Evaluation of the effectiveness of a skill model based on information-motivated behaviour in extending rehabilitation for dysphagia patients

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Abstract: The objective of this study is to comprehensively evaluate the impact of a skill model grounded in information-motivated behavior on the effectiveness of rehabilitation extension programs for patients with dysphagia. This study enrolled a total of 94 patients with dysphagia from June 2020 to February 2022, 47 cases each in the control group and the research group, the control group was given conventional rehabilitation nursing measures, and the research group was given the information-motivated behavioral skill model-based nursing program based on the control group. At the end of the trial, the two groups were compared in terms of improvement of nutritional indicators, swallowing function, nursing satisfaction score, hospitalization cost, and hospitalization time. The results of this study indicated that the efficacy evaluation of the study group was superior to that of the control group(P<0.05); there was no significant difference in TRF and PAB between the two groups (P>0.05), and BMI was higher than that of the control group (P<0.05); Burke and SSA of the research group were lower than that of the control group (P<0.05), and the score of GUSS was higher than that of the control group (P<0.05); the nursing care satisfaction score of the research group was higher than that of the control group (P<0.05), and the hospitalization cost, hospitalization cost, and hospitalization time were higher than that of the control group (P<0.05), and the hospitalization cost and length of stay were lower than those of the control group (P < 0.05). Therefore, this study found that the nursing model based on Information-Motivation-Behavioral Skills (IMB) technique can promote the recovery of patients' swallowing function, improve nutritional status, shorten hospital stay, and facilitate extended rehabilitation training for patients.

1. Introduction

Dysphagia refers to the process of not being able to safely and effectively transport food into the stomach due to the impaired structure and function of organs such as the jaw, lips, tongue, soft palate, pharynx, esophagus, etc.[1], and it occurs in as much as 40%-78% of acute strokes[2].

Patients with swallowing disorders often suffer from electrolyte imbalance, aspiration, aspiration pneumonia, lung infection, malnutrition, and other manifestations[3,4], and in severe cases, it may even lead to asphyxia, which not only seriously affects the effectiveness of the patient's rehabilitation treatment and the quality of his or her survival, but also increases the economic burden of the patient's family and society. Therefore, in the context of limited medical resources, it is the common goal of doctors and patients to improve the rehabilitation effect of patients, enhance the ability of family members to take care of them and reduce the burden on families and society. Currently, common methods for treating dysphagia in clinical settings include electrical stimulation therapy[5], oral function training[6], ice stimulation[7], and transcranial magnetic stimulation[8]. As alternative therapies, these treatments have a higher degree of risk and a long period, and patients may experience reduced motivation and poor compliance at a later stage, thus affecting the recovery effect of the disease. The information-motivation-behavioral skills model is to give patients and caregivers personalized healthcare measures through comprehensive interventions in four aspects: rehabilitation knowledge, rehabilitation motivation, training skills, and self-efficacy, to promote the expected change, continuation, and consolidation of patients' rehabilitation outcomes, and ultimately to improve the outcome of the disease, continuation, and consolidation, and ultimately achieve the purpose of improving health[9]. The IMB model is designed to be applied not only to the patient but also to the caregiver[10]. By exploring the application of the IMB model in the evaluation of the extended effect of dysphagia rehabilitation, this study aims to provide a more comprehensive and systematic rehabilitation treatment plan for dysphagia patients.

2. Information and Methods

2.1 Participants

Between June 2020 and February 2022, 94 dysphagia patients were enrolled. Inclusion criteria included any one of the first five conditions: ① Repeated salivary swallowing test ≤ 3 times; ② EAT-10 score ≥ 3 points; ③ Clear mental status, third-degree seated balance, abnormal Toronto bedside swallowing screening test; ④ Puddle of Wonders drinking test grade 3 or more; ⑤ Positive VFSS; ⑥ Stable vital signs, no unconsciousness, and stable disease condition. Exclusions were serious organic disease or terminal illness, and severe mental illness or psychiatric symptoms.

