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Review Article

Super-early neurological rehabilitation nursing intervention for HICH patients can improve prognosis and promote neurological functional recovery

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Abstract: Super-early neurological rehabilitation nursing intervention for hypertensive intracerebral hemorrhage (HICH) patients can improve prognosis and promote neurological functional recovery. Altogether 175 patients with HICH from June 2017 to December 2018 were selected and grouped according to different nursing interventions. Routine nursing was given to 82 patients as the control group (CG) and super-early neurological rehabilitation nursing was given to 93 patients as the research group (RG). Adverse events that occurred in the nursing process of the CG and the RG were observed. Neurological impairment score (NIHSS score), activity of daily living (ADL) scale and Fugl-Meyer score were used to evaluate the neurological impairment, as well as ADL and motor function of the CG and the RG at 24 h, 1 month, 3 months and 6 months after operation. Mini Mental State Examination (MMSE), Glasgow Outcome Score (GOS) and SF-36 Quality of Life (QOL) Scale were applied to evaluate the cognitive function, prognosis and QOL of patients at 6 months after their operation. Finally, a self-made nursing satisfaction questionnaire was applied to explore the nursing satisfaction. The incidence of adverse events after nursing intervention in the RG was lower than that in the CG. The NIHSS score of the RG patients after nursing intervention was lower than that of the CG. The ADL score, Fugl-Meyer score, MMSE score, GOS score and SF-36 QOL score of patients in the RG after nursing intervention were higher than those in the CG. The satisfaction degree of patients in the RG was higher than that in the CG. Super-early neurological rehabilitation nursing for hypertensive intracerebral hemorrhage patients can improve the motor ability, daily activity ability, and the recovery of neurological function. It can also reduce the occurrence of adverse events, improve the patients' nursing satisfaction, and improve the patients' cognitive function, prognosis and quality of life.

Keywords: Super-early neurological rehabilitation nursing, hypertensive intracerebral hemorrhage, prognosis, neurological functional recovery, quality of life

Introduction

Hypertension is an important risk factor for cardiovascular and cerebrovascular diseases and is a very common chronic disease seen in clinic [1]. Hypertensive intracerebral hemorrhage (HICH) is one of the most serious complications of hypertension, with a high incidence rate among 50-70 year olds. The incidence rate in males is higher than that in females, and it is greatly affected by seasons and is often found in winter and spring [2]. The incidence of HICH accounts for about 10%-30% of all strokes. HICH is characterized by rapid onset, rapid progress, high disability rate and fatality rate, and belongs to the category of critical illness [3]. The etiology of HICH is complicated and there are many inducing factors, but the radical cause of HICH is the sharp increase of the patient's blood pressure [4]. The clinical symptoms of HICH include vomiting, headache, and nausea, and patients are often accompanied by restlessness, lethargy, coma and other symptoms [5]. At present, clinical diagnosis of HICH mainly depends on CT and MRI examination [6]. Surgical treatment is still the main clinical treatment measure at present [7]. With the development of medical science, surgical treatment can clearly reduce the mortality and disability rate of patients, that occurs due to the rapid changes of HICH's condition and different degrees of brain parenchyma damage; howev-

er, many patients may still suffer from various degrees of nervous system damage after surgery, causing neurological dysfunction and quality of life decline, seriously affecting the prognosis of HICH [8]. Therefore, how to best restore the neurological function of patients, improve their prognosis and improve quality of life has been a hot research topic for clinical workers [9].

