

World Journal of *Clinical Cases*

World J Clin Cases 2021 November 26; 9(33): 10052-10391



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ABOUT COVER

Editorial Board Member of *World Journal of Clinical Cases*, Jian-Wu Zhao, PhD, Chief Physician, Professor, Department of Orthopedics, Jilin University Second Hospital, Changchun 130000, Jilin Province, China. jianwu@jlu.edu.cn

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The WJCC is now indexed in Science Citation Index Expanded (also known as SciSearch®), Journal Citation Reports/Science Edition, Scopus, PubMed, and PubMed Central. The 2021 Edition of Journal Citation Reports® cites the 2020 impact factor (IF) for WJCC as 1.337; IF without journal self cites: 1.301; 5-year IF: 1.742; Journal Citation Indicator: 0.33; Ranking: 119 among 169 journals in medicine, general and internal; and Quartile category: Q3. The WJCC's CiteScore for 2020 is 0.8 and Scopus CiteScore rank 2020: General Medicine is 493/793.

RESPONSIBLE EDITORS FOR THIS ISSUE

Production Editor: Ji-Hong Lin; Production Department Director: Xiang Li; Editorial Office Director: Jin-Lai Wang.

NAME OF JOURNAL

World Journal of Clinical Cases

ISSN

ISSN 2307-8960 (online)

LAUNCH DATE

April 16, 2013

FREQUENCY

Thrice Monthly

EDITORS-IN-CHIEF

Dennis A Bloomfield, Sandro Vento, Bao-Gan Peng

EDITORIAL BOARD MEMBERS

<https://www.wjnet.com/2307-8960/editorialboard.htm>

PUBLICATION DATE

November 26, 2021

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INSTRUCTIONS TO AUTHORS

<https://www.wjnet.com/bpg/gerinfo/204>

GUIDELINES FOR ETHICS DOCUMENTS

<https://www.wjnet.com/bpg/GerInfo/287>

GUIDELINES FOR NON-NATIVE SPEAKERS OF ENGLISH

<https://www.wjnet.com/bpg/gerinfo/240>

PUBLICATION ETHICS

<https://www.wjnet.com/bpg/GerInfo/288>

PUBLICATION MISCONDUCT

<https://www.wjnet.com/bpg/gerinfo/208>

ARTICLE PROCESSING CHARGE

<https://www.wjnet.com/bpg/gerinfo/242>

STEPS FOR SUBMITTING MANUSCRIPTS

<https://www.wjnet.com/bpg/GerInfo/239>

ONLINE SUBMISSION

<https://www.f6publishing.com>



Retrospective Study

Tripartite intensive intervention for prevention of rebleeding in elderly patients with hypertensive cerebral hemorrhage

Cai-Xia Li, Li Li, Jin-Feng Zhang, Qi-Hong Zhang, Xiao-Hong Jin, Guo-Juan Cai

ORCID number: Cai-Xia Li 0000-0003-0450-6503; Li Li 0000-0001-8864-9522; Jin-Feng Zhang 0000-0003-4413-1996; Qi-Hong Zhang 0000-0002-8355-4863; Xiao-Hong Jin 0000-0003-0634-4114; Guo-Juan Cai 0000-0002-1815-0088.

Author contributions: Li CX and Li L designed the experiment; Zhang JF drafted the manuscript; Zhang QH and Jin XH collected the data; Li CX and Cai GJ analyzed and interpreted data; Li CX and Cai GJ wrote the article.

Institutional review board

statement: This study was approved by the Affiliated Hangzhou First People's Hospital Ethics Committee.

Informed consent statement:

Patients were not required to give informed consent because the analysis used anonymous clinical data that were obtained after each patient agreed to treatment by written consent.

Conflict-of-interest statement: The authors declare that they have no conflicting interests.

Data sharing statement: No additional data are available.

