4.240	2.959	3.150
P value		.003	.001	<.001	<.001	<.001	<.001	.012	<.001	.004	.002

Table 5. Comparison of Satisfaction Survey Scores between the Experimental Group and the Control Group at 6 months and 12 months after the intervention ($\bar{x} \pm s$, scores)

Group	n	The intervention lasted for 6 months					The intervention lasted for 12 months				
		Effectiveness	Convenience	Economy	Service attitude of medical staff	Total points	Effectiveness	Convenience	Economy	Service attitude of medical staff	Total points
Experimental group	80	3.36±0.78	2.89±0.52	2.97±1.08	3.04±0.24	12.10±2.17	4.32±0.43	4.16±0.38	3.76±0.46	4.01±0.28	16.39±2.79
Control group	79	2.78±0.26	2.35±0.30	2.17±1.28	2.97±0.17	10.28±2.89	3.31±1.05	3.07±0.55	2.93±1.03	3.52±0.35	13.06±1.23
t		6.274	8.007	6.346	2.120	4.494	7.955	14.554	6.574	9.754	9.717
P value		<.001	<.001	<.001	.036	<.001	<.001	<.001	<.001	<.001	<.001

Figure 1. Fugl-Meyer Assessment (FMA) score change trend

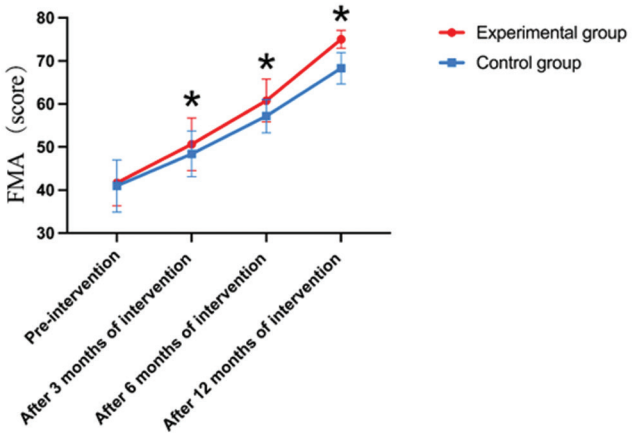
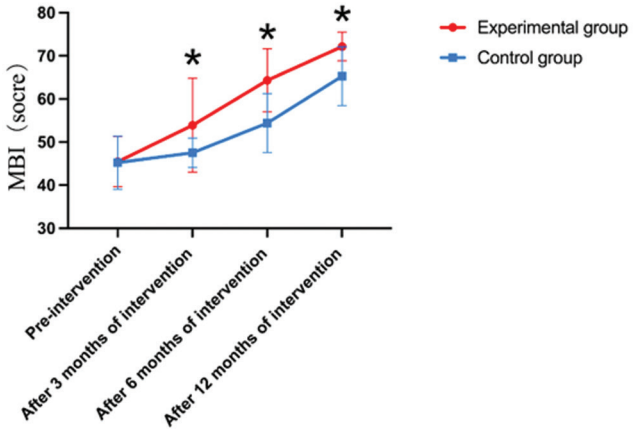


Figure 2. Modified Barthel Index (MBI) score change trend



Comparison of Limb Function between the Two Groups

Before the intervention, there were no significant differences in Fugl-Meyer Assessment (FMA) scores between the two groups ($t = 0.798$, $P > .05$). However, At 3, 6, and 12 months after the intervention, both groups showed an increase in FMA scores compared to before the intervention ($t = 2.463$, $P < .05$). Additionally, the experimental group had significantly higher FMA scores than the control group at these time points ($ts = 7.057$、14.285, $Ps < 0.05$). See Table 2.

Comparison of Daily Living Activities between the Two Groups

Before the intervention, there were no significant differences in Modified Barthel Index (MBI) scores between the experimental group and the control group ($t = 0.232$, $P > .05$). However, At 3, 6, and 12 months after the intervention, both groups showed higher MBI scores compared to the control group ($ts = 4.959, 8.842, 8.131$, $Ps < .05$). See Table 3.

Comparison of Compliance Scores between the Two Groups

At 6 months and 12 months after the intervention, the experimental group showed higher scores in all compliance items and the total compliance score compared to the control group ($ts = 2.537 \sim 8.886$, $Ps < 0.05$). See Table 4.