Postoperative nursing quality has an effect on the prognosis and quality of life of patients and is an important part of clinical treatment [10]. Rehabilitation medicine endorses that better rehabilitation effects can be achieved by early intervention of rehabilitation nursing after surgery [11]. Super-early neurological rehabilitation nursing has a scientific nursing rehabilitation plan where its content is implemented within 24 hours after the patient is admitted to hospital, and is based on the individual differences of patients, the psychological factors of patients and the principles of humanization and individuation [12]. With the development and progress of nursing discipline, super-early rehabilitation nursing is a more comprehensive nursing mode compared with conventional nursing [13]. Liu X et al. [14] showed that the early intervention of neurological rehabilitation nursing can promote faster and better neurological functional recovery and better improvement of quality of life. Many research results showed that super-early rehabilitation nursing intervention for postoperative patients could reduce mortality and disability rates and enhance the QOL of patients [15].

In this study, super-early rehabilitation nursing intervention was implemented for patients after HICH operation, and the effects of this nursing model on the prognosis, neurological functional recovery and QOL of patients with HICH operation were discussed. The aim was to provide a feasible nursing intervention measure for patients with HICH.

Materials and methods

General data

Altogether 175 patients with hypertensive intracerebral hemorrhage (HICH) from June 2017 to December 2018 were selected and grouped according to different nursing interventions. Routine nursing was used in the control group (CG) (82 cases) and super-early neurological rehabilitation nursing was implimented in the research group (RG) (93 cases). The CG consisted of 45 men and 37 women, aged 54-75 years, with an average age of (65.04±8.85) years, the bleeding volume was 31-75 ml, and the average bleeding was (48.63±9.93) ml. The RG consisted of 50 men and 43 women, aged 50-80 years, with an average age of (65.65± 9.29) years. The bleeding volume was 33-77 ml, with an average of (49.15±10.09) ml.

Inclusion and exclusion criteria

Inclusion criteria: All patients were diagnosed with hypertensive intracerebral hemorrhage by cranial CT or MRI [16]; patients had complete clinical data; patients had clear consciousness; and patients could cooperate with treatment. This study was approved by the Ethics Committee. The subjects and their families signed a fully informed consent form.

Exclusion criteria: patients with mental disorders or difficulty in communicating, patients who could not actively cooperate with this experiment; patients combined with heart, liver, kidney, lung and other important organ dysfunction; patients who suffered from blood diseases and coagulation disorders; patients with poor compliance; and patients who were lost to follow or dropped out midway.

Nursing methods

The patients in the CG received the conventional nursing mode: the nursing staff informed patients about the matters needing attention and the operation time, basic health knowledge, blood pressure control and medication matters needing attention, preventive nursing such as anti-infection and hemorrhage after operation, and gave the patients dietary guidance. The regular reexamination was carried out. The vital signs of patients were regularly monitored, and a good ward environment was provided to the patients.

The patients in the RG received super-early neurological rehabilitation nursing mode: the RG had super-early neurological rehabilitation nursing intervention within 24 hours after operation in addition to routine nursing and under the conditions of stable vital signs. The main steps are as follows. (1) Psychological rehabili-

