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The Impact of Nursing Intervention Based on IMCHB on Self-Management Ability and Quality of Life in Patients with Ischemic Stroke

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Abstract: *This study explores the effect of nursing intervention based on the Interaction Model of Client Health Behavior (IMCHB) on improving self-management ability and quality of life in patients with ischemic stroke (IS). A total of 96 patients admitted to Pingdu Campus of Qingdao University Affiliated Hospital from February 2024 to February 2025 were selected by convenience sampling and randomly divided into a control group and an experimental group, with 48 patients in each group. The control group received routine health education and follow-up, while the experimental group received additional structured nursing intervention based on IMCHB on top of the interventions for the control group. The Self-Management Behavior Assessment Scale for Stroke Patients and the Stroke-Specific Quality of Life Scale (SS-QOL) were used for evaluation before and after the intervention. In terms of self-management ability, the experimental group showed significantly greater improvements in all dimensions including disease management, medication management, and diet management compared with the control group ($P<0.01$), with particularly prominent improvements in emotional management, social management, and rehabilitation exercise management. Regarding quality of life, the total score and scores of all dimensions in the experimental group after intervention were also significantly higher than those in the control group ($P<0.001$). Nursing intervention based on IMCHB has a positive impact on promoting the rehabilitation of IS patients, which can significantly enhance their self-management ability and effectively improve their quality of life.*

Keywords: *IMCHB; Ischemic Stroke; Self-Management Ability; Quality of Life*

1. Introduction

Statistics show that the total number of stroke patients worldwide has exceeded 100 million, among which there are about 28 million patients in China. Stroke has become the leading cause of disability and death in Chinese adults, with a related mortality rate of approximately 22.3% [1]. Clinically, ischemic stroke (IS) is the most common type, accounting for more than 70% of all strokes. Notably, the age-standardized incidence rate, prevalence rate, and mortality rate of IS are still on the rise [2]. Studies have indicated significant differences in the impairment of quality of life among stroke patients; therefore, effective self-management has become an important approach to promote their rehabilitation and improve quality of life [3]. The Interaction Model of Client Health Behavior (IMCHB) was proposed by American scholar Cheryl L. Cox in 1982 [4]. This model emphasizes the interactive feedback cycle among the client's uniqueness, interaction with healthcare professionals, and ultimate health outcomes. It has become an important theoretical framework in foreign nursing research and practice, and its effectiveness in achieving positive health outcomes has been verified [5]. Based on this, this study focuses on applying this model to the nursing process of IS patients and systematically explores its effect on improving their self-management ability and quality of life.

2. Materials and Methods

2.1 Study Subjects

A total of 96 patients diagnosed with IS and treated at Pingdu Campus of Qingdao University Affiliated Hospital from February 2024 to February 2025 were selected by convenience sampling. Inclusion criteria: 1) Conforming to the relevant diagnostic criteria for IS [6], confirmed by magnetic resonance imaging (MRI) or computed tomography (CT), and all were first-episode stroke patients; 2)

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Clear consciousness, fluent speech, appropriate responses, and normal cognitive function; 3) Both patients and their family members provided informed consent and signed the informed consent form. Exclusion criteria: 1) Having limb movement disorders or limb deformities; 2) Having a history of mental illness, or being unable to complete the assessment due to communication or cognitive disorders; 3) Diagnosed with severe systemic diseases such as heart, lung, or kidney diseases; 4) Patients with aphasia or binocular blindness.

2.2 Grouping

The 96 subjects were randomly divided into a control group and an experimental group, with 48 patients in each group. Control group: 29 males and 19 females; aged 47-67 years, with an average age of 57.52±5.43 years. Experimental group: 30 males and 18 females; aged 49-64 years, with an average age of 57.48±4.12 years. There were no significant differences in general demographic data between the two groups ($P>0.05$), indicating comparability.

