Effectiveness of Nursing Intervention Based on the International Classification of Functioning, Disability, and Health for Improving Dysphagia in Stroke Patients

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Abstract: Dysphagia is a prevalent complication in stroke patients, significantly impacting their quality of life and overall health outcomes. This research aimed to investigate the effectiveness of nursing interventions grounded in the International Classification of Functioning, Disability, and Health (ICF) framework in ameliorating dysphagia among stroke patients. A randomized controlled trial was employed, and stroke patients with dysphagia were recruited from Sir Run Run hospital. The control group was treated with general swallowing-related rehabilitation. The intervention group, formulated in accordance with the ICF framework and built upon the foundation of the control group, entailed a comprehensive evaluation process and personalized care strategies tailored to address dysphagia management. 80 stroke patients were enrolled in the study. After 4 weeks or 8 weeks, the intervention group based on the ICF framework led to a statistically significant improvement in Water Swallow Test (WST) scores (P<0.05) and Standardized Swallowing Assessment (SSA) scores (P<0.05). Nursing interventions aligned with the ICF framework have demonstrated efficacy in ameliorating dysphagia among stroke patients. The implementation of comprehensive assessments and tailored care plans based on the ICF approach can be a valuable strategy to enhance dysphagia management and overall patient outcomes in the stroke population.

Keywords: nursing intervention, International Classification of Functioning, Disability, and Health (ICF), dysphagia, stroke

1. Introduction

Dysphagia is a prevalent complication of stroke, with an estimated prevalence rate of approximately 42% [1]. It primarily manifests as difficulties in eating and choking, posing considerable risks of malnutrition, aspiration pneumonia, and choking incidents [2,3]. The regulation of normal swallowing function necessitates the coordinated interaction of various anatomical structures, such as the brainstem, basal ganglia, thalamus, limbic system, cerebellum, as well as motor and sensory cortices [4]. Consequently, when these structures are affected by stroke, the likelihood of dysphagia occurrence increases. In over 30% of stroke patients, dysphagia persists for a duration exceeding 5 months, significantly impairing their quality of daily life [5]. Currently, patients afflicted with swallowing disorders primarily undergo specialized swallowing training and receive ingestion guidance in the rehabilitation department, aiming to enhance their eating proficiency [6].

The International Classification of Functioning, Disability, and Health (ICF), introduced by the World Health Organization in 2001, constituted a globally standardized terminology utilized to depict dysfunction [7]. It encompassed four key components: body structure, body function, activity and participation, as well as the environmental factor. The ICF represents one of the most comprehensive assessment tools for evaluating disease-related dysfunction, prominently employed in the field of rehabilitation [8]. Dong Yi [9] conducted a meticulous screening of 34 items from ICF for the comprehensive assessment of dysphagia in patients, resulting in favorable rating outcomes. Rehabilitation therapy operates within a collaborative teamwork framework, with previous research predominantly concentrating on the roles of rehabilitation therapists, while the significance of nursing interventions as a facilitative factor should not be disregarded. This research seeks to investigate the

efficacy of targeted nursing interventions by evaluating 34 dysphagia-related items, with the objective of assessing the treatment effectiveness for stroke patients afflicted with dysphagia.

2. Method

2.1 Subjects

Eighty patients diagnosed with post-stroke dysphagia and admitted to the Department of Rehabilitation Medicine at the Affiliated Sir Run Run Hospital of Nanjing Medical University between August 2022 and February 2023 were meticulously chosen as subjects. The inclusion criteria comprised: (1) confirmation of cerebral infarction or cerebral hemorrhage through CT or MRI; (2) identification of dysphagia via videofluoroscopic swallowing study (VFSS); (3) Mini-Mental State Examination (MMSE) score exceeding 24. The exclusion criteria: (1) severe mental disorder or cognitive impairment; (2) anatomical abnormalities affecting the oral cavity, pharynx, and esophagus; (3) severe cardiorespiratory dysfunction or infections; and (4) the manifestation of dysphagia attributed to etiologies distinct from stroke. The participants were randomized into two groups (ratio 1:1) using random numerical table method: control group (n=40) and intervention group (n=40).

