

## THE HEALING TOUCH OF CONTINUOUS CARE: A META-ANALYSIS OF SWALLOWING IMPROVEMENT AND RESPIRATORY PROTECTION IN CHINESE POST-STROKE DYSPHAGIA PATIENTS

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### Article Info

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### Abstract

Stroke is a prevalent and devastating health condition with a high incidence rate, significant mortality, and a profound impact on global health. It is currently the second leading cause of death worldwide and ranks as the primary cause of disability. In China, the lifetime risk of stroke stands at 39.9%, the highest in the world. Swallowing disorders are a common complication following a stroke, affecting 46% to 57% of stroke survivors. These complications not only compromise the safety and effectiveness of eating but also contribute to malnutrition, aspiration, pneumonia, and the potential for fatal asphyxia. Furthermore, dysphagia often leads to emotional distress, eroding patient confidence and quality of life. While some post-stroke dysphagia patients experience spontaneous recovery within a few weeks, a substantial portion, ranging from 11% to 50%, continue to experience swallowing difficulties even six months after the event. Due to factors such as economic constraints, disparities in healthcare resources, and the protracted nature of rehabilitation, many post-stroke dysphagia patients require long-term care within their homes and communities. Continuity care, an emerging nursing model, extends the spectrum of care from inpatient settings to the community or family. It encompasses an array of services including discharge planning, follow-up, and health education, aimed at fulfilling the healthcare needs of patients transitioning back to society and home. Several studies have indicated that continuous care for individuals with swallowing disorders can enhance swallowing function recovery, improve overall quality of life, and mitigate related complications. The primary objective of this review is to assess the effectiveness of continuous care in the context of Chinese patients suffering from post-stroke dysphagia.

## Introduction

Stroke is regarded as one of the common conditions with higher incidence rates, higher mortality and disability rates estimated to occur at 76 to 119 for every 100,000 population every year.[ ] It is currently the second leading cause of death and the first leading cause of disability in the world, the overall lifetime risk of stroke in China is 39.9%, ranking the first in the world.[ ]

Swallowing disorder is one of the most common complications after stroke, with an incidence of 46%~57%.[3] The occurrence of dysphagia not only affects the safety and effectiveness of patients' eating and causes malnutrition, but also increases the risk of aspiration, pneumonia, and even leads to death by asphyxia. It also leads to patients' pessimism and disappointment, reduces their confidence in recovery, and seriously affects their quality of life.[4] Studies have shown that some post-stroke dysphagia patients may recover swallowing function within a few weeks after treatment, but there are still 11%-50% patients with deglutition disorders after 6 months.[5] However, due to the economic status, the distribution of health resources and the long rehabilitation time, patients cannot take long-term rehabilitation treatment in hospital, and quite a number of post-stroke dysphagia patients need to rely on continuous rehabilitation training on home or community. Continuity care, as a part of the overall care, refers to a new nursing model that extends inpatient care services to the community or family, which can meet the health needs of patients after returning to society and family, including a series of measures such as discharge planning, follow-up, health education and so on.[6] Studies indicate that continuous care applied to patients with swallowing disorders can promote the recovery of swallowing function, improve the quality of life, and reduce related complications.[7-9]The objective of this review was to determine the effectiveness of continuous care on Chinese patients with post-stroke dysphagia.

## 2. Methods

### 2.1 Search strategy

Cochrane Library, Excerpta Medical Database (EMBASE), PUBMED, and Web of Science were searched for studies published in English; the China Biology Medicine (CBM), China Science and Technology Journal Database (VIP), China National Knowledge Infrastructure (CNKI), and Wan fang Database were searched for studies published in Chinese from the inception to January 2023. We included randomized controlled trials (RCT) or quasi-RCT testing continuity care and post-stroke dysphagia. The following search terms will be combined using Boolean logic (AND, OR, or NOT) to identify relevant studies: “RCT”, “randomized controlled trial”, “randomized controlled trial”, “stroke\*”, “continuous care”, “Dysphagia”, “Deglutition Disorder”, and “Swallowing Disorders”. English retrieval strategies, taking PubMed as an example, as shown in Figure 1.