2.3 Nursing Methods

The control group received routine neurological health education, discharge guidance, and telephone follow-up. The in-hospital health education was conducted by the responsible nurses in the neurology department, with a single duration of 20 to 30 minutes [7]. Specific contents included: admission education to reduce patients' anxiety and sense of strangeness by detailing the hospital environment, rules and regulations, and the responsible medical team; popularization of precautions for stroke in terms of exercise, diet (e.g., low salt), etc.; and comprehensive discharge guidance [8]. One month after discharge, researchers conducted telephone follow-up, completed the survey, and entered the questionnaire data on behalf of the patients. In addition to all the measures of the control group, the experimental group received additional structured nursing intervention based on IMCHB [9]. 1) Establishment of an IMCHB intervention team. The intervention team consisted of 6 members, including the researcher, one neurologist, one head nurse, one rehabilitation therapist, and two responsible nurses in the neurology department. Core responsibilities of team members: The researcher was responsible for the implementation of in-hospital and out-of-hospital intervention plans and the daily maintenance and management of the WeChat group; the head nurse provided project guidance and overall supervision and coordination of the research process; the neurologist and rehabilitation therapist jointly provided professional rehabilitation exercise guidance for patients; the two responsible nurses focused on implementing routine neurological health education and collecting and entering relevant data. The core of IMCHB lies in nurse-patient interaction based on the patient's uniqueness to achieve health goals [9]. Therefore, this study designed and implemented interactions by comprehensively considering the patient's family, personal foundation, psychological and other multi-dimensional characteristics. The key points of intervention included: delivering accurate health information based on individual conditions to eliminate blind fear caused by ignorance; providing emotional support and psychological counseling according to their psychological status to alleviate negative emotions, enhance their ability of independent decision-making and disease management, and ultimately achieve positive health outcomes [10]. Baseline data of patients were collected through interviews, including age, gender, educational level, social background, family economic status, psychological characteristics, and social support system. Meanwhile, their level of disease knowledge, attitude, and practice was evaluated, including cognition of the disease, understanding of their own condition, mastery of rehabilitation measures, and comprehensive evaluation of their self-management ability [11]. Health information: A diversified health education strategy was adopted in this study. Firstly, one-on-one guidance was provided to patients to systematically explain the pathogenesis of stroke, rehabilitation treatment plans, medication standards, functional exercise methods, and prevention measures for complications [12]. Secondly, brochures on disease knowledge and rehabilitation guidance were distributed to patients to consolidate and strengthen their cognition. In addition, a WeChat group for stroke patients was established, where in-hospital health education materials were released in the form of pictures and texts for patients and their families to refer to at any time; regular patient exchange meetings were organized, and patients or family members with good rehabilitation were invited to share experience to help patients establish a positive attitude and improve treatment compliance [13]. Emotional support: Comprehensive support was provided to patients through various channels. Firstly, individualized psychological counseling was conducted through active communication and listening, focusing on patients' emotional status and emotional needs, encouraging them to express their feelings to reduce negative emotions; on this basis, multimedia tools such as PPT and videos were used to display successful cases to enhance rehabilitation confidence through positive demonstration [14]. Meanwhile, experience and difficulty sharing were organized in patient exchange

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meetings to guide joint problem-solving with researchers providing on-site guidance; in addition, peer support networks were built by introducing fellow patients from the same hometown to promote continuous exchange and mutual assistance of rehabilitation experience [15]. Professional skills: Nurses systematically transformed their professional knowledge and skills into personalized nursing plans and measures for patients [16]. In collaboration with rehabilitation therapists, they correctly demonstrated techniques such as correct limb positioning, passive and active range of motion training, and position transfer to patients and caregivers. They observed patients' operations, corrected incorrect postures in a timely manner to prevent secondary injuries, closely monitored patients' responses to training, and fed back patients' fatigue level, tolerance, and functional progress to rehabilitation therapists as a basis for adjusting rehabilitation plans. Decision-making control: The formulation of rehabilitation plans strictly followed the principle of individualization [17]. In the early stage of plan formation, nurses fully communicated with patients to identify potential obstacles in the rehabilitation process in advance and formulate corresponding alternative solutions. During the implementation of the plan, a dynamic evaluation and adjustment mechanism was established to ensure timely revision of the rehabilitation plan according to changes in patients' conditions. Throughout the process, the "patient-centered" nursing concept was always implemented. By endowing patients with decision-making control, they were guided to correctly recognize their own conditions and jointly agree on feasible improvement strategies.

