

The Effect of Capacity Assessment Combined with Staged Target Nursing Intervention on Swallowing Functional Disturbance and Pulmonary Infection in Elderly Stroke Patients

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To investigate the effect of capacity assessment combined with staged target nursing intervention on swallowing functional disturbance (SFD) and pulmonary infection in elderly stroke patients. 82 elderly stroke patients treated in the neurological department of our hospital (June 2019–February 2021) were chosen as the study subjects and randomly split into study group (n=41) and control group (n=41). Both groups received basic treatment for cerebrovascular diseases. After that, control group received routine clinical nursing, while study group underwent capacity assessment combined with staged target nursing intervention. The scores of the Burke Lateropulsion scale in both groups after 3-month nursing intervention were obviously lower ($P < 0.001$), and after 3-month nursing intervention the scores of the Burke Lateropulsion scale in study group were obviously lower compared with control group ($P < 0.001$). The NIHSS scores in both groups after 3-month nursing intervention were obviously lower ($P < 0.001$), and the NIHSS scores in study group after 3-month nursing intervention were obviously lower compared with control group ($P < 0.001$). The total clinical efficacy rate in study group was obviously higher compared with control group ($P < 0.05$). The SWAL-QOL scores in both groups after 3-month nursing intervention were obviously higher ($P < 0.001$), and the SWAL-QOL scores in study group after 3-month nursing intervention were obviously higher compared with control group ($P < 0.001$). The levels of FVC, FEV1 and PEF in both groups after 3-month nursing intervention were obviously higher ($P < 0.001$), and those after 3-month nursing intervention in study group were obviously higher compared with control group ($P < 0.001$). Plus, the total incidence of complications in study group was obviously lower compared with control group ($P < 0.05$). The capacity assessment combined with staged target nursing intervention can effectively improve patients' swallowing function, neurological function, pulmonary function and life quality, with obvious therapeutic effect, deserving promotion and popularization.

Keywords: Capacity assessment, staged target nursing intervention, elderly stroke patients, swallowing functional disturbance, pulmonary infection

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The Stroke is a rapidly progressing neurological disease, mostly affecting middle-aged and elderly people¹. Strokes are the leading causes of death in domestic residents, and can be clinically classified into ischemic stroke and hemorrhagic stroke². Epidemiological surveys show that the prevalence rate of stroke is significantly higher in men than in women, and there is an obvious regional difference, with the incidence increasing from 0.42% in 1995 to 1.54% in 2018 year by year³.

Due to the brain nerve damage of stroke patients, their swallowing function and motor function are restricted, and the former one as a common complication in stroke patients, is often manifested by high saliva viscosity during swallowing, dysphagia, cough when drinking water, etc.⁴⁻⁶. Intravenous rehydration is often adopted clinically to supplement nutrition for stroke patients with SFD, but long-term intravenous rehydration might lead to patients' alopecia, malnutrition, etc., weakening their immunity and inducing other clinical complications, with poor prognosis. SFD not only adversely affects patients' nutrient intake, but also makes them pessimistic, leading to low treatment compliance. Besides, aspiration pneumonia may occur on account of patients' aspiration, greatly inducing pulmonary infection and affecting disease rehabilitation^[7]. Therefore, effective clinical nursing measures should be taken, which can effectively reduce pulmonary infections and improve SFD as well as prognosis in stroke patients. The performance of capacity assessment provides much preciser clinical nursing services for elderly stroke patients to improve their later life quality, while staged target nursing intervention achieves the purpose of rapid rehabilitation by setting practicable goals for elderly stroke patients stage by stage, according to their

specific clinical conditions⁸⁻¹⁰. Based on this, to explore effect of capacity assessment combined with staged target nursing intervention on SFD and pulmonary infection in elderly stroke patients, 82 elderly stroke patients admitted to the neurological department of our hospital (June 2019-February 2021) were chosen as the study subjects, and the summary reports are as below.

