



Effect of Extended Care on Functional Rehabilitation of Stroke-induced Hemiplegic Patients

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Abstract

Background: We aimed to observe the effect of extended care on improving motor function and activities of daily living of stroke-induced hemiplegic patients.

Methods: Patients clinically diagnosed as stroke with hemiplegia and hospitalized in the Neurology Department at Tianjin Haibin People's Hospital, China from 2019 to 2020 were selected. One hundred twenty patients were enrolled and randomly divided into the intervention group (60 patients) and the control group (60 patients). The control group was given routine rehabilitation treatment and care. Based on routine rehabilitation treatment and care, the intervention group was given transitional care. After discharge, the patients were followed up. Barthel indexes (BIs) were collected to evaluate the activities of daily living of patients. The Fugl-Meyer Motor Function Assessment (FMA) was adopted to evaluate the patients' motor function.

Results: There was no statistically significant difference in the total BI scores between the two groups of patients at the two time points before intervention and at discharge. The total scores of the intervention group were higher than those of the control group after 1 month and 3 months of discharge, and the difference was statistically significant ($P < 0.05$). There was no statistically significant difference in total FMA scores between the two groups of patients before intervention, indicating comparability. After 3 months of discharge, the total FMA score of the intervention group patients was higher than that of the control group, and the differences were statistically significant ($P < 0.05$).

Conclusion: Continuous care can effectively improve motor function and daily living ability of stroke patients with hemiplegia.

Keywords: Continuous care; Stroke; Functional rehabilitation

Introduction

Stroke has become an important health problem globally, which can be the third leading cause of death and disability (1). It has attracted wide at-

tention in the global health field (2, 3) due to its high morbidity, disability and mortality.



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About 70% of survivors of stroke suffer from neurological dysfunctions such as hemiplegia and aphasia, 50% of patients have less self-rehabilitation and nursing knowledge after discharge, as well as poor treatment compliance, causing a delay in their conditions, seriously affecting the quality of life of these patients (4-6). Over these years, nursing scholars all over the world actively explore the application of extended care in the field of chronic disease management. They have achieved practical results in reducing the readmission rate of patients and improving the treatment compliance as well as quality of life of patients after discharge (7, 8).

However, at present, there is no relatively mature mode of extended care for stroke. In this study, the nursing intervention was adopted for stroke-induced hemiplegic patients, to explore the influence of extended care on the functional rehabilitation of hemiplegic patients.

Methods

Research objects

Patients clinically diagnosed as stroke with hemiplegia and hospitalized in the Neurology Department at Tianjin Haibin People's Hospital from January 2019 to January 2020 were selected.

1) Inclusion criteria

- ① Patients with initial stroke who meet the diagnostic criteria (9) and were confirmed by cranial CT and / or MRI;
- ② Patients aged 45 years old or older;
- ③ Patients who lived in the living quarters of Tianjin Dagang Oilfield with clear consciousness and dysfunction on one-side limbs, no communication disorder;
- ④ All patients who were able to take care of themselves in daily life before the onset of the disease and obtained informed consent before the study.

2) Exclusion criteria

- ① Patients with severe aphasia and cognitive dysfunction;
- ② Patients with quadriplegia;
- ③ Patients with mental disorders;

④ Patients with severe internal medical conditions;

⑤ Patients with a previous history of dementia.

This study has been reviewed and approved by the hospital's Ethics Committee. Informed consent was taken from the patients.

Grouping method

In strict accordance with the inclusion and exclusion criteria of this study, 128 newly included patients were divided into a control group of 65 patients and an intervention group of 63 patients with the coin method combined with the principle of minimum imbalance index allocation. Eight patients were lost, including 5 patients in the control group and 3 patients in the intervention group, and ultimately, 60 patients in the intervention group and 60 patients in the control group were left. The control group was given usual care, and the intervention group was given routine care and extended care.

Preparation and division of labor for researchers

The extended care team was established, which was composed of physicians and matrons of Neurology Department, specialist nurses in stroke, dietetic technicians, rehabilitation physicians, psychologists and nurses from communities. The team leader was the deputy director of Neurology Department. The extended care team was trained for one month before the start of the study in the department's business learning time. The training contents included extended care mode and its contents, programs, measures, etc., and clarifying the tasks assigned to team members. In order to ensure the smooth implementation of extended care and facilitate data analysis, the records on stroke of patients within 3 days after admission were filed. Specialist nurses were responsible for recording the general sociological information and the assessment on activities of daily life, and rehabilitation physicians were responsible for simplifying the recording of the Assessment of Fugl-Meyer Motor Function Assessment (FMA).

