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# The effects of continuing care based on WeChat platform and MDT on outcomes and negative emotions in young and middle-aged patients with stroke sequelae

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### *Abstract*

*Objective:* This study aimed to investigate the effect of continuing care based on WeChat platform and MDT (multidisciplinary team) on outcomes and negative emotions in young and middle-aged patients with stroke sequelae. *Methods:* A retrospective study was conducted on clinical data of 109 young patients with post-stroke sequelae in our hospital. Based on the nursing approach, the patients were divided into two groups. Group A received conventional continued care (including reinforcing health education upon discharge, providing relevant precautions after discharge, regular follow-up of patients, and others), while Group B received continued care based on the WeChat platform and multidisciplinary team (MDT) collaboration. A comparative analysis was performed on NHISS (National Institutes of Health Stroke Scale) scores, Barthel Index (activities of daily living), FMA (Fugl-Meyer Assessment of Motor Recovery after Stroke) scores, disease awareness and attitude scores, self-efficacy scores, self-care ability scores, SAS (Self-Rating Anxiety Scale) scores, SDS (Self-Rating Depression Scale) scores, quality of life scores, and social support levels before intervention and 6 months after interventions in both groups. *Results:* Compared with Group A, Group B had lower NHISS scores (30.08 vs. 17.08) and higher Barthel Index (73.35 vs. 94.48) and FMA scores (68.06 vs. 90.08) (P<0.05); higher disease awareness scores (40.18±2.15 vs. 48.96±3.66) (P<0.05), higher self-efficacy scores (105.56 vs. 119.26) and self-care scores (98.18 vs. 110.06) (P<0.05), lower SAS scores (56.06 vs. 40.06) (P<0.05), higher quality of life (125.63±3.12 vs. 185.12±2.52) as well as higher nursing satisfaction scores (56.63±3.16 vs. 92.15±3.15) (P<0.05).
*Conclusions:* Continuing care based on the WeChat platform and MDT is beneficial to promote the recovery of neurological and physical functions, improve abilities of daily living, self-efficacy, self-care and quality of life in young and middle-aged patients with stroke sequelae, and relieve the impact of negative emotions on the recovery.

*Keywords:* Continuing care, MDT; middle-aged and young adults, negative emotions, post-stroke

## INTRODUCTION

Clinically, stroke is a cerebrovascular disease with a high incidence, and most patients will experience varying degrees of sequelae such as aphasia, cognitive dysfunction and hemiparesis, decreasing their quality of life and self-care abilities.[1,2] Epidemiological studies have found apparent rise in strokes among younger adults. The data from Stroke Foundation show that among all stroke patients, the ratio of under 65 years old is about 30% in Australia and that the number of young and middle-aged stroke patients is also significantly higher in low- and middle-income countries such as Brazil and China.[3,4] As the backbone of society, young and middle-aged people need to take social, family and personal responsibilities. Once neurological dysfunction or disability occurs, it will not only have a serious impact on their life and work, but also bring heavy psychological burdens to their family. Therefore, most young and middle-aged stroke patients usually experience negative emotions such as frustration, fear and sense of loss.[5,6]

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Young and middle-aged stroke patients face a variety of challenges during the long recovery process, including physical and mental disabilities brought about by sequelae, low self-management ability and self-efficacy, prominent psychological problems, and heavy burden of family caregiving.[7,8] It is necessary to adopt scientific and reasonable nursing measures to facilitate the rapid recovery of young and middle-aged patients with stroke sequelae.[9] Continuing care ensures that patients can enjoy the same level of services in different care settings, and extended care after discharge can promote recovery. Continuing care was traditionally performed with regular home visits and telephone follow-up, and the effect of care still needs to be enhanced.[10,11] With the advances in modern network technology, WeChat has produced a subtle effect in people's daily life and has become one crucial way of communication. Continuing care based on WeChat platform is expected to improve outcomes of rehabilitation care.[12] MDT is a cooperative model that is based on multidisciplinary collaboration and resource integration, aiming to maximize the rational use of various resources, allowing for continuous improvement in the quality of nursing services.[13] MDT has been widely used in nursing interventions for a variety of chronic diseases, including diabetes, with promising outcomes.

Most clinical studies have investigated the effects of WeChat platform or MDT-based continuing care in stroke care. However, the present study is innovative in combining these two care models in stroke sequelae care for young and middle-aged patients.

## METHODS

The clinical data of 109 young and middle-aged patients with stroke sequelae were retrospectively analyzed and divided into two groups based on the mode of care, 54 patients in Group A, who received conventional continuing care, and 55 patients in Group B received continuing care based on the WeChat platform and MDT.

The inclusion criteria were: signed informed consent; strong desire for rehabilitation; stroke confirmed by cranial MRI or cranial CT; without communication barriers. The exclusion criteria were: midway dropout; presence of psychiatric or cognitive dysfunction; presence of severe cardiac, hepatic, and renal disease; transient cerebral ischemia; ongoing participation in other studies; and other major illnesses such as concurrent respiratory failure and cardiac failure.

