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The effect of internet-based telehealth nursing on the quality of life in patients with atrial fibrillation and stroke

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Abstract

Background: The purpose of this study is to determine if patients with atrial fibrillation and stroke can benefit from receiving care at home under the supervision of remote specialist nurses through internet-based telehealth nursing. *Methods:* We selected a total of 168 patients with atrial fibrillation and stroke, who were treated in our hospital from January 2018 to December 2019. The patients were divided into a traditional at-home self-help nursing group (the control group) and an internet-based telehealth nursing group involving specialist nurses based on the post-discharge convalescence nursing modes (the experimental group). The patients were followed up and observed for 12 months, and the survival rate, readmission rate, daily life activities, limb motor ability, psychological state, cardiac function and rhythm control, adverse event rate, and the nursing satisfaction of the patients and their families were evaluated for the two different nursing modes. *Results:* Compared with traditional at-home nursing, internet-based telehealth nursing provided by specialist nurses resulted in a significant improvement in the survival rate of patients. Additionally, the readmission due to atrial fibrillation or stroke was significantly reduced, the daily activities and limb motor ability were significantly improved, the patients' anxiety and depression were reduced, and the cardiac function index and rhythm control showed obvious improvement. In addition, the rates of bedsores and minor hemorrhage events were lower, and the nursing satisfaction levels of the patients and their families were significantly higher. *Conclusion:* Patients with atrial fibrillation and stroke benefit greatly from internet-based telehealth nursing provided by specialized nurses, both in terms of prognosis and quality of life. As a result, this approach to nursing care deserves wider adoption and dissemination.

Keywords: Atrial fibrillation, cardiac function, remote nursing, stroke

INTRODUCTION

Stroke risk is increased by more than five times in people with atrial fibrillation, making it one of the leading causes of stroke. Both atrial fibrillation and stroke are examples of typical chronic diseases. Convalescence nursing treatment is especially important and is the key factor in determining the survival rate and quality of life of patients with atrial fibrillation who have suffered a stroke, in addition to active drug treatment (including for cardiac rhythm control and anticoagulation).[1]

Specialist nursing care while in the hospital followed by self-help nursing at home, is the traditional nursing model. However, due to the lack of requisite professional judgment and operational skills, the nursing effect is often poor, resulting in bedsores, deep vein thrombosis, adverse drug reactions, and hemorrhage complications.[2–5] Home care post-discharge can be challenging for patients for a variety of reasons, including lack of ready access to specialized nurses with in-depth knowledge of their condition. Professional and accurate continuing care for patient rehabilitation and home care is made possible through the use of remote video and audio, creating a direct face-to-face communication bridge between central hospitals and patients. Therefore, in this study, we explored internet-based telehealth nursing provided by specialist nurses via remote video and audio, where the specialist nurses provided

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nursing guidance to patients and their families as well as followed-up on patients, to observe whether this novel nursing approach improves the survival rate and quality of life of patients.

METHODS

Patient

A total of 168 patients with atrial fibrillation and stroke, treated in our hospital from January 2018 to December 2019, were selected as study participants. The patients were separated into two groups: 84 patients in the traditional at-home self-help nursing group (the control group) and 84 patients in the internet-based telehealth nursing group involving specialist nurses (the experimental group). There was no statistically significant difference in National Institute of Health Stroke Scale (NIHSS) scores between the two groups of patients at admission.

Inclusion criteria: All the patients with atrial fibrillation and stroke needed to meet the diagnostic criteria of cerebrovascular disease and be diagnosed with stroke by imaging examination. The following items were evaluated: first onset date, whether the patient's condition was stable (patients who were able to participate in the whole study based on their overall health status and family environment based on the comprehensive judgment of the research team at that time), and whether there were any serious heart, lung, liver, kidney, or other important organ diseases. Patients needed to have language communication ability and be conscious and have an abbreviated mental test scale of ≥ 4 points.

