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Research Article

Application of Cluster Nursing Among Post-Stroke Patients with Dysphagia

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[Abstract] **Objective:** To explore the effect of cluster nursing care among post-stroke patients. **Methods:** Post-stroke patients with dysphagia (n=72) were randomly divided into two groups: experimental (or intervention) (n=36) the control (n=36). Patients in the experimental group were given cluster care, including swallowing assessment, safe eating guide, swallowing rehabilitation, the establishment of cluster prevention strategy and health education to patients and caregivers. Patients in the control group were given conventional nursing care, and the score of swallowing function, the prevalence of aspiration pneumonia and nursing care satisfactory level in both groups were assessed before and after the intervention. **Results:** The swallowing function of patients in the two groups were improved after intervention, but patients in the experimental group showed significantly higher improvement than the control group (P<0.05). The incidence of aspiration pneumonia was significantly lower in the experimental group compared to the control group (P<0.05). Moreover, the satisfactory level of nursing management was higher in the experimental group than the control group (P<0.05). **Conclusion:** Cluster nursing (CN) practice has significantly improved the swallowing function of stroke patients with dysphagia, reduced the incidence of aspiration pneumonia and enhanced the satisfaction of nursing care.

Keywords: Stroke; Dysphagia; Cluster care; Stroke-associated pneumonia

1 Introduction

Dysphagia Dysphagia is a common complication post-stroke attack with an incident rate of 28-67%. This can lead to conditions, such as aspiration pneumonia, malnutrition and mental illness which affect the stroke patient's functional rehabilitation and quality of life[1-2]. CN is a systematic approach in nursing care towards specific clinical conditions through evidence-based medicine. It is vital to explore the effects of CN effects on post-stroke patients with dysphagia. In this study, CN was tested on post-stroke patients with dysphagia, and a comparative analysis was performed with those receiving conventional nursing care.

2 Data and methods

2.1 Object of the study

With approval from the medical ethics committee, a total of 72 acute stroke and dysphagia patients hospitalized in Department of Neurology, The Affiliated Hospital of Xuzhou Medical University between July 2016 and September 2017 were recruited as the object in this study. During their admission time, they were randomly divided into control and experimental groups, with 36 each. Inclusion criteria: the post-stroke patients ① were diagnosed with dysphagia[4], which confirmed to be first onset by CT or MRI; ② were conscious, had stable vital sign-s and no fever and pulmonary infection; ③ could und-erstand and implement the physician's rehabilitation instructions; ④ had a course

of disease < 4 weeks; and ⑤ voluntarily participated in this study. Patients who had difficulty in comprehension and suffered concurrently from dementia, severe cardiac, cerebral and renal insufficiency and mental disorder were excluded. The age, sex, course of the disease, NIHSS (National Institutes of Health Stroke Scale) and disease type were comparable between the two groups, without a statistically significant difference ($p>0.05$).

2.2 Methodology

2.2.1 Control

Routine nursing of neurology medicine was carried out, including: ① pharmacotherapy. Medicines for improving cerebral circulation, trophic nerve, dehydration and other therapies were given as advised by physicians. ② Dietary intervention. Based on Kubota drinking water test, the patients with Grade I and II could consume food using mouth while patients with Grade III and above received nasal feeding and standard guidance. ③ Limb function exercise. Patients with Parkinson's disease were given kinesitherapy, occupational therapy and physical agent therapy. ④ Dysphagia treatment, namely neuromuscular electrical stimulation.

2.2.2 Experimental group

The experimental group was given traditional nursing care plus CN. A stroke and dysphagia rehabilitation team composed of department director, therapist, head nurse and primary nurse was established to carry out an evidence-based investigation. Detailed intervention methods, cluster nursing scheme and nursing measure check sheet were worked out based on the results and evidence and further used by the team and doctor-in-charge and therapist to implement the intervention measures.

