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## Original Article / Оригинални рад

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# Multidisciplinary approach to patients with post-stroke dysphagia to improve swallowing and quality of life

Мултидисциплинарни приступ пацијентима са дисфагијом након можданог удара ради побољшања гутања и квалитета живота

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# Multidisciplinary approach to patients with post-stroke dysphagia to improve swallowing and quality of life

## Мултидисциплинарни приступ пацијентима са дисфагијом након можданог удара ради побољшања гутања и квалитета живота

**SUMMARY**

**Introduction/Aim** This study aimed to investigate the impact of multidisciplinary management led by brain–heart health experts on the quality of life (QoL) of patients suffering from post-stroke dysphagia.

**Methods** A total of 194 patients with post-stroke dysphagia, treated between January 2021 and June 2024, were selected and randomly assigned to a control group (99 cases, standard care) and an observation group (95 cases, multidisciplinary management by brain–heart health experts). Both groups received intervention for three months. The swallowing function, clinical efficacy, nutritional risk and QoL were compared between the two groups before and after the intervention using the Water Swallowing Test (WST), the Gugging Swallowing Screen (GUSS), Nutritional Risk Screening 2002 (NRS2002) and Stroke-Specific Quality of Life Scale (SS-QOL).

**Results** Compared to the pre-intervention period, both the observation group and the control group exhibited reduced WST grades, GUSS scores and NRS2002 screening risks post-intervention ($p < 0.05$), with a significant increase in the SS-QOL scores ($p < 0.05$). Compared with the control group, the observation group demonstrated lower WST grades, GUSS scores and NRS2002 screening risks post-intervention ($p < 0.05$). The clinical efficacy of the observation group was superior to that of the control group ($p < 0.05$), and the SS-QOL scores in the observation group were significantly higher than those in the control group ($p < 0.05$).

**Conclusion** Multidisciplinary management led by brain–heart health experts significantly improved swallowing functions, reduced malnutrition risk and enhanced QoL in patients with post-stroke dysphagia.

**Keywords:** dysphagia; stroke; brain–heart health experts; multidisciplinary care; quality of life

**САЖЕТАК**

**Увод/Циљ** Ова студија је имала за циљ да истражи утицај мултидисциплинарног менаџмента који су водили менаџери за здравље мозга и срца на квалитет живота пацијената који пате од дисфагије након можданог удара.

**Методе** Укупно 194 пацијената са дисфагијом након можданог удара, лечених од јануара 2021. до јуна 2024., одабрано је и насумично распоређено у контролну групу (99 случајева, стандардна нега) и групу за посматрање (95 случајева, мултидисциплинарно управљање мозгом-срцем). здравствени менаџери). Обе групе су интервенисане три месеца. Функција гутања, клиничка ефикасност, нутритивни ризик и квалитет живота упоређени су између две групе пре и после интервенције коришћењем Теста гутања воде (ВСТ), Гугингов тест гутања (ГУСС), Скрининга нутритивног ризика 2002 (НРС2002) и Скала квалитета живота специфична за мождани удар (СС-КОЛ).

**Резултати** У поређењу са периодом пре интервенције, и посматрачка и контролна група су показале смањене ВСТ оцене, ГУСС резултате и НРС2002 скрининг ризике после интервенције ($p < 0,05$), уз значајно повећање СС-КОЛ резултата ($p < 0,05$). У поређењу са контролном групом, посматрана група је показала ниже ВСТ оцене, ГУСС резултате и ризике скрининга НРС2002 након интервенције ($p < 0,05$). Клиничка ефикасност посматране групе била је супериорнија у односу на контролну групу ($p < 0,05$), а резултати СС-КОЛ у посматраној групи били су значајно виши од оних у контролној групи ($p < 0,05$).

**Закључак** Мултидисциплинарни менаџмент који воде здравствени менаџери мозга и срца значајно побољшава функције гутања, смањује ризик од потхрањености и побољшава квалитет живота пацијената са дисфагијом након можданог удара.