tation nursing: after the patient was admitted to hospital, the nursing staff immediately formulated a nursing plan that conformed to the patients according to the psychological conditions of the patient and the principles of humanization and individualized nursing, and at the same time encouraged the patient to communicate, as well as established good communication with the patient and gained their trust. (2) Health knowledge education: Health knowledge education was conducted in different ways based on the patient's educational level, so that patients and their families could know more about the relevant knowledge of the disease, such as clinical manifestations, disease progression, adverse reactions and prognosis, and this was continued until the end of treatment and then the patient was discharged from hospital. (3) Respiratory tract nursing: After the operation, the nursing staff closely monitored whether the patient's respiratory tract was unobstructed, regularly cleaned viscous secretions in the respiratory tract and helped the patient turn over to prevent the occurrence of aspiration pneumonia. (4) Rehabilitation nursing of limb function: according to the specific situation of patients, an appropriate exercise training program was selected. Within 24 hours after the operation, the upper limb and lower limb joints were flexed and extended in sequence, step by step. During this period, no injury was caused by excessive force. After the conditions improved, the shoulder joint and iliac joint were moved. Muscle strength training was carried out every day, gradually changing from passive activity to active activity, and comprehensive muscle training was carried out from upper limb to lower limb, and the training time was gradually increased depending on the recovery of patients. (5) Rehabilitation nursing for swallowing function: after operation, the recovery of patients was evaluated and a rehabilitation training was conducted for patients who need to establish swallowing function. The patients were placed in a lateral position, the head of the patient's bed was properly raised, cotton swabs were applied to absorb a small amount of warm boiled water, which was placed on the patient's tongue root, soft palate and throat wall to stimulate saliva. This step was conducted slowly. A spoon was gently placed in the patient's mouth to train chewing movements. At the same time, the tongue muscles and masticatory muscles were given rehabilitation training. During this period, the occurrence of choking cough was closely observed and handled in real time. (6) Language rehabilitation nursing: language stimulation training was carried out within 24 hours after the operation. The method of one-on-one and independent training was adopted to strengthen verbal communication with the patient and encourage the patient to pronounce, practice and express more verbally. Through playing music, the patient's language and auditory system were stimulated. The verbal and limb movements, as well as facts and photographs were used for repeated practice and correction, and stimulation was carried out continuously. At the same time, strength stimulation training was also be performed in daily life situations. (7) Rehabilitation and nursing of daily living ability: According to the recovery of patients, a daily living ability training plan was formulated, which mainly included diet, clothing, hygiene, urination and defecation, bathing and minor household activities.

Observation index

The neurological deficits, daily activities and motor functions of the CG and the RG were evaluated at 24 hours, 1 month, 3 months and 6 months after intervention. The cognitive function, quality of life, prognosis and occurrence of adverse events of the CG and the RG were evaluated 6 months after operation.

(1) The neurological function impairment score (NIHSS score) [17] was used to evaluate the recovery of neurological function of the CG and the RG of patients: there were 15 items, each with the score of 0, 1, 2, 3 and 4 points respectively, with a total score of 34 points. A high score was closely related to a more serious neurological function impairment of the patients and a more serious illness.

(2) Activity of daily life (ADL) [18] was applied to evaluate the ADL of patients: there were 10 items, including defecation, urination, decoration, toilet use, eating, movement, activity, dressing, going up and down stairs, bathing; with a total score of 100 points. A score of less than 20 points indicated that patients had extremely serious functional defects and patients were completely dependent; a score of 20-40 points indicated that the patients needed a lot of help; a score of 40-60 indicated that

the patients needed help; a score of more than 60 points indicated patients had basic self-care ability. A high score was closely related to a strong ability of daily living.

(3) Fugl-Meyer score was used to evaluate the motor function of CG and the RG patients: Fugl-Meyer motor function evaluation scale (FMA) [19] was used to evaluate, with a total of 66 points. A high score was closely related to better motor function.

(4) The cognitive function of the CG and the RG patients was tested by mini-mental state examination (MMSE) [20], including orientation, immediate memory, short-term memory, attention, calculation, language and structural imitation. The total score was 30 points, and the dementia severity grade was mild with MMSE of 21-26 points, moderate with MMSE of 10-20 points, and severe with MMSE of ≤9 points.

(5) Glasgow Outcome Score (GOS) [21] was used to evaluate the prognosis of the patients: it included five grades, one point indicated death; 2 points indicated a persistent vegetative state with eye movements and sleep cycles; 3 points indicated severe disability, dependent daily life and needing care; 4 points indicated moderate disability, but the patients could still live independently and work under protection; 5 points indicated a good recovery and a return to normal life. A high score was closely related to a better prognosis.

(6) SF-36 Quality of Life (QOL) Scale [22] was applied to explore the QOL of the patients: referring to the QOL Scale (SF-36 Scale) developed by the American Medical Research Institute, the QOL of the patients was evaluated, including eight items, with a total score of 0-100 points, and a high score was closely related to a better quality of life.

