

Original Article

Feasibility study of collaborative care interventions for stroke patients

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Abstract: Objective: This study aimed to explore the feasibility of collaborative care interventions for stroke patients. Methods: A total of 78 stroke patients treated in our hospital from January 2019 to December 2019 were enrolled as the research objects and divided into the study and control groups (with 39 cases in each group) according to the random number table. Patients in the control group were given routine out-of-hospital care, whereas those in the study group received collaborative care interventions. The quality of life (QOL), self-care ability, negative emotions, motor function and self-perception were compared between the two groups before and after intervention. Results: Before intervention, there was no significant difference in the scores of 36-Item Short-Form Health Survey (SF-36), Exercise of Self-Care Agency (ESCA), Self-Rating Anxiety Scale (SAS), Self-Rating Depression Scale (SDS), simplified Fugl-Meyer Assessment (SFMA), Functional Ambulation Category (FAC), General Self-Efficacy Scale (GSES) and Self-Perceived Burden Scale (SPBS) ($P>0.05$). At 1, 3 and 6 months after intervention, patients in the study group had higher scores of each dimension in the SF-36, higher scores of each dimension in the ESCA, lower SAS and SDS scores, higher FMA, FAC and GSES scores, and lower SPBS scores compared to those in the control group ($P<0.05$). Conclusion: For stroke patients, collaborative care can significantly improve their QOL, self-care ability and self-efficacy, relieve their negative emotions, and accelerate their limb function recovery, as well as help to reduce their self-perceived burden, which is worthy of clinical application.

Keywords: Stroke, collaborative care, intervention, feasibility, analysis

Introduction

In recent years, with rapid development of the economy in China, the lifestyle and diet structure of Chinese people have obviously changed, and the prevalence rate of various cardio-cerebrovascular diseases has also shown a trend of increasing year by year. Some investigations have pointed out that China is currently one of the countries with the heaviest burden of cardio-cerebrovascular diseases in the world, with the incidences of atherosclerosis, hemorrhagic stroke and ischemic heart disease rising significantly in the past few years, which has a greater correlation with population aging and unhealthy living habits in the country [1, 2]. According to survey data on the prevalence rate of atherosclerosis, proportions of the deaths and the total deaths of atherosclerosis in China had increased from 40% and 11% in 1990 to 61% and 25% in 2016, with the number of

deaths increasing from 1 million/year to 2.4 million/year over the same period. This suggests that cardio-cerebrovascular diseases have seriously affected the social progress and economic development of China [3, 4].

Stroke, also known as apoplexy, is a kind of acute cerebrovascular disease caused by the sudden rupture of cerebral blood vessels or vascular obstruction, resulting in blood unable to flow into the brain, thus causing brain tissue damage. According to its pathological changes, stroke can be classified into ischemic stroke and hemorrhagic stroke, of which the former accounts for 60%-70% [5, 6]. The disease is more common in people over the age of 40, with a higher incidence in males than in females. Clinical studies have found that stroke is currently the leading cause of death in urban and rural areas and the main cause of disability among adults in China, and its prevalence rate

Feasibility of collaborative care interventions for stroke patients

has been increased with the aging trend [7, 8]. In clinical practice, stroke is characterized by an acute onset and a dangerous condition, so in addition to early treatment, clear requirements for out-of-hospital care are also proposed for stroke patients. A large number of studies have shown that satisfactory out-of-hospital care significantly improves the quality of life (QOL) of stroke patients, which is beneficial to prolonging their lifespan [9, 10]. As a nursing intervention model developed based on Orem's Self-Care Theory, collaborative care has a core to give full play to the assisting role of patients' families and communities to jointly provide health assistance to patients with chronic diseases. At present, this model has achieved positive practical effects in chronic heart failure, chronic obstructive pulmonary disease and other diseases [11]. The purpose of this study was to explore the feasibility of collaborative care for stroke patients, so as to provide a clinical basis for improving the QOL and prognosis of patients.

Materials and methods

General information

A total of 78 stroke patients treated in our hospital from January 2019 to December 2019 were enrolled as the research objects and divided into the study and control groups (with 39 cases in each group) according to random number tables.