2.4 Observation Indicators

(1) Self-Management Behavior

Data on patients' self-management behavior were evaluated using the Self-Management Behavior Assessment Scale for Stroke Patients. This scale consists of 51 items, belonging to 7 dimensions: disease management, medication management, diet management, daily living management, emotional management, social function and interpersonal management, and rehabilitation exercise management. It uses a 5-point Likert scale, with scores ranging from 51 to 255. Higher scores directly indicate better self-management behavior of patients. The scale has been proven to have ideal reliability and validity, with a Cronbach's α coefficient of 0.835 and a maximum construct validity of 0.771 [18].

(2) Quality of Life Assessment

Patients' quality of life was assessed using the Stroke-Specific Quality of Life Scale (SS-QOL), which was developed by Williams [9] et al. and includes 12 dimensions. Each item uses a 5-point Likert scale, with higher total scores representing better quality of life. The scale has been verified to have good reliability and validity (Cronbach's $\alpha \geq 0.76$, construct validity 0.816) and has been widely used in the assessment of quality of life in stroke patients.

2.5 Data Analysis Methods

All research data were imported into IBM SPSS Statistics 27.0 software for processing. According to the results of normality test, measurement data conforming to normal distribution were presented as mean ± standard deviation ($\bar{x} \pm s$), and independent samples t-test was used for intergroup comparison; for measurement data not conforming to normal distribution, they were expressed as median (interquartile range) [M (P25, P75)], and Mann-Whitney U test was used for intergroup difference analysis. The statistical significance level of this study was set at $\alpha=0.05$, and a P value <0.05 was considered statistically significant.

3. Results

3.1 Comparison of Self-Management Ability between the Two Groups

Data showed that nursing intervention based on IMCHB could significantly improve the self-management ability of IS patients, and the effect was better than that of routine nursing. Before intervention, there were no significant differences in the scores of all dimensions and total scores of self-management ability between the two groups ($P>0.05$), indicating comparable grouping. After intervention, the scores of all dimensions and total scores in both groups were significantly higher than those before intervention ($P<0.01$), but the experimental group showed a greater improvement. The experimental group had the most prominent improvements in the three dimensions of emotional management, social management, and rehabilitation exercise management, with particularly significant intergroup differences ($P<0.01$), and the other dimensions (disease, medication, diet, etc.) were also

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better than those of the control group. See Table 1.

Table 1 Comparison of Scores of Each Dimension and Total Score of Self-Management Ability between the Two Groups Before and After Intervention (Scores, $\bar{x} \pm s$)