(7) The self-made "nursing satisfaction questionnaire" was applied to explore the nursing satisfaction [23], mainly including attitude, character, wearing, and operation proficiency. There were 20 questions, each with 5 points; a score of <70 points indicated unsatisfactory, 70-89 points indicated basically satisfactory, and ≥90 points indicated satisfactory. Satisfaction = (Satisfactory+Basically satisfactory)/Total cases × 100%.

(8) The adverse events occurring in the nursing process of the CG and the RG of patients were observed.

Statistical methods

SPSS 20.0 (IBM Corp, Armonk, NY, USA) was applied for statistical analysis, GraphPad Prism 7 for illustrating the figures. The counting data was represented by [n (%)]. Chi-square test was applied for counting data comparison. The measurement data were represented by Mean ± standard deviation (x±sd). t test of independent samples was applied for measuring data comparison, paired t test for the comparison before and after treatment. The data of multiple time points in the group were analyzed by one-way ANOVA, and the SNK-q test was used for pair-wise comparison of different time points in the group. When $P<0.05$, the difference was statistically significant.

Results

General data

There was no evident difference between the CG and the RG in general clinical baseline data such as gender, age, bleeding volume, bleeding site, body mass index (BIM), residence, nationality, educational level, smoking history, drinking history, and diabetes history ($P>0.05$). See **Table 1**.

Comparison of neurological deficit scores before and after nursing intervention

Before the nursing intervention, there was no evident difference in NIHSS scores between the CG and the RG ($P>0.05$). The NIHSS scores of the CG and the RG before the nursing intervention were higher than that at 24 h, 1 month, 3 months and 6 months after the operation, and the RG was evidently lower than the CG ($P<0.05$). See **Table 2**.

Comparison of ADL scores between two groups of patients before and after nursing intervention

Before the intervention, there was no evident difference in ADL scores between the CG and the RG ($P>0.05$). After intervention, at 24 hours, 1 month, 3 months and 6 months, the ADL scores of the CG and the RG of patients were evidently higher than those before intervention, and the ADL scores of the patients in the RG were evidently higher than those in the CG ($P<0.05$). See **Table 3**.

Table 1. Comparison of general data between two groups of patients [n (%)] (x±sd)

Classification	RG (n=93)	CG (n=82)	t/χ^2 value	*P* value
Gender			0.022	0.883
Male	50 (53.76)	45 (54.88)		
Female	43 (46.24)	37 (45.12)		
Age (years)	65.65±9.29	65.04±8.85	0.443	0.658
Bleeding volume (mL)	48.63±9.93	49.15±10.09	0.343	0.732
Bleeding site			0.111	0.998
Basal ganglia	48 (51.61)	42 (51.22)		
Thalamus	20 (21.51)	19 (23.17)		
Lobe	15 (16.13)	13 (15.85)		
Brainstem	6 (6.45)	5 (6.10)		
Cerebellum	4 (4.30)	3 (3.66)		
BMI (kg/m^2)	24.8±3.2	24.4±3.4	0.801	0.424
Residence			0.022	0.883
Urban	43 (46.24)	37 (45.12)		
Rural	50 (53.76)	45 (54.88)		
Nationality			0.001	0.976
Han	69 (74.19)	61 (74.39)		
Minorities	24 (25.81)	21 (25.61)		
Educational level			0.034	0.853
High school or higher	33 (35.48)	28 (34.15)		
< high school	60 (64.52)	54 (65.85)		
Smoking history			0.001	0.989
Yes	67 (72.04)	59 (71.95)		
No	26 (27.96)	23 (28.05)		
Drinking history			0.097	0.756
Yes	58 (62.37)	53 (64.63)		
No	35 (37.63)	29 (35.37)		
History of diabetes			0.059	0.807
Yes	38 (40.86)	35 (42.68)		
No	55 (59.14)	47 (57.32)		