Country/Territory of origin: China

Specialty type: Nursing

Cai-Xia Li, Li Li, Jin-Feng Zhang, Department of Critical Care, Affiliated Hangzhou First People's Hospital, Zhejiang University School of Medicine, Hangzhou 310000, Zhejiang Province, China

Qi-Hong Zhang, Xiao-Hong Jin, Guo-Juan Cai, Department of Emergency, Zhuji People's Hospital of Zhejiang Province, Zhuji 311800, Zhejiang Province, China

Corresponding author: Guo-Juan Cai, BSc, Associate Chief Nurse, Department of Emergency, Zhuji People's Hospital of Zhejiang Province, No. 9 Jianmin Road, Zhuji 311800, Zhejiang Province, China. caiguojuan1982@163.com

Abstract

BACKGROUND

Hypertensive cerebral hemorrhage (HICH) is the rupture and bleeding of vessels of the cerebral parenchyma caused by continuously elevated or violently fluctuating blood pressure. The condition is characterized by high disability and high mortality. Hematoma formation and resulting space-occupying effects following intracerebral hemorrhage are among the key causes of impaired neurological function and disability. Consequently, minimally invasive clearance of the hematoma is undertaken for the treatment of HICH because it can effectively relieve intracranial hypertension. Therefore, special attention should be given to the quality of medical and nursing interventions in the convalescent period after minimally invasive hematoma clearance.

AIM

The study aim was to determine the value of intensive intervention, including doctors, nurses, and patient families, for the prevention of rebleeding in elderly patients with HICH during the first hospitalization for rehabilitation after the ictal event

METHODS

A total of 150 elderly HICH patients with minimally invasive hematoma evacuation in our hospital between May 2018 and May 2020 were selected and equally divided into two groups of 75 each by their planned intervention. The control group was given conventional nursing intervention and the observation group was given tripartite intensive intervention. The length of hospital stay, cost, complication rate, satisfaction rate, and rebleeding rate during hospitalization were recorded. Changes in cerebral blood flow indicators were recorded in both

Provenance and peer review:

Unsolicited article; Externally peer reviewed.

Peer-review report's scientific quality classification

Grade A (Excellent): 0
Grade B (Very good): B
Grade C (Good): C
Grade D (Fair): 0
Grade E (Poor): 0

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Received: July 15, 2021

Peer-review started: July 15, 2021

First decision: August 19, 2021

Revised: August 28, 2021

Accepted: September 10, 2021

Article in press: September 10, 2021

Published online: November 26, 2021

P-Reviewer: Koehn J, Waliszewska-Prosol M

S-Editor: Wang JL

L-Editor: Filipodia

P-Editor: Liu JH



groups. Changes in the National Institutes of Health Stroke Scale (NIHSS) score, quality of life index (QLI) score, and health behavior score were evaluated at the National Institutes of Health.

RESULTS

Duration of hospitalization was shorter in the observation group than in the control group, the hospitalization cost was less than in the control group, and the rate of rebleeding during hospitalization was lower than in the control group (all $P < 0.05$). There were no significant differences between the two groups before treatment (all $P > 0.05$). The mean flow rate (Q_{mean}) and mean velocity (V_{mean}) of the two groups increased ($P < 0.05$), and the dynamic resistance and peripheral resistance decreased ($P < 0.05$). The Q_{mean} and V_{mean} in the intervention group were higher than those in the control group ($P < 0.05$). Moreover, the dynamic resistance and peripheral resistance of the blood vessels were also lower in the intervention group than in the control group ($P < 0.05$). The difference in health behavior scores between the two groups before treatment was not significant ($P > 0.05$). In both groups, the scores for healthy behaviors such as emotion control, medication adherence, dietary management, exercise management, and self-monitoring were higher after than before treatment ($P < 0.05$), and the scores of healthy behaviors in the intervention group were higher than those in the control group ($P < 0.05$). There was no significant difference in the NIHSS and QLI scores between the two groups before treatment ($P > 0.05$). The QLI scores of the two groups increased ($P < 0.05$), and the NIHSS scores decreased ($P < 0.05$). The QLI scores of the intervention group were higher than those of the control group ($P < 0.05$), and the NIHSS score was correspondingly lower than that of the control group ($P < 0.05$). The incidence of respiratory infections, pressure sores, central hyperpyrexia, and deep venous thrombosis was lower in the intervention group than in the control group. Accordingly, the satisfaction rate was higher in the treatment group than that in the control group ($P < 0.05$).

CONCLUSION

Intensive intervention by doctors, nurses, and families of elderly patients with HICH reduced the rate of rebleeding during hospitalization. It also reduced the incidence of complications, promoted rehabilitation, improved the quality of life, and enhanced nerve function. Additionally, it improved satisfaction and promoted healthy behaviors.

