Original Article
Effect of programmed nursing combined with cognitive behavioral intervention on clinical nursing effect and neurological function of patients with intracerebral hemorrhage

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Abstract: Objective: To investigate the effect of programmed nursing combined with cognitive behavioral intervention on clinical efficacy and neurological function of patients with intracerebral hemorrhage (ICH). Methods: In this retrospective study, 96 patients with ICH admitted to our hospital were enrolled and divided into a programmed group and a joint group, with 48 cases in each group. Patients in the programmed group were treated with programmed nursing while those in the joint group were given cognitive behavior intervention based on programmed nursing, for 28 days. The Fugl-Meyer (FM) Assessment Scale was used to evaluate the motor function of patients, the Barthel index to analyze the activities of daily living (ADL), and the National Institutes of Health Stroke Scale (NIHSS) and Glasgow Outcome Scale (GOS) to assess the neurological function. The quality of life of patients was evaluated by the World Health Organization quality of life Brief Version (WHOQOL-BREF), and the nursing satisfaction of patients or their families was investigated by the self-made satisfaction scale. The incidence of adverse reactions during treatment was recorded and compared. Results: FM Assessment Scale and Barthel index did not differ significantly between the two groups before nursing ($t_{Fugl-Meyer}$ =0.059, $t_{Barthel}$ =0.033, both P>0.05); after nursing, the two scores increased in both groups, with higher scores in the joint group ($t_{Fugl-Meyer}$ =3.331, $t_{Barthel}$ =2.735, both P<0.05). Before nursing, there was no difference in NIHSS and GOS scores between the two groups (t_{NIHSS} =0.257, t_{GOS} =0.553, both P>0.05); after nursing, however, the NIHSS score decreased and the GOS score increased in both groups, with statistically significant differences between the two groups (t_{NIHSS} =5.158, t_{GOS} =5.303, both P<0.05). The total effective rate in the joint group was significantly higher than that in the programmed group (91.67% vs. 77.08%; x^2=4.511, P=0.034). No significant difference was observed in the World Health Organization Quality of Life Scale Brief Version (WHOQOL BREF) score between the two groups (t=0.049, P=0.960) before nursing; after nursing, the score increased significantly in both groups, with a significant difference between the two groups (t=15.970, P<0.001). The satisfaction was 95.83% in the joint group, which was higher than that of 83.33% in the programmed group (x^2=3.913, P=0.048). The joint group also had fewer adverse reactions than the programmed group (x^2=7.401, P=0.007). Conclusion: Programmed nursing combined with cognitive behavioral intervention can improve the clinical efficacy of patients with ICH, improve limb motor ability, and reduce neurological deficits, with high safety.

Keywords: Intracerebral hemorrhage, programmed nursing, cognitive behavioral intervention, neurological function

Introduction

Intracerebral hemorrhage (ICH), also known as spontaneous cerebral hemorrhage, is a common cerebrovascular disease. According to the statistics of the Guidelines for the Diagnosis and Treatment of ICH in China (2014), there are 10-15 people out of every 100,000 people in China suffering from ICH, and the disease is usually complicated with hypertension and arteriosclerosis, with a high incidence in people over 50 years of age [1]. The common site of ICH is the basal ganglia region, which occupies more than 50% of the bleeding site, followed by

thalamus and putamen. Epidemiological survey data showed that the mortality rate of patients with hemorrhage in the above areas was 32%-55%. ICH is a multiple disease, which mostly affects the middle-aged and elderly. Moreover, patients are accompanied by limb movement disorder to a certain extent, with reduces independent survival ability [2]. The increase of cerebral lobe hematoma and the aggravation of brain edema are the main reasons leading to the deterioration of neurological function in patients with ICH 12-24 hours following the episode of ICH.