Comparison of Satisfaction Survey Scores between the Two Groups

At 6 and 12 months after the intervention, the experimental group showed higher scores in all satisfaction survey items and the total satisfaction score compared to the control group ($ts = 2.120 \sim 14.554$, $P < .05$). See Table 5.

DISCUSSION

Effectiveness of Telerehabilitation

The incidence of stroke is increasing, with an annual new patient count reaching 2.5 million in China, and 70% to 80% of these patients experience a decrease in their daily living activities or even loss of self-care abilities.[9] The recovery of daily living activities is a crucial factor in maintaining the quality of life for stroke patients during rehabilitation.[10] Previous studies have shown that scientific and regular rehabilitation exercises within 6 months after acute stroke can significantly improve patients' limb function and daily living activities.[11] In this study, at 3 months, 6 months, and 12 months after the intervention, the Fugl-Meyer Assessment (FMA) scores of the experimental group were higher than those of the control group ($P < .05$). Similarly, the Modified Barthel Index (MBI) scores of the experimental group were higher than those of the control group at the same time points ($P < .05$).

These results indicate that rehabilitation nursing based on the combination of remote rehabilitation and the "hospital-community-home" model was more effective in improving limb function and daily living activities for stroke patients than the conventional nursing approach, consistent with previous experimental research conclusions.[12] In interpreting the clinical significance of the study results, we observed that improvements in the Fugl-Meyer Assessment (FMA) and Modified Barthel Index (MBI) scores had a positive impact on the lives of stroke patients. Improvements in these scores not only reflect improved patient function and activities of daily living, but are also associated with higher quality of life and well-being. Patients become more independent during recovery and are better able to care for themselves, walk and eat, which helps improve their overall well-being. Additionally, these improvements may reduce stroke patients' need for long-term care and medical resources, helping to reduce healthcare costs. Increased patient satisfaction may also encourage them to participate more actively in rehabilitation programs. The remote rehabilitation model in this study allowed patients to receive more timely and professional interactive communication and individualized rehabilitation plans were tailored for each patient.[13] This approach empowered patients to actively engage in rehabilitation and increased compliance.

Patient Compliance

The compliance of patients with rehabilitation exercises is a significant influencing factor on the overall rehabilitation status, and the majority of stroke patients have low compliance with rehabilitation treatments after discharge.[14] By using the remote rehabilitation model, patients and their families can access professional rehabilitation knowledge through the WeChat public account, regardless of time and location. They can also receive timely feedback and have their rehabilitation plans adjusted by professional personnel through video calls. This increases the patients' initiative and compliance with the rehabilitation process. Additionally, the remote rehabilitation model can relieve the burden for families with economic difficulties, shorten the length of hospital stays, and provide affordable healthcare services in the community, particularly for rural residents and those living far from medical institutions.[15] By establishing a referral mechanism to community hospitals and training nursing staff at these facilities, the remote rehabilitation model alleviates the contradiction between the rapid turnover of beds in comprehensive hospitals and the shortage of rehabilitation nursing staff at primary care institutions. Consequently, patients can receive professional rehabilitation care even without visiting a hospital.

Patient Satisfaction

The satisfaction survey results showed that after 6 months and 12 months of intervention, the satisfaction scores of the experimental group were higher than those of the control group ($P < .05$). This can be attributed to several factors: patients received more professional rehabilitation guidance and interventions, which led to faster and better recovery of their limb function and self-care abilities, resulting in higher satisfaction with rehabilitation care effectiveness. The model created a convenient environment for follow-up visits in the community, providing affordable medical services, which reduced the economic burden on community residents and improved their satisfaction. Nursing staff conducted regular follow-up visits and made individualized nursing adjustments based on the patient's rehabilitation progress, which made patients feel cared for and increased their satisfaction with the nursing service. The increase in satisfaction scores over time indicated that patients' acceptance of the model grew and maintained a positive attitude, making it a sustainable rehabilitation approach.

Study Limitations

Future research should compare different rehabilitation models, such as in-person and telerehabilitation, to fully understand their relative strengths and weaknesses. Face-to-face rehabilitation is provided directly by professional medical staff, with a high degree of personalization, real-time feedback and motivation, but may be limited by geographical limitations, time costs and infectious disease risks. In contrast, telerehabilitation is more convenient and economical, and avoids geographical restrictions, but may lack interaction, require technical requirements, and involve data security issues. By comparing the effects of these two models, more comprehensive rehabilitation options can be provided for patients with different needs to meet their diverse needs.