Inclusion criteria: (1) All patients were confirmed with stroke by CT or MRI. (2) Patients met the diagnostic criteria of stroke developed by the 4th National Cerebrovascular Disease Academic Conference. (3) Patients could cooperate in the investigation. (4) Patients had clear and complete medical records. (5) Patients had the attack of stroke for the first time. (6) Patients and their families clearly understood the process, methods and principles of this investigation and signed an informed consent. (7) Patients were receiving rehabilitation therapy at home. (8) Patients had lower-extremity dysfunction. This study was conducted with the approval of the ethics committee of our hospital.

Exclusion criteria: (1) Patients who were complicated with mental disorders. (2) Patients who were complicated with severe disturbance of consciousness. (3) Patients who were compli-

cated with other organic diseases such as coronary heart disease and renal failure. (4) Patients who were found through examinations to be with stroke caused by non-vascular factors such as brain tumor and trauma. (5) Patients with a previous history of stroke. (6) Pregnant or lactating women. (7) Patients with poor treatment compliance. (8) Patients who were complicated with congenital lower-extremity dysfunction. (9) Patients who lived alone.

Elimination criteria: (1) Patients with disturbance of consciousness and unable to continue the investigation during intervention. (2) Patients with poor compliance and unable to continue the investigation during intervention. (3) Patients who voluntarily requested to leave during intervention. (4) Death cases.

Intervention methods

Patients in the control group received routine out-of-hospital care, including regular re-examinations, necessary health inquiry services provided by medical staff, regular medication, regular diet and self-rehabilitation training.

Patients in the study group received collaborative care on the basis of routine out-of-hospital care. Specific measures were as follows: (1) First, a collaborative care group was set up to formulate the plan and define the responsibilities of collaborative care, with members of the group consisting of the physicians and nursing staff of the hospital, the patients' co-resident family members, and medical staff in the community medical institutions where the patients lived. After the establishment of the group, a meeting was held at an appropriate time, during which the hospital medical staff introduced the overall treatment of the patients and the main points of the next nursing work to the community medical staff and the patients' family members. At the same time, the hospital medical staff provided the community with the necessary clinical data of patients, so as to facilitate the continuation of the later treatment. It was clear that the community medical staffs were responsible for the follow-up general nursing interventions and the family members were responsible for cooperation in the implementation. (2) Collaborative care was carried out. The community medical staff fully understood the actual situation of the patients at first, and then worked together with the family members to develop detailed nursing inter-

vention plans, mainly including diet interventions, drug supervision, health education, rehabilitation therapy, psychological care, and return visits and reexaminations. Diet interventions and drug supervision were main responsibilities of the family members, who should adjust the diet structure of patients according to their requirements to ensure nutrition intake while reducing the intake of various oils and salts. Drug supervision was also carried out by the family members to urge the patients to take drugs regularly. Health education was mainly organized by the community medical staff in a flexible and diverse way, such as convening large classes for the community patients, distributing leaflets and WeChat push, so as to improve the patients' understanding of stroke and treatment compliance. Rehabilitation therapy was carried out jointly by the community medical staff and the family members to restore the patients' joint function and improve their self-care ability. The purpose of psychological care was to monitor the emotional fluctuation of patients and intervene in those with negative emotions in time. Return visits and reexaminations were mainly performed by the hospital medical staff, facilitating the revision of the later-stage collaborative care plan. (3) Plan revision and adjustment. According to rehabilitation situation, the tripartite cooperation continuously revised the intervention plan to meet the rehabilitation needs of patients.

Observational indicators and evaluation criteria

Comparison of QOL before and after intervention: The 36-Item Short-Form Health Survey (SF-36) was used to assess the QOL of patients before and at 1, 3 and 6 months after intervention. The scale was composed of 8 aspects such as physiological function, vitality and emotional function, which can evaluate the QOL of patients and has been widely used in clinical practice. It can be divided into somatic, mental and life functions. Higher score indicates better QOL.

Comparison of self-care ability before and after intervention: The Exercise of Self-Care Agency (ESCA) was used to evaluate the patients' self-care ability before and at 6 months after intervention, consisting of self-care skills (12 items), initiative and self-responsibility (8 items), self-concept (9 items) and knowledge and informa-

tion seeking (14 items), with 4 sub-items and 43 items in total. The ESCA score is the sum of item scores. Higher score of each dimension indicates stronger self-care ability [12].