Exclusion criteria: Patients with severe cognitive impairment, patients with a history of mental illness, or those with a recent history of antidepressant or antianxiety drug use were excluded. Patients with severe renal or liver insufficiency or dysfunction, intermittent consciousness, repetitive or unstable conditions, or complete aphasia were also excluded. In addition, any patients refusing to cooperate in the study were excluded. All patients provided informed consent and agreed to participate in the study, and the study was approved by the hospital ethics committee.

Nurses

All of the members of the research group were nurses-in-charge with more than eight years of experience in clinical nursing, including three stroke specialists in cardiovascular medicine and three stroke specialists in neurology. Nursing services were provided according to the following methods after the 168 patients were divided into the two groups.

Nursing care for patient

Control group: During hospitalization, the patients were given standardized early-stage rehabilitation care according to the rehabilitation nursing path. Before discharge, the nurses provided rehabilitation health education (e.g., family medication guidance, functional exercise and daily life guidance to the primary family caregivers, and the main caregivers participated in the early-stage rehabilitation of patients) for at-home nursing care so that the main family caregivers could master the relevant knowledge and skills of at-home rehabilitation as soon as possible. After discharge, the patients were transferred to local primary medical institutions, where community nurses were responsible for guiding the rehabilitation and follow-up. The responsible nurses conducted telephone follow-up care once a month.

Experimental group: The patients in the experimental group received internet-based telehealth nursing at home after discharge. Based on the control group, internet-based telehealth nursing at home—including via audio and video calls, was provided by specialist nurses. The patients wore ECG and blood pressure monitoring devices. The nurses in the research group provided the pre-discharge rehabilitation guidance to the patients, assisted in formulating the post-discharge at-home rehabilitation program for the patients, and guided the patients or their families to skillfully use internet-based devices (including WeChat video and the wearable ECG and home blood pressure monitoring devices). They also actively provided out-of-hospital rehabilitation guidance to the patients, conducted follow-up, and provided individualized guidance via audio and video calls, and by remotely accessing the ECG and blood pressure information of the patients once a week, evaluated the rehabilitation effect on the patients and scored their limb motor function and daily life activities. These scores were compared with the pre-discharge scores to evaluate the rehabilitation progress and its effect on the patients; subsequently, the nurses provided guidance on the next rehabilitation steps. They evaluated the physical and social environment of

the patients, created favorable environments and conditions to support the rehabilitation of patients, and helped patients return to their normal social life as early as possible.

Evaluation indexes

Survival rate: Regular telephone follow-up conversations with the patients, to record their survival-related information.

Readmission rate: Readmission of patients for treatment due to stroke and other complications during the 12-month follow-up period.

Evaluation of daily life activities: We utilized the Barthel index, which included the following 10 evaluation items: grooming, feeding, bathing, dressing, bowel control, bladder control, toilet use, transfers (bed to chair and back), 50 m of walking on a level surface, and ascending and descending stairs. The total score of this index is 100 points. The higher the score, the higher the daily life activities level. The evaluation scale is the gold standard for evaluating daily life activities and judging the progress of stroke patients, and has good reliability and validity.

Evaluation of limb motor function: The Fugl–Meyer Assessment (FMA) index was used to evaluate the limb motor function. The total score is 100 points. The higher the score, the better the limb motor function and rehabilitation treatment effect of the patients. Based on the scoring results, dyskinesia is divided into four levels: 96–99 points, mild dyskinesia; 85–95 points, moderate dyskinesia; 50–84 points, obvious dyskinesia; and 0–49 points, severe dyskinesia. The scale is a common method for the clinical evaluation of limb motor function, and it has high reliability and sensitivity.

Zung Self-Rating Anxiety Scale (SAS) and Zung Self-Rating Depression Scale (SDS): The two groups were evaluated for the presence of anxiety or depression and for the severity of the conditions. The higher the evaluated score, the more serious the patients' anxiety and depression.

Adverse reaction monitoring: The following items were recorded and analyzed in detail: pressure sores, deep vein thrombosis, minor hemorrhage events (ecchymosis of the skin and mucosa, hematuria, bulbar conjunctival hemorrhage, gingival hemorrhage, hemorrhoid hemorrhage, and epistaxis), massive gastrointestinal hemorrhage events, pulmonary infections, urinary tract infections, aspirations, and trauma caused by falls.