This study was approved by the medical ethics committee of Shanxi Bethune Hospital, Shanxi Academy of Medical Sciences, Tongji Shanxi Hospital, Third Hospital of Shanxi Medical University.

In Group A, the patients and their family members were given health education at the time of discharge, and were instructed to perform proper exercise, take healthy diet, correct bad habits, and return to the hospital for timely review; patients were regularly followed up at home or by telephone to review their condition and receive appropriate advices. The personnel conducted the intervention included primary caregivers, psychologists, clinical pharmacists, neurologists, dietitians, and rehabilitation therapists. The responsibilities were delineated as follows: neurologists undertook the primary responsibility of assessing the patients' conditions and devising specific treatment plans accordingly, adjusting these plans based on their post-discharge progress. Neurology nurses provided comprehensive continuing care, encompassing post-discharge nursing evaluations, health education, dietary advice, and medication guidance. Rehabilitation therapists, after a comprehensive understanding of the patients' cardiopulmonary function, condition, and muscle strength, devised post-discharge rehabilitation exercise regimes and timely adjustments, along with formulating subsequent rehabilitation plans based on their progress. Clinical pharmacists offered rational recommendations concerning medication plans proposed by neurologists, supervised and examined the medication's efficacy and adverse effects, ensuring utmost medication safety. Psychologists assessed the psychological state of discharged patients and their families, offering tailored psychological counseling. They employed motivational interviews to rectify adverse lifestyle choices such as excessive consumption of high-fat, high-salt, heavy alcohol intake, and smoking. They informed patients that strict adherence to medical advice for rehabilitation exercises ensured optimal recovery. Nutritionists chiefly focused on comprehensive nutritional assessments for patients and tailor dietary plans accordingly, instructing patients to strictly adhere to these plans post-discharge to enhance the efficacy of recovery.

Group B received continuing care based on the WeChat platform and MDT. Continuing care was conducted based on WeChat platform. A WeChat group for stroke rehabilitation was established. All patients joined the group by scanning SR code

when they are discharged from the hospital:

(1) Contents of care in group: After the patient is discharged from the hospital, a dedicated person was responsible for promoting stroke-related knowledge in this WeChat group everyday, including stroke pathogenesis, risk factors, treatment methods, symptoms, the latest stroke news, post-discharge rehabilitation exercise methods, and others, so as to improve the disease awareness of patients and their families. Rehabilitation exercise, including massages on the affected side, bridge exercises, sitting, standing, walking exercises, communication training, etc. were sent through video, which is convenient for patients to learn at any time. Patients and their families were encouraged to discuss in the WeChat group, Nursing staffs need to patiently and meticulously answer questions raised by patients and their families; A disease -related group discussion was organized in WeChat group every month to encourage patients to show their rehabilitation effects and to promote mutual encouragement and mutual support.

(2) One-to-one guidance: Nursing staffs became WeChat friends with the patient or family members, and strengthen one-to-one targeted guidance according to the patient's condition, including instructing the patient to measure body mass, heart rate and blood pressure every day, give advice on medication, exercise and diet according to the measurement results, and instruct the family members to strictly supervise the patient's medication.

(3) Follow-up care: nursing staffs can communicate with patients face-to-face by WeChat video calls, so as to carry out follow-up visits and strengthen the guidance and rehabilitation supervision of patients' conditions; Problems that are difficult to solve by WeChat follow-up visits are resolved by home visits, and if patients' conditions became worsen, they should be guided to seek medical treatment in a timely manner.

MDT-based continuing care:

(1) A MDT care team was established, joined by patient's primary caregiver, psychological counselor, clinical pharmacist, neurologist, nutritionist, and rehabilitator, and when the patients experienced serious complications, the team also included specialists from other departments. MDT training is reinforced for all team members and they are qualified before on duties. One member was assigned as the team leader, who is mainly responsible for the communication between members, and all members have a clear division of work and responsibilities.

(2) Division of labor and responsibilities: The neurologist is mainly responsible for assessing the patient's condition and formulating a targeted treatment plan for him/her according to the condition, as well as adjusting the treatment plan after discharge. The neurology nurses are mainly responsible for providing continuing care services, including post-discharge nursing assessment, health education, dietary and medication guidance. With a comprehensive understanding of the patient's cardiopulmonary function, condition and muscle strength, the rehabilitator formulates a post-discharge rehabilitation plan, and makes timely adjustments according to the patient's actual condition. The clinical pharmacist mainly gives advices on the medication plan supervises and checks toxic side effects, and ensures the safety of medication. The psychological counselor is mainly responsible for assessing the psychological status of patients and their families after discharge and providing them with targeted psychological counseling. Through motivational interviewing, he or she corrects patients' unhealthy lifestyles such as high fat and salt food, heavy alcohol consumption and smoking. The nutritionist was responsible for developing a targeted meal plan in order to improve the rehabilitation effect.

(3) Multidisciplinary teamwork process: During hospitalization, patients were dynamically evaluated by the multidisciplinary team and regimens and protocols were adjusted in a timely manner; Before discharge, a multidisciplinary meeting was held to discuss whether the patients could be discharged and to re-evaluate them; after the patients were discharged, their continuous follow-up was strengthened to observe the changes in their conditions and to provide them with continuous care services. The intervention time was 6 months in both groups.