MATERIALS AND METHODS

General Information

82 elderly stroke patients treated in the neurological department of our hospital (June 2019-February 2021) were chosen as the study subjects and randomly split into study group (n=41) and control group (n=41). Among them, study group had 23 males and 18 females, in which 19 patients suffered from hemorrhagic stroke and 22 patients suffered from ischemic stroke, with the average age of (70.21±4.33) years old, the average disease course of (4.22±1.06) months and the average weight of (68.25±5.79) kg; while control group had 22 males and 19 females, where 17 patients suffered from hemorrhagic stroke and 24 patients suffered from ischemic stroke, with the average age of (70.24±4.31) years old, the average disease course of (4.25±1.03) months and the average weight of (68.27±5.77) kg. No obvious differences in clinical data were found between the two groups, with comparability (P > 0.05).

Inclusion Criteria

- ① Patients were diagnosed with strokes by brain CT and MRI, aging from 60 to 85 years old.
- ② Patients had no severe complications.
- ③ Patients' Glasgow coma scale scored more than 8 points.
- ④ Patients could sit with assistance.
- ⑤ Patients had no mental diseases.
- ⑥ Patients had

grade 3-5 swallowing disorders in the water swallow test. ⑦ This study got approval of the Hospital Ethics Committee, and the patients and their family members knew the study process and signed informed consent.

Exclusion Criteria

① Patients had systemic coagulation disorders, cardiac insufficiency and severe arrhythmia. ② Patients could not carry out nasal feeding. ③ Patients had severe organic diseases in brain, heart, lungs, kidneys, etc. ④ Patients with cognitive impairment such as mental disorders or refused to cooperate with the study.

Methods

Both groups received basic treatment of cerebrovascular diseases, such as catheterization, etc. The control group underwent routine clinical nursing, such as medication guidance, clinical monitoring, feeding training, dietary intervention, health education, etc.

The study group adopted capacity assessment combined with staged target nursing intervention, and the specific implementation steps are as follows. ① Physical assessment. Patients received physical assessment through inquiry, physical examination results and assessment scale, in terms of patients' disease history (examination results) and physical examination (general physical examination, vital signs, sleep quality, nutritional status, etc.). After that, patients' physical conditions were evaluated objectively, so as to timely and accurately complete nursing information and treatment. ② Psychological assessment. Interview methods, psychometric testing methods and observational methods were adopted to evaluate patients' psychological conditions in the aspects of emotion, psychological characteristics, family, state of economy, etc. ③ Assessment of cognitive function. The mini-mental state examination was used to evaluate patients' cognitive function, which included memory disorders, learning skills, and thought disorders^{11,12}. Then, according to

the assessment results, corresponding stage target nursing intervention was carried out according to patients' specific conditions.

Staged target nursing intervention. ① Psychological nursing. Specific staged targets were set for the patients according to their psychological changes at different times. Nursing staff actively educated patients and their family members about the knowledge of strokes and some adverse reactions that may occur during treatment, so as to correct patients' incorrect perceptions of their own diseases and improve their treatment compliance. During patients' hospitalization, according to patients' different complications and psychological characteristics, targeted psychological counseling was carried out stage by stage according to specific conditions, thus helping patients overcome their inner fears and gradually achieving the final goal of nursing. ② Dietary nursing. Staged diet plans were designated based on the patients' conditions, physical status and nutritional needs during different periods. Before that, the patients' daily needs for nutrition and calories were assessed, and then the patients were given corresponding nutritional supports. When the current staged target was achieved, other staged targets were continued, gradually realizing the final goals. ③ Respiratory rehabilitation training. The patients took supine position. Nursing staff, with their upper limbs vertical with patients' bodies, put hands in lower positions of the patients' clavicles, and their two thumbs were placed on the manubrium sterni, with the rest of fingers opening slightly on both sides of the patients' upper breast. Then, the pressure on patients' thorax was conducted along the exhalation direction from top to bottom when patients breathing. ④ Swallowing training. Sterile swabs dipped with pre-prepared lemon squash were put into freezers and then were used to stimulate patients' soft palates and throat walls to make sounds of "ah", with each part stimulating for 8-10 seconds. Subsequently, the patients were instructed to swallow independently 3 times a day. ⑤ Feeding training. The patients remained sitting positions and slightly lifted their larynx,

with body trunks leaning forward by 20-30° and necks bending forward by 15°, to ingest foods smoothly into the esophagus. In early stage, the patients had liquid and dense foods such as porridge, steamed egg custards, etc.; then, they gradually had semi-liquid and solid foods, under the principle of eating from less to more, with initially a single meal of 3-5ml gradually increasing to 20ml. Nursing staff should encourage patients to swallow independently after each meal, and ask patients to drink water appropriately and clean up food residue in their mouths, with 30 minutes a time and 1 time a day.