The control group included 47 patients (29 males, 18 females), aged 51-79, with an average age of 65.3±2.7 years. Swallowing dysfunction was grade III-IV in 17 cases and grade I-II in 30 cases. The study group comprised 47 patients (30 males, 17 females), aged 52-80, with an average age of 65.8±2.5 years. Swallowing dysfunction was grade III-IV in 19 cases and grade I-II in 28 cases. Both groups were similar in general data (P>0.05), and the study was ethics committee-approved.

2.2 Methods

2.2.1 Control group

According to the patient's condition, regular monitoring of blood lipids, blood glucose, blood pressure, and other indicators, dietary guidance, swallowing function rehabilitation training, etc., and regular assessment of the nutritional status and the effect of rehabilitation training. The nurse in charge of the bed needs to supervise the implementation of the patient's rehabilitation training every day and answer the questions of the patient and the family promptly.

2.2.2 Research group

2.2.2.1 Formation of the research group

In the pre-trial period, an information-based motivational behavioral skills model management group was set up, including one doctor and one therapist, one nursing expert, two specialist nurses, and one postgraduate student. Doctors are responsible for the routine treatment of patients; therapists are responsible for rehabilitation training; nursing experts act as the team leaders, fully responsible for the implementation of the trial process, and trial quality control; specialist nurses are responsible for the implementation of the specific trial program; postgraduate students are responsible for distribution and recycling of information, data collation and analysis. The leader trained the team members through a cluster management approach, which included behavioral, motivational, and information skills nursing intervention processes.

2.2.2.2 Intervention implementation

The study group was given rehabilitation nursing measures based on the IMB skill model on top of conventional rehabilitation nursing care. The IMB model focuses on considering the influence of the social support system on patients' behavioral change, with particular attention to their information knowledge and motivation levels. By addressing the key issues in the social support system, rehabilitation nursing operation techniques, and health education are targeted to patients and their families to better promote the recovery of patients' diseases[11]. At the same time, a peer education system was constructed during the trial through the online development of a public number and WeChat group, which regularly sends out knowledge about the prevention and treatment of dysphagia and related complications, and encourages patients and their families to actively participate in the discussion and interaction. (1) Information intervention: patients were enrolled and their basic information was collected, including history, demographic and sociological data, diagnosis of the disease, causes of the disease, and treatment options. Patients and their families were introduced to the common manifestations of dysphagia and possible complications; the diagnostic process of dysphagia, assessment methods, and the significance of the assessment results were explained; various treatment modalities for dysphagia, therapeutic effects, and potential risks were introduced in detail; and dietary guidance was given according to the dynamic assessment results of the patients. (2) Motivation intervention: Understand patients' motivation and medical needs through face-to-face communication and questionnaires, and formulate personalized medical care plans according to patients' conditions. During the treatment process, healthcare professionals can collaborate with patients to establish rehabilitation goals, while ensuring that these goals are achievable, time-bound, and measurable. During the treatment period, healthcare professionals should share successful rehabilitation cases with patients and their families to enhance patients' motivation for treatment and strengthen their willingness to undergo rehabilitation. Simultaneously, we must constantly monitor the patient's psychological state and assist them in alleviating their negative emotions. By means of listening, encouragement, and reassurance, we provide emotional support to patients, thereby enhancing their confidence in rehabilitation, as well as the confidence of their families. Regular feedback to doctors, therapists, patients, and family members on the effects of rehabilitation treatment, to make dynamic adjustments. (3) Behavioural skills: the nurse needs to accompany the patient throughout the rehabilitation training process. ①Preparation: The nurse assists the patient to sit on the bed or in a chair, placing their hands on the abdomen and chest respectively. The patient is instructed to take a deep breath, then to keep their shoulders stationary while slowly rotating their head in a clockwise direction, ultimately returning to the starting position. Following this, the patient is directed to