With the increase of people's awareness of health care, people put higher requirements for the quality of hospital care. Studies have confirmed that the condition of ICH patients can be significantly ameliorated if their neurological function is improved [3]. Nursing plays an important role in the rehabilitation of ICH, which is conducive to the recovery of the neurological function of patients [4]. Based on the concept of nursing process management, programmed nursing arises as a novel care model to improve the quality and deepen the connotation of nursing by standardizing nursing schemes [5]. It has been applied in clinical rehabilitation treatment of brain diseases and achieved encouraging results. Patients with ICH are associated with some degree of cognitive dysfunction after surgery. Previous studies have confirmed that improving cognitive function of patients with cerebral infarction can promote their social activities, spirit, as well as quality of life. In addition, cognitive theory supports that bad cognitive behavior can increase patients' negative emotions, thus forming a vicious circle. Cognitive behavioral intervention is to adjust the psychological state of patients, improve the clinical nursing effect by increasing the patients' own defense system, and formulate individual cognitive reconstruction measures according to the cognitive behavioral intervention theory of Western medicine, so as to correct the wrong cognition and behavior of patients and improve rational cognitive behavior [6]. Comprehension and cognition can strengthen the effect of cognitive intervention, and promote the development of cognitive function by reinforcing the cognitive intervention program through re-education [7]. However, there is a paucity of clinical evidence on the application of programmed nursing combined with cognitive behavioral

intervention in patients with ICH, and the neurological rehabilitation of patients is not yet understood. In this study, we investigated the effect of programmed nursing combined with cognitive behavioral intervention on clinical and neurological function of patients with ICH.

Materials and methods

General information

A total of 96 patients with ICH treated in our hospital from July 2017 to July 2019 were retrospectively analyzed. Inclusion criteria: (1) All the patients met the diagnosis criteria of the fourth National Conference on Cardiovascular Prevention [6]; (2) Patients were diagnosed as ICH by CT; (3) Patients had no secondary or multiple attacks; (4) The estimated onset time of patients was ≤12 h. Exclusion criteria: (1) Patients <18 or >80 years old; (2) Patients without drug treatment; (3) Patients with coma within 48 hours after admission; (4) Patients with intracranial tumors or brain trauma; (5) Patients who took sedative drugs before enrollment; (6) Patients with myocardial infarction, anemia, abnormal liver function or immunosuppression; (7) Patients who did not cooperate with treatment or had significantly impaired cognitive ability. A total of 96 patients were enrolled and divided into two groups: programmed group (n=48) treated by programmed nursing, and joint group (n=48) treated by programmed nursing combined with cognitive behavioral intervention. Both groups of patients and their families understand the content of this study. This study was approved by the Ethics Committee of our hospital and the informed consent was obtained from all the patients.

Nursing methods

Patients in both groups were given programmed nursing, which was started on the first day of admission for 14 days [7]. A nursing team consisting of 1 department director, 1 physician in charge, 1 head nurse and 5 nurses was established, and the responsibilities and nursing contents mainly covered the following dimensions. (1) Data collection: general data, vital signs, laboratory indicators and underlying diseases of patients were sorted and collected. Nurses got a comprehensive understanding about the social environment of patients from

the collected data, and divided the nursing needs of patients into the following four aspects: physiology, psychology, environment and community, so as to carry out targeted nursing care for patients at all levels. (2) Formulation of nursing plans: physiological domain: to lower patients' blood pressure while maintaining their vital signs and reduce the occurrence of other diseases; Psychological domain: to alleviate patients' negative emotions and improve treatment compliance; Environmental domain: to keep the ward clean and comfortable, and avoid the aggravation of the disease caused by external conditions; Community domain: to improve the activities of daily living (ADL), social function, as well as the quality of life of patients. (3) Implementation of nursing plans: physiological nursing: venous channels were first established to balance the electrolytes and stabilize the vital signs of the patient. The patients' oral secretions were cleaned to avoid accidental inhalation and ensure the smooth airway. Also, family members were instructed to understand the color of secretions, vomitus and feces to prevent gastrointestinal bleeding. Each patient was kept in bed rest, and the headboard was raised about 15°-30° to avoid the increase of intracranial blood pressure. After 24-72 h, the gastric tube was inserted for nasal feeding to ensure the smooth flow of the drainage tube. Besides, the patients were observed for temperature changes and physical cooling was carried out in time in case of high fever. Psychological nursing: in response to the patients' anxiety caused by excessive worry about the condition, nurses communicated with each patient in a timely manner to let him/her understand the importance of healthy emotions to early recovery from the disease. In addition, patients who showed significant improvement were invited to give lectures to increase the motivation of other patients and their confidence in overcoming the disease. Environmental nursing: ventilated and quiet, the ward was kept at the appropriate temperature and humidity, so as to reduce the aggravation of the disease caused by external environmental stimulation. Community nursing: after the ICH patients were discharged from the hospital, nurses carried out regular visits to give them medication guidance, as well as introduction of drug usage and adverse reactions. Additionally, patients were asked to take medicine on time as prescribed by the doctor and to visit the hospi-

tal in time in case of nausea and vomiting. (4) Social function nursing: the functional rehabilitation plan, including oral and facial function, language, limb and walking limb function training, was developed according to the patients' condition and tolerance, so as to help them improve their self-ability gradually and realize social function.