**Кључне речи:** дисфагија; мождани удар; менаџери за здравље мозга и срца; мултидисциплинарна нега; квалитет живота



## INTRODUCTION

Stroke is a prevalent detrimental condition that often leads to long-term complications. Subnuclear damage to the swallowing, hypoglossal and vagus nerves due to stroke can lead to

 

true bulbar palsy, while bilateral corticobulbar tract damage can result in pseudobulbar palsy. These conditions impair voluntary tongue movements, reduce muscular coordination and contribute to dysphagia [1]. Surveys suggest a complication incidence rate oscillating between 28% and 67% [2]. This range is influenced by differences in study populations, assessment methods, and dysphagia screening times. Nonetheless, it highlights the significant burden of dysphagia after stroke and highlights the importance of early identification and targeted management to prevent associated complications such as aspiration pneumonia, malnutrition, and prolonged hospitalization. Dysfunctional swallowing predisposes patients to malnutrition, electrolyte imbalances, psychological disorders and other health issues, thereby impeding recovery from cerebral injury and diminishing quality of life (QOL). Moreover, the risk of aspiration during mealtimes can lead to life-threatening conditions such as aspiration pneumonia and choking [3]. Consequently, in clinical practice, expedited restoration of swallowing functionality constitutes a cornerstone of rehabilitative care. Predominant therapeutic modalities include respiratory function training, electrical stimulation, central stimulation, swallowing function training and acupuncture therapy. However, these singular rehabilitation treatments are susceptible to external factors, potentially leading to suboptimal patient compliance and outcomes. To meet these challenges, there is an increasing shift to a multidisciplinary management model, moving away from the traditional, experience-guided, personalized approach. The model emphasizes collaborative decision-making between professionals from different disciplines who integrate their expertise to design individualized and evidence-based intervention plans based on each patient's clinical situation [4]. Recent studies [5, 6] highlighted the pivotal role of multidisciplinary collaboration (involving a multidisciplinary diagnosis and treatment pattern) in the rehabilitation process of patients who experienced stroke. Consensus among experts [7] advocates for a multidisciplinary team approach to dysphagia management, with brain–heart health experts emerging as pivotal



 

figures responsible for comprehensive patient evaluations, health management and professional follow-ups. They are professionally trained and evaluated in multidisciplinary theoretical knowledge and communication skills, possessing extensive medical knowledge and practical experience [8]. Numerous studies have shown that the involvement of brain–heart health experts in the rehabilitation process can effectively enhance patient recovery outcomes [9, 10]. This study endeavors to investigate the effects of multidisciplinary management involving brain–heart health experts on the rehabilitation of patients with post-stroke dysphagia. The aim of this examination was to identify an effective management model to provide a reference for guiding the clinical practice of rehabilitation treatment for patients with post-stroke dysphagia.



## METHODS

### Study participants

A cohort of 213 newly diagnosed patients with stroke-dysphagia, treated in the Department of Neurology at the First Affiliated Hospital of Anhui University of Science and Technology between January 2021 and June 2024, were selected as the study participants. They were divided into an observation group (103 cases) and a control group (110 cases). After accounting for dropouts (five cases) and deaths (three cases) in the observation group, and dropouts (three cases) and deaths (eight cases) in the control group, 95 cases in the observation group and 99 cases in the control group were ultimately included in the statistical analysis. The inclusion criteria were as follows:

(1) patients experiencing their first stroke episode, with diagnoses corroborated by head magnetic resonance imaging or computer tomography scans, aligning with established stroke

 

diagnostic criteria [11];

(2) patients with the manifestation of dysphagia, as evidenced by a Water Swallowing Test (WST) grade of III or higher [12];

(3) patients who demonstrated an ability to cooperate well;

(4) patients who voluntarily consented to participate in the study.

