

ORIGINAL RESEARCH

Integrated Nursing and Targeted Functional Training for Cerebral Hemorrhage Recovery

Xia Fu, BM; Chao Hu, BM; Jiangyu Fu, BM; Zhifei Li, BM

ABSTRACT

Objective • This study aimed to investigate the impact of integrating medical nursing with targeted functional training interventions on neurological and limb motor function and self-care ability in patients diagnosed with cerebral hemorrhage.

Methods • A retrospective cohort study was conducted, including 100 patients diagnosed with cerebral hemorrhage who received interventions at our hospital between January 2020 and June 2022. The patients were divided into two groups: the research group (50 cases) and the reference group (50 cases), based on different intervention methods. The reference group received targeted functional training intervention, while the research group implemented the integration of medical nursing in addition to the reference group intervention. Differences in the National Institutes of Health Stroke Scale (NIHSS) score, Barthel index, Modified Barthel Index (MBI) score, Glasgow Coma Scale (GCS) score, Edinburgh Speech Scale (ESS) score, Fugl-Meyer score, Ability of Daily

Living (ADL) score, and efficacy evaluation were observed and compared between the two groups of patients.

Results • After nursing, the Fugl-Meyer score and Barthel index score were significantly higher in both groups compared to before nursing, with the research group showing higher scores than the reference group ($P < 0.05$). There was no significant difference in limb motor function scores between the two groups before nursing ($P > 0.05$). After the integrated nursing intervention, the NIHSS and ADL scores of both groups were significantly higher than before nursing, with the research group demonstrating higher scores than the reference group ($P < 0.05$).

Conclusions • Integrating medical nursing with targeted functional training interventions has the potential to significantly improve cognitive function, neurological function, and daily activity engagement in patients with cerebral hemorrhage, thereby enhancing their overall quality of life. (*Altern Ther Health Med.* 2023;29(7):80-85).

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INTRODUCTION

Cerebral hemorrhage is a condition characterized by bleeding within the brain, often resulting from a ruptured blood vessel, leading to neurological impairment.¹ The prevalence of cerebral hemorrhage has significantly increased due to changes in lifestyle and diet, causing significant clinical concern as it leads to disability and higher mortality rates among patients.¹⁻² Patients affected by cerebral hemorrhage often experience varying degrees of neurological and limb dysfunction, leading to

a substantial decline in their overall quality of life.² Clinical treatment for cerebral hemorrhage involves surgical procedures and conservative therapies. While traditional postoperative interventions may have limited effects, there is an increasing preference for a recovery approach focusing on targeted functional training. This approach is favored because it offers consistent and more effective outcomes.^{2,3}

Postoperative rehabilitation training for cerebral hemorrhage is a lengthy and challenging process. Many patients face difficulties following traditional rehabilitation programs and lack access to expert guidance, which can negatively affect the effectiveness of rehabilitation and ultimately impact their prognosis.⁴⁻⁵ Targeted functional training is an innovative approach used by nursing staff, patients, and their families to develop and manage rehabilitation plans.⁶ The primary objective of this recovery approach is to set appropriate rehabilitation goals for the patient. Once a goal is achieved, a more advanced goal is introduced to ensure continuous progress toward better outcomes. The nursing staff provides rehabilitation guidance to help maintain an elevated state of recovery in the patient's body.⁷

The integration of medical nursing, rooted in advancements in medical technology, has gained widespread usage as a comprehensive, systematic, professional, efficient, and continuous nursing model.⁸ Several scholars have discovered the importance of high-quality nursing services models, such as the integrated medical nursing, which refers to the specialized area of nursing practice that focuses on providing care and support to patients with medical conditions, diseases, or injuries. The incorporation of the advanced medical technology, medical nursing interventions, allow approaches designed to optimize patient outcomes and enhance neurological recovery.^{9,10} This integration enables medical nurses to utilize cutting-edge tools, techniques, and evidence-based practices to provide targeted care, closely monitor patient progress, administer appropriate treatments, and effectively manage patients' neurological conditions.¹⁰ Therefore, this study aims to investigate the impact of integrated medical nursing and targeted functional training on neurological and limb function and self-care ability in patients with cerebral hemorrhage.