Comparison of negative emotions before and after intervention: The Self-Rating Anxiety Scale (SAS) and the Self-Rating Depression Scale (SDS) were used to evaluate the patients' anxiety and depression before and at 6 months after intervention. In the SAS, there were 20 items reflecting the anxiety of the patients, including 15 positive scores and 5 negative scores. A four-grade scoring system of 1-4 was adopted. According to Chinese standards, a score of 49 points or below indicates no anxiety, 50-59 points for mild anxiety, 60-69 points for moderate anxiety, and 70 points or above for severe anxiety. There were 20 items in the SDS, including 10 positive scores and 10 negative scores. A four-grade scoring system of 1-4 was adopted. According to Chinese standards, a score of 52 points or below indicates no depression, 53-62 points for mild depression, 63-72 points for moderate depression, and 73 points or above for severe depression [13].

Comparison of limb function before and after intervention: The Fugl-Meyer Assessment Lower Extremity (FMA-LE) and the Functional Ambulation Category (FAC) were used to evaluate the patients' lower limb motor function and functional ambulation category before and at 6 months after intervention, respectively. The FMA-LE mainly included 7 items such as sitting, supine and standing positions, with a full score of 34 points. Higher score indicates better lower limb function. The FAC is divided into 0-5 grades. Grade 0 represents that patients cannot walk on their own. Grade 1 represents that patients can walk with the continuous support from 1 person. Grade 2 represents that patients can walk with the intermittent support from 1 person. Grade 3 represents that patients can walk without the support but with supervision. Grade 4 represents that patients can walk independently on level ground but require help on stairs. Grade 5 represents that patients can walk independently anywhere [14].

Comparison of self-efficacy and self-perceived burden before and after intervention

The General Self-Efficacy Scale (GSES) and Self-Perceived Burden Scale (SPBS) were used

Feasibility of collaborative care interventions for stroke patients

Table 1. Comparison of general clinical data ($\bar{x} \pm sd$)/[n (%)]

| General clinical data | | Study group (n=39) | Control group (n=39) | t/X ² | P |
|----------------------------------|------------------------------|-----------------------|-------------------------|------------------|-------|
| Gender | Male | 23 | 24 | 0.054 | 0.817 |
| | Female | 16 | 15 | | |
| Average age (years) | | 56.19±3.21 | 56.21±2.98 | 0.029 | 0.977 |
| Average body weight (kg) | | 62.18±3.22 | 62.22±3.31 | 0.054 | 0.957 |
| Average BMI (kg/m ²) | | 22.39±2.19 | 22.41±2.21 | 0.04 | 0.968 |
| Occupations | Farmers | 9 | 9 | 0.311 | 0.811 |
| | Workers | 14 | 15 | | |
| | Others | 16 | 15 | | |
| Educational background | Illiteracy | 5 | 4 | 0.361 | 0.801 |
| | Primary school | 11 | 12 | | |
| | Junior high school | 14 | 13 | | |
| | Senior high school and above | 9 | 10 | | |
| Marital status | Married | 35 | 34 | 0.126 | 0.723 |
| | Unmarried | 4 | 5 | | |
| Types of diseases | Hemorrhagic | 30 | 31 | 0.075 | 0.784 |
| | Ischemic | 9 | 8 | | |

to evaluate the patients' self-efficacy and self-perceived burden before and at 6 months after intervention, respectively. The GSES includes 10 items, and each item is divided into 4 options, with a scoring system of 1-4 points adopted and the scores of the 10 items as the final score. Higher score indicates higher self-efficacy. The SPBS consists of 10 items, with a full score of 40 points, and a scoring system of 1-5 points was adopted. Higher score indicates heavier self-perceived burden.

Statistical analysis

The collected data were statistically analyzed by SPSS20.0. Measurement data were expressed as ($\bar{x} \pm sd$) and compared by Student's t-test. Count data were expressed as [n (%)] and compared by chi-square test. When $P < 0.05$, the difference was statistically significant [15].

Results

Comparison of general clinical indicators

There was no significant difference in terms of general clinical data such as gender, age, body weight, marital status, educational background, types of diseases and medical history between the two groups ($P > 0.05$) (**Table 1**).

Comparison of QOL before and after intervention

Before intervention, there were no statistically significant differences in the scores of each dimension in the SF-36 between the two groups ($P > 0.05$). After intervention, the scores in the study group were significantly increased ($P < 0.05$), while those in the control group were not ($P > 0.05$). The scores in the study group were higher than those in the control group after intervention ($P < 0.05$) (**Figure 1**).