The exclusion criteria were as follows:

(1) patients with severe cardiac, renal or hepatic dysfunction;

(2) patients with moderate to severe cognitive impairments or psychiatric conditions that precluded cooperative participation;

(3) patients in a comatose state.

**Ethics approval:** This study was conducted in accordance with the Declaration of Helsinki and approved by the Medical Ethics Committee of The First Affiliated Hospital of Anhui University of Science and Technology.



## METHODS

All participants were randomly divided into an observation group and a control group using a random number table method. Based on their admission sequence number, each participant was assigned a three-digit number from a pre-set random number table. Patients with an odd number were placed in the observation group, while those with an even number were placed in the control group. The control group followed the rehabilitation management methods outlined

 

in the Chinese Guidelines for Dysphagia Rehabilitation Management (2023) [13]. Conversely, the observation group received multidisciplinary management led by brain–heart health experts, who collaborated to develop treatment and care plans.

Specific strategies: Team formation

The multidisciplinary team included: a deputy director of the nursing department with extensive clinical nursing experience as the team leader; the head of the neurology department and the head nurse from the neurology ward as deputy leaders; and members comprising a neurologist, a charge nurse, a rehabilitation therapist, a dietitian, a psychological counsellor and a brain–heart health expert.

Division of labor

(1) The team leader managed the multidisciplinary team and coordinated communication between specialities.

(2) The deputy leaders were responsible for establishing team working protocols to ensure the adoption of optimal rehabilitation measures for patients.

(3) The neurologist was tasked with interpreting the Chinese Guidelines for Early Rehabilitation Treatment of Stroke, conducting examinations and providing guidance for nursing care.

(4) The charge nurse was responsible for recognising aspiration risk, monitoring patient progress and psychological state and implementing health education.

(5) The rehabilitation therapist conducted swallowing function screenings, assessed patients' swallowing functions, established swallowing function training programmes and initiated rehabilitation interventions.



 

(6) The dietitian conducted comprehensive nutritional assessments of patients and developed and adjusted nutritional plans based on individual nutritional needs to ensure adequate nutrient intake.

(7) The psychological counsellor was responsible for assessing and intervening in patients' psychological states.

(8) The brain–heart health expert was tasked with the comprehensive assessment, health management and professional follow-up of inpatients and outpatients.

Implementation of multidisciplinary management interventions led by brain–heart health experts

A multidisciplinary management communication platform was established and spearheaded by the team leader through the creation of a 'Multidisciplinary Management Team WeChat Group'. Specific intervention measures based on the information platform included:

1) Nutritional risk screening: Brain–heart health experts assisted dietitians in conducting nutritional risk screenings using the Nutrition Risk Screening 2002 (NRS2002) tool [14] to assess patients' nutritional status.

2) Swallowing function training [15]: included exercises for lip, cheek and tongue movements. Pharyngeal stimulation involved using an ice cotton swab to stimulate the palatoglossal arch, the base of the tongue and the posterior pharyngeal wall and instructing patients to perform dry swallowing actions to help stimulate pharyngeal muscles. Each session lasted five minutes and was conducted three times daily.

3) Health education: Focused health education sessions were held weekly, with brain–heart health experts responsible for notifying team members to prepare PowerPoint presentations in



 

advance. The multidisciplinary team organized and ensured active participation by patients with stroke-dysphagia and their families.

4) Psychological care: Psychological counsellors dynamically assessed patients' psychological states and promptly communicated any psychological issues to psychiatrists.

5) Rehabilitation follow-up: a follow-up database for discharged patients was established and a follow-up WeChat group was created; weekly phone calls were conducted with patients for continuous rehabilitation guidance and ensured via the implementation of a three-month in-person follow-up process.

**Evaluation indicators**

The patients in both groups were assessed before the intervention and 3 months after discharge using the following indicators. Follow-up at 3 months was conducted via on-site outpatient visits, where members of the multidisciplinary management team evaluated clinical efficacy, swallowing function, nutritional status and QoL using questionnaires or on-site examinations. The findings were subsequently reviewed and validated by the team leader and deputy leader.