*Outcome measurement*

(1) NHISS score, Barthel index and FMA score[14]: before and after the intervention, the NHISS score was used to evaluate the neurological deficits, ranging from 0-45 points, and the higher the score, the more severe the neurological deficits were. The Barthel index was used to evaluate the daily living ability of both groups, going up and down stairs, toileting, washing, and bowels, etc. The total score ranged from 0-100, and the higher the score, the better the daily living ability. The FMA

score was used to evaluate the functional status of the upper and lower extremities, ranging 0-100, the higher the score, the better the limb function.

(2) Disease awareness score[15]: Before and after the intervention, the disease awareness of patients in both groups was evaluated, including attitude toward the management of symptoms episodes, risk factor prevention and management, attitude toward social participation, and attitude toward disease treatment, with a total of 15 items on a 0-4 point scale, and the level of disease awareness was directly proportional to the score.

(3) Self-efficacy scores[16]: Before and after the intervention, the self-efficacy of both groups was evaluated using the Conscious Health Behavior Self-Efficacy Scale, with 28 items, covering exercise, nutrition, psychological well-being, and health responsibility on a 0-4 scale, with total scale scores ranging from 0-112, and self-efficacy is proportional to total scores.

(4) Self-care abilities scores[17]: Before and after the intervention, the ESCA (Self-care Agency Scale) was used to evaluate the self-care abilities in both groups, with 43 items in four aspects: level of health knowledge, self-concept, self-care responsibility, and self-care skills, with a total of 11 reverse-rated items. All items were evaluated on a 5-point scale, ranging 0-172 points, and patients' self-care abilities were proportional to their scores.

(5) Negative mood[18]: Before and after the intervention, the negative mood was evaluated using SAS and SDS, with cut-off values of 50 and 53, respectively, and the level of anxiety and depression was directly proportional to the scores.

(6) Quality of life[19]: The SS-QOL (Stroke Specific Quality of Survival Scale) was used, which included 12 domains with a total of 49 items, covering patients' ability to work, emotional management, social activity, family relationships, interpersonal communication, and self-care, and the quality of life was proportional to the scores.

(7) Nursing satisfaction[20]: After the intervention, a satisfaction survey was performed in both groups in terms of nursing expertise, nursing attitude, and nursing responsibility, with a total score of 100, and nursing satisfaction was proportional to the scores.

(8) Level of social support: The social support levels of the two patient groups were assessed using the Social Support Scale (SSS) before and after the intervention. The scale consists of 10 items, including subjective support (items 1, 3, 4, 5), objective support (items 2, 6, 7), and utilization of support (items 8, 9, 10), representing three dimensions. The total score of all items reflects the overall level of social support, with higher scores indicating higher levels of social support.

*Statistical methods*

Data in this study were analyzed using SPSS 23.0 statistical software. Measurement data conforming to normal distribution and exhibiting homogeneity of variance underwent independent sample t-tests. For non-normally distributed measurement data and ranked data, before and after data comparisons were conducted using the Wilcoxon signed-rank test, while between-group comparisons were conducted utilizing the Mann-Whitney test. Descriptive analysis was used for the measurement data, whereas between-group comparisons for count data utilized the chi-square test in a contingency table format. The significance level was set at $\alpha$=0.05.

## RESULTS

*Comparison of baseline data*

There was no significant differences in terms of gender, age, type of disease, and type of sequelae between two groups (P>0.05) (Table 1).

*Comparison of NHISS scores, Barthel index and FMA scores*

There was no significant difference in NHISS scores, Barthel index and FMA scores before intervention in both groups ($P$>0.05); Compared with before intervention, NHISS scores were lower and Barthel index and FMA scores were higher in both groups after intervention ($P$<0.05); Compared with Group A, Group B had lower NHISS scores (mean = 30.08 in group A vs. 17.08 in Group B) and higher Barthel index (mean = 73.35 in Group A vs. 94.48 in Group B), FMA scores (mean = 68.06 in Group A vs. 90.08 in Group B) ($P$<0.05) after the intervention (Figure 1).

*Comparison of disease awareness scores*

There was no significant difference in disease cognitive attitude scores between the two groups before the intervention ($P$>0.05); disease cognitive attitude scores were higher in both groups after the intervention compared to before the intervention

**Table 1: Comparison of baseline data [n (%)]/($\bar{x}$±s)**

| Data | | Group A (n=54) | Group B (n=55) | $t/X^2$ | *P* |
|---|---|---|---|---|---|
| Gender (cases) | Male | 39 (72.22) | 41 (74.55) | 0.075 | 0.784 |
| | Female | 15 (27.78) | 14 (25.45) | | |
| Age (years) | | 45.19±2.13 | 45.22±2.15 | 0.073 | 0.942 |
| Type of disease (cases) | | | | | |
| Cerebral infarction | | 29 (53.70) | 30 (54.55) | 0.008 | 0.930 |
| Cerebral hemorrhage | | 25 (46.30) | 25 (45.45) | | |
| Type of sequelae (cases) | | | | | |
| Left-sided hemiparesis | | 28 (51.85) | 29 (52.73) | 0.008 | 0.927 |
| Right-sided hemiparesis | | 26 (48.15) | 26 (47.27) | | |

(*P*<0.05); and disease cognitive attitude scores were higher in Group B after the intervention compared to Group A (*P*<0.05) (Table 2).