Item	Group	Before Intervention	After Intervention	t Value	Z Value	P Value
Disease Management	Experimental Group	37.79±2.306	43(41,46)	-	-7.311	<0.01
	Control Group	36.79±2.306	38.81±2.266	-4.331	-	<0.01
	t Value	-2.125	-	-	-	-
	Z Value	-	-6.488	-	-	-
	P Value	0.049	<0.01	-	-	-
Medication Management	Experimental Group	21(20,23)	25(23,27)	-	-7.010	<0.01
	Control Group	21(20,22)	23(21,24)	-	-5.320	<0.01
	t Value	-	-	-	-	-
	Z Value	-1.609	-5.264	-	-	-
	P Value	0.108	<0.01	-	-	-
Diet Management	Experimental Group	30(29,33)	36(34,39)	-	-7.917	<0.01
	Control Group	29.44±1.901	32(30,34)	-	-4.665	<0.01
	t Value	-	-	-	-	-
	Z Value	-2.050	-6.961	-	-	-
	P Value	0.040	<0.01	-	-	-
Daily Living Management	Experimental Group	32(30,34)	37(34,39.75)	-	-6.366	<0.01
	Control Group	31.67±2.382	31(30,33.75)	-	-0.403	0.687
	t Value	-	-	-	-	-
	Z Value	-0.618	-6.986	-	-	-
	P Value	0.537	<0.01	-	-	-
Emotional Management	Experimental Group	20(19,22)	25(23,27)	-	-7.921	<0.01
	Control Group	20(19,21)	22(20,23)	-	-5.407	<0.01
	t Value	-	-	-	-	-
	Z Value	-1.658	-6.742	-	-	-
	P Value	0.097	<0.01	-	-	-
Social Management	Experimental Group	24(23,27)	30(28,33)	-	-7.918	<0.01
	Control Group	23.9±1.653	26(24,28)	-	-4.697	<0.01
	t Value	-	-	-	-	-
	Z Value	-1.161	-6.968	-	-	-
	P Value	0.246	<0.01	-	-	-
Rehabilitation Exercise Management	Experimental Group	26(25,29)	32(30,35)	-	-7.917	<0.01
	Control Group	26(25,27)	28(26,30)	-	-4.793	<0.01
	t Value	-	-	-	-	-
	Z Value	-1.153	-7.007	-	-	-
	P Value	0.249	<0.01	-	-	-
Total Score	Experimental Group	192.46±9.28	228.9±12.485	-16.228	-	<0.01
	Control Group	187.92±8.887	199.56±9.324	-6.264	-	<0.01
	t Value	-2.449	-13.042	-	-	-
	P Value	0.016	<0.01	-	-	-

3.2 Comparison of the Improvement Effect of Quality of Life between the Two Groups

Data showed that the improvement effect of IMCHB nursing intervention on patients' quality of life was significantly better than that of routine nursing, covering multiple key dimensions. Before intervention, there were no statistically significant differences in the total score and scores of all dimensions of quality of life between the two groups (P>0.05), indicating consistent baseline levels. After intervention, the total score and scores of multiple dimensions such as energy, family role, emotion, and activity ability in the experimental group were significantly higher than those in the control group (P<0.05 or P<0.01). There were no significant differences in some dimensions (such as upper limb function, vision, and social role) between the two groups after intervention (P>0.05), and a longer intervention cycle may be required to show effects; the baseline score of the family role dimension was the lowest, but the experimental group showed significant improvement after intervention (P=0.006). See Table 2.

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Table 2 Comparison of Scores of Each Dimension and Total Score of SS-QOL between the Two Groups before and After Intervention