Water-Swallowing Test: utilizing the WST for grading [12], patients initially consumed 1–3 tablespoons of water. If no abnormalities were observed, they proceeded to drink 30 mL of water, with the duration of drinking being recorded to observe the condition of drinking and the presence of coughing or choking. The test consisted of five grades, Grade I: normal, i.e. drinking in one gulp within five seconds without coughing or choking; Grade II: suspected swallowing disorder, i.e. taking more than five seconds to drink in one gulp or needing more than two attempts without coughing or choking; Grade III: able to drink in one gulp but with coughing or choking; Grade IV: needing more than two attempts with coughing or choking; Grade V: frequent coughing or choking, unable to finish drinking. Grades III to V were



 

considered to include swallowing disorders.

Clinical efficacy: markedly effective – a two-grade improvement in the WAST compared to before the intervention; improved – a one-grade improvement compared to before the intervention; ineffective – no improvement in the WST results. The overall response rate (ORR) was calculated by comparing the efficacy between the two groups as ORR = (significant effect + improved) / total number of cases × 100%.

Swallowing function: the Standardized Swallowing Assessment (SSA) [16] was utilised to evaluate patients' swallowing function before and after the intervention and included a clinical examination, water drinking test and normal eating assessment, with a total score of 18–46 points. The score was inversely related to swallowing function.

Nutritional status of patients: The NRS2002 tool [17] was employed to screen patients for nutritional risk and covered nutritional status, disease severity and age. A score of 3 or above indicated a risk of malnutrition.

Quality of life: The Stroke-Specific Quality of Life Scale (SS-QOL) [18] was used for the assessment of 12 dimensions including family roles, cognition, mobility and self-care, with 49 items and a total score of 49–245 points. A higher score indicated a better QoL.

**Statistical analysis**

All data were statistically analysed using the SPSS 25.0 (SPSS Inc., Chicago, IL, USA) software. Quantitative data were described as mean ± standard deviation ($\bar{x} \pm s$), and differences between the two groups were compared using a t-test. Categorical data were described as rates (%), and between-group comparisons were made using the $\chi^2$ test with a significance level of $\alpha = 0.05$.



 

## RESULTS

### Comparison of baseline data between the two groups

A cohort of 213 patients was recruited according to the inclusion criteria and randomly divided into an observation group (103 cases) and a control group (110 cases). After a three-month follow-up, 95 cases in the observation group and 99 cases in the control group were included. The comparison of baseline data between the two groups showed no significant differences in demographic characteristics, stroke type and average hospital stay ($p > 0.05$), indicating comparability between the groups (Table 1).

### Comparison of water swallowing test grades between the two groups

WST scores were significantly improved in both groups after the intervention ($p < 0.05$), and greater improvements were observed in the observation group, particularly in terms of a reduction in severe dysphagia (Grade V) and an increase in normal swallowing function (Grade I) (Table 2).

### Comparison of clinical efficacy between the two groups

The overall response rate in the observation group (92.63%) was significantly higher than in the control group (66.67%), with a statistically significant difference ($p < 0.05$).

### Comparison of swallowing function between the two groups

The swallowing function score showed a significant improvement in both groups after the intervention ($p < 0.001$), and a greater reduction was observed in the observation group, suggesting that swallowing function enhancement was more effective (Table 3).

### Comparison of Nutritional Risk Screening 2002 results between the two groups



 

NRS2002 risk screening showed a significant reduction in the risk of malnutrition in both groups after the intervention ($p < 0.05$), with a more significant improvement in the observation group compared to the control group. (Table 4).

**Comparison of quality of life between the two groups**

SS-QOL scores showed a significant improvement ($p < 0.001$) in both groups after the intervention, with a greater increase in the observation group compared to the control group, indicating an improved quality of life after the intervention (Table 5).