Table 2. Comparison of NIHSS score between the CG and the RG before and after nursing intervention (x±sd)

Group	n	Before intervention	24 hours after intervention	One month after intervention	Three months after intervention	Six months after intervention
RG	93	28.43±2.51	26.05±2.31	22.34±2.12	19.08±2.05	15.35±1.83
CG	82	28.27±2.62	27.02±2.40	24.96±2.39	22.46±2.24	19.65±2.06
t		0.412	2.722	7.685	10.420	14.620
P		0.681	0.007	<0.001	<0.001	<0.001

Comparison of FMA scores between two groups of patients before and after nursing intervention

Before the intervention, there was no evident difference in FMA scores between the CG and the RG (P>0.05). After the intervention, at 24 hours, 1 month, 3 months and 6 months, the FMA scores of patients in the CG and the RG were evidently higher than those before the intervention, and the FMA scores of patients in the RG were evidently higher than those in the CG (P<0.05). See **Table 4**.

Table 3. Comparison of ADL score between two groups of patients before and after nursing intervention (x±sd)

Group	n	Before intervention	24 hours after intervention	One month after intervention	Three months after intervention	Six months after intervention
RG	93	59.23±5.49	64.05±5.20	70.40±5.26	75.27±5.21	80.13±5.01
CG	82	59.98±5.71	62.21±5.43	65.50±5.53	69.95±5.34	74.25±5.27
t		0.885	2.288	6.003	6.662	7.561
P		0.377	0.023	<0.001	<0.001	<0.001

Table 4. Comparison of FMA score between two groups of patients before and after nursing intervention (x±sd)

Group	n	Before intervention	24 hours after intervention	One month after intervention	Three months after intervention	Six months after intervention
RG	93	35.21±5.49	41.23±5.13	49.78±5.91	55.34±5.01	60.23±4.81
CG	82	36.02±5.71	38.68±5.53	41.61±6.04	48.55±5.64	53.15±5.27
t		0.956	3.164	9.032	8.434	9.291
P		0.341	0.001	<0.001	<0.001	<0.001

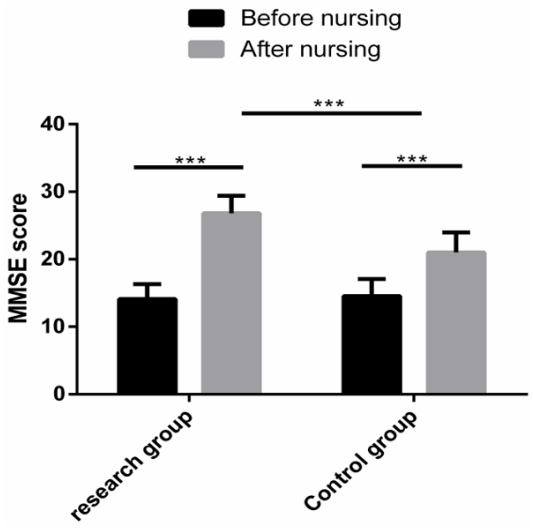

Figure 1. MMSE scores of two groups of patients. There was no significant difference in MMSE scores between the CG and the RG before nursing intervention. The MMSE scores in the RG were higher than those in the CG after nursing intervention. Note: *** indicates P<0.001.

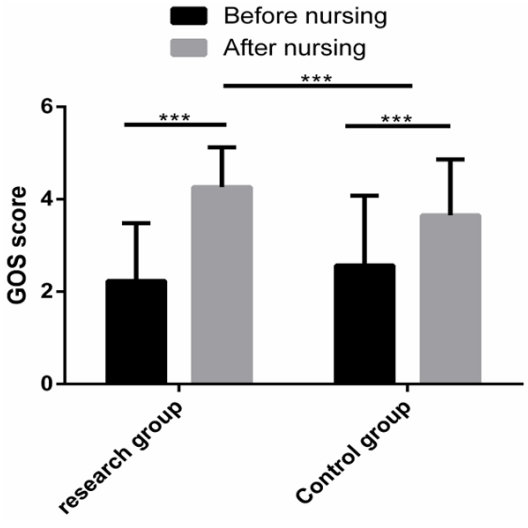

Figure 2. GOS score of two groups of patients. There was no significant difference in GOS score between the CG and the RG before nursing intervention. The GOS score in the RG was higher than that in the CG after nursing intervention. Note: *** indicates P<0.001.