Patients in the joint group were supplemented with the following cognitive behavioral intervention measures based on the above nursing methods [8]. (1) Health education: nurses explained the knowledge related to ICH to patients, and informed the importance of following the doctor's advice. In addition, nurses recorded the blood pressure changes of patients before and after medication, and informed the attending physician immediately when there was an increase or decrease in blood pressure. Moreover, patients were urged to control their blood pressure and use drugs while monitoring changes in blood pressure. (2) Rehabilitation training: nurses encouraged patients to conduct early functional training to reduce limb functional dyskinesia, pressure sores and infections caused by long-term bed rest, strengthen self-observation initiative, and scientifically and reasonably guided patients to recover limb and neurological functions. (3) Diet management: nurses made a reasonable diet after understanding the patient's medication, and provided more digestible food instead of spicy and stimulating food, so as to avoid influencing the medicine effect. (4) Cognitive intervention: patients were prone to self-abasement, anxiety and depression due to enduring rehabilitation process, so nurses actively and patiently communicated with patients during nursing to encourage them to express their inner feelings and build up confidence in overcoming the disease. Nurses also corrected patients' wrong cognitive concepts and behavior patterns, ensured that they had enough sleep, and informed patients that the improvement of neurological function was a gradual process. Furthermore, the emotional state of patients was closely observed during the treatment process to relieve their stress, and drug intervention was carried out when necessary. The nursing time of patients in both groups was 28 days, and the observation indexes were evaluated after the patient's vital signs were stable.

Outcome measures

Primary outcome measures

Comparison of Fugl-Meyer (FM) assessment scale and Barthel index before and after nursing: The FM Assessment Scale has been widely used to evaluate the motor function of patients with cerebral infarction and craniocerebral injury, with the Cronbach's α coefficient of 0.739. The FM Assessment Scale assesses the motor function of patients from the dimensions of motor functioning, balance, sensation and joint functioning, as well as joint pain. The higher the score, the stronger the patient's motor ability. The Barthel index has been confirmed to be effective in evaluating the quality of life of patients with acute stroke, and the Cronbach's α coefficients of the 10 items in the scale ranging from 0.871 to 0.915, indicating high reliability. It assesses patients' activities of daily living (ADL) by 10 items, with a total score of 100 points. <20 points, 21-40 points, 41-60 points and >60 points correspond to totally dependent, very dependent, partially dependent and independent respectively, and a Barthel index >10 indicates good ADL of the patient [9].

Neurological function scores before and after nursing: The National Institutes of Health Stroke scale (NIHSS) was used to conduct a multicenter, large sample study on the reliability, validity and sensitivity of stroke patients in China. The test-retest reliability coefficients of other dimensions except limb ataxia and best gaze are between 0.5 and 1, indicating high reliability and validity. The Glasgow Outcome Score (GOS) has been widely used to evaluate neurological function in patients with craniocerebral injury, and clinical and prognostic studies can be conducted based on different GOS scores. The full score of NIHSS is 42, and the higher the score, the more serious the neurological function damage of the patient. The total score of GOS is 5 points, with 1-5 points indicating dead, vegetative state, severe disability, moderate disability, and good recovery, respectively. The higher the score, the better the prognosis of the patient [10].

Nursing efficacy: The nursing effect of patients with ICH was observed according to the clinical efficacy, which was judged according to the above functional deficit scores of patients. The nursing effect was divided into basically recovered, significantly effective, effective, ineffective, and death. Basically recovered: functional deficit score decreased by >90%; Significantly effective: functional deficit score decreased by 45%-89%; Effective: functional deficit score decreased by 18-44%; Ineffective: Functional deficit score decreased by ≤18%; Death. Total effective rate = (basically recovered + significantly effective + effective) cases/total number of cases ×100% [11].

Secondary outcome measures

Quality of life scale: The World Health Organization Quality of Life Scale Brief Version (WHOQOL BREF), a scale with a higher reliability as indicated by the Cronbach's alpha reliability coefficient, was used to evaluate the quality of life of ICH patients in both groups before and after nursing. The scale has been applied in many academic fields with good theoretical basis, and the higher the score, the better the quality of life [12].