Key Words: Tripartite intensive intervention by doctors; Nurses and patient families; Hypertensive intracerebral hemorrhage; Rebleeding; Rehabilitation; Nerve function

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Core Tip: We evaluated the value of tripartite intensive intervention in elderly patients with hypertensive intracerebral hemorrhage (HICH) during their first rehabilitation hospitalization after onset. A tripartite intensive intervention strategy in elderly HICH patients during the convalescent period shortened their hospitalization duration, reduced hospitalization costs, and lowered the rate of rebleeding during hospitalization as well as the overall incidence of complications, including pulmonary infection, pressure sores, central high fever, and deep venous thrombosis.

Citation: Li CX, Li L, Zhang JF, Zhang QH, Jin XH, Cai GJ. Tripartite intensive intervention for prevention of rebleeding in elderly patients with hypertensive cerebral hemorrhage. *World J Clin Cases* 2021; 9(33): 10106-10115

URL: <https://www.wjgnet.com/2307-8960/full/v9/i33/10106.htm>

DOI: <https://dx.doi.org/10.12998/wjcc.v9.i33.10106>

INTRODUCTION

Hypertensive intracerebral hemorrhage (HICH) is a common clinical cerebrovascular event[1-3]. Rupture of blood vessels and formation of hematoma for various reasons will compress the surrounding brain tissue, leading to secondary brain injury and neurological impairment[4-7]. Because of the sudden onset and rapid progress of HICH, it usually manifests with lasting limb hemiplegia, language impairment, dysphagia, and other sequelae[8-12]. Patients in the convalescent period are prone to emotional excitement, which is not conducive to the rehabilitation process[13-16]. On the other hand, severe emotional fluctuations can induce recurrent bleeding, which has a negative impact on prognosis. Therefore, nursing intervention should be emphasized during the rehabilitation for elderly patients hospitalized after first onset HICH, so as to reduce the risk of recurrent bleeding.

The nursing staff is currently the primary source of clinical nursing for HICH patients during convalescence, and the overall nursing effectiveness needs to be improved beyond just mechanically follow the doctor's advice[17]. Tripartite intensive intervention refers to a novel approach to medical care jointly delivered doctors, nursing staff, and the patient's family. It can provide patients with timely, comprehensive, and professional medical care services that enhance rehabilitation, and it has already been applied in a variety of medical fields[18]. This study explored the value of tripartite intensive intervention for elderly patients with HICH to prevent rebleeding during hospitalization for rehabilitation subsequent to ictus.

MATERIALS AND METHODS

General information

Elderly HICH patients who were treated at our hospital between May 2018 and May 2020 and underwent minimally invasive hematoma evacuation were recruited for this study. The inclusion criteria were (1) HICH that satisfied the criteria of the Guidelines for Diagnosis and Treatment of Intracerebral Hemorrhage in China (2014), and documented by imaging; (2) between 60 and 75 years of age, without restriction based on gender; (3) prior minimally invasive hematoma evacuation; (4) first onset of HICH; and (5) with complete clinical data. The exclusion criteria were (1) time from onset to initial physician assessment of more than 12 h; (2) accompanying circulatory and respiratory dysfunction; (3) a past medical history of mental illness; (4) accompanying neurological diseases; (5) accompanying severe diseases such as of the heart, liver, or kidney; and (6) not understanding the study procedures. A total of 150 patients, 78 men and 72 women with an average age of 68.21 ± 5.23 years were included in the study and were divided into two groups of 75 patients each. The control group was provided conventional nursing intervention. The observation group was provided with intensive tripartite intervention. There were no significant differences in the general data between the two groups ($P > 0.05$), as shown in Table 1.

Methods

The control group was provided with conventional nursing intervention and close monitoring of the vital signs, administration of drugs per doctor's advice, guiding the patients toward a reasonable diet, maintaining emotional stability, and implementing rehabilitation exercise as planned. The observation group was given tripartite intensive intervention by doctors, nurses, and the patient's family. A trinity of nursing group doctors, nursing staff, and family members was established. Trinity nursing knowledge training was provided to all team members. Ward rounds were jointly conducted by the medical staff. Prior to ward rounds, the nursing staff were tasked to evaluate the patient's vital signs, disease dynamics, emotional state, and the effect of rehabilitation exercise. The findings were reported to the doctor. During ward rounds, the nursing staff were expected to ask the doctors about the priorities for nursing care and the details of each patient, for continuous improvement of nursing quality. The nursing staff were also expected to inform the patient's family about the key points of focus in the daily care process. For patients with obvious adverse emotions, doctors, nursing staff, and family members were expected to cooperate for psychological counseling. Doctors were expected to clearly inform the patients that minimally invasive hematoma removal has satisfactory effects so as to reduce their anxiety and accordingly communicate the prognosis of similar patients to bolster confidence on the road to recovery. The nursing staff were expected to explain the importance of postoperative rehabilitation exercises to the patients and guide them as to the correct