## DISCUSSION

The *Chinese Stroke Dysphagia and Nutritional Management Manual* (2019) underscores that the management of post-stroke dysphagia is a clinical management process involving multidisciplinary collaboration [19]. Management teams involving brain–heart health experts conduct comprehensive assessments primarily based on patient needs and risk factors and provide patients with high-quality, professional and comprehensive management, thereby improving patient outcomes. Furthermore, these teams significantly contribute to enhancing the compliance of patients with stroke concerning medical advice and health education [20, 21].

The results of the present study indicate that multidisciplinary management involving brain–heart health experts significantly improved the clinical efficacy, swallowing function, nutritional status and QoL of patients with post-stroke dysphagia compared to the control group. Stroke and its complications require a lengthy rehabilitation process. Brain–heart health experts play an active and affirmative role in improving the awareness of patients with stroke and high-risk populations' awareness of the disease and treatment compliance through effective

 

health management and follow-up [22]. Within the team, they are instrumental in conducting comprehensive assessments, health management and professional follow-ups for both in-hospital and out-hospital patients with stroke. Implementing multidisciplinary management for dysphagia ensures the continuous professional management of patients and timely assessment and adjustment of rehabilitation treatment plans, where it acts as a bridge between in-hospital and out-hospital care to ensure effective rehabilitation treatment for patients.

The results of this study are consistent with multiple studies and demonstrate unique advantages. Chen et al. [6] proposed that the multidisciplinary collaboration model could effectively improve the recovery rate of swallowing function, however, their model lacked a clearly defined core coordinator, which may have limited team collaboration efficiency. In contrast, the present study introduced a management model led by brain–heart health experts, which improved the communication efficiency between various disciplines and realized continuous management from hospitalization to discharge and significantly improved clinical efficacy. Wang et al. [9] showed that the intervention of brain–heart health experts through mobile health platforms could improve patient treatment compliance. In our study, the model was further applied to the field of swallowing function rehabilitation, combined with nutritional support, psychological care and family participation, and the results for the observation group were better than the control group in terms of swallowing function score, nutritional status and QoL, indicating that this management model has high promotional value. In addition, the community-based group rehabilitation program of Yang et al. [16] demonstrated that structured rehabilitation could help improve patients' QoL. Accordingly, a digital follow-up system (via the WeChat platform) was included in this study to enhance the continuity and operability of the intervention, thereby enabling patients to still receive professional guidance after discharge and ensure the stability of rehabilitation effects. In summary, this study followed a more systematic and practical approach than previous studies in terms of integrating



 

multidisciplinary resources, strengthening the role of experts and optimizing the use of assessment tools, which provides new ideas and a practical path for the standardized management and rehabilitation of post-stroke dysphagia.

Patients with stroke, hindered by partial brain tissue damage, encounter restrictions in self-care, language capabilities and social participation. The condition's slow and prolonged rehabilitation process and sequelae can easily trigger mental afflictions. Patients with stroke-induced dysphagia experience swallowing dysfunction, leading to aspiration, coughing and even pulmonary infection under adverse psychological and physiological states, which can lead to malnutrition. Brain–heart health experts can implement systematic, standardized, and stratified follow-up management—covering physical, psychological, and medication-related aspects – to tailor the timing and content of follow-up according to each patient's condition [21, 23]. By establishing a robust communication relationship with patients that focuses on their psychological frame of mind and providing necessary socio-psychological support, brain–heart health experts can significantly alleviate adverse psychological emotions such as anxiety and depression among patients with stroke and improve outcomes while also addressing nutritional issues and enhancing patients' QoL [20].



## CONCLUSION

In conclusion, multidisciplinary management involving brain–heart health experts integrates multidisciplinary resources, personnel and professional knowledge and applies them to the clinical care of patients with stroke and dysphagia. This enhances the accuracy and specificity of rehabilitation measures, ensuring timely and effective treatment of the condition and providing social and psychological support. This approach exerts a more pronounced ameliorative effect on patients' dysphagia, enhances clinical efficacy, diminishes the risk of

 

nutritional malnutrition and improves patients' QoL, demonstrating substantial value for clinical implementation.