*Comparison of self-efficacy scores*

There was no significant difference in total self-efficacy scores between the two groups before the intervention (*P*>0.05); The self-efficacy scores were improved after the intervention (*P*<0.05); compared with group A, group B (mean = 105.56 in Group A vs. 119.26 in Group B) exhibited higher self-efficacy scores (*P*<0.05) (Figure 2).

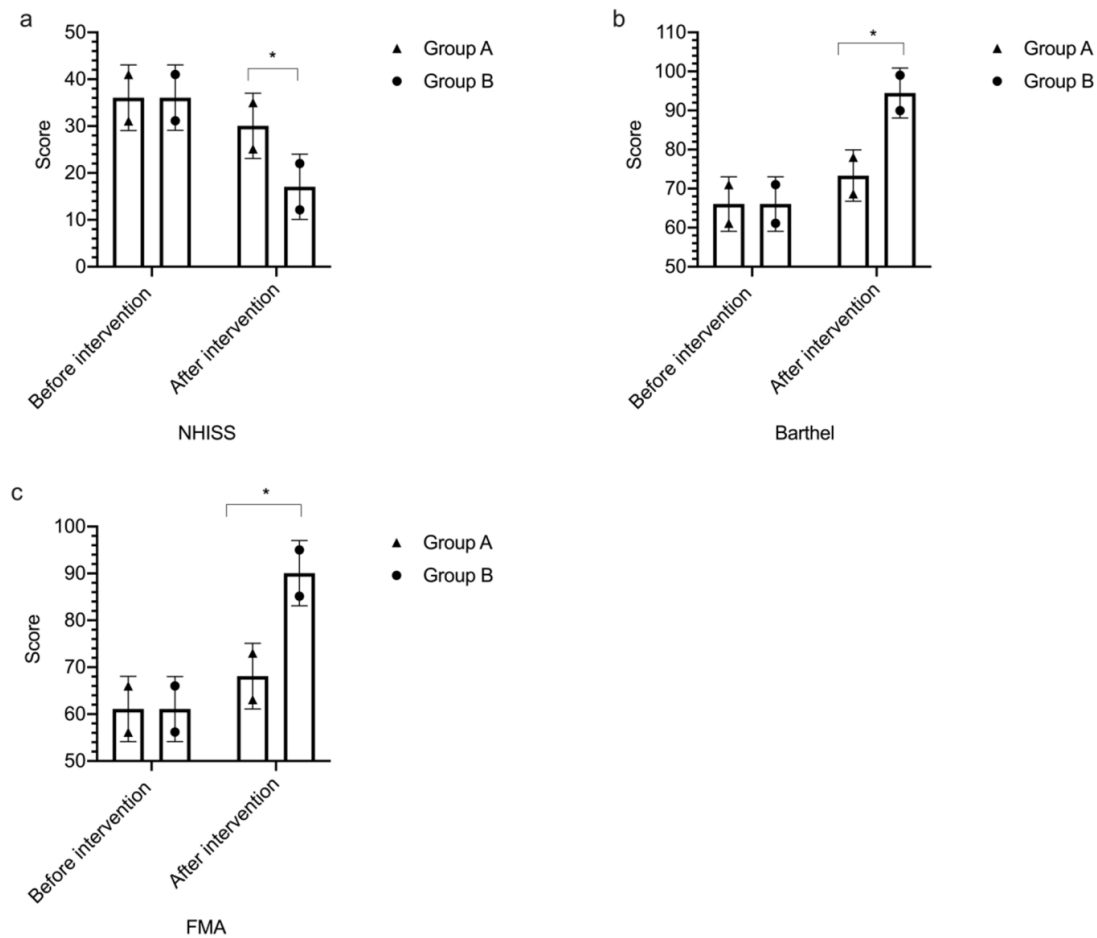


Figure 1. Comparison of NHISS scores, Barthel index and FMA scores
a: NHISS scores; b: Barthel index; c: FMA scores.* indicates *P*<0.05 compared with group A.

**Table 2: Comparison of disease awareness scores ($\bar{x}$±s, points)**

| Group | Before intervention | After intervention |
|---|---|---|
| Group A (n=54) | 36.12±1.05 | 40.18±2.15# |
| Group B (n=55) | 36.15±1.02 | 48.96±3.66#* |
| *t* | 0.151 | 15.235 |
| *P* | 0.880 | <0.001 |

#indicates comparison with pre-intervention, *P*<0.05; *indicates comparison with group A, *P*<0.05.