Table 1 General participant characteristics in the two groups, *n* (%)

Parameters	Control group, <i>n</i> = 75	Observation group, <i>n</i> = 75	χ^2/t	<i>P</i> value
Sex			0.107	0.744
Male	40 (53.33)	38 (50.67)		
Female	35 (46.67)	37 (49.33)		
Age in yr	67.96 ± 6.11	68.45 ± 5.89	0.500	0.618
Hypertension course in yr	8.56 ± 2.17	8.41 ± 2.23	0.417	0.677
Time of onset in h	6.45 ± 2.13	6.51 ± 2.28	0.167	0.868
Bleeding in mL	36.58 ± 5.45	37.12 ± 5.08	0.628	0.531
Cerebral hemorrhage site			1.841	0.398
Basal ganglia	48 (64.00)	41 (54.67)		
The hypothalamus	19 (25.33)	21 (28.00)		
Cerebral lobe	8 (10.67)	13 (17.33)		
Level of education			0.435	0.805
Primary or lower secondary	12 (16.00)	11 (14.67)		
High school, or secondary school,	38 (50.67)	42 (56.00)		
College or above	25 (33.33)	22 (29.33)		
Combined diseases				
Chronic obstructive pulmonary disease	27 (36.00)	33 (44.00)	1.000	0.317
Coronary heart disease	22 (29.33)	15 (20.00)	1.758	0.185
Diabetes	16 (21.33)	20 (26.67)	0.585	0.444
Hyperlipidemia	36 (48.00)	38 (50.67)	0.107	0.744

way of performing the exercises. Families were expected to help patients relax and facilitate treatment adherence through encouraging words and actions. Family members were expected to accompany the patients during rehabilitation and exercise, and to provide prompt reports on any problem to their doctors and nursing staff to guide changes to the plan of rehabilitation and exercise programs. The period of intervention in both groups lasted included the duration of hospitalization for rehabilitation.

Observation indicators and evaluation criteria

The hospitalization duration, cost, complication rate, satisfaction rate, and rebleeding rate during hospitalization were recorded for each patient. The rebleeding criteria were established on the basis of clinical deterioration within 24 h following surgery (with rebleeding from the original site of the lesion), recurrence of hematoma upon clinical deterioration beyond 24 h following surgery, or increase in hematoma volume by more than 50% or more than 20 mL despite satisfactory clinical outcomes. Health behavior scores included five key aspects, emotional control (10 points), adherence to medications ordered by the doctor (15 points), dietary management (20 points), exercise management (20 points) and self-monitoring (10 points). Higher scores corresponded to better health behaviors.

The National Institutes of Health Stroke Scale (NIHSS) and Quality of Life Index (QLI) scores[19] were used to evaluate neurological function and quality of life. The total score of the NIHSS is 42 points, and higher scores correspond with worsening neurological function. The QLI has a maximum score of 10 points, and lower scores correspond to worsening quality of life. Patient satisfaction was evaluated using an in-house scoring system. The total score consisted of 100 points. Ninety to 100 were very satisfactory, 75–89 points were satisfactory; and scores below 75 were unsatisfactory.

Detection methods

Cerebrovascular function indicators such as mean flow rate (Q_{mean}) and mean velocity, (V_{mean}) dynamic resistance, and peripheral vascular resistance were measured in both

groups at the time of hospitalization prior to intervention and following intervention (at the time of discharge). The instrument used in the examination was an AD-7 cerebrovascular hemodynamic analyzer (Beduz, Germany).

Statistical analysis

The data were processed with SPSS ver. 19.0. The measurement indices were reported as means $\pm$ SD, and *t*-tests were used for comparison. Count data were reported as the number and percentage (%) of cases. Comparisons were performed by χ^2 tests. The level of significance was set at $P = 0.05$.