Nursing satisfaction: A self-made nursing satisfaction scale was used to investigate the satisfaction of patients. The Cronbach α coefficient of the total internal consistency reliability of the questionnaire is 0.846, indicating a good evaluation effect. On a 100-point scale, <60, 60-90 and ≥91 points correspond to dissatisfied, basically satisfied and satisfied respectively. Satisfaction = (satisfied + basically satisfied) cases/total number of cases ×100%.

Comparison of adverse reactions: Adverse reactions (pulmonary, urinary infection, etc.) in programmed group and joint group were observed and recorded.

Statistical analysis

SPSS 23.0 software was used to analyze the research contents of the two groups. The measurement data were expressed as mean ± standard deviation ($\overline{x}$±sd) and analyzed by t-test, denoted by χ^2. The curative effect, satisfaction and adverse reactions were recorded as (n (%)). Independent sample t test was used for inter-group comparisons, and paired sample t test was employed for intra-group comparisons. P<0.05 indicates that the difference was statistically significant.

Table 1. Comparison of general information

Group	Programmed group (n=48)	Joint group (n=48)	χ^2/t	P
Gender			0.394	0.821
Male	30	27		
Female	18	21		
Average age (years)	65.4±3.3	66.1±3.6	1.105	0.272
Average bleeding volume (mL)	25.31±9.85	26.17±9.62	0.424	0.673
Bleeding site (n)			0.904	0.636
Basal ganglia	24	21		
Brain lobe	10	14		
Thalamus	14	13		
History of coronary heart disease (n)	8	12	0.725	0.696
History of diabetes (n)	10	9	0.048	0.976
Carotid atherosclerosis (n)	14	15	0.03	0.985
Drinking history (n)	30	32	0.049	0.976
Smoking history (n)	25	22	0.154	0.926
Education years (years)	10.20±2.30	11.05±3.00	1.558	0.123
MoCA cognitive function score (points)	22.39±6.50	23.14±5.60	0.606	0.546
MMSE intelligence score (points)	26.50±3.60	27.05±3.50	0.759	0.450

Table 2. Comparison of Fugl-Meyer (FM) motor function scale and Barthel index before and after nursing

Group	FM score (points)		Barthel Index (points)	
	Before care	After care	Before care	After care
Programmed group (n=48)	43.25±15.30	58.30±17.25###	40.10±14.33	56.28±13.39###
Joint group (n=48)	43.06±16.11	71.05±20.14###	40.20±15.69	64.28±15.21###
t	0.059	3.331	0.033	2.735
P	0.953	0.001	0.974	0.007

Note: Compared with before nursing, ###P<0.001.

Results

Comparison of general data

There was no significant difference in sex, age, blood loss and bleeding site between the two groups (P>0.05; **Table 1**).

Programmed nursing combined with cognitive behavioral intervention can improve the motor function and ADL of patients with ICH

FM Assessment Scale and Barthel index did not differ significantly between the two groups before nursing (both P>0.05); after nursing, both the FM Assessment Scale and Barthel index increased in the two groups, with higher scores in the joint group compared with the programmed group (both P<0.05; **Table 2**).

Programmed nursing combined with cognitive behavioral intervention can improve the neurological function of patients with ICH

Before nursing, there was no difference in NIHSS and GOS scores between the two groups (both P>0.05); after nursing, the NIHSS score decreased and the GOS score increased, with statistical differences between the two groups (both P<0.05; **Table 3**).

Programmed nursing combined with cognitive behavioral intervention can improve the clinical nursing effect of patients with ICH

After nursing, the total effective rate in the joint group (91.67%, n=44) was significantly higher than that in the programmed group (77.08%, n=37; χ^2=4.511, P=0.034; **Table 4**).

Table 3. Scores of neurological deficits in the two groups before and after nursing

Group	NIHSS score (points)		GOS score (points)	
	Before care	After care	Before care	After care
Programmed group (n=48)	12.20±2.65	9.25±2.14##	3.98±0.65	4.52±0.44#
Joint group (n=48)	12.05±3.05	7.30±1.51###	4.05±0.59	4.96±0.37#
t	0.257	5.158	0.553	5.303
P	0.798	<0.001	0.582	<0.001

Note: Compared with before nursing, #P<0.05; ##P<0.01, ###P<0.001.