*Comparison of self-care abilities scores*

There were no significant differences in the self-care abilities between two groups before the intervention (*P*>0.05), and the self-care abilities were improved in both groups after intervention (*P*<0.05); Compared with Group A, Group B had higher self-care abilities (mean = 98.18 in Group A vs. 110.06 in Group B) after the intervention (*P*<0.05) (Figure 3).

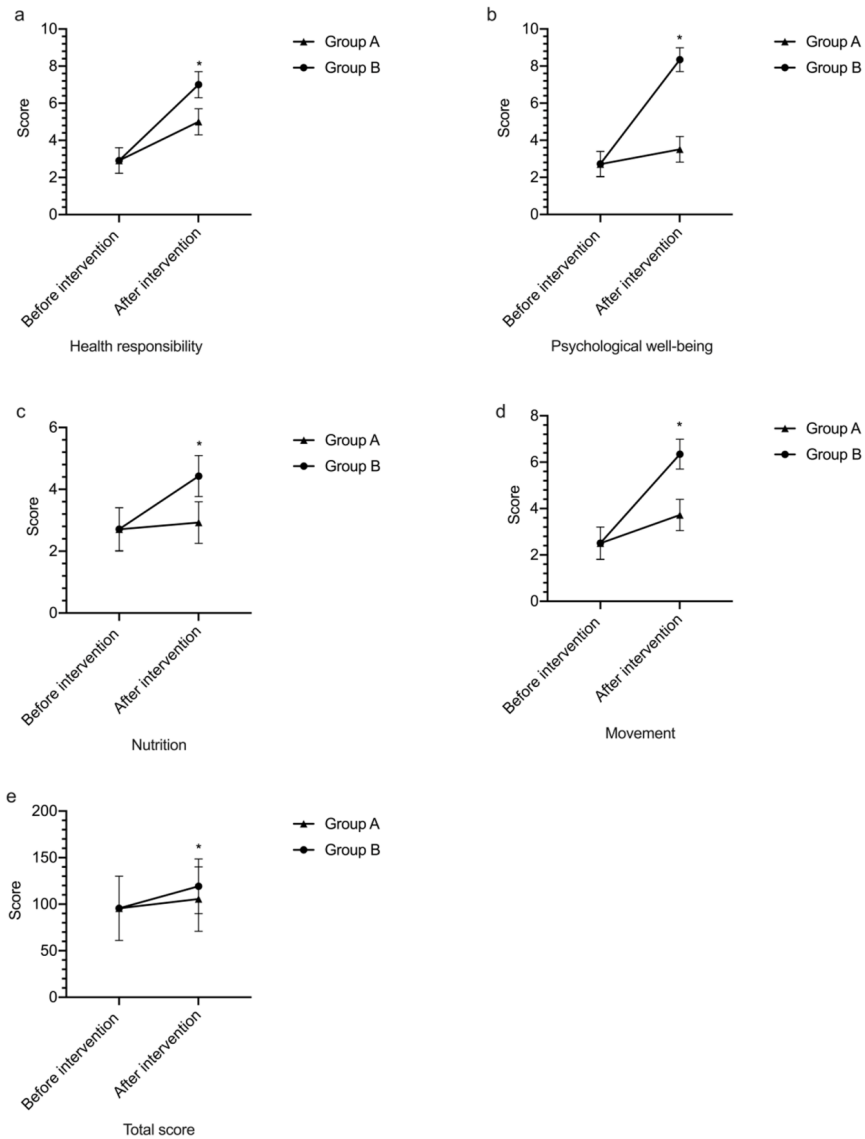


Figure 2. Comparison of self-efficacy scores
a: Health responsibility scores; b: Psychological well-being scores; c: Nutrition scores; d: Exercise scores; e: Total self-efficacy scores.* indicates *P*<0.05 compared with group A.