RESULTS

Comparison of duration of stay, cost, and rebleeding between the two groups

The duration of hospitalization was shorter, the cost of hospitalization was less, and the rebleeding rate during hospitalization was lower in the intervention group than in the control group, with statistical significance (all $P < 0.05$; Table 2).

Comparison of cerebral blood flow indicators between the two groups

Before intervention, there was no significant difference in cerebral blood flow between the two groups ($P > 0.05$). After intervention, the Q_{mean} and V_{mean} values increased in both groups ($P < 0.05$), and the dynamic resistance and peripheral vascular resistance decreased in both ($P < 0.05$). The Q_{mean} and V_{mean} values were higher in the intervention group than in the control group ($P < 0.05$), and the dynamic resistance and peripheral vascular resistance were lower than those in the control group ($P < 0.05$; Table 3).

Comparison of health behavior scores between the two groups

Before intervention, there was no significant difference in the health behavior scores between the two groups ($P > 0.05$). After intervention, the health behavior scores, including emotional control, medication adherence, dietary management, exercise management, and self-monitoring increased in the two groups compared with those prior to intervention ($P < 0.05$). Health behavior scores in the observation group were higher than those in the control group ($P < 0.05$; Table 4).

Comparison of NIHSS and QLI scores between the two groups

Prior to intervention, the NIHSS and QLI scores between the two groups were not statistically significant (both $P > 0.05$). Following intervention, the QLI scores of both groups accordingly increased ($P < 0.05$); the NIHSS score decreased ($P < 0.05$); and the QLI score of the observation group was higher than that of the control group ($P < 0.05$). Moreover, the NIHSS score in the treatment group was lower than that of the control group ($P < 0.05$; Table 5).

Complications during hospitalization of the two groups

The total incidence of complications such as pulmonary infection, pressure sores, central hyperpyrexia, and deep vein thrombosis was significantly lower in the intervention group than that in the control group ($P < 0.05$; Table 6).

Comparison of satisfaction between the two groups

The satisfaction rate was higher in the observation group significantly higher than in the control group ($P < 0.05$; Table 7).

DISCUSSION

Tripartite intensive intervention is a novel approach to medical care that is different from the conventional nursing interventions delivered in the past. The model attributes great importance to the participation of doctors and the patient's family members so that doctors can better grasp the specific situations of each patient during rehabilitation. It allows due consideration of the initiative of the patient's family so that the patient can obtain better care[20]. Some previous care givers applied the trinity nursing model in interventions for patients with transient ischemic attack, and found that the short-term efficacy of treatment and the quality of life of patients improved. However, no relevant studies have reported on the use of the intervention

Table 2 Hospital stay, cost, and rebleeding rate in the two groups

Group	Number of cases	Hospital stay in d	Hospitalization costs, 10000 yuan	Rebleeding rate during hospitalization, n (%)
Control group	75	16.89 ± 2.45	2.76 ± 0.32	10 (13.33)
Observation Group	75	15.21 ± 2.34	2.58 ± 0.28	3 (4.00)
t/χ^2		2.294	3.666	4.127
<i>P</i> value		0.000	0.000	0.042

Table 3 Cerebral blood flow indexes in the two groups (mean ± SD)

Group	Number of cases	Q_{mean} in mL/s		V_{mean} in cm/s		Dynamic resistance in kPa·s/m		Peripheral vascular resistance in kPa·s/m	
		Pre-intervention	After intervention	Pre-intervention	After intervention	Pre-intervention	After intervention	Pre-intervention	After intervention
Control group	75	8.64 ± 0.64	10.35 ± 0.71 ^a	12.52 ± 1.36	16.36 ± 1.42 ^a	461.58 ± 51.33	351.23 ± 42.02 ^a	1896.35 ± 315.23	912.36 ± 102.05 ^a
Observation Group	75	8.69 ± 0.72	11.56 ± 0.57 ^a	12.43 ± 1.82	18.21 ± 1.53 ^a	452.87 ± 56.74	323.52 ± 28.47 ^a	1904.27 ± 286.89	854.23 ± 84.56 ^a
<i>t</i>		0.449	11.509	0.343	7.675	0.986	4.728	0.161	3.798
<i>P</i> value		0.654	0.000	0.732	0.000	0.326	0.000	0.872	0.000