Figure 1 PubMed search strategy.

### 2.2 Eligibility criteria for included studies

#### 2.2.1 Types of Research

Randomized controlled trials of continuity of care for patients with dysphagia after stroke in China (including Hong Kong, Macao, and Taiwan), the article was published in Chinese or English, whether blind method was used or not.

#### 2.2.2 Types of participants Inclusion and exclusion criteria

Inclusion criteria : age  $\geq 18$  years old, diagnosed with stroke by the Fourth National Conference on Cerebrovascular Diseases of the Chinese Medical Association in 1996 or established by the WHO in 1978, diagnosed by CT or MRI; deglutition function evaluation, the deglutition function evaluation  $\geq$  grade 3 after drinking water test in depression field, and/or patients with consciousness disturbance; Exclusion criteria: patients complicated with serious heart, liver and kidney diseases, endocrine and metabolic diseases, tumors, severe malnutrition and severe stroke were excluded.

### **2.2.3 Types of studies**

We will administer continuous nursing intervention for patients in the experimental group and conventional nursing intervention or no nursing intervention for patients in the comparisons group.

### **2.2.4 Types of outcomes**

Swallowing function index: water swallow test, divided into five levels; Grade 1: Swallow smoothly once; Grade 2: Swallow twice or more; Grade 3: Swallow once, but cough; Grade 4: Swallow more than twice, but cough; Grade 5: Coughs heavily when drinking water and cannot swallow completely. If the swallowing function of the patient is improved by 2 grades, it is effective, and if the swallowing function is increased by 1 grade, it is invalid; Complications of dysphagia: including aspiration, choking and aspiration pneumonia; Activity of daily living index: the Barthel Index (BI), with a total score of 100 points.

## **2.3 Search methods for identification of studies**

### **2.3.1 Literature exclusion criteria**

Discussions, meetings, editorials, reviews, case reports, letters, commentaries, critiques and detailed data cannot be extracted were excluded. The outcome index does not contain any of the above were excluded. No comparative literature and the design scheme is not scientific, poor quality literature were also excluded.

### **2.3.2 Literature screening and data extraction**

Two researchers independently screened literature, extracted data and cross-checked according to inclusion and exclusion criteria. In case of disagreement, the third researcher was consulted to make a decision. The extracted literature data included: first author name, publication year, sample size, intervention measures, outcome indicators and evaluation tools, outcome indicators measurement time, and outcome measurement data.

### **2.3.3 Literature quality evaluation**

Two researchers used Cochrane bias risk assessment tool to independently evaluate the included literatures. The main contents included: random assignment scheme; distribution scheme hiding; blind method; result data integrity; selective reporting of research results; and other sources of bias. Evaluators are required to make a "yes" (low risk of bias), "no" (high risk of bias), or "unclear" (lack of relevant information or uncertain bias) judgment on each content. If there is any disagreement in the quality evaluation, it can be discussed or solved with the assistance of a third researcher.

### **2.3.4 Statistical Analysis**

We used RevMan software (Review Manager, version 5.4) and Stata16.0 for data analysis. The  $X^2$  test and  $I^2$  value were used for the heterogeneity among the included results. If  $P \geq 0.1$  and  $I^2 < 50\%$ , the heterogeneity between the studies was acceptable. The fixed-effect model was used for meta-analysis. If  $P < 0.1$  and  $I^2 \geq 50\%$ , the heterogeneity between the studies was large. The random effects model was used for meta-analysis, and subgroup analysis, sensitivity analysis, meta regression analysis and other methods were used to analyze the sources of heterogeneity. When there was obvious heterogeneity between studies, but the source of heterogeneity could not be determined, only descriptive analysis was performed. The following measures of treatment effect were used: risk ratio (RR) and 95% confidence intervals (CI) for the analysis of dichotomous outcomes, mean and standard mean differences, 95%CI for continuous outcomes, and  $P < 0.05$  was considered statistically significant. As planned, publication bias will be evaluated using funnel plot asymmetry testing if a sufficient number of studies are identified ( $n > 10$ ). The level of meta-analysis was  $\alpha = 0.05$ .

