Investigation and Research on the Knowledge, Attitude and Practice of Intensive Care Unit Nurses on Pulmonary Rehabilitation after Cerebral Hemorrhage Surgery Based on the IKAP model

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Abstract: *Objective:* To investigate the knowledge, beliefs, and behaviors of ICU nursing staff regarding pulmonary rehabilitation after cerebral hemorrhage surgery, and to analyze the influencing factors based on the IKAP (Information-knowledge-belief-behavior) model, in order to provide a basis for optimizing nursing project management. *Methods:* A cross-sectional study design was used to conduct a questionnaire survey among ICU nursing staff in a tertiary grade A hospital from January to June 2025. A self-compiled questionnaire on knowledge, attitude and practice of pulmonary rehabilitation after cerebral hemorrhage was used, which included demographic data, knowledge dimension (10 questions), belief dimension (10 questions), and behavior dimension (10 questions). The questionnaire was scored on a Likert scale of 5, with a higher total score indicating a better level of knowledge, attitude and practice. Descriptive statistics, t-tests and one-way analysis of variance were used for the data using SPSS 25.0. *Results:* A total of 120 questionnaires were distributed, and 115 valid questionnaires were retrieved, with an effective recovery rate of 95.8%. Nursing staff scored (7.2 ± 1.5) points (out of 10) in the knowledge dimension, (8.0 ± 1.2) points (out of 10) in the belief dimension, and (6.5 ± 1.8) points (out of 10) in the behavior dimension. There were statistically significant differences in knowledge-attitude-practice scores among nursing staff of different ages, years of service and titles ($p < 0.05$). Multiple linear regression showed that years of service and training experience were the main influencing factors of knowledge, attitude and practice ($\beta = 0.25$, $p < 0.01$). *Conclusion:* ICU nursing staff have a moderate level of knowledge and behavior regarding pulmonary rehabilitation after cerebral hemorrhage surgery, have positive beliefs, but their practical behavior needs to be strengthened. Nursing project management based on the IKAP model can improve the quality of care through intensive training and personalized intervention.

Keywords: Pulmonary rehabilitation after cerebral hemorrhage surgery; Knowledge–attitude–practice; IKAP mode; Intensive care unit; Nursing staff

1. Introduction

Cerebral hemorrhage is one of the common emergencies in clinical neurology. Whether patients can recover effectively after surgical treatment for cerebral hemorrhage is closely related to postoperative treatment and care [1]. Due to the damage to brain and body tissues caused by cerebral hemorrhage surgery and prolonged bed rest after the operation, patients may have problems such as atrophy and weakness of respiratory muscles, poor expectoration ability, and thus are prone to pulmonary failure, which can further lead to a series of problems such as pulmonary infection and atelectasis. As a result, patients are prone to clinical deterioration of their condition and longer hospital stays. If these symptoms are not intervened in time, it will affect the recovery of neurological function in patients after treatment. Conversely, it will form a vicious cycle, leading to a decline in rehabilitation effect. Pulmonary rehabilitation is an important measure in clinical postoperative management, helping patients with cerebral hemorrhage to restore lung function through respiratory function exercises and comprehensive rehabilitation methods [2]. However, traditional nursing methods are mainly educational, mostly adopting a "one-size-fits-all" approach to education and guidance, lacking specificity and uniformity. As a result, most patients with cerebral hemorrhage do not truly attach importance to rehabilitation exercises and do not actively cooperate to complete standardized exercises, leading to problems such as poor exercise effects and affecting the effectiveness of pulmonary rehabilitation [3].

The IKAP model (Information–knowledge–believe–behavior) is a health education and management framework that enhances patients' cognitive and behavioral levels through progressive intervention and is widely used in chronic disease management. In recent years, nursing project management has emphasized systematic and individualized care. Integrating the IKAP model into pulmonary rehabilitation after cerebral hemorrhage surgery may optimize the nursing process, but most related studies have focused on intervention trials and lack cross-sectional survey data. Therefore, this study, through a cross-sectional design, investigates the application status of the IKAP model in pulmonary rehabilitation after cerebral hemorrhage surgery and analyzes its relationship with the effect of pulmonary rehabilitation in order to provide an empirical basis for clinical nursing [4].

2. Data and methods

2.1. Research subjects

Using the convenience sampling method, nursing staff in the ICU of a tertiary grade A hospital from January to June 2025 were selected as research subjects.