Statistical analysis

SPSS 17.0 was used for statistical analysis. The measurement data are expressed as mean ± standard deviation and verified by a t-test. The enumeration data are expressed as percentage and verified by the chi-squared test. $P < 0.05$ was considered statistically significant.

RESULTS

There were no significant differences in gender, age, weight, cardiac function, and concomitant medication between the two groups. See Table 1 for the demographics and baselines of the patients.

The internet-based telehealth nursing increased the one-year survival rate of the patients with atrial fibrillation and stroke and reduced the readmission rate. The one-year survival rate of the patients in the experimental group was 84.5%, which was significantly better than the survival rate of the patients in the control group ($P < 0.05$). The number of readmissions due to stroke and complications was significantly lower than that in the control group ($P < 0.01$) (see Figure 1).

Internet-based telehealth nursing significantly improved the daily life activities and limb motor ability of the patients during the one-year follow-up period (see Table 2). The Barthel index and the FMA index scores of the patients in the experimental group improved compared to the control group. In addition, the experimental group had obvious advantages compared to the control group.

Internet-based telehealth nursing significantly improved the patients' anxiety and depression (see Table 3). The one-year follow-up data showed that the SAS and SDS scores in the experimental group were significantly better than those in the control group, suggesting that internet-based telehealth nursing improves the state of anxiety and depression.

Internet-based telehealth nursing improved patient satisfaction; the proportion of "very satisfied" patients in the experimental group was significantly higher than in the control group, and the overall satisfaction was significantly higher than in the control group ($P < 0.05$) (see Table 4).

Internet-based telehealth nursing significantly reduced the incidence of complications. The proportion of complications in the experimental group, including pressure sores,

Table 1: Comparison of baseline clinical data between two groups

	Control group (n=84)	Experimental group (n=84)
Gender (male/female)	46/38	45/39
Age (year-old)	61.5±10.8	62.6±14.1
Body mass index	23.1±3.3	22.2±4.2
Systolic pressure	147±16.5	145±18.1
Diastolic pressure	84.6±11.6	86.5±10.9
Ventricular rate	95.8±13.5	98.1±11.9
Type of atrial fibrillation		
Paroxysmal atrial fibrillation	12/84 (14.3%)	16/84 (19.1%)
Persistent atrial fibrillation	23/84 (27.4%)	20/84 (23.8%)
Permanent atrial fibrillation	49/84 (58.3%)	48/84 (57.1%)
Radiofrequency ablation of atrial fibrillation	6/84 (7.1%)	8/84 (9.5%)
Thrombolytic/interventional therapy for stroke	10/84 (11.9%)	8/84 (9.5%)
Pacemaker implantation	6/84 (7.1%)	7/84 (8.3%)
Smoking history	38/84 (45.2%)	39/84 (46.4%)
Diabetes	11/84 (13.1%)	13/84 (15.5)
Coronary heart disease	13/84 (15.5%)	14/84 (16.7%)
Anticoagulant	36/84 (42.9%)	40/84 (47.6%)
Antiplatelet drug	69/84 (82.1%)	69/84 (79.8%)
Antihypertensive drug	80/84 (95.2%)	81/84 (96.4%)
Lipid-regulating drug	81/84 (96.4%)	81/84 (96.4%)
Amiodarone	36/84 (42.9%)	40/84 (47.6%)

deep vein thrombosis, minor hemorrhage events (ecchymosis of skin and mucosa, hematuria, bulbar conjunctival hemorrhage, gingival hemorrhage, hemorrhoid hemorrhage, and epistaxis), massive gastrointestinal hemorrhage, pulmonary infections, urinary tract infections, aspirations, and trauma caused by falls, was significantly lower than in the control group ($P < 0.05$) (see Table 5).