MATERIAL AND METHODS

Study Design and Population

A total of 100 patients diagnosed with cerebral hemorrhage, who received interventions at our hospital from January 2020 to June 2022, were included in this retrospective study. The patients were divided into two groups: the research group and the reference group, each consisting of 50 cases based on different intervention methods. The diagnostic criteria for intracerebral hemorrhage align with the guidelines outlined in "Key Points for the Diagnosis of Various Cerebrovascular Diseases".¹¹ The criteria for patient selection in this retrospective study were based on the understanding that intracerebral hemorrhage typically occurs during physical activity or emotional agitation and presents symptoms such as repeated vomiting, headache, and elevated blood pressure. The disease follows a rapid progression, often resulting in disturbances in consciousness and neurological focal symptoms like hemiplegia.

Inclusion and Exclusion Criteria

Inclusion criteria for this study were as follows: (1) patients with onset time within 72 hours; (2) patients with blood loss of less than 30 ml and receiving non-surgical treatment; (3) patients with a confirmed diagnosis based on imaging examination results and clear consciousness.

Exclusion criteria were: (1) patients with major organ insufficiency or other active bleeding tendencies; (2) patients with intratumoral infection, prognostic bleeding, intratumoral tumors, mental diseases, various dementias, or cognitive impairments; (3) individuals with cognitive impairment; or (4) hearing impairment that prevented them from expressing themselves in language.

Intervention Method for Reference Group

In the reference group, targeted functional training interventions were employed with specific goals at different timeframes:

Short-term goals were based on following: (1) After the surgery, the patient was positioned supine or laterally on the bed; (2) The patient's healthy side thigh was placed on the affected side leg, and the affected side thigh was moved to the edge of the bed, maintaining natural bending; (3) Passive leg movements were performed, including rotating the body and swinging the legs; (4) The duration of passive training was 15 minutes per session, performed twice daily.

Mid-term goals were based on following training activities: (1) The patient was guided to stand and slowly move their feet forward; (2) Upper limbs were kept straight, hips were lifted, knees were straightened, and standing time was gradually extended based on the patient's tolerance; (3) Restoration of standing balance was emphasized as quickly as possible; (4) Cognitive function training was conducted using storytelling techniques, incorporating elements such as time and objects; (5) The content of the stories was expanded, and questions were asked to improve the patient's memory ability.

Long-term goals were comprised of the following training activities: (1) Walking exercises were gradually introduced based on the patient's ability to sit; (2) Focus was given to going upstairs and downstairs during walking training, with a recommended walking time of 5 to 10 minutes per session, depending on the patient's tolerance; (3) Patients were assisted in performing daily rehabilitation exercises such as washing, eating, and simple tasks, to improve postoperative limb function; (4) Mental restorative training, including activities like counting numbers, interpreting pictures, and improving literacy skills, were integrated; (5) Language skills were practiced through storytelling and memorizing numbers, ensuring clear articulation and smooth expression.

Intervention Method for Research Group

Integrated medical nursing is implemented along with targeted functional training interventions in the research group. The integration involves the following components.

Formulating a Comprehensive Nursing Plan.

Formulating a comprehensive nursing plan: (1) Patient's basic data and condition are thoroughly investigated, including nursing care needs and key points; (2) A medical nursing plan is developed by consulting relevant literature, integrating patient-centered treatment and nursing based on the patient's specific situation and literature evidence.

Establishing an Information Platform. Establishing an information platform for integrated nursing implementation: (1) An information platform is created to streamline nursing content, with different units connected through a service system; (2) Nursing content includes condition nursing, special nursing, basic life nursing, safety nursing, health assessment, rehabilitation nursing, nutritional nursing, environmental nursing, and psychological care; (3) A four-in-one operation mode integrates medical treatment, nursing, health education, and rehabilitation; (4) The components of the operation mode are modularized and combined as per individual needs, facilitating the exchange and reuse of

medical and nursing data across patients with varying illness severity, while minimizing complexity.