2.1.1. Inclusion criteria

   (1) Registered nurses
   (2) Work in ICU for at least 1 year
   (3) Voluntary participation in this study

2.1.2. Exclusion criteria

   (1) Intern or trainee nurses
   (2) Those who were on leave or resigned during the survey period

A total of 120 nursing staff were included, including 28 males (23.3%) and 92 females (76.7%); Ages ranged from 22 to 45 years, with an average of (30.5 ± 5.2) years; Working years 1 to 20 years, average (6.8 ± 4.1) years;

Title: 52 nurses (43.3%), 45 senior nurses (37.5%), 23 senior nurses (19.2%); Education: 40 junior college (33.3%), 75 bachelor's degree (62.5%), 5 master's degree (4.2%). The study was approved by the hospital ethics committee and all participants signed the informed consent form [5].

2.2. Study methods

2.2.1. Investigation tools

The self-developed "Questionnaire on Knowledge, Attitude and Practice of Pulmonary Rehabilitation after Cerebral Hemorrhage Surgery" was used. The questionnaire was developed based on the IKAP model theory framework through literature review and expert consultation. The questionnaire includes

 (1) Demographic information (age, gender, years of work, title, educational background, etc.);

 (2) Knowledge dimension (10 questions, covering definitions, methods, contraindications of pulmonary rehabilitation, etc., multiple-choice questions, 1 point for correct answer, 0 point for incorrect answer, total score 0 to 10 points)

 (3) Belief dimension (10 questions, assessing attitudes towards the importance of pulmonary rehabilitation, using a Likert 5-point rating from "strongly disagree" to "strongly agree", assigned 1 to 5 points, total 10 to 50 points, standardized to a full score of 10 points)

 (4) Behavioral dimension (10 questions, assessing the frequency of pulmonary rehabilitation practice, on a Likert 5-point scale from "never" to "always", assigned 1 to 5 points, out of 10 to 50 points, standardized to a full score of 10 points). The questionnaire was pretested with a Cronbachs α coefficient of 0.85 and a content validity index (CVI) of 0.90, indicating good reliability and validity [6].

2.3. Data collection

Questionnaires were distributed via an online questionnaire platform, such as Wenjuanxing, which was uniformly directed by the researchers and completed anonymously for about 15 minutes. A total of 120 questionnaires were distributed and 115 valid questionnaires were retrieved [7].

2.4. Statistical methods

Data analysis was conducted using SPSS 25.0 software. Measurement data were expressed as mean ± standard deviation, and count data were described as frequency and percentage. The t-test or one-way analysis of variance was used for comparisons between groups, and multiple linear regression was used for analysis of influencing factors (with the total score of knowledge, attitude and practice as the dependent variable and demographic variables as independent variables). A difference was considered statistically significant when $p < 0.05$ [8].

3. Results

3.1. Overall score of knowledge, attitude and practice of nursing staff

The score for the knowledge dimension of nursing staff was (7.2 ± 1.5) points, the score for the belief dimension was (8.0 ± 1.2) points, the score for the behavior dimension was (6.5 ± 1.8) points, and the total score of knowledge, attitude and practice was (21.7 ± 3.0) points (out of 30 points). The knowledge score rate was 72.0%, the belief score rate was 80.0%, and the behavior score rate was 65.0%, indicating a moderate level of knowledge, positive belief, but insufficient behavioral practice [9].

3.2. Comparison of knowledge, attitude and practice scores among nursing staff with different demographic characteristics

Univariate analysis showed that there were statistically significant differences ($p < 0.05$) in the total score of knowledge, attitude and practice among nursing staff with different working years, professional titles and training experiences, while there were no statistically significant differences ($p > 0.05$) in gender, age and educational attainment. See **Table 1** and **2** for details.