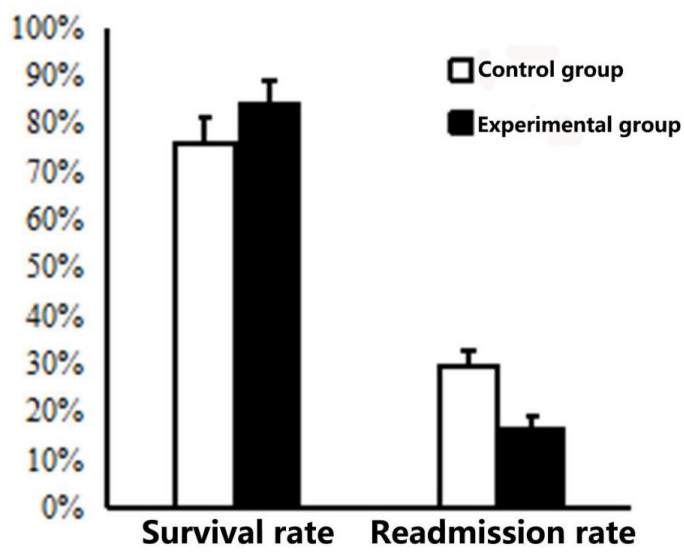

Figure 1. Comparison of survival rate and readmission rate after one year. Compared with the control group, *P < 0.05.

Table 2: Evaluation of patients' activities of daily living and limb motor ability

		Control group	Experimental group	*t*	*p*
	Number of cases (discharged/followed-up)	84/74	84/81		
Barthel index	At discharge	40.8±3.5	42.1±5.1	0.379	0.112
	1-year follow-up	46.9±6.2	66.8±8.3	-5.402	<0.001
	t	-5.123	-10.551		
	p	<0.05	<0.001		
FMA index	At discharge	24.9±3.1	22.1±2.2	0.498	0.197
	1-year follow-up	31.7±5.3	46.8±3.9	-6.902	<0.001
	t	-6.282	-17.102		
	p	<0.05	<0.001		

FMA: Fugl-Meyer Assessment

Table 3: Evaluation of anxiety and depression in two groups of patients

		Control group	Experimental group	*t*	*p*
	Number of cases (discharged/followed-up)	84/74	84/81		
SAS score	At discharge	54.1±6.0	56.8±5.9	0.665	0.414
	1-year follow-up	48.9±6.4	33.1±8.0*	-11.02	<0.001
	t	-6.331	-10.551		
	p	<0.05	<0.001		
SDS score	At discharge	66.3±5.1	63.9±6.2	0.774	0.317
	1-year follow-up	45.7±4.4	33.8±3.3	-10.551	<0.001
	t	-13.222	-17.102		
	p	<0.05	<0.001		

SAS: Self-Rating Anxiety Scale; SDS: Self-Rating Depression Scale

Table 4: Comparison of nursing satisfaction between two groups after one-year follow-up

Group	Control group (n=74)		Experimental group (n=81)		X^2	*p*
	n	Proportion	n	Proportion		
Very satisfied	20	27.02703	37	45.67901		
Satisfied	23	31.08108	35	43.20988		
Less satisfied	20	27.02703	5	6.17284		
Dissatisfied	11	14.86486	4	4.938272		
Total satisfaction	63	85.13514	77	95.06173	4.255	0.039

Table 5: Significantly reduced incidence of complications in experimental group

	Control group (n=74)		Experimental group (n=81)		X^2	*p*
	n	**Proportion**	**n**	**Proportion**		
Pressure sores	12	16.2	6	7.4	4.255	0.031
Lower extremity deep venous thrombosis	8	10.8	1	1.2	6.11	0.025
Minor hemorrhage events	50	67.6	36	44.4	9.12	<0.01
Gastrointestinal hemorrhage	9	12.2	5	6.2	6.222	0.036
Pulmonary infection	18	24.3	11	13.6	4.55	0.014
Urinary tract infection	12	16.2	6	7.4	6.25	0.011
Aspiration	9	12.2	2	2.5	4.95	<0.01
Trauma	8	10.8	3	3.7	8.11	0.019