Semi-Structured Interviews and Functional Analysis. Utilizing semi-structured interviews and functional analysis methods include the following activities: (1) The integration of medical nursing information platform based on medical technology was determined through semi-structured interviews and functional analysis methods; (2) Patient data collected during doctor visits, home monitoring, or community medical services, is automatically categorized into electronic medical record and health record databases; (3) The platform enables data exchange and sharing, providing essential medical information for clinical treatment; (4) Attending physicians and rehabilitation specialists use established health records to conduct physical examinations, assess the patient's condition and rehabilitation progress, and guide the discharge procedures for patients who meet the criteria; (5) Communication of patient health management data is facilitated through patient health management files.

Individualized Interventions and Supportive Activities. Individualized interventions and supportive activities include the following: (1) Patients receive individualized interventions according to the established intervention plan; (2) Group activities based on patient preferences and emotions, such as reading and painting, are organized; (3) Emotional support is provided for patients experiencing adverse emotions through techniques like playing soothing music and engaging in therapeutic communication; (4) Close monitoring of patient symptoms and signs is maintained during the recuperation process; (5) Badges were created for patients, containing contact information for family members and relevant nursing staff, ensuring timely understanding of the patient's medical history, symptom evaluation, and effective intervention.

Observation Indicators

Indicators of Self-Care Ability of Daily Living. Prognosis evaluation: The European Stroke Scale (ESS) was utilized to assess neurological function, consisting of 14 dimensions. The evaluation was completed using a percentage system, with higher scores indicating better neurological function.

Consciousness recovery assessment: The Glasgow Coma Scale (GCS) was employed to evaluate the recovery of consciousness, including language ability, body function, and sleep-eye response. The total score is 15 points, with a higher score indicating a better state of consciousness.

Assessment of self-care ability: The Modified Barthel Index (MBI) scale comprises 9 dimensions, evaluated using a percentage system. A high score on the MBI indicates a high level of self-care ability.

Indicators of Functional and Motor Abilities. (1) Limb motor function score: Patients' quality of life and daily activity (ADL) scores in both groups were assessed before and after nursing. The quality-of-life score considers physical, emotional, social, and other functional aspects, with a score ranging from 0 to 100 points. Higher scores indicate a better quality of life; (2) The

NIHSS score evaluated the state of consciousness, sensory, motor, and language abilities of cerebral hemorrhage patients, with a score range of 0 to 42 points; (3) Neurological function score: The Fugl-Meyer score primarily measured the motor function of the upper and lower limbs, with scores ranging from 0 to 100 points. Higher scores indicate better motor function; (4) The Barthel index observed daily activities related to walking, dressing, eating, urination, and defecation. The score ranges from 0 to 100 points.

Statistical Analysis

Microsoft Excel was employed for data sorting and management, while Statistical Product and Service Solutions (SPSS) 28.0 statistical software (IBM, Armonk, NY, USA) was utilized for data analysis. Different statistical methods were applied based on the data types. Measurement data were presented as ($\bar{x} \pm SD$). The homogeneity of variance was initially tested. If the data exhibited homogeneity, the *t* test was employed. For data with unequal variance, the rank-sum test was utilized. The chi-square test was employed for analyzing count data. Statistical significance was set at $P < .05$.

RESULTS

Comparison of Clinical Data

There were no significant differences between the two groups regarding gender, average age, amount of intracerebral hemorrhage, and educational level, as determined by *t*-test and chi-square test ($P > .05$). Refer to Table 1.

Comparison of Daily Life Self-Care Ability Scores

There was no significant difference in the scores of daily life self-care ability between the two groups before the nursing intervention, as indicated by the *t* test ($P > .05$). However, after the integrated nursing intervention, the research group showed significantly higher scores in MBI, GCS, and ESS compared to the reference group, with a statistically significant difference ($P < .05$). See Figure 1.

Comparison of Neurological Scores

There was no significant difference in neurological function scores between the two groups before nursing intervention ($P > .05$). However, after the integrated nursing intervention, both groups demonstrated higher Fugl-Meyer scores and Barthel index scores compared to their respective scores before the nursing intervention. Additionally, the research group exhibited higher scores than the reference group, with a statistically significant difference ($P < .05$). See Figure 2.