Observation Indexes

Swallowing function before nursing intervention and at 3 months after nursing intervention in both groups was evaluated, according to the Burke Lateropulsion scale¹³ including the items of pneumonia, strokes, test of eating and drinking, food consumption, time of use, and behavior, with each item scoring 7 points and the total score of 42 points, and higher scores indicated severer SFD in patients.

Neurological function before nursing intervention and at 3 months after nursing intervention in both groups was evaluated, with referring to the *national institute of health stroke scale*¹⁴ (NIHSS), which consisted of the criteria of eye movement, facial expression, limb capability, sensation, etc., with the total score of 45 points, and higher scores indicated severer neurological impairment.

Efficacy evaluation. The reduction of more than 75% of Burke and NIHSS scores after 3-month nursing intervention was considered as excellent; the reduction of 25-75% of Burke and NIHSS scores was considered as effective; the reduction of less than 25% of Burke and NIHSS scores was considered as ineffective. Total efficacy rate = excellent rate + effective rate.

The life quality before nursing intervention and at 3 months after nursing intervention in

both groups was evaluated, according to the swallowing quality of life questionnaire^[15] (SWAL-QOL), which included feeding time, frequency of SFD symptoms, food preference, language communication, and social communication, with the total score of 125 points, and higher scores indicated better quality of life.

Pulmonary function indexes including forced expiratory volume in one second (FEV1), peak expiratory flow rate (PEF) and forced vital capacity (FVC) before nursing intervention and at 3 months after nursing intervention in both groups were detected by lung function detector (Manufacturer: Guangzhou Aoxun Instruments Co., Ltd.).

The incidence of complications such as aspiration pneumonia, aspiration, asphyxia, pulmonary infection, and malnutrition during nursing intervention in both groups was recorded and compared.

Statistical Treatment

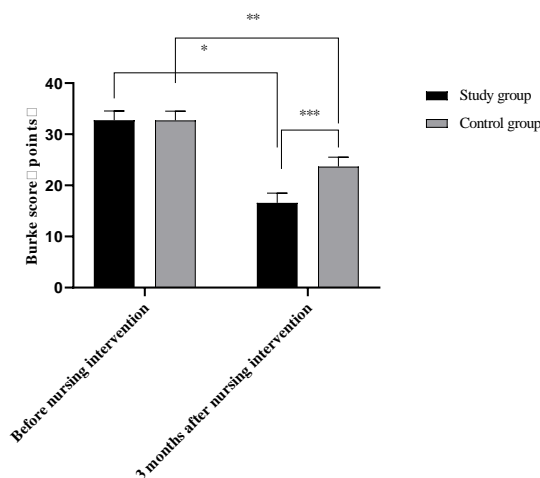
The data in this study were statistically processed and analyzed by SPSS21.0 software, and GraphPad Prism 7 (Graphpad Software, San Diego, USA) was used to draw the pictures of the data. Measurement data were expressed by ($\bar{x} \pm s$) and tested by t-test. Enumeration data were expressed as [n (%)] and tested by χ^2 test. The differences had statistical significance when $P < 0.05$.

RESULTS

Comparison of Burke Scores

The Burke scores in both groups after 3-month nursing intervention were obviously lower ($P < 0.05$), and the Burke scores in study group after 3-month nursing intervention were obviously lower compared with control group ($P < 0.05$; Figure 1).

Figure 1.
Comparison of Burke scores (±s)



Note: The abscissa represented before nursing intervention and 3 months after nursing intervention, while the ordinate represented Burke score (points).

The Burke scores in study group before nursing intervention and at 3 months after nursing intervention were (31.47±2.55) points and (15.24±2.69) points, while those in control group were (31.45±2.53) points and (22.37±2.62) points, respectively.

* indicated an obvious difference in Burke scores before nursing intervention and at 3 months after nursing intervention in study group (t=28.037, P=0.000).