^a*P* < 0.05 vs the same group before intervention.**Table 4 Health behavior scores in the two groups (mean ± SD)**

Parameter	Time	Control group, <i>n</i> = 75	Observation group, <i>n</i> = 75	<i>t</i>	<i>P</i> value
Emotional control	Pre-intervention	5.74 ± 0.96	5.69 ± 1.02	0.309	0.758
	After intervention	7.32 ± 0.67 ^a	8.51 ± 0.88 ^a	9.318	0.000
Compliance with medication	Pre-intervention	7.65 ± 1.12	7.59 ± 1.08	0.334	0.739
	After intervention	12.33 ± 1.54 ^a	12.54 ± 1.26 ^a	0.914	0.362
Catering management	Pre-intervention	10.23 ± 1.35	10.08 ± 1.27	0.701	0.484
	After intervention	14.12 ± 1.24 ^a	16.35 ± 1.41 ^a	10.285	0.000
Movement management	Pre-intervention	10.45 ± 1.08	10.29 ± 1.13	0.886	0.377
	After intervention	14.03 ± 1.51 ^a	16.65 ± 1.32 ^a	11.313	0.000
Self-monitoring	Pre-intervention	6.52 ± 0.58	6.61 ± 0.67	0.880	0.381
	After intervention	7.89 ± 0.64 ^a	8.78 ± 0.69 ^a	8.190	0.000

^a*P* < 0.05 vs the same group before intervention.

model during the convalescence of elderly HICH patients.

Tripartite intensive intervention was applied in this study of the management of elderly HICH patients in the convalescent period. It was found to shorten the duration of hospitalization, reduce hospitalization costs, lower the rate of rebleeding during hospitalization, reducing the overall incidence of complications such as respiratory infection, pressure sores, central hyperpyrexia, and deep venous thrombosis. With the trinity nursing model, medical staff can undertake joint ward rounds, and the nursing staff can provide feedback on the patient's vital signs, dynamic conditions, emotional state, response to rehabilitation exercises, and other information. The feedback can be communicated to the doctor in a more detailed and timely manner to facilitate the doctor's formulation of the treatment plan and the implementation of improvements in the rehabilitation process. During ward rounds, doctor may remind nurses of the priorities and minutiae of care, which facilitates continuous improvement in the

Table 5 National Institutes of Health Stroke Scale and Quality of Life Index scores between the two groups (mean $\pm$ SD, subdivision)

Group	Number of cases	NIHSS score		QLI score	
		Pre-intervention	After intervention	Pre-intervention	After intervention
Control group	75	13.23 $\pm$ 3.26	7.45 $\pm$ 2.66 ^a	5.65 $\pm$ 1.14	6.85 $\pm$ 1.75 ^a
Observation Group	75	14.02 $\pm$ 3.41	6.27 $\pm$ 2.13 ^a	5.58 $\pm$ 1.25	7.53 $\pm$ 1.27 ^a
<i>t</i>		1.450	2.999	0.358	2.724
<i>P</i> value		0.149	0.003	0.721	0.007

^a*P* < 0.05 *vs* the same group before intervention.

NIHSS: National Institutes of Health Stroke Scale; QLI: Quality of Life Index.

Table 6 Complications during hospitalization in both groups, *n* (%)

Group	Number of cases	Pulmonary infection	Pressure sore	Central hyperthermia	Deep venous thrombosis	Total
Control group	75	2 (2.67)	3 (4.00)	5 (6.67)	2 (2.67)	12 (16.00)
Observation group	75	0 (0.00)	1 (1.33)	2 (2.67)	0 (0.00)	3 (4.00)
χ^2						6.000
<i>P</i> value						0.014

Table 7 Satisfaction in the two groups, *n* (%)

Group	Number of cases	Very pleased	Satisfactory	Not satisfied	Satisfaction rate
Control group	75	29 (38.67)	33 (44.00)	13 (17.33)	62 (82.67)
Observation group	75	42 (56.00)	28 (37.33)	5 (6.67)	70 (93.33)
χ^2					4.040
<i>P</i> value					0.044

quality of care. Through the process, family members learned of key points for attention to care that allowed better implementation of daily nursing operations, reduced complications, and ultimately promoted recovery.