Comparison of self-care ability before and after intervention

Before intervention, the scores of self-care skills, initiative and self-responsibility, self-concept and knowledge and information seeking expressed no significant difference between the two groups ($P > 0.05$). After intervention, the above-mentioned scores in the study group were significantly higher than those in the control group ($P < 0.05$), and the total score of self-care ability was higher in the study group ($P < 0.05$) (**Figure 2**).

Comparison of negative emotions before and after intervention

Before intervention, the two groups showed no statistically significant differences in SAS and

Feasibility of collaborative care interventions for stroke patients

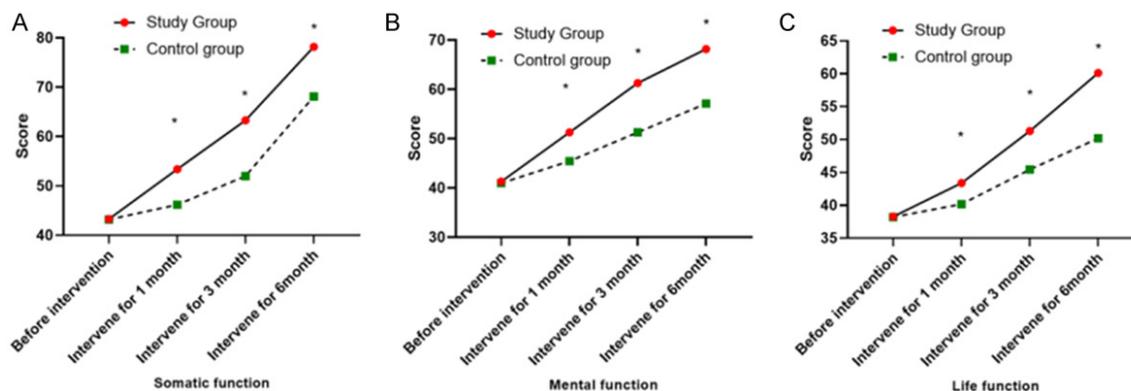


Figure 1. Comparison of QOL before and after intervention. Before intervention, there was no significant difference in the scores of each dimension in the SF-36 between the two groups ($P>0.05$). At 1, 3 and 6 months after intervention, the scores of each dimension in the two groups showed a gradually increasing trend, and the difference before and after intervention was statistically significant ($P<0.05$). At 1, 3 and 6 months after intervention, the scores of somatic, mental and life functions in the study group were higher than those in the control group ($P<0.05$) (A-C). * indicates a statistically significant difference in the same indicator between groups at the same time point.

SDS scores ($P>0.05$). At 6 months after intervention, the SAS and SDS scores were significantly decreased in the two groups ($P<0.05$), and the scores were lower in the study group ($P<0.05$) (Figure 3).

Comparison of limb function before and after intervention

Before intervention, the FMA-LE and FAC scores expressed no significant difference between the two groups ($P>0.05$). After intervention, the FMA-LE and FAC scores were significantly increased in the two groups ($P<0.05$), and the scores were higher in the study group ($P<0.05$) (Table 2).

Comparison of self-efficacy and self-perceived burden before and after intervention

Before intervention, no significant difference was found in the GSES and SPBS scores between the two groups ($P>0.05$). At 6 months after intervention, the GSES scores were significantly increased but the SPBS scores were significantly decreased in the two groups ($P<0.05$). At 6 months after intervention, the GSES score was higher but the SPBS score was lower in the study group compared with those in the control group ($P<0.05$) (Table 3).

Discussion

In recent years, with the rapid development of economy in China, the living standards of Chinese people have been significantly im-

proved, but the trend of social aging and the adjustment of life and diet structures have also led to significant changes in the prevalence rates of various diseases. Cardio-cerebrovascular diseases are one of the most common diseases in China, with a prevalence rate of up to 80% in the middle-aged and the elderly population. They account for 41% of the total causes of deaths and have a disability rate of 50%, both of which rank the first. In China, 3.5 million people die of the diseases every year, with the mortality rate accounting for 42% of the total deaths of residents, far higher than that of other diseases [16]. In addition, the long course of disease, difficult treatment, easy recurrence, and high mortality and disability rates are typical features of cardio-cerebrovascular diseases, whose disease burdens account for approximately 70% of total disease burdens, seriously affecting the normal development of Chinese society and the improvement of living standards of Chinese people.