Comparison of Limb Motor Function Scores

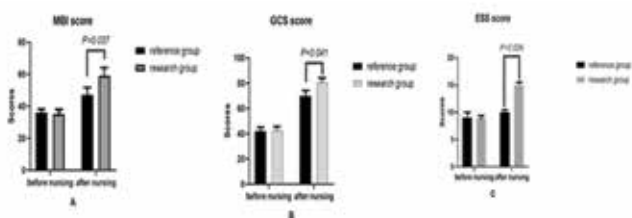
No significant difference was observed in limb motor function scores between the two groups before nursing intervention ($P > .05$). Following integrated nursing, both groups of patients showed significantly higher NIHSS and ADL scores compared to their scores before the nursing intervention. Moreover, the research group had higher scores than the reference group, with a statistically significant difference ($P < .05$). See Figure 3.

Table 1. Comparison of general data of patients in two groups [n, ($\bar{x} \pm s$)]

Group	Gender (Male/ Female)	Average Age (Years)	Intracerebral Hemorrhage Volume (MI)	Educational Level		
				Elementary school and below	Junior high school	High school and above
Reference Group (50)	23/27	70.63 ± 2.12	136.31 ± 12.51	27	15	8
Research Group (50)	22/28	70.62 ± 2.11	136.30 ± 12.52	28	13	9
χ^2/t	0.013	0.032	0.015	0.220		
P value	.903	.976	.945	.896		

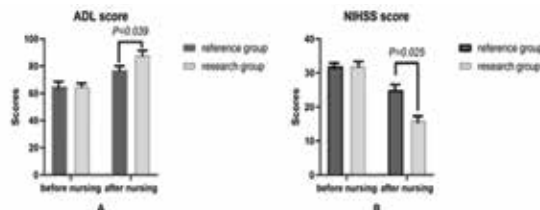
Note: Intracerebral hemorrhage volume: Volume of hemorrhage within the brain measured in milliliters; χ^2/t : Statistical tests used for comparison between groups; χ^2 : Chi-square test; t : t test; P -value: indicating the level of statistical significance.

Figure 1. Comparison of Daily Life Self-Care Ability Scores.



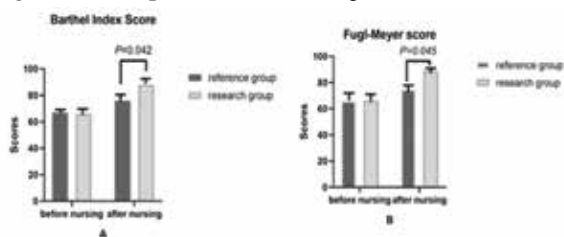
Note: The data for comparing daily life self-care ability scores were entered using Epidata, and statistical analysis was conducted using SPSS 28.0. Two individuals entered the data into a computer database, and the results were presented as mean ± standard deviation. An independent samples t test was performed. The results showed no significant difference in the scores of daily life self-care ability between the two groups before nursing intervention ($P > .05$). However, after the nursing intervention, the research group exhibited significantly higher scores in MBI, GCS, and ESS compared to the reference group, indicating improved self-care ability. The difference between the groups was statistically significant ($P < .05$).

Figure 3. Comparison of limb motor function scores.



Note: The data to compare limb motor function scores were entered into a computer database using Epidata. The data was then subjected to statistical analysis using SPSS 28.0. Two individuals performed the data entry, and the scores were expressed as mean ± standard deviation. An independent samples t test was conducted. The analysis indicated no significant difference in limb motor function scores between the two groups before nursing intervention ($P > .05$). However, after the nursing intervention, the patient's NIHSS and ADL scores significantly increased compared to their scores before the nursing intervention. Notably, the research group exhibited higher scores than the reference group, and this difference was statistically significant ($P < .05$).

Figure 2. Comparison of neurological function scores.