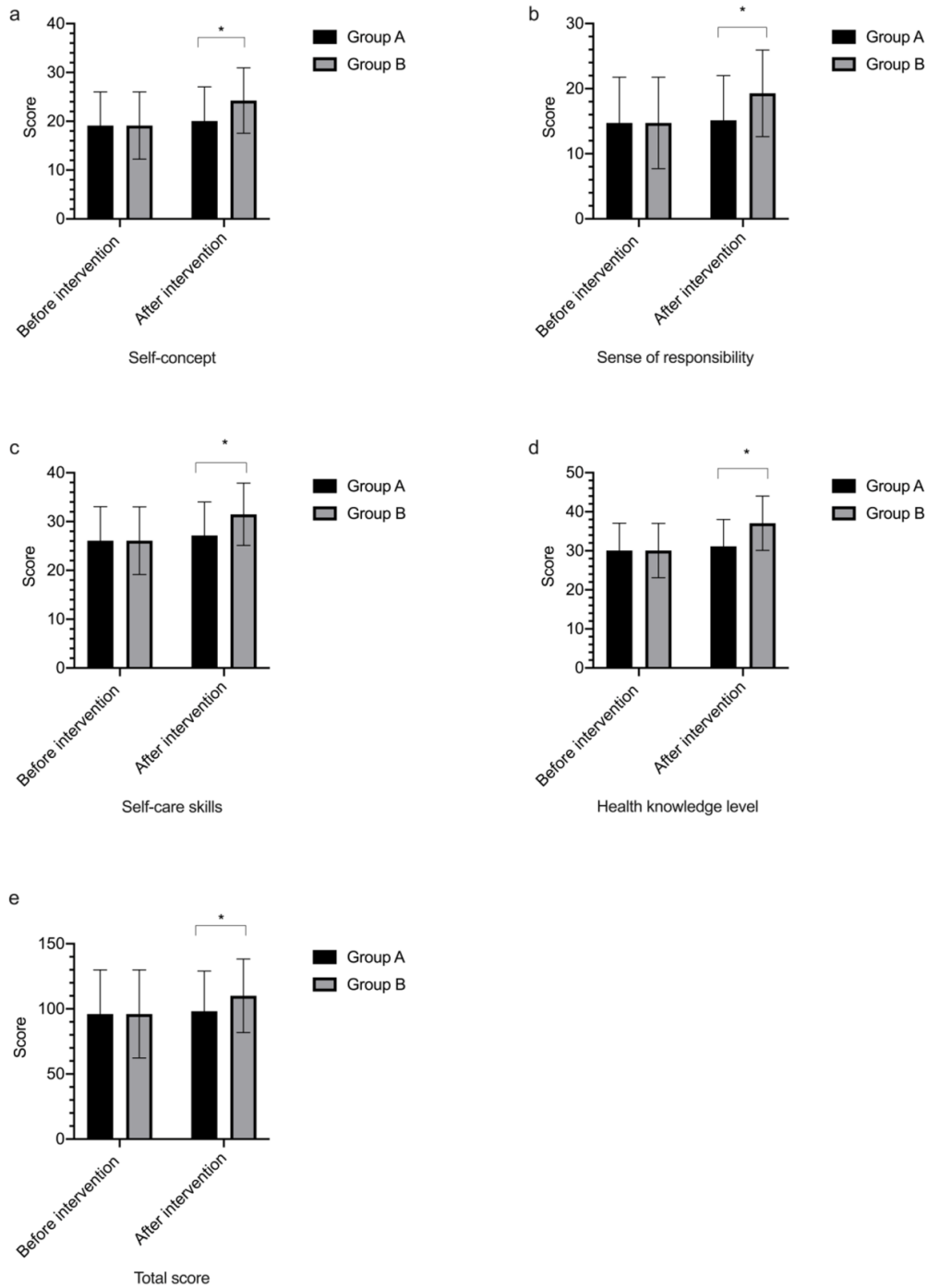


Figure 3. Comparison of self-care ability scores
a: Self-concept scores; b: Self-care responsibility scores; c: Self-care skill scores; d: Health knowledge scores; e: Total self-care ability scores.* indicates $P<0.05$ compared with group A.

*Comparison of negative mood scores*

There was no significant difference in SAS scores and SDS scores before the intervention between two groups ($P>0.05$); SAS scores and SDS scores were decreased in both groups after the intervention ($P<0.05$); Compared with Group A, SAS scores (mean = 56.06 in Group A vs. 40.06 in Group B) and SDS scores (mean = 59.06 in Group A vs. 41.13 in Group B) were lower in Group B after the intervention ($P<0.05$) (Figure 4).

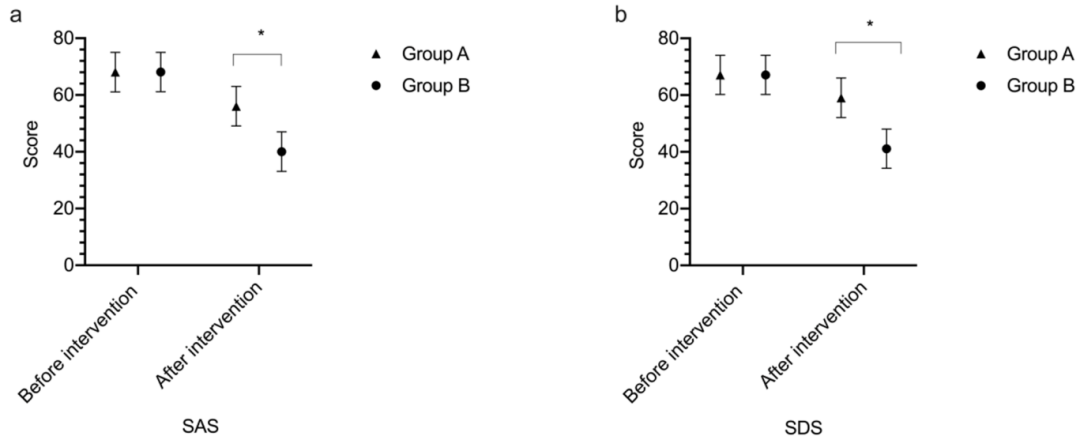


Figure 4. Comparison of negative mood scores
a: SAS scores; b: SDS scores.* indicates $P<0.05$ compared with group A.