** indicated an obvious difference in Burke scores before nursing intervention and at 3 months after nursing intervention in control group (t=15.963, P=0.000).

*** indicated an obvious difference in Burke scores at 3 months after nursing intervention between the two groups (t=12.158, P=0.000).

Comparison of NIHSS Scores

The NIHSS scores in both groups after 3 months of nursing intervention were obviously lower (P < 0.05), and the NIHSS scores in study

group after 3 months of nursing intervention were obviously lower compared with control group (P < 0.05; Table 1).

Table 1.
Comparison of NIHSS scores (±s, points)

Group	n	Before nursing intervention	After 3-month nursing intervention	T ₂	P ₂
Study group	41	35.84±3.53	17.24±3.17	25.103	0.000
Control group	41	35.82±3.56	26.54±3.12	12.553	0.000
T ₁		0.026	13.388		
P ₁		0.980	0.000		

Notes: T₁P₁ indicated the intergroup comparison of the NIHSS scores before nursing intervention and after 3 months of nursing intervention, and T₂P₂ indicated the intra group comparison of the NIHSS scores before nursing intervention and after 3 months of nursing intervention.

Comparison of Clinical Efficacy

The clinical efficacy rate in study group was

obviously higher compared with control group (P < 0.05; Table 2).

Table 2.
Comparison of clinical efficacy [n (%)]

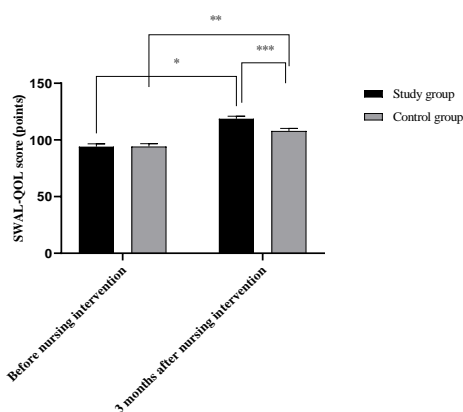
Group	n	Excellent	Effective	Ineffective	Total efficacy rate
Study group	41	18 (43.90%)	21 (51.22%)	2 (4.88%)	95.12% (39/41)
Control group	41	15 (36.59%)	16 (39.02%)	10 (24.39%)	75.61% (31/41)
X ²					6.248
P					0.012

Comparison of SWAL-QOL Scores

The SWAL-QOL scores in both groups after 3 months of nursing intervention were obviously higher (P < 0.05), and those in study group after

3 months of nursing intervention were obviously higher compared with control group (P < 0.05; Figure 2).

Figure 2.
Comparison of SWAL-QOL scores (±s)



Note: The abscissa represented before nursing intervention and 3 months after nursing intervention, while the ordinate represented SWAL-QOL score (points).

The SWAL-QOL scores in study group before nursing intervention and at 3 months after nursing intervention were (92.35±3.54) points and (117.03±3.26) points, while those in control group were (92.37±3.56) points and (106.29±3.24) points, respectively.

* indicated an obvious difference in SWAL-QOL scores before nursing intervention and at 3 months after nursing intervention in study group (t=32.838, P=0.000).

** indicated an obvious difference in SWAL-QOL scores before nursing intervention and at 3 months after nursing intervention in control group (t=18.516, P=0.000).

*** indicated an obvious difference in SWAL-QOL scores at 3 months after nursing intervention between the two groups (t=14.962, P=0.000).

Comparison of Pulmonary Function Indexes

The levels of FVC, FEV1 and PEF after 3 months of nursing intervention in both groups

were obviously higher (P < 0.05), and those in study group were obviously higher compared with control group (P < 0.05; Table 3).

Table 3.
Comparison of pulmonary function indexes (±s)

Group	n	Time	FVC (%)	FEV1 (%)	PEF (L/S)
Study group	41	Before nursing intervention	50.21±4.62	29.84±3.64	4.96±0.22
		After 3 months of nursing intervention	73.58±5.24	42.85±3.74	6.03±0.14
Control group	41	Before nursing intervention	50.24±4.65	29.86±3.66	4.93±0.25
		After 3 months of nursing intervention	64.34±5.62*	32.98±3.49*	5.36±0.16*

Note: All pulmonary function indexes in both groups after 3 months of nursing intervention were obviously higher; * indicated the comparison between the two groups after 3 months of nursing intervention, P < 0.001.