In this study, emotional control, medication adherence, dietary management, exercise management, self-monitoring, and other health behavior scores before and after nursing intervention were evaluated. It was found that the tripartite intensive intervention improved the health-seeking behavior of these elderly HICH patients. Furthermore, the NIHSS score was used to evaluate the degree of neurological impairment, and the QLI score was used to evaluate quality of life. It was found that intensive intervention could better reduce neurological impairment and improve patient quality of life. With the tripartite intensive intervention model, all parties cooperate to relieve the patient's adverse emotions. The doctor is responsible for providing patients with information on the good effect of the operation and the prognosis of similar patients so that the patient can build confidence for recovery. The nursing staff serves as the main performers of the intervention, and during the nursing interval, they explain the importance of postoperative rehabilitation exercises and the correct methods for performing the program to the patients; they may help patients to overcome difficulties and fear and adhere to the rehabilitation plan until its completion. Nurses can also teach patients to count their heart rate, and can provide timely information to physicians if the patients experience discomfort upon rehabilitation training, to ensure patient safety. Family members can help foster calmness through their emotions and enhance treatment adherence through encouraging language and actions. In addition, family members can carefully prepare the patient's meals, frequently change their clothes, and provide good life care. The joint efforts from the three parties can greatly reduce the negative emotions of the patients. During the rehabilitation exercises, the patient is accompanied by his/her family member. When patients encounter discomfort, they are helped to sit down and are asked about

the situation. If any problems are found, they promptly reported to the doctor and nursing staff so that the doctor can promptly tailor the rehabilitation exercise plan to achieve maximum rehabilitation with the least effort, minimizing patient disability [21].

Increased cerebrovascular resistance and decreased blood perfusion are risk factors for poor prognosis in elderly HICH patients. In this study, measurement of cerebral blood flow indices before and after the intervention found that intensive intervention by doctors, nurses and family members increased Q_{mean} and V_{mean} and reduced dynamic resistance and peripheral vascular resistance. It was related to enhanced emotional control, treatment adherence, dietary management, exercise management, self-monitoring and other health behaviors following intervention.

CONCLUSION

In conclusion, intensive intervention by doctors, nurses, and family members reduced the rebleeding rate during hospitalization and the incidence of complications, promoted rehabilitation, and improved quality of life, neurological function, and patient satisfaction and health-seeking behavior.

ARTICLE HIGHLIGHTS

Research background

Hypertensive cerebral hemorrhage (HICH) is the rupture and bleeding of vessels of the cerebral parenchyma caused by continuously elevated or violently fluctuating blood pressure. The condition is characterized by high disability and high mortality. Hematoma formation and the resulting space-occupying effects following intracerebral hemorrhage are among the key causes of impaired neurological function and disability. Minimally invasive clearance of the hematoma effectively relieves intracranial hypertension. Therefore, special attention should be given to the quality of medical and nursing interventions during convalescence after minimally invasive hematoma clearance.

Research motivation

This study confirmed the value of intensive intervention including doctors, nurses, and patient families, for the prevention of rebleeding among elderly patients with HICH during the first hospitalization for rehabilitation after the ictal event.

Research objectives

This study aimed to determine the value of intensive intervention with tripartite care in preventing rebleeding in elderly HICH patients with HICH during their first hospitalization after the onset.

Research methods

A total of 150 elderly HICH patients who underwent minimally invasive hematoma evacuation were selected and divided equally to two groups of 75 each according to their intervention plan. The control group was given conventional nursing intervention and the observation group was given intensive tripartite intervention. The length of hospital stay, cost, complication rate, satisfaction rate, and rebleeding rate during hospitalization were recorded; changes in cerebral blood flow indicators were recorded.

Research results

The hospital stay was shorter, the hospitalization cost was lower, and the rate of rebleeding during hospitalization was lower in the observation group than in the control group. There were no significant differences in the patient characteristics and health behavior scores between the two groups before treatment. The scores for healthy behaviors such as emotion control, medication adherence, dietary management, exercise management, and self-monitoring in both groups were higher after treatment than before treatment, and the of healthy-behavior scores in the intervention group were higher than those in the control group.

Research conclusions

Intensive intervention by doctors, nurses, and families of elderly patients with HICH can reduce the rate of rebleeding during hospitalization, reduce the incidence of complications, promote rehabilitation, improve the quality of life, and enhance nerve function.

Research perspectives

Intensive intervention can improve the quality of treatment and care for the elderly with HICH.

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