2.2 ICF evaluations

Each participant underwent a comprehensive assessment twice during their admission and subsequent discharge, encompassing the 34 swallowing-related ICF items. This suite encompassed 18 items involving body function, 2 items involving body structure, 7 items involving activity and participation, as well as 7 items involving environmental factor. The extent of impairment was quantified using descriptive values, where 0=no impairment, 1=mild impairment, 2=moderate impairment, 3=severe impairment, 4=complete impairment, 8 indicated inadequate information for determination, and 9 indicated inapplicability.

2.3 Interventions

Control Group: (1) Food Intake Training: Based on individual circumstances, employ appropriate feeding and food inlet positions to regulate food size, character, temperature, and flavor, ensuring patients can consume food normally. (2) Oral Hygiene: Administer mouth cleansing using a 0.9% sodium chloride solution once in the morning and once in the evening. (3) Swallowing Electrical Stimulation: Implement low-frequency electrical stimulation therapy using a dysphagia therapeutic instrument, once daily for 30 minutes, over a span of 30 days. (4) Menthol Ice Lolly Stimulation: Prior to or within 2 hours post-meal, employ a homemade menthol ice lolly to stimulate the soft palate arch on both sides, the posterior of the tongue root, the pharyngeal wall, the buccal area, and both sides of the tongue surface. Simultaneously, instruct patients to perform swallowing, undertaking this regimen 2-3 times daily for 15-20 minutes each time. (5) Fundamental Swallowing Training: Guide patients through articulation and lip exercises, blowing maneuvers, tongue depressor resistance exercises, cheek puffing training, dental adhesive biting exercises, and tongue muscle training, undertaking this routine 2-3 times daily for 20-30 minutes per session.

Intervention Group: Based on the control group, additional interventions were introduced. In the initial phase, a filtration process excluded the items with scores of 0, 8, and 9. Subsequently, the remaining items exhibiting barriers were selected for targeted interventions. These interventions encompassed the following aspects: (1) Body Function: A collaborative effort between the charge nurse and the speech therapist was directed towards functional musculo-neurorehabilitation. This approach aimed at reinforcing the patient's control over the oral and pharyngeal phases of food intake, as well as enhancing abilities related to taste, smell, perception, and attention. (2) Body Structure: Dental prosthetics were provided for patients requiring them, and timely management of gum disease was ensured. (3) Activity and Participation: The nursing staff was attuned to the unique dietary and taste preferences of patients, endeavoring to accommodate these preferences. (4) Environmental Factors: Nurses were tasked with cultivating a conducive dining environment for patients, offering meals aligned with their tastes and eating habits, while ensuring ease of swallowing. Adjustments to food consistency and properties, based on swallowing imaging outcomes, were employed if necessary. During meals, encouragement was extended to instill confidence and fortitude in patients.

2.4 Outcome measures

Swallowing function was assessed using a standardized scale at three time points: pre-intervention, after four weeks of intervention, and after eight weeks of intervention. The assessment included the following components:

(1) Water Swallow Test (WST) [10]: Patients were guided to assume a seated position and ingest 30 ml of warm water. The grading criteria were as follows: Grade 1 denoted successful swallowing of the entire volume in one attempt; Grade 2 indicated successful swallowing after more than one attempt without choking; Grade 3 implied successful single-attempt swallowing without choking; Grade 4 represented successful swallowing after more than one attempt without choking; and Grade 5 signified frequent choking without the ability to fully swallow.

(2) Standardized Swallowing Assessment (SSA) [11]: The SSA was comprised of three sections: initial assessment, consumption of a spoonful of water, and consumption of a glass of water, encompassing a total of 17 items. The initial segment encompassed a preliminary evaluation of factors such as consciousness level, head and trunk control, breathing pattern, lip closure, soft palate mobility, laryngeal function, pharyngeal reflexes, and spontaneous coughing, with scores ranging from 8 to 23. The second section involved the patient drinking a spoonful of water (5ml), repeated thrice. Observations encompassed indicators such as drooling after consumption, laryngeal movements during swallowing, repetitive swallowing, wheezing during swallowing, and laryngeal function post-swallowing, with scores ranging from 5 to 11 per repetition. The third segment involved the patient consuming a glass of water (60ml) while assessing the ability to complete consumption, instances of coughing and choking, and voice quality, with scores ranging from 5 to 12. The cumulative SSA score ranged from 18 to 46, with higher scores indicative of compromised swallowing function.