**Table 4.** Comparison of nursing efficacy between the two groups

Group	Basically recovered (%)	Significantly effective (%)	Effective (%)	Ineffective (%)	Worsened (%)	Total effective rate (%)
Programmed group (n=48)	6 (12.50)	20 (41.67)	11 (22.92)	9 (18.75)	2 (4.17)	37 (77.08)
Joint group (n=48)	9 (18.75)	25 (52.08)	10 (20.83)	3 (6.25)	1 (2.08)	44 (91.67)
X^2			16.606			4.511
P			0.002			0.034

Table 5. Comparison of quality of life (WHOQOL BREF) between the two groups (points)

Group	Before care	After care
Programmed group (n=48)	49.23±5.05	70.24±4.28###
Joint group (n=48)	49.18±4.90	85.66±5.14###
t	0.049	15.970
P	0.960	<0.001

Note: Compared with before nursing, ###P<0.001.
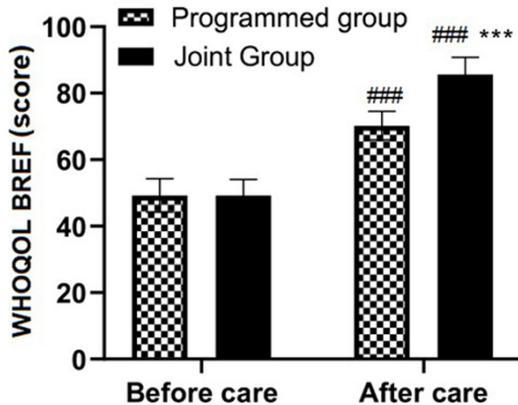
Figure 1. Comparison of quality of life (WHOQOL BREF) between the two groups. Compared with the programmed group, ***P<0.001; compared with before nursing, ###P<0.001.

Programmed nursing combined with cognitive behavioral intervention can improve the quality of life of patients with ICH

No evident difference was observed in the WHOQOL BREF score between the two groups before nursing (49.23±5.05 vs. 49.18±4.90, t=0.049, P=0.960). After nursing, WHOQOL BREF scores in programmed group and joint group were (70.24±4.28) and (85.66±5.14) points, respectively, which were significantly higher than those before nursing, with a higher score in the joint group compared with the programmed group (t=15.970, P<0.001; **Table 5** and **Figure 1**).

Programmed nursing combined with cognitive behavioral intervention can improve the nursing satisfaction of patients with ICH

The satisfaction of the joint group was 95.83%, which was significantly higher than that of the programmed group (83.33%; χ^2=3.913, P= 0.048; **Table 6**).

Programmed nursing combined with cognitive behavioral intervention can reduce adverse reactions in patients with ICH

The number of adverse reactions in the joint group (10.42%, n=5) was markedly lower than that in the programmed group (27.08%, n=13; χ^2=7.401, P=0.007; **Table 7**).

Discussion

The American Congress of Rehabilitation Medicine points out that unrestricted by other institutions and conditions, the FM Assessment Scale can better reflect the limb function of patients. The Barthel index can reflect the independent survival ability of patients, which is

Table 6. Comparison of nursing satisfaction between the two groups

Group	Satisfied (%)	Basically satisfied (%)	Dissatisfied (%)	Satisfaction rate (%)
Programmed group (n=48)	19 (39.58)	21 (43.75)	8 (16.67)	40 (83.33)
Joint group (n=48)	24 (50.00)	22 (45.83)	2 (4.17)	46 (95.83)
χ^2		8.758		3.913
P		0.013		0.048

Table 7. Comparison of the incidence of adverse reactions between the two groups

Group	Lung infection (%)	Urinary system infection (%)	Pressure sore (%)	Renal insufficiency (%)	Incidence (%)
Programmed group (n=48)	3 (6.25)	4 (8.33)	1 (2.08)	5 (10.42)	13 (27.08)
Joint group (n=48)	1 (2.08)	2 (4.17)	0 (0.00)	2 (4.17)	5 (10.42)
χ^2	2.088	1.384	2.037	2.677	7.401
P	0.148	0.239	0.154	0.102	0.007

often used to evaluate the clinical nursing efficacy [13]. Patients with ICH suffer from severe oxidative stress, and those with severe nerve injury have poor independent survival ability and low Barthel index scores. Neurological dysfunction in patients with ICH includes disturbance of consciousness, dysphagia and stress ulcer. Programmed nursing is a new nursing model that has emerged in nursing science in recent years. It emphasizes the standardized management and nursing process by first formulating the nursing plan process to clarify the nursing goals and then implementing the nursing plan in accordance with the scientific and standardized nursing process. With the in-depth development of medical psychology in clinical practice, cognitive behavioral intervention has become an important part of the modern medical treatment system [14]. Cognitive behavior intervention can train and improve the limb function of ICH patients, thus improving their ADL. According to the research of Wen et al., cognitive behavioral intervention is a nursing method that intervenes in the mental state of patients [15]. By increasing the disease awareness of ICH, stabilizing emotions, and reducing the stress response of patients, it can improve the quality of life of patients while enhancing their treatment compliance, so as to improve patients' limb function and neurological function.