Note: The neurological function score comparison data were inputted into a computer database using Epidata. Subsequently, statistical analysis was performed using SPSS 28.0. Two individuals entered the data, expressed as mean ± standard deviation. An independent samples t test was conducted. The analysis revealed no significant difference in the neurological function scores between the two groups before nursing intervention ($P > .05$). However, after the nursing intervention, the Fugl-Meyer and Barthel index scores in both groups increased compared to their respective scores before nursing. Notably, the research group demonstrated higher scores than the reference group, and this difference was statistically significant ($P < .05$).

DISCUSSION

Intracerebral hemorrhage occurs predominantly when blood vessels rupture due to a substantial increase in blood pressure. This occurrence not only leads to the formation of a hematoma but also activates local vasoactive substances, causing ischemia and hypoxia in nearby tissues, resulting in functional impairment.¹² Consequently, the primary objective of clinical treatment for patients with hypertensive intracerebral hemorrhage is to minimize bleeding damage and facilitate functional recovery.¹³

Utilizing minimally invasive hematoma evacuation in managing cerebral hemorrhage provides the benefit of reduced trauma, contributing to enhanced postoperative recovery for patients. However, surgical treatment can often lead to patient uncertainty about their condition, triggering anxiety, depression, and other negative emotions. These psychological factors may impact patient compliance and, subsequently, the effectiveness of the surgical procedure. Furthermore, the risk of postoperative complications remains a significant concern. Therefore, it is crucial to implement effective nursing interventions in clinical practice to manage such patients.¹⁴ Adopting integrated nursing with medical

technology facilitates the creation of an information platform where data regarding patients' illnesses, therapeutic interventions, and recovery processes can be exchanged and disseminated. This integration ultimately enhances the scientific efficacy of post-treatment nursing practices.¹⁵

Our study revealed that the research group had significantly higher MBI scores, GCS scores, and ESS scores after integrating nursing intervention compared to the reference group, with a statistically significant difference. This finding indicates an improvement in the patient's self-care ability. These improved outcomes are attributed to various factors, including the implementation of integrated medical and nursing care, which combines medical expertise and nurturing support, the utilization of a data-sharing platform, adherence to guidance provided by medical professionals, and modifications made to the nursing plan.¹⁶

The nursing intervention was designed to be adaptable to changing conditions, effectively addressing the influence of uncertain factors in nursing. It aims to allocate resources judiciously and optimize their utilization, aligning with the principles of sustainable development.¹⁷ The expanded scope of nursing allowed us to go beyond traditional care and incorporate the provision of convalescent services. This adaptation leads to refining nursing practices, emphasizing meticulous attention to detail. Moreover, nursing personnel experience heightened demands, which enhance their overall proficiency and ensure the delivery of a superior standard of care.¹⁸

Doctors made informed adjustments to the treatment plan and nursing care by analyzing the collected patient data, including clinical information and nursing assessments.¹⁹ This integration of medical treatment and nursing intervention considered the clinical aspects of treatment plans, technologies, medications, and the nurturing aspects of comprehensive nursing care.²⁰ The communication platform facilitates the exchange of information and collaboration between medical professionals and nurses, emphasizing the significance of combining effective treatment and comprehensive nursing to maximize patient benefits.²¹

Targeted functional training played a crucial role in setting specific nursing goals and prioritizing patient autonomy, self-awareness, and self-management. As patients achieved their initial goals, the functional training program was adjusted to establish subsequent objectives.²² This approach encouraged patients to actively engage in pursuing these goals, enhancing their self-confidence and motivation for functional training. This virtuous cycle stimulated enthusiasm, leading to improved prognosis and recovery.²³ We tailored the rehabilitation plan to individual needs and used targeted functional training to ensure a more realistic approach, enabling patients to adhere to the plan consistently and effectively.²⁴

Setting training goals enhances communication between nurses and patients, boosts patients' enthusiasm and self-confidence in participating in training, and promotes better cooperation with the nursing staff to successfully complete the training program.²⁵ As these aspects improved, patients gained more confidence in achieving the next stage of their goals,

leading to a virtuous cycle of recovery and increased cooperation during training. This positive cycle contributed to improving the patient's prognosis and overall recovery.²⁶ Moreover, targeted functional training played a vital role in helping patients set specific goals, motivating them to exert significant effort toward achieving them. It also alleviated negative emotions and enhanced their subjective motivation to engage in functional training. Their participation was supported by self-encouragement and nursing guidance. These factors together lead to better recognition, increased knowledge, and an overall improvement in patient's quality of life. However, it is important to note that the specific reasons behind these improvements may vary and may not always be certain.²⁷