Stroke is a common disease with high incidence in cardio-cerebrovascular diseases, which is characterized by an acute onset, a dangerous condition, and high mortality and disability rates. Clinical studies have indicated that patients with stroke have a long clinical treatment cycle and generally need long-term nursing interventions after the acute phase in hospitals, so as to alleviate the limb dysfunction, speech and language impairment, psychological disorders, cognitive disorder and other phenomena caused by cerebral ischemia. Data

Feasibility of collaborative care interventions for stroke patients

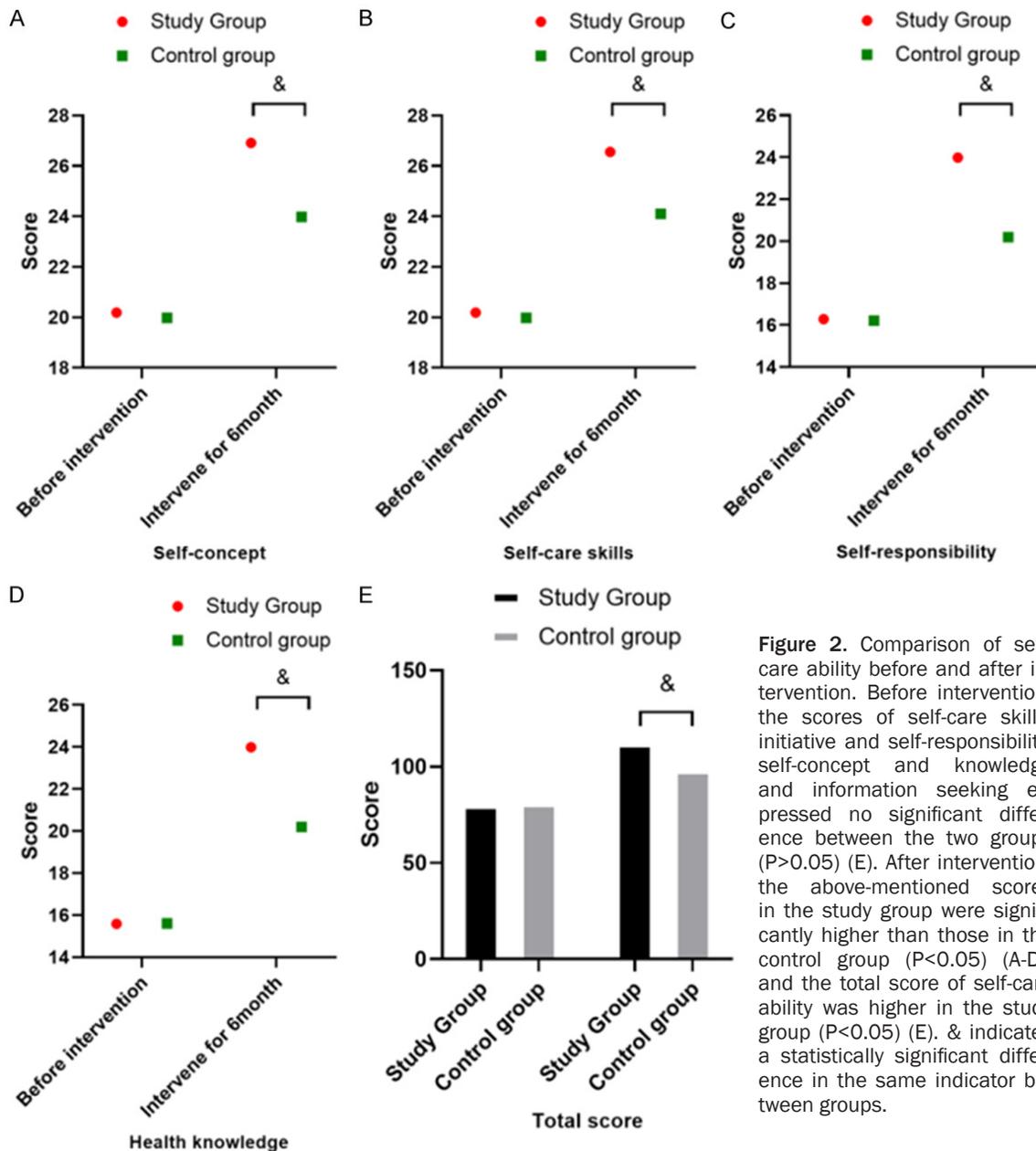


Figure 2. Comparison of self-care ability before and after intervention. Before intervention, the scores of self-care skills, initiative and self-responsibility, self-concept and knowledge and information seeking expressed no significant difference between the two groups ($P>0.05$) (E). After intervention, the above-mentioned scores in the study group were significantly higher than those in the control group ($P<0.05$) (A-D), and the total score of self-care ability was higher in the study group ($P<0.05$) (E). & indicates a statistically significant difference in the same indicator between groups.