Comparison of MMSE scores between two groups of patients before and after nursing intervention

Before the intervention, there was no evident difference in MMSE scores between the CG and the RG (P>0.05). After intervention, at 6 months, the MMSE scores of the CG and the RG were evidently higher than those before treatment, and the scores of the RG were evidently higher than those of the CG (P<0.05). See **Figure 1**.

Comparison of GOS score between two groups of patients before and after nursing intervention

Before the intervention, there was no evident difference in GOS scores between the CG and the RG (P>0.05). After intervention, at 6

Table 5. Comparison of quality of life score between two groups of patients after nursing intervention (x±sd)

Quality of life score	RG (n=93)	CG (n=82)	t value	*P* value
Overall health	77.85±5.03	64.05±3.45	20.880	<0.001
Physiological function	72.18±5.45	61.05±4.04	15.180	<0.001
Role-physical	75.06±6.60	62.20±4.15	15.190	<0.001
Bodily pain	78.80±7.57	60.05±6.36	17.610	<0.001
Vitality	79.05±8.01	65.24±7.36	11.820	<0.001
Social function	76.23±7.32	64.36±6.38	11.360	<0.001
Role-emotional	74.64±6.95	63.25±5.15	12.180	<0.001
Mental health	77.32±5.34	65.39±5.28	14.830	<0.001

Table 6. Comparison of incidence of adverse events between two groups of patients [n (%)]

Group	n	Fall	Infection	Thrombus	Pressure ulcer	Total incidence
RG	93	2 (2.15)	0 (0.00)	0 (0.00)	1 (1.08)	3 (3.23)
CG	82	5 (6.10)	3 (3.66)	1 (1.22)	3 (3.66)	12 (14.64)
χ^2	-	-	-	-	-	7.237
P	-	-	-	-	-	0.007

Table 7. Comparison of nursing satisfaction between two groups of patients [n (%)]

Items	RG (n=93)	CG (n=82)	χ^2 value	*P* value
Very satisfied	74 (79.57)	46 (56.10)	-	-
Satisfied	15 (16.13)	20 (24.39)	-	-
Dissatisfied	4 (4.30)	16 (19.51)	-	-
Nursing satisfaction	89 (95.70)	66 (80.49)	9.961	0.001

months, the GOS scores of the CG and the RG were evidently higher than those before intervention, and the scores of the RG were evidently higher than those of the CG (P<0.05). See **Figure 2**.

Comparison of quality of life between two groups of patients after nursing intervention

After nursing intervention, the quality of life scores of the RG were evidently higher than those of the CG (P<0.05). See **Table 5**.

Incidence of adverse events during nursing intervention

The incidence of adverse events in the RG during nursing was evidently lower than that in the CG (P<0.05). See **Table 6**.

Comparison of nursing satisfaction between two groups of patients

The nursing satisfaction of the patients in the RG was 95.70% and that of the CG was 80.49%. Satisfaction in the RG was evidently higher than the CG (P< 0.05). See **Table 7**.