This study is not without its limitations. Being a single-centre study with a relatively small cohort size, the findings are susceptible to bias, potentially curtailing the universality and applicability of the conclusions. Moreover, the short follow-up time and the small number of follow-up visits preclude a comprehensive evaluation of patients' recovery process and long-term outcomes, including an absence of statistical analysis on the recurrence rates of stroke. To address these shortcomings, future studies should aim to conduct more rigorous multi-centre, large-sample studies and provide references for the rehabilitation treatment of patients with stroke-induced dysphagia through extended follow-up periods.



**Availability of data and materials**

All data generated or analyzed during this study are included in this article. Further enquiries can be directed to the corresponding author.

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**Table 1.** Comparison of baseline data between the two groups

| Parameters | Observation Group (n = 95) | Control Group (n = 99) | p |
|---|---|---|---|
| Age* | 71.11 ± 11.56 | 73.21 ± 11.08 | 0.196 |
| **Gender∞** | | | |
| Male | 56（58.95） | 61（61.62） | 0.704 |
| Female | 39（41.05） | 38（38.38） | |
| **Stroke Type∞** | | | |
| Ischemic Stroke | 80（84.21） | 80（80.81） | 0.533 |
| Hemorrhagic Stroke | 15（15.79） | 19（19.19） | |
| Average Hospital Stayα | 14.16 ± 6.37 | 14.62 ± 7 | 0.634 |

*data are presented in years with mean value and standard deviation;

∞data are presented as u number of patients with percentage in brackets;

αdata are presented in days with mean value and standard deviation



 

**Table 2.** Comparison of water-swallowing test grades before and after intervention

| Parameters | Cases | Grade I | Grade II | Grade III | Grade IV | Grade V | p |
|---|---|---|---|---|---|---|---|
| **Observation Group** | | | | | | | |
| Before | 95 | 1 | 11 | 27 | 27 | 29 | < 0.001 |
| After | 95 | 36 | 28 | 25 | 3 | 3 | |
| **Control Group** | | | | | | | |
| Before | 99 | 2 | 10 | 27 | 29 | 31 | < 0.001 |
| After | 99 | 25 | 30 | 21 | 12 | 11 | |



 

**Table 3.** Comparison of Swallowing Function Scores (SFS) before and after intervention

| Parameters | Number of Cases | SFS | p |
|---|---|---|---|
| **Observation Group** | | | |
| Before | 95 | 31.53±6.31 | < 0.001 |
| After | 95 | 23.33±4.60 | |
| **Control group** | | | |
| Before | 99 | 29.49±7.06 | < 0.001 |
| After | 99 | 20.83±3.78 | |



 

**Table 4.** Comparison of Nutritional Risk Screening 2002 before and after treatment

| Group | Cases | Risk of malnutrition | Without the risk of malnutrition | p |
|---|---|---|---|---|
| **Observation Group** | | | | |
| Before | 95 | 82 | 13 | < 0.001 |
| After | 95 | 47 | 48 | |
| **Control Group** | | | | |
| Before | 99 | 84 | 15 | < 0.001 |
| After | 99 | 55 | 44 | |



 

**Table 5.** Comparison of Stroke-Specific Quality of Life Scale (SS-QOL) scores before and after treatment

| Group | Cases | SS-QOL Scores | p |
|---|---|---|---|
| **Observation Group** | | | |
| Before | 95 | 128.75 ± 38.17 | < 0.001 |
| After | 95 | 170.83 ± 35.61 | |
| **Control Group** | | | |
| Before | 99 | 124.96 ± 38.83 | < 0.001 |
| After | 99 | 159.77 ± 26.09 | |



 