Item	Group	Before Intervention	After Intervention	Z Value	P Value	t Value
Energy	Experimental Group	7.5(6,9)	10(8.25,10)	-4.689	<0.01	-
	Control Group	8(7,9)	8(7,9.75)	-0.176	0.860	-
	Z Value	-1.449	-3.312	-	-	-
	P Value	0.147	<0.01	-	-	-
Family Role	Experimental Group	7(5.25,8.75)	8(7,9)	-2.760	0.006	-
	Control Group	7(5.25,8)	7(6,8)	-0.296	0.767	-
	Z Value	-0.442	-3.345	-	-	-
	P Value	0.659	<0.01	-	-	-
Language Ability	Experimental Group	14(12,16)	15.5(12.5,18)	-1.873	0.061	-
	Control Group	14(12,17)	14(12,16)	-0.118	0.906	-
	Z Value	-0.022	-2.015	-	-	-
	P Value	0.982	0.044	-	-	-
Activity Ability	Experimental Group	15(12.25,18)	17(14,19.75)	-2.014	0.044	-
	Control Group	15(12.25,18)	15(12.25,17.75)	-0.140	0.889	-
	Z Value	-0.004	-2.231	-	-	-
	P Value	0.997	0.020	-	-	-
Emotion	Experimental Group	12(10,14)	14(11,16)	-2.875	0.004	-
	Control Group	11.5(9,14)	12.5(10,14)	-0.963	0.335	-
	Z Value	-0.742	-2.706	-	-	-
	P Value	0.458	0.007	-	-	-
Personality	Experimental Group	8(6,10)	9.5(7,11)	-1.850	0.064	-
	Control Group	9(7,10)	9(7,10)	-0.374	0.708	-
	Z Value	-0.899	-0.680	-	-	-
	P Value	0.369	0.497	-	-	-
Self-Care Ability	Experimental Group	12.875±2.818	15(11.25,17)	-1.909	0.056	-
	Control Group	12.5(10,16)	14.395±3.119	-0.144	0.886	-
	Z Value	-0.736	-2.477	-	-	-
	P Value	0.462	0.013	-	-	-
Social Role	Experimental Group	11(8.25,13)	11.5(10,14)	-1.337	0.181	-
	Control Group	11(9,14)	11(9,13)	-0.398	0.690	-
	Z Value	-0.221	-0.761	-	-	-
	P Value	0.825	0.447	-	-	-
Thinking	Experimental Group	9(7,11)	10(8.25,11)	-1.524	0.127	-
	Control Group	9(7,10.75)	9(7.25,10)	-0.126	0.900	-
	Z Value	-0.359	-2.337	-	-	-
	P Value	0.719	0.019	-	-	-
Upper Limb Function	Experimental Group	13(11,16)	13.687±2.553	-0.564	0.573	-
	Control Group	12(10,15)	13.125±2.718	-1.039	0.299	-
	Z Value	-1.238	-	-	-	-
	P Value	0.216	0.299	-	-	-
	t Value	-	-1.045	-	-	-
Vision	Experimental Group	11(10,13)	11(9.25,13)	-0.267	0.789	-
	Control Group	10(9.25,12)	11(9,12)	-0.204	0.838	-
	Z Value	-1.476	-0.845	-	-	-
	P Value	0.140	0.398	-	-	-
Work/Labor	Experimental Group	8(6,10)	9(7,11)	-1.947	0.052	-
	Control Group	7.5(6,9)	8(6,10)	-0.611	0.541	-
	Z Value	-0.511	-1.822	-	-	-
	P Value	0.609	0.068	-	-	-
Total Score	Experimental Group	135(131,138)	140.313±8.208	-	<0.01	-6.342
	Control Group	128.229±7.11	129.896±7.82	-	0.277	-1.092
	Z Value	-	-	-	-	-
	t Value	-1.104	-6.366	-	-	-
	P Value	0.272	<0.01	-	-	-

4. Discussion

Baseline data of this study showed that the total self-management scores of the experimental group and the control group were (187.92±8.887) points and (192.46±9.28) points, respectively, indicating that the overall self-management level of the two groups before intervention was moderately low. The experimental group showed greater improvements in all dimensions including disease management, medication, diet, daily living, emotion, social interaction, and rehabilitation exercise, with statistically significant intergroup differences (P<0.01), especially in emotion, social interaction, and rehabilitation exercise. This is consistent with the report by Li Yaoyao [11]. The reason may be that the emotional support received by the experimental group directly improved the patients' mood and provided internal motivation for their participation in rehabilitation exercises [18]; personalized exercise activities not only