(1) Swallowing function assessment. ① First swallowing function assessment was conducted by primary nurse within 2 hours of admission; ② Grade II patients of Kubota drinking water test were assessed every day until the function became normal and given tube feeding or healthy diet guide, aspiration prevention chart and bedside angle measurement card; ③ The assessment results were reported to the doctor-in-charge, who would inform the patient's family about the patient's condition and aspiration risk and prescribe or cancel the nasal feeding; ④ The assessment results of patients with Grade II and above were further reported to the therapist who would conduct further clinical bedside evaluation or instrument examination when the patient's condition is acceptable and prepared individualized dietary guidelines and swallowing rehabilitation training plan based on the results.

(2) Safe eating guide. Grade I & II patients of Kubota drinking water test received safe oral food intake guide. ① Environment: The ward must be quiet, comfortable, the television turned off and caregiver, visitor limited, to enhance the eating safety. ② Food: Subjecting to the severity of dysphagia, easy-swallowing mushy non-loose food with even density and proper stickiness (which could be increased via thickening or adding of slush powder by family) was first given, followed by soft rice, normal diet and liquid food when the swallowing function was improved. ③ Tableware: Spoons with a thick and long handle as well as blunt bottom and edge, wide-mouthed and flat-bottom bowel and notch cup were recommended, but straw was not allowed. ④ Preparatory work: The patients were required to reduce movement 30 minutes before eating to avoid fatigue. The oral cavity was checked, respiration observed, expectoration assisted and secreta cleared in order to clean the mouth. Proper position counted: when eating, a patient who could well control his body was advised to flex the knee joints to 90° and upright the trunk, thus the patient could see the food and the latter's color and boost the appetite by the food's fragrance; a patient with limited movements caused by disease was advised to seat with a lateral position with the head bent forward, hemiplegic shoulder blocked up by pillow and the bedside raised to 30-45°. ⑤ Food intake monitoring: The primary nurse should observe when a patient is eating, including the bolus position in the mouth, a mouthful volume, intake speed and time, directed head-down or head-up swallowing, dry swallowing and alternate swallowing to assist the physiologic function. ⑥ Post-meal disposition: a patient should remain in sitting position or semi-fowler position after eating and rest for at least 30-45 minutes; the oral cavity was checked for any residual food to ensure the mouth is clean; turning over, back patting and sputum suction should be avoided for 1 hour after eating. Patients with Grade III and above of Kubota drinking water test should receive an indwelling nasogastric tube of level 2 fixation as advised by the physician. ① Gastric retention should be checked and bowel sound monitored before nasal feeding, and the

volume, type and concentration of feeding should be adjusted subject to personal condition. ② The bedside was raised to at least 30° for 30-45 minutes when and after nasal feeding, ③ Turning over and sputum suction must be avoided within 1 hour after nasal feeding to prevent regurgitation and aspiration caused by pharyngeal stimulation.

(3) Swallowing recovery training. ① Sensory promotion synthetic training: Various sensory stimulations were offered to the patients before swallowing: when food was delivered into the mouth, more pressure was added from the spoon onto the tongue; the patients were given cold food or food with strong smell to chew; For patients with poor oral sensation, an iced cotton swab dipped with lemonade, capsaicin or menthol or other liquids could be blocked in the mouth to stimulate the soft palate, root of tongue and posterior pharyngeal wall followed by patients' directed dry swallowing. The training was performed 3 times per day, with 5-10 minutes each. ② Swallowing organ training: Subjecting to personal conditions, the therapist directed the dysphagia patients to perform mouth opening, tongue moving, velopharyngeal closure and expiration and inspiration etc., all of which enhance the control ability on the lips, tongue, jaw, soft palate, vocal cord and relevant muscles, thus improving their swallowing function. The training was performed 3 times per day, with 5-10 minutes each.

(4) Prevention and disposal of aspiration. The primary nurse carried out aspiration risk assessment and preventive measures based on the patients' conditions and eating pattern, respectively. In the case of aspiration, measures would be promptly taken based on the hospital's risk response plan to reduce further harm.

(5) Health education for patients and caregivers. This systemic education rendered by primary nurse based on the patients' conditions includes ① introduction of stroke and dysphagia; ② selection and assortment of foods; ③ skills of safe eating; ④ oral care; ⑤ prevention and first aid for aspiration/asphyxia; ⑥ psychological counseling.