repeat the rotation in a counterclockwise direction using the same method.This action is repeated three times, rotation to not cause dizziness as appropriate. Then shrug your shoulders backward and forward three times. ②Oral function training: the muscles around the mouth and swallowing muscle groups to implement functional training. By repeatedly coughing, the secreted mucus is cleared, resulting in a closed state of the larynx.[12] . Next, the nurse assists the patient to sit on a chair with their hands braced against the chair's surface. The patient is then instructed to hold their breath, exert pressure through movement, and release their hands. Following this, the patient is guided to vocalize loudly, which aids in strengthening the muscles of the soft palate and the function of the vocal cords.[13]. Subsequently, the nurse instructs the patient to complete the series of actions including chewing, inspiration, breath-holding, swallowing, and coughing. Implementing swallowing on the vocal folds, can effectively improve swallowing during transoral feeding and reduce dysphagia. ③ Breathing and swallowing training.[14]. ④Feeding training: the nurse advises the family members to select an appropriate feeding position for the patient. Additionally, the nurse guides the family members to choose the texture and bolus size of the food based on the results of the Volume-Viscosity Swallow Test (V-VST) conducted during the initial stages of the patient's training. While ensuring the patient's safety and comfort, the variety of food types is enriched. The dietary structure and eating mode were promptly adjusted according to the results of the patient's swallowing function test. When the patient's swallowing function improves and can import food, correctly instruct the patient to control the speed of ingestion, chewing, and swallowing to avoid eating too fast to produce. If the patient suddenly develops symptoms such as a violent cough, tense face, rapid heartbeat, and dyspnoea, he/she should stop eating immediately and pat the patient back in time to discharge the food residues. Behavioral therapy was performed for about 30 min per training session, once a day, 5 times/week for 4 weeks of continuous observation.

2.3 Observation indicators

(1) Eating: Ineffective: patients are still unable to eat orally or can only consume liquid food. Effective: patients can consume semi-liquid food. Apparent effect: patients can consume solid food.

(2) Nutritional index levels: transferrin (TRF), albumin (PAB), body mass index (BMI). (3) Improvement of swallowing function: Standardized Swallowing Assessment Scale (SSA)[15]: the scale includes three parts: clinical examination (8-23 points), 5 ml drinking test (5-11 points), and 60 ml drinking test (5-12 points). The total score is 46 points, and the higher the score the worse the swallowing function. Burke Dysphagia Screening Test (BDST)[16]: BDST scores a total score of 7 points, and the higher the score, the greater the swallowing function. Gugging Swallowing Screen (GUSS)[17] : patients' swallowing function was observed through indirect and direct swallowing tests. The indirect test includes observing whether the patient can stay awake for at least 15 min, the ability to cough or clear the throat, and the ability to swallow saliva, to assess the basic swallowing function of the patient, and the direct test was performed for those without abnormalities. (4) Clinical nursing work scoring: This study utilized a clinical nursing work evaluation form self-developed by the research team, allowing patients in both groups to rate the nursing care across four categories: rehabilitation nursing, daily living nursing, disease-specific nursing, and psychological nursing. Each category was assigned a maximum score of 10 points.

2.4 Statistical methods

SPSS 27.00 statistics was used to process and analyze the data. Count data were expressed using frequency and constitutive ratio (%), and the chi-square test was used. Comparisons between groups for rank information were made using the non-parametric rank sum test. Measurement data were

assessed for normality by the Kolmogorov-Smirnov test and were expressed as mean ($\bar{x} \pm S$) standard deviation ($\bar{x} \pm S$) if they obeyed normal distribution, and as median, interquartile spacing if they did not obey normal distribution. For the comparison of data between groups, two independent samples t-test was used if normality and chi-square were satisfied; if not, the Mann-Whitney U rank-sum test was used; for comparison of data within groups, paired t-test was used if normality and chi-square were satisfied, and vice versa, Wilcoxon test was used. The test level of this test was $\alpha=0.05$, and the data results of $P<0.05$ were considered to be different and statistically significant.