2.5 Data analysis

Statistical analysis was performed using SPSS version 24.0 software. Continuous variables were presented as mean ± standard deviation ($\bar{x} \pm s$). Group comparisons were conducted utilizing the t-test, while intragroup comparisons were performed through one-way analysis of variance (ANOVA). Statistical significance was established at a threshold of $P < 0.05$.

3. Results

3.1 Demographic and clinical characteristics

Table 1 provides an overview of the demographic and clinical characteristics of the 80 participants. No statistically significant differences were observed among the two groups.

Table 1 demographic and clinical characteristics. ($\bar{x} \pm s$)

	Control Group (n=40)	Intervention Group (n=40)	P value
Gender (male/female)	18/22	19/21	0.96
Age(years)	56.1±7.8	60.2±11.0	0.54
Course(months)	2.1±1.8	2.4±2.0	0.73
MMSE	28.6±1.1	28.4±0.9	0.93

3.2 Characteristics of ICF items

Table 2 illustrates the ICF assessment conducted at the time of admission in both study groups.

Table 2 ICF items score for two groups of patients

ICF items	Control Group (n)				Intervention Group (n)			
	1	2	3	4	1	2	3	4
b110	0	0	0	0	0	0	0	0
b117	0	0	0	0	0	0	0	0
b1301	0	0	0	0	0	0	0	0
b1302	4	0	0	0	5	0	0	0
b140	0	0	0	0	0	0	0	0

b156	0	0	0	0	0	0	0	0
b1644	0	0	0	0	0	0	0	0
b250	8	5	3	0	10	3	1	0
b255	1	0	0	0	0	0	0	0
b510	8	13	6	13	13	4	7	16
b5100	3	8	7	11	6	5	9	10
b5101	12	6	8	2	17	5	11	4
b5102	17	6	5	6	15	4	8	6
b5103	14	7	2	9	11	3	6	7
b5104	6	7	1	0	8	3	0	0
b5105	8	12	14	5	5	14	14	7
b51050	3	4	7	2	4	6	8	0
b51051	5	8	7	2	1	8	6	7
s110	11	14	12	3	14	8	9	9
s320	2	3	0	0	3	1	0	0
d550	8	11	12	4	9	9	13	6
d560	5	7	6	3	8	5	9	1
d630	8	7	3	6	5	3	2	7
d850	0	0	0	0	0	0	0	0
d9100	0	0	0	0	0	0	0	0
d9102	3	1	0	0	2	0	0	0
d920	7	3	1	0	3	2	0	0
e1100	2	1	3	0	5	4	1	0
e115	1	2	0	0	0	1	0	0
e310	3	2	0	1	1	4	2	1
e340	7	2	0	0	5	3	1	0
e410	2	7	1	1	5	2	0	1
e450	0	0	0	0	0	0	0	0
e580	0	0	0	0	0	0	0	0

3.3 WST and SSA comparison

The outcomes evaluated using both scales exhibited congruence, with baseline data indicating no significant disparity between the two groups (P>0.05). Subsequent to an 8-week rehabilitation period, both groups demonstrated a significant reduction in SSA and WST scores (P<0.01). Comparative analysis between the fourth and eighth weeks revealed that the intervention group exhibited significantly lower scores compared to the control group (see Table 3 and 4).

Table 3 Comparison of SSA ($\bar{x}\pm s$)

Group	Baseline	4-week	8-week	F	P
Control Group (n=40)	40.6±3.4	30.6±3.7	22.1±2.9	386.61	<0.001
Intervention Group (n=40)	40.3±3.6	27.9±4.3	20.5±2.5	341.81	<0.001
t	0.32	2.99	2.57		
P	0.750	0.003	0.012		

Table 4 Comparison of WST ($\bar{x}\pm s$)

Group	Baseline	4-week	8-week	F	P
Control Group (n=40)	3.8±0.8	3.3±1.0	2.8±1.0	61.3	<0.001
Intervention Group (40)	3.8±0.7	2.4±1.0	2.0±1.0	50.7	<0.001
t	-0.14	3.71	3.73		
P	0.882	<0.001	<0.001		