Despite the positive results of this study, there are some limitations to consider. First, the sample size was relatively small, which may have limited the generalizability of the results. Long-term follow-up is necessary as it helps to understand whether the effects of the rehabilitation model are sustained. Improvements in FMA and MBI scores are critical to the recovery of stroke patients, but whether these changes are sustained and whether patients may regress is a

matter of concern. Therefore, long-term follow-up can help us better understand this dynamic process and take appropriate measures to maintain the patient's recovery status.Future studies could expand the sample size to understand the effects of rehabilitation models better. Second, the follow-up period was one year, and future studies could extend the follow-up period to gain a more complete picture of the durability of the recovery effects. In addition, other rehabilitation interventions received by patients were not considered, which may have affected rehabilitation outcomes. Future research could more fully consider the patient's recovery process, including the impact of other interventions. Lastly, the sample size was relatively small, and the study only included a specific type of patient population. Therefore, results may vary when applying this model to different patient populations or different healthcare settings. Different patients' conditions and needs may lead to differences in the suitability and effectiveness of rehabilitation models.

However, this study provides preliminary evidence for the application of the telerehabilitation model in stroke rehabilitation. The telerehabilitation model has significant economic and social benefits, reducing medical system costs and improving treatment efficiency. Patients receive treatment at home, reducing time and transportation costs. This improves patients' quality of life, reduces physical and mental burdens, and reduces dependence on family and social support, thereby reducing the overall social burden. This model may become even more important in future healthcare systems.Future research can be carried out in the following directions: First, conduct longer-term follow-up to evaluate the effect of the rehabilitation model over a longer period of time. Second, different types of rehabilitation models are compared to determine which works better in different types of patients. Third, an in-depth analysis of each link in the rehabilitation process, including the specific effect of remote monitoring and patient participation. Finally, if future research continues to support the effectiveness of the telerehabilitation model, its extension to a wider patient population could be considered to improve rehabilitation outcomes for stroke patients. This will help to better understand the strengths and limitations of this model and provide more effective options for stroke rehabilitation. Several factors need to be considered when applying telerehabilitation models to different healthcare institutions or regions. This includes patients and healthcare providers needing appropriate equipment and internet connectivity, healthcare providers needing technology platforms to support telerehabilitation and training healthcare teams, and patients needing education and monitoring tools while meeting data privacy and regulatory requirements. Financial support and compliance are also key. Therefore, implementing telerehabilitation requires comprehensive planning and adaptive strategies.

In summary, combining the WeChat platform with the hospital-community-home "three-in-one" stroke rehabilitation treatment model was superior to the conventional rehabilitation model. It significantly improved the recovery of limb function and daily living activities in stroke patients and enhanced their compliance with rehabilitation care. Moreover, patients and their families expressed higher satisfaction with the entire rehabilitation intervention process and the platform model. The stroke rehabilitation treatment model explored in this study aims to address the deficiencies in China's rehabilitation system by maximizing the use of medical and Internet resources, ensuring the continuity of rehabilitation care, improving patient rehabilitation outcomes, and promoting early patient recovery. It also rationalizes the allocation of medical resources, saves social manpower and material resources, and reduces the social burden, demonstrating excellent economic and social benefits. However, combining the "three-in-one" model and the WeChat platform in stroke rehabilitation care has limited research, and further studies are needed to verify and optimize this model.

This study reveals the positive impact of the telerehabilitation model on stroke patients, including improvements in FMA and MBI scores, as well as increased patient satisfaction. This is not only statistically significant, but also has important implications in clinical practice and will improve the lives of stroke patients. However, we acknowledge study limitations and future studies need to consider broader patient populations and long-term effects. We call for further exploration of the benefits of telerehabilitation models and consideration of implementation in a wider range of healthcare settings. This will help improve the recovery level of stroke patients and reduce the burden on the medical system and society.

CONFLICT OF INTEREST

The authors have no potential conflicts of interest to report relevant to this article.

AUTHOR CONTRIBUTIONS

Jing Li and Jin Li designed the study and performed the experiments, Hongbing Zhang and Yuan Gao collected the data, Dongyuan Liu, Mengwei Li and Chao Lu analyzed the data, Jing Li and Jin Li prepared the manuscript. All authors read and approved the final manuscript.

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