show that approximately 80% of the patients who receive initial treatment in hospitals need to return to their families for further interventions [17, 18]. At present, the commonly used out-of-hospital intervention model for stroke patients is continuous care, which aims at enabling the patients to get appropriate out-of-hospital care. However, since the effects of simple continuous care cannot meet the expectation because of limited medical resources and the patients' own factors, some stroke patients lack the conditions to receive this nursing model due to living alone or widow-

hood, which affects the postoperative functional recovery of patients [19].

Collaborative care is a new nursing model originated in the United States in recent years. Based on Orem's Self-Care Deficit Theory, scholars Lott and others have proposed a model that fully utilizes the limited manpower to stimulate the potential of patients and the surrounding population to participate in nursing, unites nursing staff, the patients and their families as a whole, mobilizes the patients' subjective initiative, and finally implements nursing

Feasibility of collaborative care interventions for stroke patients

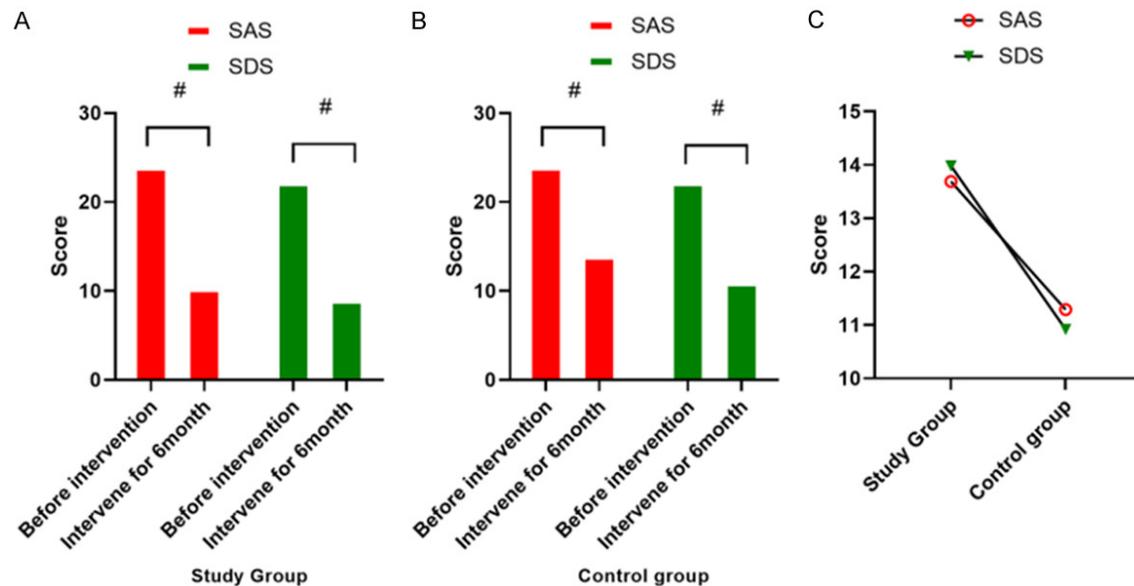


Figure 3. Comparison of negative emotions before and after intervention. After intervention, the SAS and SDS scores were significantly decreased in the study group ($P < 0.05$) (A). After intervention, the SAS and SDS scores were significantly decreased in the control group ($P < 0.05$) (B). The decrease of the two scores in the study group was greater than that in the control group (C). # indicates a statistically significant difference in the same indicator between groups at the same time point.