2.3 Assessment Criteria

Therapeutic effect: The effect was assessed by Kubota drinking water test[6]. Taking a sitting position or a semi-reclining position with the bedside higher than 30°, a patient was given drink up to about 2-3 spoons of water by one time before drinking up to 30 ml warm water "as usual" when the 2-3 spoons were successful. The drinking time, bucking and performance were observed and recorded. Dysphagia could be divided into 5 grades based on severity, with Grade I: the water was drunk up by one time without bucking; Grade II: the water was finished in twice without bucking; Grade III: the water was drunk up by one time with bucking; Grade IV: the water was drunk up in twice with bucking; Grade V: the patient could barely drink the water, with frequent bucking. Effects: ① Cured: the symptoms of dysphagia disappeared, with Grade I result in drinking water test; ② Excellent: dysphagia was markedly alleviated, with drinking water test result rising by at least two grades; ③ Improved: the symptoms were improved, with drinking water test result rising by one grade; ④ Ineffective: there was no marked improvement and change of drinking water test result.

Aspiration pneumonia incidence[7]: ① The post-stroke patient had no history of tracheal and pulmonary diseases; ② Cough, expectoration, anhelation and fever lasted for over 3 days; ③ Dry and moist rales could be auscultated in bilateral lungs, at temperature higher than 37℃ ; ④ Blood routine: WBC >11X109/L, NEUT >0.70; ⑤ Scattered infected lesions were indicated in bilateral lungs by chest CT or X-ray.

Satisfaction of nursing care: A table was designed for this purpose, where the satisfaction was be divided into "unsatisfactory" (score: below 60), "acceptable" (score: 60-79), "satisfactory" (score: 80-90) and "excellent" (score: above 90), with a full score is 100.

2.4 Statistical Processing

SPSS20.0 was used for statistical analysis. Measurement data was presented by $\chi \pm s$, and t-test was applied for group comparison. Enumeration data was presented by percentage points while sequence and test were employed to compare the ordinal variable groups. χ^2 test was used for unordered variables. A difference with $P<0.05$ was considered statistically significant.

3 Results

3.1 Inter-group comparison of the therapeutic effect

Admission evaluation indicated that there was no significant difference between the swallowing function of the two groups ($Z=-0.246$, $p=0.807$) as shown in Table 1. Interesting, the intra-group comparison showed a marked post-treatment improvement of swallowing

in both groups (Z=-2.364, p=0.017). Additionally, the results of inter-group comparison showed that the experimental group achieved a higher overall effective rate in improving the swallowing function than the control group (χ^2=12.784, p=0.005) as presented in Table 2.

3.2 Inter-group comparison of aspiration pneumonia incidence and satisfaction for the nursing care

The results showed that only 3 cases of aspiration pneumonia were diagnosed in the experimental group, which is significant lower than the control group (3 cases), with χ^2=6.46, p<0.05. Furthermore, as shown in Table 3, the assessment on the satisfaction of nursing indicated that the experimental group significantly achieved a better satisfaction compared to the control group (χ^2=4.89, p<0.05).

Table 1 Pre-treatment and post-treatment ratings of swallowing function in the two groups (%)

Group	n	Rating of Swallowing Function					Z	ρ
		Grade I	Grade II	Grade III	Grade IV	Grade V		
Pre-treatment							-0.246	0.807
Experimental	36	0（0.00）	6（16.67）	7（19.44）	10（27.78）	13(36.11)		
Control	36	0（0.00）	6（16.67）	8（22.22）	10（27.78）	12（33.33）		
Post-treatment							-2.364	0.017
Experimental	36	10（27.78）	8（22.22）	12（33.33）	6（16.67）	0（0.00）		
Control	36	4（11.11）	6（16.67）	11（30.56）	8（22.22）	7（19.44）		

Pre-treatment and post-treatment Comparison of experimental and control groups through the rank-sum test indicate Z=-5.306, ρ<0.001 and ： Z=-4.507, ρ<0.001 respectively.