3. Results

3.1 Comparison of efficacy evaluation between the two groups

The efficacy of the study group's eating situation was better than that of the control group ($P < 0.05$), as shown in Table 1.

Table 1: Comparison of eating in two groups (cases, %).

group	n	ineffective	effective	significant	effective ratio
control	47	9(19.1)	13(27.7)	25(53.2)	80.9%
research	47	1(2.1)	17(36.2)	29(61.7)	97.9%
χ^2	/	/	/	/	5.786
P	/	/	/	/	<0.05

3.2 Comparison of the levels of nutritional indicators between the two groups

There was no significant difference in TRF and PAB between the two groups ($P > 0.05$), and BMI was higher than that of the control group ($P < 0.05$), as shown in Table 2.

Table 2: Comparison of the levels of nutritional indicators between the two groups ($\bar{x} \pm s$).

group	n	TRF(g/L)		PAB(g/L)		BMI(kg/m^2)	
		before	after	before	after	before	after
control	47	2.18±0.15	1.73±0.06	0.26±0.04	0.24±0.04	20.63±1.60	21.15±1.81
research	47	2.17±0.14	1.86±0.11	0.27±0.04	0.22±0.04	21.00±1.87	26.46±1.79
T	/	1.199	7.635	1.367	13.326	1.217	14.882
P	/	>0.05	<0.05	>0.05	<0.05	>0.05	<0.05

3.3 Comparison of the scores of swallowing function-related scales between the two groups

Table 3: Comparison of the scores of swallowing function-related scales between the two groups (points, $\bar{x} \pm s$).

group	n	Burke		GUSS		SSA	
		before	after	before	after	before	after
control	47	6.14±1.17	3.02±0.56	6.45±1.73	3.40±1.50	33.75±1.13	26.33±0.68
research	47	6.03±1.24	1.96±0.32	6.34±1.75	2.56±1.40	33.53±1.04	21.44±0.57
T	/	1.103	11.366	1.744	7.879	1.002	13.436
P	/	>0.05	<0.05	>0.05	<0.05	>0.05	<0.05

The Burke and SSA of the study group were lower than those of the control group ($P < 0.05$),

and the V-VST was higher than those of the control group ($P < 0.05$), as shown in Table 3.

3.4 Comparison of nursing work scores between the two groups

The nursing work score of the study group was higher than that of the control group ($P < 0.05$). (Table 4)

Table 4: Nursing performance scores for both groups ($\bar{x} \pm s$).

group	n	Clinical nursing care ratings			
		rehabilitation	life	psychological	disease
control	47	6.86±0.75	8.13±1.13	7.83±0.86	7.13±0.54
research	47	8.07±0.82	9.13±1.13	8.52±0.78	8.43±0.63
T	/	11.026	12.673	13.739	14.418
P	/	<0.05	<0.05	<0.05	<0.05