Our study revealed that the Fugl-Meyer score and Barthel index score of patients in both groups improved after nursing intervention, with the research group showing higher scores than the reference group. These differences were statistically significant, indicating an improvement in the patient's neurological function. Several factors contributed to this improvement. Firstly, doctors made necessary adjustments to the treatment plan and nursing interventions based on the collected data, ensuring patients received appropriate and tailored care. This personalized approach enhanced the patient's chances of recovery.²⁸

Our study also highlighted the importance of sharing patients' conditions, living habits, and basic information with the nursing staff for effective post-discharge care. It helped prevent the patient from being overwhelmed by external stimuli in their daily life, ultimately leading to improved neurological function and the symptoms associated with cerebral hemorrhage. Moreover, it enhances the patient's self-care ability.²⁹ Furthermore, integrating treatment and nursing interventions and supporting patients' transition to a convalescent institution allowed full-time rehabilitation therapists, clinicians, and nursing staff to provide guidance and assistance, resulting in an accelerated patient recovery process.³⁰

Our study observed that the NIHSS and ADL scores of both patient groups improved significantly after the integrated nursing intervention compared to before the nursing intervention. The research group showed higher scores than the reference group, and these differences were statistically significant. These findings indicate an improvement in the patient's limb motor function. Several factors contributed to these positive outcomes. Firstly, integrating medical nursing allowed for a comprehensive and multidimensional analysis of patient conditions, enabling the development of scientifically guided treatment and nursing programs. This integration promoted the collaborative efforts of each team member, leveraging their individual expertise and contributions.^{31,32}

Furthermore, establishing medical nursing information platforms facilitated the exchange and sharing of medical technology, nursing knowledge, and electronic medical records.^{33,34} Accurately grasping the patient's treatment and nursing process was beneficial for the medical staff in ensuring the smooth and organized progression of care. It facilitated the exchange and sharing of work experiences among medical staff,

ultimately leading to an improvement in the quality of treatment and nursing practices, as also reported in earlier studies.³⁵

Study Limitations

Our study has certain limitations that need to be considered. These limitations can be categorized into two main aspects: sample limitations and a focus on in-hospital rehabilitation. The sample population in our study mainly consisted of patients with intracerebral hemorrhage from our hospital, which may introduce geographical limitations and insufficient sample representation. Secondly, our study primarily focused on rehabilitation within the hospital setting, with a relatively short training period. Although the rehabilitation effect was enhanced, some indicators still showed moderate levels, and the emphasis was placed on the early effects after training. The long-term impact on patients' rehabilitation needs further investigation.

Implications for Future Research and Care

Future research and care should focus on establishing continuous care with families and communities, building upon the medical service community model advancements. This approach offers several advantages, including standardized and continuous rehabilitation, individualized care plans tailored to each patient's needs, and restoring family and social roles. By involving families and communities in the care process, patients can receive comprehensive support, leading to improved quality of life and maximizing their potential for recovery. This approach will ensure a holistic and patient-centered approach to healthcare, enhancing patients' overall well-being.

CONCLUSION

In conclusion, our study highlights the positive impact of integrating medical nursing with targeted functional training intervention on patients' cognitive function, neurological function, and daily activity capabilities. This holistic approach leads to tangible improvements in patient's quality of life, emphasizing the importance of combining medical expertise with personalized functional training. By implementing this comprehensive strategy, patients' experience enhanced overall well-being and a greater sense of independence in their daily lives.

CONFLICT OF INTERESTS

The authors declared no conflict of interest.

AUTHORS' CONTRIBUTIONS

Xia Fu and Jianguyu Fu designed the study and performed the experiments, Jianguyu Fu and Zhifei Li collected the data, Zhifei Li and Chao Hu analyzed the data, and Xia Fu prepared the manuscript. All authors read and approved the final manuscript.

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