## **3 Results**

### **3.1 Literature screening process and results**

Initially 200 literatures were retrieved, of which 145 were in Chinese and 55 were published in English. A total of 117 literatures were obtained after excluding 11 literatures of review, meta-analysis and systematic review. After reading the title and abstract, 24 literatures needed to obtain the full text. After reading the full text, literatures with outcome indexes that did not meet the inclusion criteria and incomplete information were deleted,

11 RCTs and 979 patients were finally included. 10 RCTs reported water swallow test, 6 studies reported complications of dysphagia, and 3 studies reported other outcomes. The literature screening process and results are shown in Figure 2. The basic characteristics of included studies are shown in Figure 3, and the methodological quality of the included studies was shown in Figure 4.

A total of 901 patients from 10 studies were included.[8-17]The heterogeneity of the included studies was not significant ( $I^2=37\%$ ,  $P=0.11$ ). A combined analysis using a fixed-effects model yielded  $[RR=1.43, 95\%CI(1.32,1.54), P<0.001]$ , indicating a statistically significant difference in the effective rate of swallowing function changes between the two groups, as shown in figure 5 .

Figure 5 Continuous care versus standard care: swallowing function.

### 3.2.2 Complications of Dysphagia

6 studies with a total of 505 patients were included.[8, 10, 12, 14, 15, 17]The included studies were heterogeneous ( $I^2=63\%$ ,  $P=0.02$ ) and were pooled using a random-effects model  $[RR=0.10, 95\%CI(0.03,0.28), P<0.001]$ , indicating a statistically significant difference in the effective rate of changes in swallowing function between the two groups, as shown in Figure 6. The heterogeneity was found to be insignificant ( $I^2=4\%$ ,  $P=0.38$ ) and, after the articles by Jiying Cheng,[12]were excluded. The fixed effects model was used to analyze the heterogeneity  $[RR=0.18, 95\%CI (0.09, 0.38), P<0.001]$ , indicating that there is a significant difference in the effective rate of complications of dysphagia change between the two groups.

Figure 6 Continuous care versus standard care: complications of dysphagia.

### 3.2.3 The Barthel Index (BI) scores

A total of 298 patients from 3 studies were included.[13, 16, 18] The included studies had heterogeneity ( $I^2=79\%$ ,  $P=0.008$ ) and were pooled using a random-effects model  $[MD=16.21, 95\%CI (8.35, 24.07), P<0.001]$ , indicating a statistically significant difference in BI scores between the two groups, as shown in figure 7. After removing QiaolingLi[18]and other articles, the heterogeneity was not significant ( $I^2=0\%$ ,  $P=0.99$ ) , so the fixed effects model was used to analyze the data  $[MD=20.23, 95\%CI(16.06,24.39), P<0.001]$  , indicating a statistically significant difference in BI scores between the two groups.

Figure 7 Continuous care versus standard care: BI score.

## 4. Discussion

"The National Nursing Career Development Plan (2016-2020)" points out continuity nursing as the key content of the "13th Five-Year Plan". Continuous care service system should extend professional services to the community and family, improve the "medical institutions as the support, home rehabilitation as the basis, and community resources as the support".[19] Due to the shortage of domestic medical resources and huge medical demand, the impact of economic pressure and the slow development of community health care, stroke patients often choose to return to their families after undergoing acute treatment.

However, discharge does not mean the end of treatment, and the diet, life and rehabilitation of patients after discharge will mainly depend on their families. Effective and continuous nursing intervention can help patients and their families get timely rehabilitation guidance, and promote the rehabilitation rate of disease up to 50%, continuity of care services has been paid more and more attention.[20, 21]

### 4.1 Influence of continuous care on swallowing disorders after stroke

Dysphagia is very common after stroke, affecting patients' food safety and quality of life. The results of meta-analysis in this study showed that compared with the control group, although the intervention follow-up time and intervening measures were different in the included literature, the extended care group could improve the recovery of swallowing function in stroke patients with swallowing disorders, which was consistent with the results of several domestic studies.[6,10] Liu Ling yun[20] pointed out that we should pay attention to the swallowing problem of elderly patients. Accurate evaluation and standardized intervention is very important for them. Effective health education, and continuous follow-up care after discharge can improve the outcome of

patients' rehabilitation and improve the quality of life of the elderly. At present, the continuous nursing service adopted in our country is oriented by specialization, characterized by information, and the linkage between hospital, community and family. However, studies related to continuity of nursing started late in China. The continuation of nursing models are different between provinces, and lack a unified process and system.[22] A perfect and diversified care is still needed for the future research direction of nursing in China.