Table 2. Comparison of limb function before and after intervention ($\bar{x} \pm sd$)

| Groups | Number of cases | FMA-LE | | FAC | |
|---------------|-----------------|---------------------|--------------------|---------------------|--------------------|
| | | Before intervention | After intervention | Before intervention | After intervention |
| Study group | 39 | 10.28±2.39 | 20.29±2.31* | 2.87±0.21 | 4.19±0.34* |
| Control group | 39 | 10.31±2.88 | 15.18±2.33* | 2.91±0.19 | 3.87±0.19* |
| <i>t</i> | - | 0.05 | 9.726 | 0.882 | 5.131 |
| <i>P</i> | - | 0.96 | <0.001 | 0.381 | <0.001 |

Note: Compared with before treatment, * $P < 0.05$.

Table 3. Comparison of self-efficacy and self-perceived burden before and after intervention ($\bar{x} \pm sd$)

| Groups | Number of cases | GSES | | SPBS | |
|---------------|-----------------|---------------------|--------------------|---------------------|--------------------|
| | | Before intervention | After intervention | Before intervention | After intervention |
| Study group | 39 | 20.18±2.32 | 33.38±3.21* | 19.19±2.31 | 10.21±2.11* |
| Control group | 39 | 19.98±2.31 | 27.19±3.01* | 18.98±2.41 | 13.18±2.09* |
| <i>t</i> | - | 0.382 | 8.785 | 0.393 | 6.245 |
| <i>P</i> | - | 0.704 | <0.001 | 0.695 | <0.001 |

Note: Compared with before treatment, * $P < 0.05$.

interventions through strengthening the role of collective [20, 21]. This model is nursing process optimization, which maximizes the integration of existing medical resources and provides patients with as much care and health guidance as possible. In this study, the feasibility of collaborative care application was ana-

lyzed by grouping stroke patients. The results showed that after intervention, the scores of each dimension in the SF-36 in the study group were significantly higher than those in the control group, indicating that collaborative care is helpful for improving the QOL of stroke patients. Some studies have pointed out that stroke

patients usually suffer from multi-system dysfunction due to cerebral ischemia, which seriously affects their normal life [22]. The traditional nursing mode for stroke patients mostly belongs to passive nursing, which is dominated by medical staff, while the collaborative care mode combines medical staff, patients and patients' families to form a nursing intervention circle, making nursing more fit for patients' lifestyle. A nursing study on 90 stroke patients showed that compared with conventional continuous care, collaborative care can effectively improve the subjective initiative of patients, strengthen their awareness of active nursing and nursing skills, and improve the quality of life of long-term follow-up patients [23]. The results of meta analysis for collaborative care show that collaborative care has the following advantages: (1) It abandons the traditional one-way teaching mode of medical staff to patients, but advocates to give full play to the strength of the patients, their families and communities, and strengthens the role of group nursing. (2) Continuous collaborative care can enhance the consciousness of patients' participation in nursing and maximize the potential of patients' self-care. (3) It also fully integrates the existing human and medical resources to effectively avoid the waste of resources. (4) Compared with traditional nursing, collaborative care pays more attention to daily interventions, which penetrates into all aspects of patients' lives and increases the feasibility and effectiveness of nursing interventions [24]. In view of the above advantages to the observational indicators in this study, we have conducted the analysis as follows: collaborative care provides a platform for patients to perform rehabilitation exercises and psychological counseling, so the patients in the study group are better than those in the control group in improving their QOL and relieving their negative emotions. This model also stimulates their subjective initiative and improves their self-care ability during the process of active participation. Moreover, it can provide a full-day platform for rehabilitation exercise interventions. Under the guidance of family members and the community medical staff, patients can carry out limb function exercises at a high frequency and obtain better limb function recovery. Finally, with the continuous improvement of stroke, patients' self-efficacy was continuously improved, but their sense of self-perceived burden significantly reduced [25].

In summary, collaborative care can significantly improve the QOL, self-care ability and self-efficacy of stroke patients, relieve their negative emotions, and accelerate their limb function recovery, as well as help to reduce their self-perceived burden, which is worthy of clinical application. However, there are several deficiencies in this study as follows: (1) The results were not representative due to the small sample size. (2) The follow-up time was too short to evaluate the long-term efficacy. In view of the above deficiencies, a study with a larger sample size, longer follow-up time and more detailed observational indicators is planned to be carried out in the next step, so as to provide strong theoretical support for the rehabilitation nursing of stroke patients.

Disclosure of conflict of interest

None.

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Feasibility of collaborative care interventions for stroke patients

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