DISCUSSION

The leading causes of mortality in China now are cardiovascular and cerebrovascular diseases. Over 10 million people in China are currently living with atrial fibrillation. In addition, a high number of patients have suffered a stroke because of inadequate anticoagulation rates. The cumulative number of patients with atrial fibrillation and stroke now exceeds 3 million, placing a heavy burden on Chinese society. Patients with atrial fibrillation often have a poor prognosis due to the high rates of disability, recurrence, and mortality associated with stroke. In addition, these patients need to be monitored closely by a medical professional and given anticoagulants or anti-vascular drugs for the rest of their lives.[6] In China, patients with atrial fibrillation still rely heavily on traditional stroke nursing provided by family members, despite the fact that these caregivers often lack the knowledge and experience to effectively manage the chronic conditions suffered by the patients.[7] This is also one of the main reasons for the poor prognosis of patients with atrial fibrillation patients and stroke in China. Atrial fibrillation and stroke are typical chronic diseases. The absence of proper treatment and nursing care can lead to various complications that can be the main causes of death from stroke. Therefore, it is crucial to provide patients with long-term, routine nursing care and active, effective treatment in order to increase their chances of survival, enhance their quality of life, and decrease the likelihood of relapse and medical costs.[5,8,9]

The purpose of this study is to determine if patients with atrial fibrillation and stroke can benefit from receiving care at home under the supervision of remote specialist nurses through internet-based telehealth nursing. With the increasing development of internet technology, WeChat video and wearable ECG and blood pressure monitoring devices are more accessible to more families[10], enhancing the feasibility of this research. Through internet-based technology, close contact is maintained with patients diagnosed with stroke caused by atrial fibrillation after discharge. In addition, data are transmitted (e.g., blood pressure, blood sugar, and other parameters measured by the patients themselves) to the nursing research group through the internet so that the treatment and recovery of the patients outside the hospital can be effectively managed, and they can be provided timely guidance on their related drug complications.

The advantages of internet-based telehealth nursing can be evaluated from four dimensions. First, internet-based telehealth nursing significantly reduced the one-year mortality of the patients, the readmission rate of the patients due to the aggravation of atrial fibrillation or stroke and related complications, and the economic burden of the patients, and prolonged the survival time of the patients. Second, a one-year follow-up evaluation was conducted on the condition of the patients including their daily life activities and limb motor ability. The results indicated that the daily life activities and limb motor ability of

the patients were significantly improved under the internet-based telehealth nursing, suggesting that this mode can help improve the independent living ability of patients and their quality of life. Third, the mental health status of the patients was better when they received at-home internet-based telehealth nursing. The anxiety and depression scores of the patients suggest that telehealth nursing significantly improved the patients' anxiety and depression through remote video calls, psychological counseling, and care. Fourth, the feedback on patient satisfaction with nursing suggests that the satisfaction of the patients and their families with nursing can be significantly improved with internet-based telehealth nursing. Internet-based telehealth nursing is a novel nursing mode that promotes communication and cooperation between nurses and patients. It enhances patient rehabilitation and deepens the mutual trust between the nurses and the patients.[11,12]

Long-term hospitalization and frequent hospital-based nursing have become increasingly challenging for patients in the post-pandemic era, when crowd containment has become a key measure in epidemic prevention.[12] Furthermore, as a result of rising incomes and shifting social mores, there is also a growing need for health care. People used to be content with merely curing their illness, but nowadays they want more. Thus, the six-in-one design of modern health care guidance for disease prevention, treatment, nursing, rehabilitation, health education, and family planning has become increasingly popular.[13–15] As a result, the at-home nursing of patients can be greatly enhanced and their prognoses improved through the use of internet-based telehealth nursing.

DISCLOSURE

Ethics: This study was conducted with the approval from the Ethics Committee of Huazhong University of Science and Technology. This study was conducted in accordance with the declaration of Helsinki. Written informed consent was obtained from all participants.

Data availability: The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

Financial support: None

Conflict of interest: None

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