*Comparison of quality of life scores*

There was no significant difference in quality of life scores between the two groups before the intervention ($P>0.05$); The quality of life scores were improved in both groups after the intervention ($P<0.05$); Compared to Group A (125.63±3.12), quality of life scores were higher in Group B (185.12±2.52) after the intervention ($P<0.05$) (Table 3).

*Comparison of nursing satisfaction scores*

There was no significant difference in nursing satisfaction scores between two groups before the intervention ($P>0.05$); Compared to before the intervention, nursing satisfaction scores were increased in both Group A (45.12±2.12 vs. 56.63±3.16) and Group B (45.18±2.09 vs. 92.15±3.15) after the intervention ($P<0.05$); Compared to group A, nursing satisfaction scores were higher in Group B after the intervention ($P<0.05$) (Table 4).

*Comparisons of social support levels between the two groups*

There were no significant differences in subjective support, objective support, utilization of support, and total social support scores between the two groups before the intervention ($P > 0.05$). However, compared to before the intervention, both groups showed significant improvements in subjective support, objective support, utilization of support, and total social support scores after

**Table 3: Comparison of quality of life scores ($\bar{x}$±s, points)**

| Group | Before intervention | After intervention |
|---|---|---|
| Group A (n=54) | 115.12±2.15 | 125.63±3.12# |
| Group B (n=55) | 115.19±2.13 | 185.12±2.52#* |
| *t* | 0.171 | 109.608 |
| *P* | 0.865 | 0.000 |

#indicates comparison with pre-intervention, $P<0.05$; *indicates comparison with group A, $P<0.05$.

**Table 4: Comparison of nursing satisfaction scores ($\bar{x}$±s, points)**

| Group | Before intervention | After intervention |
|---|---|---|
| Group A (n=54) | 45.12±2.12 | 56.63±3.16# |
| Group B (n=55) | 45.18±2.09 | 92.15±3.15#* |
| *t* | 0.149 | 58.768 |
| *P* | 0.882 | 0.000 |

#indicates comparison with pre-intervention, $P<0.05$; *indicates comparison with group A, $P<0.05$.

the intervention ($P < 0.05$). Additionally, when comparing Group B to Group A, the post-intervention scores for subjective support (mean = 25.09 in Group A vs. 30.48 in Group B), objective support (mean = 12.32 in Group A vs. 15.79 in Group B), utilization of support (mean = 11.01 in Group A vs. 15.65 in Group B), and total social support (mean = 52.08 in Group A vs. 78.98 in Group B) were higher in Group B ($P < 0.05$) (Figure 5).

## DISCUSSION

In this study, a continuing care model based on the WeChat platform and MDT was implemented to facilitate the rehabilitation of young and middle-aged patients with stroke sequelae. Our results indicated that after intervention, Group B demonstrated lower NHISS scores, higher disease awareness and attitude scores, higher social support levels, higher Barthel index, higher FMA score, higher quality of life scores, and higher nursing satisfaction scores ($P < 0.05$). These findings suggest that continuing care based on the WeChat platform and MDT can promote the recovery of neurological and physical functions among young and middle-aged patients with stroke sequelae, enhance activities of daily living and quality of life, reduce the impact of negative emotions on recovery, and lead to higher patient satisfaction.[21] The reason may be that WeChat is becoming more and more popular among Chinese population and is the primary social platform for people to connect with each other. Based on this, this study made full use of WeChat platform where patients joined the group by scanning QR code when they were discharged from the hospital, and nursing staffs shared knowledge related to stroke sequelae in WeChat group every day, and patiently answered questions raised by patients and their families,