4. Discussion

The conventional ingestion-swallowing process encompasses five distinct phases: cognitive, preparatory, oral, pharyngeal, and esophageal [12]. Among stroke patients, dysphagia may manifest in any single phase or encompass multiple phases concurrently. The cognitive and preparatory phases of swallowing are notably influenced by food attributes and the patient's psychological state. Factors such

as food texture, temperature, flavor, and portion size, along with alterations in the dining environment, can impact these phases [13]. While healthcare professionals often prioritize assessments of swallowing muscle strength and localized structural impairments, rehabilitation therapists employ electromyographic feedback during training to facilitate secure swallowing and reinforce the process [14]. Nursing care involves extended patient interaction, granting ample opportunity for instruction and fostering enhanced compliance due to the patients' heightened receptiveness. The ICF theory furnishes nurses with a robust tool for conducting a comprehensive assessment of patients grappling with swallowing disorders [15]. Encompassing 34 items related to swallowing, this framework addresses aspects such as food perceptions, ingestive action, utensils used, and the environmental context. Post-assessment, nurses can detect potential issues at an early stage and tailor interventions accordingly. This not only offers insights for collaborative efforts in dysphagia-related rehabilitation but also lays the foundation for future endeavors.

The findings of this study indicated that following four weeks of intervention, both the MST and SSA assessments indicated a significant enhancement in the intervention group compared to the control group. The concordance between these two assessment methods was notable. This substantial improvement remained evident even at the conclusion of the eighth week. These results underscore the effectiveness of employing dysphagia-related ICF items for evaluation and executing tailored nursing interventions guided by the assessment outcomes, resulting in a noteworthy enhancement of swallowing function among stroke patients. Nurses engage in interventions that address patients' physiological, psychological, social needs, and environmental factors, thereby effectively harnessing the patient's subjective engagement in rehabilitative functional training. This approach aligns seamlessly with the progression of the contemporary medical model and corresponds to the developmental requisites of the modern medical paradigm [16]. In the execution of physical function interventions, nurses employed strategies like attention and perception training, taste enhancement exercises, as well as swallowing and ingestion training to enhance patients' concentration during meals. Concurrently, these interventions targeted perceptual, taste, ingestion, inhalation, biting, chewing, food control within the oral cavity, oral and pharyngeal swallowing functions. Moreover, color and flavor stimulation training were implemented to instill a positive eating ambiance, fostering an internal impetus for proactive eating and thereby enhancing the motivation for rehabilitation training in individuals with swallowing disorders. For patients with dental deficiencies, the provision of suitable dentures was undertaken to facilitate eating, effectively ameliorating the impediments associated with food mastication and evacuation within the oral cavity, thereby significantly reducing the occurrence of choking incidents.

Interventions pertaining to environmental factors, including optimizing the dining setting, selecting appropriate food, establishing suitable eating positions, and employing assistive dining aids, collectively served to enhance the patients' chewing and food-swallowing capabilities. The constructive outlook of medical personnel and the supportive involvement of family members positively influenced the recuperation of the patients' swallowing functions. It should be recognized that swallowing dysfunction transcends mere physiological parameters; it carries social and familial implications. A prolonged absence of communal dining experiences with family and friends might amplify the risk of depression [17].

This study is not without certain limitations. Firstly, the relatively modest sample size may pose limitations to the generalizability of the findings. Despite the absence of significant differences in the baseline characteristics of the participants, the potential for bias resulting from the limited sample size cannot be completely disregarded. Secondly, the evaluated parameters in this study are reliant on scales, thereby potentially subject to the inherent subjectivity of the assessing nurses. Lastly, the duration of data collection may not have been extensive enough to capture and illuminate certain nuances, potentially masking certain underlying issues.

In summary, the incorporation of the 34 items from ICF into the clinical management of dysphagia patients proves to be a comprehensive approach to evaluating patient challenges, thereby effectively identifying the key focal points for rehabilitation nursing care. This strategy enhances the precision and efficacy of nursing interventions. By applying these 34 ICF items in the clinical care of dysphagia patients, a comprehensive assessment of patient issues is achieved, highlighting the primary areas of emphasis for rehabilitation nursing practice, resulting in more precise, human-centered, and scientifically informed nursing interventions. This approach significantly enhances patients' swallowing function, yielding notable therapeutic outcomes. Consequently, its widespread adoption is strongly recommended.

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