Intervention methods

According to the theory of extended care and requirements for its connotation, continuous and serial nursing activities were designed including health education during hospitalization and follow-up after discharge.

1) Nursing care during hospitalization

Patients in both groups were given routine specialized care in the Neurology Department, followed by standard treatment measures for clinical pathway of cerebral infarction or cerebral hemorrhage, and the same systematic rehabilitation treatments, including acupuncture, physiotherapy, hemiplegia limb rehabilitation training, etc. The patients' information was collected and the file was established. On the first day of admission, specialist nurse interviewed the patients and filled out a general information questionnaire, including the patients' basic information, social and cultural background, and the identification of the main caregiver. ADL and motor functions of patients in the two groups were evaluated and recorded within 3 days.

2) Care before discharge

Control group: The patients were given verbal routine guidance for discharge, including guidance for medication, regular monitoring for blood pressure, rehabilitation training, simple psychological counseling, reasonable diet, guidance for lifestyle, factors for controlling the recurrence of diseases, etc. The patients in the control group did not receive extended care at home after discharge, and the members of the extended care team only called the patients at 1 month and 3 months after discharge to urge them to come to the hospital for reexamination to evaluate their activities of daily life and motor function. For patients who did not come to the hospital for reexamination due to special circumstances, rehabilitation therapists and specialist nurses followed up the patients at home, evaluated the patients, and gave guidance according to the questions raised by the patients.

Intervention group: 1-2 days before discharge, patients were given diaries to understand and

confirm the patients' accurate understanding of medical and nursing guidance after discharge, to guide the patients' compliance after discharge, and to teach the patients or their main caregivers to record diaries on these patients (including training for rehabilitation at home, scientific nutrition diet, daily routine of life, strict medication compliance, regular review, etc.). Team members discussed the best time for the patients to discharge, held seminars for cases, solved the nursing problems of the patients after discharge, formulated health goals after discharge together with the patients and their caregivers, made plans for discharge, followed by dynamical monitoring and implementation. The contents of home care after discharge were introduced to the patients and their caregivers. Community nurses were informed to establish effective communication channels between the patients and their family members and the hospital, and consultation services through WeChat and telephone initiated by the patients at any time were provided. Investigators and community nurses had regular follow-ups through telephone and at home. At 1 month and 3 months after discharge, the patients came to the department for reexamination.

3) Care after discharge (follow-up for the intervention group only)

Week 1: Specialist nurses and community nurses went to patients' houses to evaluate the patients' living environment, and improvement measures were put forward for the problems such as missing armrests, dim lighting, high thresholds, cluttered debris, unstable seats, etc. in the bathroom, guided and supervised the patients' training for activities of daily life, rehabilitation exercises, etc., in the total of 30-40 minutes the patients' houses. **Week 2:** Patients or their main caregivers were followed up through telephone, and standard telephone follow-up manuscripts were adopted to avoid the randomness of the contents followed up and make the implementation of telephone follow-up more standardized. The telephone follow-up lasted for 5-10min each time (which was decided through joint consultation between nurses and the patients), including problems about

greetings and entry status, symptom assessment and compliance behavior, health guidance, and emotional support. The follow-up mainly included psychological care, rehabilitation training, correct medication following medical advice, preventing complications, adjusting diet, arrangement of exercises and rest, quitting smoking, quitting alcohol, guidance for sleeping and bowel, etc. Through the telephone follow-ups, specialist nurses carefully analyzed the feedback information from the patients and gave targeted health guidance. After the follow-ups, specialist nurses filled in the follow-up form with the contents and feedback information of each visit, identified the problems that cannot be solved and fed them back to the extended care team. The members of the extended care team formulated the key contents of following follow-ups according to the results and the feedback from specialist nurses.

Week 3: Follow-ups were performed at home.