Table 2 Comparison of the effects of the intervention on swallowing function (%) in the two groups

Group	n	Effects				Overall Effective Rate	χ^2	ρ
		Cured	Excellent	Improved	Ineffective	%		
Experimental	36	12(33.33)	17(47.22)	5(13.89)	2(5.56)	94.44	12.784	0.005
Control	36	5(13.89)	10(27.78)	13(36.11)	8(22.22)	77.78		

Table 3 Comparison of aspiration pneumonia incidence and satisfaction of nursing care (%) in the two groups

Group	n	Aspiration Pneumonia		Satisfaction of Nursing Care			
		Yes	No	Excellent	Satisfactory	Acceptable	Unsatisfactory
Experimental	36	3（8.33）	33（91.67）	19(52.78)	12(33.33)	2(13.89)	0(0.00)
Control	36	10（27.78）	26（72.22）	7(19.44)	12(33.33)	7(19.44)	10(27.78)
χ^2		6.46			4.89		
ρ		<0.05			<0.05		

4. Discussion

4.1 Cluster nursing standardizes the nurses' assessment of swallowing function

Dysphagia is a common symptom of stroke that usually occurs in the acute phase. Although some patients can achieve a gradual remission within 1-2 weeks, but the reduced swallowing function after acute stroke may cause multiple complications, such as aspiration, aspiration pneumonia, malnutrition and dehydration, and the like, extending the hospitalization and even causing death. Nursing staff in our department are rarely aware of the importance of swallowing assessment and only have limited swallowing function-related knowledge, thus leading to inaccuracy of assessment results. Moreover, the ratio of initial assessment to newly admitted stroke patients is low, and follow-ups and dynamic evaluations to the Grade II dysphagia patients of Kubota drinking water test and those receiving nasal feeding are inadequate. Given

these drawbacks, the CN research and development team has opened a course on dysphagia theory and skill training, in which it designed a stroke and dysphagia assessment check sheet and monitored the whole care of the post-stroke patients with dysphagia, with the aim of ensuring a safe, professional and full-course quality nursing.

4.2 CN intervention facilitates an early recovery of swallowing function

Rehabilitation from dysphagia in post-stroke patients requires the joint efforts of multiple professions. Prevention, intervention and treatment can be coordinated and effective with continuous and complete cluster nursing (CN) that based on evidence-based medicine [8]. In this study, the primary nurse and therapist conducted a timely and comprehensive assessment in the experimental group, respectively, and a personal eating strategy was established based on the results. In this regard, the team can guide the patients the correct way of food intake and ensure safe eating, thus reducing the incidence of aspiration and aspiration pneumonia, securing the nutrition and water supply and laying a solid foundation for recovery from stroke and poor swallowing function. On the basis of intake-swallowing management, a comprehensive rehabilitation training was conducted for the organs involving in swallowing, effectively enhancing the flexibility and coordination between muscle groups, making the central nervous system more malleable and repairable. In addition, this training also facilitates an early recovery of swallowing function.

4.3 CN intervention made the patients and family more satisfied with the nursing care

In the view of physiological and social needs, food intake by mouth is considered a great pleasure. Recovery from dysphagia can be affected by the patient's anxiety and fear of aspiration, bucking and accompanying sense of insecurity. As the primary caregiver and origin of social support, the family may feel helpless as they lack nursing care knowledge when a family member is diagnosed with such condition. In this study, the patient and family's need was concerned, CN was designed, and health education to the patient and family was recommended. Through systemic education, the patients discarded negative psychology, regained confidence and accepted treatment more actively and obediently, thus improving their total recovery. Having mastered relevant rehabilitation knowhow and skills, the family realized a better and continuous nursing care. During the systemic education, a harmonious and considerate caregiver-patient relationship was also established, and the patient and family became more satisfied with nursing care.

In conclusion, CN could be a nursing care for the post-stroke patients with dysphagia. Its success relies on the joint efforts between the nursing staff and the efficient implementation of every measure. It is discovered that the compliance to CN may vary due to subjective and objective factors, such as individual patients and the environment. Hence, an in-depth investigation is required to rule out these factors, and a strict monitor system should be strictly implemented to improve the compliance and the nursing work.

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