Discussion

HICH is caused by long-term hypertension and atherosclerosis of cerebral vessels in patients [24]. HICH often occurs after emotional excitement or strenuous exercise, and blood pressure rises sharply and instantly, resulting in cerebral vascular rupture and hemorrhage, forming an intracerebral hematoma [25]. Intracranial pressure increases sharply, followed by ischemic necrosis of brain tissue, which results in a cerebrovascular disease caused by cerebral blood circulation disorders [26]. Due to the compression of brain tissue caused by cerebral hemorrhage, the nervous system is seriously injured, and neurological functions such as limb function and language function are impaired. As most affected patients are elderly and have other chronic diseases, the decline of body function and resistance increase the risk of HICH, which is also an important factor of high disability rate and high mortality rate [27]. Slow functional recovery after clinical surgical treatment acts on the QOL and health of patients at the later stage [28]. Therefore, the nursing measures taken after surgical treatment are particularly important for the prognosis of patients and the promotion of neurological function recovery [29].

In this study, super-early neurological rehabilitation nursing was carried out on patients with hypertensive intracerebral hemorrhage, and we found that the neurological function recovery and prognosis of patients after nursing intervention were evidently improved. This nursing mode is a targeted professional type of nursing that integrates the physiological and psychological factors of each patient. In the study of Rollnik J D et al. [30], NIHSS scores one month and three months after the intervention of neurological rehabilitation nursing for HICH patients were evidently lower than those in the conventional nursing intervention group. The results of this study showed that the NIHSS scores at 24 h, 1 month, 3 months and 6 months after intervention all decreased, and the degree of decrease in the RG was more evident than that in the CG, indicating that super-early neurological rehabilitation nursing intervention can clearly promote the recovery of neurological function, which is similar to the research results of Rollnik J D et al. The results revealed that the ADL scores of the RG were evidently higher than those of the CG after nursing intervention, indicating that super-early neurological rehabilitation nursing can effectively improve the patients' daily activities. van Meijeren-Pont W et al. [31] indicated that ADL score was enhanced and abilities of daily activities improved after neurological rehabilitation nursing intervention in stroke patients, which is similar to the results of our study. In the study of Rech KD et al. [32], after rehabilitation nursing intervention was given for cerebral hemorrhage patients with hemiplegia, the limb function evaluation showed that FMA score of the RG was higher than that of CG, suggesting that early rehabilitation nursing intervention can improve limb function of patients. In this study, super-early neurological rehabilitation nursing for patients with cerebral hemorrhage after surgery gradually improved and enhanced the limb function recovery of patients.

Cognitive function, outcome prognosis and quality of life of HICH patients directly reflect the results of clinical surgical treatment and nursing intervention. According to Seidel G et al. [33], early neurorehabilitation nursing could effectively improve the outcome and prognosis of stroke patients and improve their quality of life. Therefore, this study applied super-early neurological rehabilitation nursing intervention to carry out comprehensive nursing for HICH patients. The results showed that the MMSE score, GOS score and quality of life scores of the RG were clearly higher than those of the CG, indicated that ultra-early neurological rehabilitation nursing could improve cognitive function, prognosis and quality of life of patients, and may improve the quality of life of patients by improving their adverse psychological emotions and improving the function of nervous system. At the same time, we further compared the nursing satisfaction of the CG and the RG of patients. The results showed that the nursing satisfaction of the RG was higher than that of the CG, indicating that the patients were more pleased with the super-early neurological rehabilitation nursing.

Although this study confirmed that super-early neurological rehabilitation nursing brings many clear benefits to HICH patients, there is still room for improvement in this study. For example, we can further analyze the risk factors that affect the adverse prognosis after HICH surgery, which will help to remind nursing staff of the risk factors requiring additional attention. At the same time, we can also increase the sample size of the study to increase the credibility of the study. In the future, we will gradually carry out supplementary research from the above perspective.

To sum up, the application of super-early neurological rehabilitation nursing in patients with hypertensive intracerebral hemorrhage after operation is effective. It can improve the recovery of neurological function, the ADL, the recovery of cognitive function and limb function, reduce the incidence of adverse events during postoperative nursing, improve the patient's nursing satisfaction, and effectively improve the prognosis and QOL of patients.

Disclosure of conflict of interest

None.

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