① Health guidance and consultation for home rehabilitation were given to the patients and their main caregivers; ② The compliance behaviors of the patients were understood and the patients were encouraged to keep truthful diaries; ③ Guidance was provided according to the control for stroke risk factors, followed by blood pressure control, blood glucose control, low-salt and low-fat diet, smoking cessation, alcohol limit, appropriate lifestyle and exercise, etc.; ④ The patients and their main caregivers were instructed on the methods of home rehabilitation training, including sitting position and sitting balance training, correct sitting posture, sitting position conversion, and standing balance training; ⑤ The patients and their main caregivers were instructed to train their activities of daily life, and the patients were instructed to do some exercises to improve the fine functions of fingers and the coordination between limbs, such as building blocks, spelling patterns, kneading silly putty, etc. This part of guidance lasted for 30-40 min.

Week 4: Patients in the intervention group came to the hospital for review, and the extended care team continued to assess their activities of daily life and motor function. According to the pa-

tients' assessment, the patients' health goals and the plan for home rehabilitation were adjusted. Weeks 5, 6 and 7: Patients were followed up once a week, which lasted for 5-10 min each time.

Week 8: Specialist nurses and community nurses followed up at the patients' houses to continue the guidance for rehabilitation. They guided family members to give the patients more psychological comfort, let the patients tell the feelings, targeted counseling the patients, to improve family and social support, and carried out walking, walking up and down stairs training on the basis of standing balance.

Week 9: Telephone follow-ups were performed.

Week 10-11: Follow-up was performed once for 30-40 min.

Week 12: The patients were admitted to the hospital for review, and the extended care team continued the assessment and recording of the patients' activities of daily life and motor function, followed by the health guidance in the later stages of rehabilitation.

Assessment indicators and measurement tools

1) Questionnaire on general conditions of patients with stroke:

The questionnaire mainly covers gender, age, smoking, drinking, education level, occupation, marital status, medical payment method, type of diseases and other conditions.

2) Assessment of motor function

The simplified Fugl-Meyer motor function assessment (FMA) adopted in this study (10) was developed by Fugl-Meyer et al. from Sweden according to Brunnstrom's views. In this study, motor function was assessed with the simplified Fugl-Meyer assessment scale. Only the Fugl-Meyer assessment scale for the assessment of upper and lower limbs' motor function was selected, including 50 items. The scores were divided into four levels, the score < 50 indicated severe dysfunction of the affected limb; the score of 50-84 indicated that the affected limb was in obvious motor dysfunction; the score of 85-95 indicated that the affected limb was in moderate motor dysfunction; the score of 96-99 indicated that the affected limb was in mild motor dysfunction.

tion. A higher score indicated a lesser degree of motor dysfunction in the affected limb. The study showed that the internal consistency of the FMA scale was greater than 0.70, indicating that this scale has high reliability for the determination of the patients' motor function.

3) Assessment of activities of daily life

Simplified Barthel Index (BI) Scale (11) was adopted in this study. It covered 10 items, such as defecation, urination, grooming, and toileting. It was divided into four levels as 0 points, 5 points, 10 points and 15 points, with the total score of 100 points. The higher the score, the stronger the activities of daily life.

Statistical methods

Statistical processing and analysis were performed with SPSS 18.0 (Chicago, IL, USA). Data were expressed as $\bar{x} \pm s$, and tested with *t*-test. The test level as $P < 0.05$ showed a statistical significance.

Results

Equilibrium test on general conditions of patients between two groups

There were no significant differences in age, gender, education, marital status, payment method, type of stroke, smoking and alcohol drinking in patients between the two groups, which were comparable, as shown in Table 1.

Table 1: Comparison of balance on general conditions

Item		Intervention Group (n =60)	Control Group (n =60)	χ^2	P
Age (yr)		58.03±6.06	60.00±7.35	-	0.11
				1.60	2
				*	
Gender	Male	40	37	0.32	0.70
	Female	20	23	6	4
Education Level	Illiterated	6	7	0.44	0.93
	Primary School	16	17	0	2
	Middle School	22	23		
	High School and above	16	13		
Marital Status	Married (Spouse is alive)	51	54	4.08	0.25
	Divorced	2	0	6	2
	Widowed	6	3		
	Remarried	1	3		
Payment Method	Self-paid	13	9	2.04	0.56
	Publicly-funded	1	0	4	3
	Medical Insurance	37	42		
	New rural cooperative medical system (NCMS)	9	9		
Type of Stroke	Cerebral Infarction	49	46	1.26	0.53
	Cerebral Hemorrhage	11	13	1	2
	Subarachnoid hemorrhage	0	1		
Smoking	Yes	16	15	0.36	0.83
	No	33	36	3	4
	Has quit	11	9		
Drinking	No	30	39	3.44	0.17
	Occasionally	18	15	7	8
	Usually	12	6		