Table 1. Comparison of total scores of knowledge, attitude and practice among nursing staff with different demographic characteristics (n = 115)

Characteristics	Grouping	Number of people	Total score of knowledge, belief and action	t/F score	p-value
Gender	male	28	22.1 ± 2.8	1.12	0.265
	female	92	21.5 ± 3.1		
Age (years)	< 30	60	21.3 ± 2.9	1.85	0.162
	≥ 30	55	22.1 ± 3.0		
Years of work experience (years)	< 5	50	20.5 ± 2.7	4.56	0.012
	5–10	45	22.0 ± 3.1		
	> 10	20	23.2 ± 2.8		
Title	Nurse	52	20.8 ± 2.9	5.23	0.007
	Nurse	45	22.1 ± 3.0		
	Head Nurse	23	23.0 ± 2.7		
Education	Junior college	40	21.2 ± 3.1	1.34	0.266

Table 2. Comparison of total scores of knowledge, attitude and practice among nursing staff with their training experience (n = 115)

Features	Grouping	Number of people	Total score of knowledge, belief and action	t/F score	p-value
Training experience	Undergraduate	75	21.9 ± 2.9	3.45	0.001
	Master's	5	22.5 ± 2.8		
	have	70	22.5 ± 2.8		
	no	45	20.4 ± 3.0		

3.3. Multiple linear regression analysis of influencing factors of knowledge, attitude and practice

The total score of knowledge, attitude and practice was used as the dependent variable, and the years of work (assignment: < 5 years = 1,5–10 years = 2, > 10 years = 3), title (assignment: nurse = 1, nurse assistant = 2, senior nurse assistant = 3), and training experience (assignment: with = 1, without = 0) were used as independent variables for multiple linear regression analysis. The results showed that years of work and training experience were independent influencing factors of knowledge, attitude and practice ($p < 0.05$), as shown in **Table 3** below.

Table 3. Multiple linear regression analysis of influencing factors of knowledge, attitude and practice

Independent variables	β value	Standard error	t value	p-value
Constant term	18.50	1.20	15.42	< 0.001
Years of service	0.25	0.10	2.50	0.014
Title	0.18	0.12	1.50	0.136
Training experience	0.30	0.11	2.73	0.007

Note: $R^2 = 0.28$, adjusted $R^2 = 0.25$, $F = 8.45$, $p < 0.001$

4. Conclusion

This study revealed the current status of knowledge, attitude and practice of ICU nursing staff in pulmonary rehabilitation after cerebral hemorrhage surgery through a cross-sectional survey. The data showed a significant gap between the knowledge dimension score (7.2 ± 1.5) and the belief dimension score (8.0 ± 1.2), while the behavior dimension score (6.5 ± 1.8) was significantly lower than the belief score. This data feature indicates that although nursing staff recognize the importance of pulmonary rehabilitation, they have insufficient professional cognitive reserves and have failed to effectively translate positive attitudes into practical actions. This imbalance between cognition and behavior may directly affect the quality and continuity of the implementation of clinical pulmonary rehabilitation measures [10].

Further analysis revealed significant differences ($p = 0.012$) in the total knowledge, attitude and practice scores of nursing staff with different years of service. Among them, the group with less than 5 years of service scored (20.5 ± 2.7) points, while the group with more than 10 years of service reached (23.2 ± 2.8) points. This trend of increasing scores with years of work reflects the positive impact of the accumulation of clinical experience on rehabilitation nursing ability. At the same time, training experience became a key influencing factor. Those with training experience scored (22.5 ± 2.8) points significantly higher than those without training experience (20.4 ± 3.0) points ($p = 0.001$), highlighting the important value of systematic training in enhancing professional competence.

The results of the multiple linear regression analysis further clarified the extent of influence of each factor. Years of service ($\beta = 0.25$, $p = 0.014$) and training experience ($\beta = 0.30$, $p = 0.007$) both reached statistical significance, while title factor ($p = 0.136$) did not show independent predictive effect. This finding suggests that the mere promotion of technical title does not fully represent the improvement of clinical practice ability; continuous professional training and the accumulation of practical experience are the key factors for improving the quality of nursing. This also explains why it is difficult for nursing staff to translate positive beliefs into standardized behavior [11].

Based on the IKAP theoretical framework, the findings of this study have important implications for clinical practice. The "high belief, medium knowledge, low behavior" characteristics displayed by nursing staff are typical manifestations of the break from belief to behavior in the IKAP model. It is recommended that medical institutions establish a hierarchical training system, conduct targeted training for nursing staff of different seniorities, and focus on strengthening the theoretical knowledge and practical skills training of junior nurses. At the same time, departmental management systems should be improved and work processes optimized to create better practical conditions for pulmonary rehabilitation for nursing staff, thereby promoting the effective transformation of knowledge into behavior and comprehensively improving the quality of pulmonary rehabilitation for patients with

cerebral hemorrhage.

Funding

Disclosure statement

The author declares no conflict of interest.

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