Comparison of the Complications During Nursing Intervention

study group was obviously lower compared with control group (P < 0.05; Table 4).

The overall incidence of complications in

Table 4.
Comparison of the incidence of complications during nursing intervention [n (%)]

Group	n	Aspiration pneumonia	Aspiration	Asphyxia	Pulmonary infection	Malnutrition	Total incidence
Study group	41	0 (0.00%)	1 (2.44%)	0 (0.00%)	1 (2.44%)	1 (2.44%)	7.32% (3/41)
Control group	41	2 (4.88%)	4 (9.76%)	1 (2.44%)	2 (4.88%)	1 (2.44%)	24.39% (10/41)
X ²							4.479
P							0.034

DISCUSSION

Recently, with the gradual increase of stroke cases in China, stroke-related complications have attracted wide attention from the medical community. Clinically, stroke rehabilitation is divided into three levels, specifically, early treatment in wards (Level I), rehabilitation in rehabilitation department or center (Level II) and rehabilitation of sequelae in community (Level III)¹⁶. Strokes can damage patients’ swallowing center, causing muscle weakness of linguales and masseter, and persistent muscle weakness will further aggravate patients’ SFD, thus it is essential to implement basic training such as swallowing stimulation. In addition, SFD can adversely affect patients’ breathing, which can easily trigger aspiration, food reflux, etc., increasing the risk of pulmonary infection¹⁷. Some scholars believe that the first 4 weeks of stroke onset are the optimal

rehabilitation period, thus comprehensive and systematic clinical rehabilitation training should be carried out as early as possible to improve prognosis and restore limb and neurological function. SFD is a common complication in elderly stroke patients, and the medical community has paid more attention to the early nursing and rehabilitation of this disease. Besides, elderly patients have more basic diseases, poor comprehension, and slow recovery of body function, which poses a higher demand for clinical nursing¹⁸. At present, clinical rehabilitation is of great importance to reduce pulmonary infection and improve life quality in elderly stroke patients. However, the irregularity of the routine nursing model, resulting in rigid intervention forms and stereotyped operation, tends to be unsatisfactory for clinical demands¹⁹⁻²¹.

In this study, the swallowing function was obviously improved after the adoption of capacity assessment combined with staged target nursing intervention in elderly stroke patients, presuming that the comprehensive assessment of patients' physical conditions might provide precise reference basis for developing the staged target nursing intervention program after assessing patients' disease history, feeding conditions, daily life, etc. By implementing swallowing stimulation and feeding rehabilitation training, patients' swallowing nerves were effectively stimulated and the recovery of damaged nerves was accelerated, greatly promoting the recovery of swallowing function. Stroke can weaken patients' central nervous and stress reaction, and the pulmonary ventilation can also be adversely affected because patients are confined to beds for a long time, ultimately leading to pulmonary infection^{22,23}. Our study found that all pulmonary function indexes were obviously improved in patients after combined rehabilitation training, and the combined nursing intervention could effectively improve patients' rate of sputum drainage, keep breath unobstructed and reduce the risk of pulmonary infection. Jessica Quah et al²⁴ in the study pointed out that after patients with ischemic stroke received capacity assessment combined with staged target nursing intervention, their FVC was (74.02±5.36)%, which was obviously higher than (63.46±5.31)% of the reference group, demonstrating that the combined nursing intervention can obviously improve pulmonary function and pulmonary ventilation, and reduce pulmonary infection. The implementation of combined nursing intervention can accelerate elderly stroke patients' disease rehabilitation, relieve their family members' economic pressure, and provide clinical experience and guidance for the development of nursing care related to SFD and pulmonary infection in the future, which can significantly improve the medical treatment in our hospital^{25, 26}.

In conclusion, the capacity assessment combined with staged target nursing intervention can

effectively improve patients' swallowing function, neurological function, pulmonary function and life quality, with obvious therapeutic effect, deserving promotion and popularization.

DECLARATION OF CONFLICTING INTERESTS

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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