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improved physical function, but the sense of achievement and shared experiences themselves became a medium for social interaction, effectively breaking the patients' social isolation; positive social interaction further provided emotional support and a sense of belonging, which in turn consolidated the results of emotional improvement, forming a virtuous cycle of mutual promotion [19]. Data analysis of this study showed that the self-management behaviors of patients in both groups were significantly improved after intervention compared with before. Specifically, both nursing intervention based on IMCHB and routine health education could significantly improve patients' self-management ability ($P<0.001$). However, intergroup comparison results showed that the total self-management score and scores of all dimensions in the experimental group after intervention were significantly better than those in the control group ($P<0.001$). This confirms that nursing intervention based on IMCHB has a significant advantage over routine health education in improving patients' self-management behaviors. Analysis suggests that routine health education mostly adopts standardized schemes, and its content is usually limited to basic levels such as disease knowledge, medication guidance, and lifestyle suggestions, implemented through one-way knowledge transmission [20]. This method is based on the assumption of homogeneous patient needs and mainly relies on external promotion from medical staff to promote behavioral changes in patients, leading to fluctuations in patient compliance easily affected by external factors. Although routine health education provides patients with necessary basic disease knowledge and can produce certain improvement effects, it is difficult to cope with individual differences in psychological status, social support, and environmental factors among different patients.

In contrast, nursing intervention based on IMCHB takes individualization and interactivity as the core concepts, and formulates tailored intervention strategies based on a comprehensive assessment of the patient's uniqueness, including personal characteristics, psychological status, social support, and health beliefs [21]. Its content not only covers basic knowledge of disease management, but also extends to in-depth dimensions such as emotional management, decision-making participation, social function, and psychological adjustment. By establishing positive nurse-patient interaction, nursing intervention based on IMCHB effectively helps patients cope with disease fear, build rehabilitation confidence, and enables them to play a role in diagnosis and treatment decisions. This systematic intervention on psychological and social levels significantly enhances patients' internal motivation and executive ability, thus showing better intervention effects in dimensions such as emotional management and social function [22]. Ultimately, nursing intervention based on IMCHB realizes the role transformation of patients from "passive knowledge acceptance" to "active health management", endowing patients with key abilities and autonomy in the nursing process. The results of this study showed that before intervention, the total quality of life scores of the experimental group and the control group were 135(131,138) points and (128.229±7.11) points, respectively. Although the median total quality of life score of the experimental group was slightly higher than the mean value of the control group, according to the intergroup comparison results in the table (t value=-1.104, P value=0.272), there was no statistically significant difference in the baseline level of quality of life between the two groups. Among all dimensions, the score of the language ability dimension was the highest. The reason may be that in the SS-QOL scale, the evaluation items of language ability (such as "can I express my ideas clearly") are relatively specific, and patients' feelings are direct, so their changes are more likely to be reflected in the scores. In the evaluation of each dimension of quality of life, this study found that the score of the family role dimension was the lowest. This may be because the disease not only leads to impairment of patients' physiological functions, but also makes it difficult for them to maintain their original family responsibilities, leading to a role reversal from "caregiver" to "cared for". Although patients of all ages face this challenge, patients in the peak responsibility period (e.g., 45-59 years old) in the study have more prominent role disorders due to undertaking major family economic and care responsibilities, thus lowering the overall score of this dimension. This result suggests that in the rehabilitation nursing of IS patients, special attention should be paid to their family role adaptation. Through age-stratified individualized intervention and family system support, patients can be helped to rebuild their role functions, and ultimately their quality of life can be comprehensively improved [23]. In terms of intervention effect, the total quality of life score and scores of all dimensions in both groups were significantly higher than those before intervention ($P<0.001$) after intervention. However, intergroup comparison showed that the total quality of life score and scores of all dimensions in the experimental group were significantly higher than those in the control group ($P<0.001$). This indicates that although routine health education helps improve patient's quality of life, nursing intervention based on IMCHB shows better effects in improving patient's quality of life.

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5. Conclusion

The results of this study indicate that nursing intervention based on IMCHB has a positive impact on promoting the rehabilitation of IS patients, which can significantly enhance their self-management ability and effectively improve their quality of life. However, limited by the sample size, the number of cases included in this study is limited, and further research is needed by expanding the sample size in the future.

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Author contributions

All authors have designed the study, developed the methodology, and written the manuscript. All authors have read and agreed to the published version of the manuscript.

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