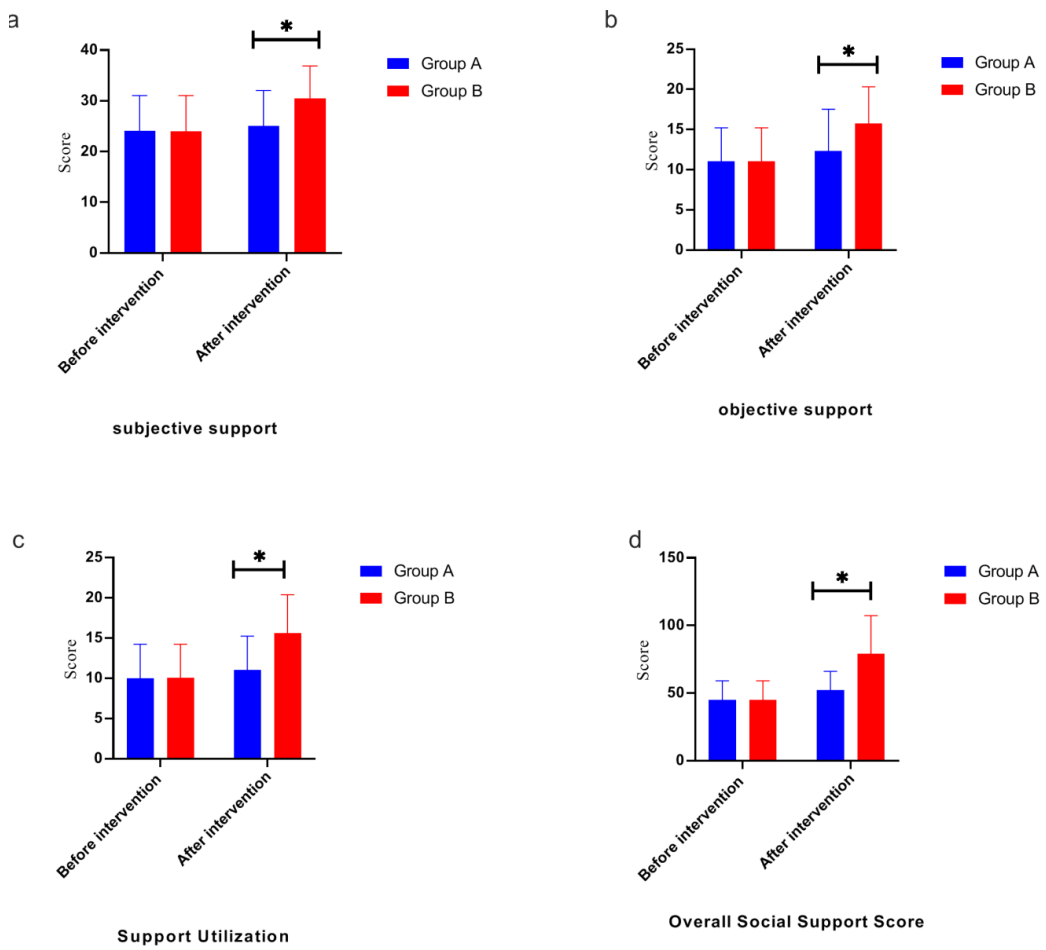


Figure 5. Comparisons of social support scores between the two groups
a: Subjective support scores; b: Objective support scores; c: Utilization of support scores; d: Total social support scores.* indicates $P<0.05$ compared with group A.

and provided one-to-one WeChat guidance to patients if necessary, which not only facilitated the improvement of patients' disease knowledge awareness, but also guided patients to strengthen rehabilitation exercises, reduce the degree of neurological deficits, improve limb function, and improve the ability to daily activities and quality of life.[22] Secondly, MDT-based continuous nursing intervention not only ensures that patients receive personalized rehabilitation guidance during hospitalization, but also receive professional, scientific and comprehensive rehabilitation guidance after discharge. The members of each team within the MDT have a clear division of labor, maximize respective function of roles, and jointly develop targeted rehabilitation programs for patients, which can effectively compensate for shortcomings of rehabilitation care provided by nurses alone.

Self-efficacy is the belief in one's capabilities to organize and execute the courses of action required to accomplish an established behavioral goal, and improving patients' self-efficacy is conducive to promoting the enhancement of their ability of self-care. The results of this study showed that the self-efficacy scores and self-care ability scores were higher in Group B than in Group A after care, suggesting that continuing care based on the WeChat platform and MDT was beneficial to improve the self-efficacy and self-care ability of young and middle-aged patients. This may be due to fact that health education and rehabilitation guidance was strengthened via WeChat, which significantly increased their disease awareness and improved self-management behaviors, so their self-efficacy increased. Coupled with the joint efforts of all members of the MDT, their condition improved significantly, and the patients themselves acquired more self-care skills.

The results of this study showed that the SAS score and SDS score in group B after the intervention were lower than those in group A ($P<0.05$), which demonstrated the effectiveness of the continuing care model based on the WeChat platform and MDT. This was highly consistent with the study of Zhang *et al*.[23], which showed that the psychological self-assessment depression scale scores and the psychological self-assessment anxiety scale scores of stroke patients were significantly reduced after continuing care ($P<0.05$). The reason may be that the MDT included professional counselors who were responsible for assessing the psychological status of patients and their families after discharge and providing them with targeted psychological guidance, correcting patients' badly habits through motivational interviewing, and providing support and encouragement to patients, so patients' negative emotions were eased. Therefore, there is a close relationship between the recovery of young and middle-aged patients with stroke sequelae and the continuing care based on the WeChat platform and MDT. However, similar research in the clinical field is lacking, thus making this study significantly innovative.

In conclusion, we believe that WeChat platform and MDT-based continuing care can facilitate the recovery of neurological and physical functions, improve the ability of daily living, self-efficacy, self-care abilities as well as quality of life, and reduce the influence of negative emotions in young and middle-aged patients with stroke, with high patient satisfaction.

This study has some limitations. Although this study demonstrated the favorable outcomes of continuing care in young and middle-aged patients with stroke sequelae utilizing a WeChat-based platform and MDT, the analysis was conducted only from the patient's perspective, and it is necessary to further strengthen the research and analysis of the changes in the nursing ability of caregivers.

The strength of this study lies in investigating the application effectiveness of continuing care for young and middle-aged patients with stroke sequelae through a continuing care model based on the WeChat platform and MDT. This can offer a new approach and evidence-based support for the continued care of young and middle-aged patients with stroke sequelae, fostering benefits for a broader spectrum of patients with similar conditions.

## DISCLOSURE

Financial support: None

Conflict of interest: None

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