Clinical evaluation of nerve injury by NIHSS score has been widely recognized and applied internationally. At present, the NIHSS scale is widely applied to evaluate the neurological function of patients with ICH in clinical studies

[16]. In ICH patients, the higher the NIHSS score was, the more severe the ICH was and the more serious the neurological defect was. However, there is a singularity in the use of NIHSS score alone, and GOS score can better show the prognostic disability degree in patients with ICH. The GOS score of ICH patients increased after early comprehensive nursing, and the combination of the NIHSS score can better indicate their neurological function repair [17]. Therefore, the application of scientific and reasonable nursing in the clinical treatment of patients with ICH is of vital importance to improve the patients' limb motor function and clinical efficacy. Based on nursing process management, programmed nursing takes nursing procedures as the framework, and follows the biological-psychological-social nursing model to care for patients [18]. The study of O'Moore K A showed that cognitive and behavioral therapy played a very important role in alleviating negative emotions [19]. By relieving patients' anxiety and anxiety, it can improve patients' treatment adherence, thus enhancing their confidence in treatment and improving their neurological function. In this study, the motor function and neurological function of patients with ICH improved significantly in the joint group, indicating that programmed nursing combined with cognitive behavioral intervention is conducive to the recovery of the neurological function of patients through limb function training.

Furthermore, in our research, the quality of life of patients was assessed by the WHOQOL BREF. It was found that the score was lower in

all the ICH patients before nursing, while was bolstered in both groups after nursing, with higher scores in the joint group compared with the programmed group, suggesting that programmed nursing combined with cognitive behavioral intervention can improve the quality of life of patients. It has been confirmed by the study of Dong et al. that formulated by the team composed of medical professionals, programmed nursing offers targeted intervention to patients according to the nursing process, and gradually improves their limb movement ability and motor nerve activity, thus enhancing their social adaptability and living ability [20, 21]. Besides, cognitive behavioral intervention is shown to improve patients' treatment compliance, subjective initiative, nursing effect and quality of life through enhancing their cognition and understanding of the disease. Sampson et al. proved that cognitive behavioral intervention can regulate the motor function of patients with ICH, increase their independent survival ability and bolster their quality of life, which agrees with the results of our study [22].

The Activity Plan of High Quality Nursing Service Demonstration Project points out that nursing methods should keep pace with the times, and clinical nursing is a holistic care rather than a single and one-sided one. The nursing process of ICH patients requires the use of evidence-based medicine science to increase clinical efficacy. By following the established management and nursing process, programmed nursing can not only improve the standardization of management, but also increase nursing efficiency, so as to tailor to the needs of patients and increase nursing satisfaction [23, 24]. Related studies have shown that patients with ICH need long-term bed rest, which will induce pressure sores and urinary system infection [25, 26]; cognitive behavioral intervention can provide early rehabilitation training for patients with ICH, which facilitates self-rehabilitation and reduces complications. This study found that, compared with the programmed group, the nursing satisfaction of patients in the joint group increased and the complications decreased, indicating that programmed nursing combined with cognitive behavioral intervention can validly bolster limb and neurological functions of patients, reduce complications and improve nursing satisfaction while effectively increasing patients' disease cognition

and improving treatment enthusiasm. All in all, programmed nursing combined with cognitive behavioral intervention for patients with ICH is beneficial to reduce the occurrence of medical accidents, increase the economic effect of hospitals, and promote the level of medical and health work in China to a new level.

However, there are still some shortcomings in this study. The small sample size and limited research indicators may have an impact on the results, so experimental data and samples will be expanded in future studies to provide a strong clinical basis for clinical nursing.

To sum up, programmed nursing combined with cognitive behavioral intervention can improve the clinical efficacy of patients with ICH, ameliorate their limb motor ability and reduce neurological deficits.

Disclosure of conflict of interest

None.

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