Note: * indicates *t* value

Comparison of BI scores at different time points before and after intervention between the two groups

There were no significant differences in BI scores at two time points before intervention and at discharge.

At 1 month and 3 months after discharge, the total score of the intervention group was higher than that of the control group, and the difference was statistically significant ($P < 0.05$), as shown in Table 2.

Table 2: Comparison of BI scores at different time points between the two groups ($\bar{x} \pm s$)

Time	BI		t	P
	Intervention Group (n=60)	Control Group (n=60)		
Before the intervention	52.17±19.49	52.75±22.58	0.0151	0.880
At discharge	61.83±17.73	55.25±20.36	1.888	0.061
Discharged for 1 month	71.83±13.84	60.58±18.21	3.811	0.000
Discharged for 3 months	84.83±11.68	68.08±16.62	6.386	0.000

Comparison of FMA scores on motor function before and after intervention between the two groups

There was no significant difference in the total score of FMA between the two groups before the

intervention, which were comparable. At 3 months after discharge, the total score of FMA of the intervention group was higher than that of the control group, and the differences were statistically significant ($P < 0.05$), as shown in Table 3.

Table 3: Comparison of FMA scores on motor function before and after the intervention between the two groups ($\bar{x} \pm s$)

Time	FMA		t	P
	Intervention group (n =60)	Control group (n =60)		
Day 2 after admission	35.78±20.20	38.22±26.07	-0.571	0.569
Three months after discharge	69.18±20.49	54.65±21.68	3.173	0.002

Discussion

The results of this study showed that extended care is effective in improving the activities of daily life of patients with stroke, and the longer the intervention training, the better the rehabilitation of various abilities in the patients' daily life, which is consistent with the results of another study (12). The reasons may be as follows: First, the level of ADL knowledge has been improved through health education. The mastery of patients' health knowledge helps to enhance their beliefs on health, so that they can actively follow the health behaviors (13,14); Secondly, the role of

caregivers can be given full play, caregivers can be guided for how to assist patients with home rehabilitation training, especially, they cannot be guided to excessively replace patients to complete daily activities, and the patients can be encouraged to complete their own independent as far as possible, so as to give full play to their role of self-care. This study provided rehabilitation information for patients with stroke after discharge, met the needs of patients and their family members, strengthened communication with the patients, understood the psychological status of the patients, and carried out psychological nursing in time by establishing an extended care team, linking hospital-community resources, combined

with online consultation, offline teaching, telephone follow-up, home visit and other measures. It helps to improve the self-care ability of patients, thereby improving the quality of life of the patients and improving the health outcome of the patients, which are similar to the results of relevant studies (15,16).

The results also showed that the control group showed a gradual improvement in self-care ability and motor function in the process of rehabilitation. However, the increase was significantly lower than that of the intervention group. With the appropriate training to the extended care team, community health workers can play a key role in training and mentoring family caregivers and patients with stroke (17). After discharge, the patients were followed up. During the follow-ups, nurses mainly guided the patients' rehabilitation training and supervised the patients' compliance, so that the patients could complete the daily activities as independently as possible. Secondly, the improvement of activities of daily life was closely related to the improvement of patients' motor function. The motor function at 3 months after discharge in the intervention group was significantly improved compared with that of the control group. The rehabilitation of motor function complemented the improvement of activities of daily life.

Conclusion

The extended care intervention program established by us can effectively improve the activities of daily life and motor function of stroke-induced hemiplegic patients, which is worthy of clinical promotion.

Journalism Ethics considerations

Ethical issues (Including plagiarism, informed consent, misconduct, data fabrication and/or falsification, double publication and/or submission, redundancy, etc.) have been completely observed by the authors.

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Conflict of Interest

The authors declare that there is no conflict of interest.

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