4. Discussion

4.1 The Information-Motivation-Behavioral skills model can improve swallowing function

The occurrence of dysphagia is influenced by multiple factors. When the structure and function of organs such as the mandible, lips, tongue, and pharynx are impaired, dysphagia can ensue[18]. Furthermore, when patients experience neuromuscular damage, such as in conditions like stroke, Parkinson's disease, and myasthenia gravis, the coordination of muscles involved in swallowing is disrupted, leading to dysphagia. The onset of dysphagia not only hinders the recovery process but can also lead to a series of adverse outcomes, such as aspiration, aspiration pneumonia, and dehydration, which can be life-threatening in severe cases. Studies have shown that the mortality rate due to aspiration caused by dysphagia ranges from 20% to 65%[19]. Therefore, it is crucial to improve swallowing function in patients with dysphagia, enhance their quality of life, and reduce the incidence of complications[20]. Currently, common clinical treatments include oral motor exercises[12], physical therapy, acupuncture, and acupoint injections. These interventions can increase tongue agility, prevent disuse atrophy of the pharyngeal muscles, and improve oral mastication function. However, these training methods require the assistance of professional rehabilitation therapists and a prolonged treatment period to achieve noticeable effects. Due to limitations in medical insurance coverage, patients may find it difficult to undergo long-term treatment in a hospital setting, which can affect rehabilitation outcomes[8]. The Information-Motivation-Behavioral Skills model emphasizes the influence of information, motivation, and behavioral skills on behavioral choices[9]. Post-discharge, patients can engage in self-directed training, with healthcare providers conducting regular follow-ups to monitor the progress of their rehabilitation. Our study results indicate that the efficacy of swallowing function improvement in the intervention group was significantly higher than that in the control group, with a statistically significant difference. The Burke dysphagia score and SSA score were lower in the intervention group than in the control group, while the GUSS score was higher in the intervention group, indicating that the IMB model can improve swallowing function in patients with dysphagia. During the rehabilitation process, healthcare providers dynamically assess patients' eating situations and guide patients or their families in selecting appropriate foods. They also teach patients to adopt correct postures during eating, such as head tilting forward, laryngeal prominence, or rotating the head sideways, to facilitate swallowing. Concurrently, targeted oral and oropharyngeal muscle exercises are conducted to promote the recovery of swallowing function.

4.2 The Information-Motivation-Behavioral skills model can improve nutritional status

This study monitored nutritional indicators of patients, and results showed no significant differences in TRF and PAB between the two groups after the intervention. However, the BMI of the intervention group was higher than that of the control group, indicating that the IMB model can improve patients' nutritional status and increase their weight. During the feeding process, healthcare professionals educate patients and their families on the importance of balanced diets and healthy food choices. Families can select nutritious foods based on the patient's taste preferences to facilitate the recovery of swallowing function. Additionally, they guide family members in understanding food labels and choosing foods that are low in sugar, salt, and fat. Nurses conduct daily bedside education or regular small group lectures in the ward to emphasize the importance of good nutrition in promoting disease recovery and preventing complications. Patients are encouraged to record their daily dietary intake and use dietary recording tools or applications for self-monitoring, helping to identify and correct unhealthy eating habits. Healthcare professionals assist patients in setting specific, achievable nutritional goals and formulating action plans. They regularly follow up and evaluate progress, providing positive feedback and rewards to further enhance patient motivation.

4.3 The Information-Motivation-Behavioral skills model can improve patient compliance

The results of this trial indicate that the patient care satisfaction scores in the intervention group were higher than those in the control group, demonstrating that patients and their families highly recognize the implementation of this model. Traditional nursing methods involve nurses providing simple information to patients, who may not fully understand the disease treatment process, the significance of rehabilitation training, and precautions during the care process. This lack of comprehensive understanding can reduce their acceptance of treatment and care, ultimately leading to suboptimal intervention outcomes. In the IMB model, healthcare professionals provide clear, accurate, and easily understandable disease information to patients and their families, such as the causes of dysphagia, specific treatment methods, potential complications, and rehabilitation training precautions. This information is supplemented with visual tools, such as charts, images, and videos, regularly released through departmental WeChat public accounts, giving patients and their families a more detailed understanding of the disease. During training, healthcare professionals enhance patients' ability to perform self-rehabilitation exercises by providing practical skills to better manage the potential complications of dysphagia in daily life. Throughout the hospitalization period, regular dynamic assessments of the patient's condition are conducted to adjust the treatment plan. Continuous practice and feedback improve the patient's operational skills, ensuring that the care plan meets the patient's needs. By establishing a collaborative healthcare system involving patients, families, and medical staff, patients are guided to follow treatment plans for self-training and self-care. This approach accelerates recovery process, boosts patients' confidence in overcoming the disease, and improves compliance with treatment, achieving optimal rehabilitation outcomes.

5. Conclusion

In summary, in evaluating the extended effects of dysphagia rehabilitation, nursing care based on the IMB model can promote the recovery of swallowing function, improve nutritional indicators, and enhance patient compliance with rehabilitation treatment. This approach is suitable for further clinical and community application.

Acknowledgement

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