#### **4.2 Influence of continuous nursing on pulmonary complications in Post-stroke dysphagia patients.**

Dysphagia is an important risk factor for stroke-related pneumonia. Due to disease factors, patients may have limited lingual muscle and throat muscle activity, and may have difficulty in mastication, leading to the occurrence of stroke-related pneumonia. The occurrence of stroke-associated pneumonia may lead to prolonged hospital stay and even an increased risk of death during hospitalization.[23] Continuous care is conducive to the recovery of swallowing dysfunction in stroke patients and reduce the occurrence of complications.[21, 24] In the meta-analysis of this study, it was also found that, compared with the control group, the incidence of adverse events such as coughing, aspiration and lung infection after discharge was lower in the continuous care group.

#### **4.3 Form and status of continuous care for stroke patients with dysphagia in China.**

At present, in most hospitals in China, telephone follow-up combined with home visit is the main method of continuity care for post-stroke dysphagia patients. The 11 literatures included in this study also use this form for continuity care. There are disadvantages in monitoring and guiding patients' rehabilitation exercise and medication through telephone follow-up and other communication methods. Issues such as lack of information, untimely communication, and poor interaction with the patients. Although family visits can provide face-to-face guidance to patients and their families, but these interventions only benefit a small percentage of stroke patients, home visits are not available in rural areas. In recent years, Internet is also widely used in continuous care services. In 2018, The General Office of the State Council issued a statement on promoting the development of an "Internet + Medical and Health" service system. The government proposed to improve the service system to meet the growing medical and health needs of the masses.[25] A number of domestic scholars provide continuity of care services through the network information platforms, such as WeChat, QQ, remote management, mobile APP. The Internet enables timely communication between medical staff and patients and facilitates further discussion among patients. With the help of WeChat public account and group function, complete intervention and guidance for disease treatment can be achieved; errors in rehabilitation training of patients can be corrected; and the therapeutic effect can ultimately be improved. [17, 26-30] However, there is still no perfect continuity nursing management network system for dysphagia and for other elderly care issues. It is difficult to achieve timely coordination, connection, consistency between discharged patients and medical staff. In the future, it is necessary to establish a continuous follow-up nursing management network system and standardize follow-up policies and procedures from admission to discharge. Nurses should regularly observe patients' swallowing and eating conditions online, and provide accurate and timely targeted guidance. [27]

#### **Limitations of this study**

As a result of the different medical models at local, national and international levels, this study is only considered the impact of continuous care on dysphagia after stroke in China. The included literatures were all in Chinese, and most of the studies did not mention the method of randomization, intervention and evaluators' blindness, which may lead to some measurement bias. All the included studies showed positive results, which may have a certain publication bias. The sample size of some included studies was small and the quality was low.

#### **Disadvantages and Suggestions**

At present, there is a lack of multidisciplinary cooperation and standard mode of continuity of nursing interventions, leading to inconsistent ways of intervention, and poor intervention effects. The future research direction is to establish a mature and continuous nursing model and standard system and process with the cooperation of doctors, dietitians, rehabilitation therapists, responsible nurses and other disciplines. Patients with

dysphagia after stroke have a great demand for disease-related knowledge, life care and rehabilitation guidance, specific implementation plans and assessment standards should be formulated according to the specific needs of patients. The Internet based continuity of care is an important and innovative intervention, but there is still not a perfect management network system for patients with stroke related swallowing disorders. As well, the coordination system between hospital and community and family needs further study.

## Conclusion

This meta-analysis provided evidence that continuity of care is effective to improve swallowing function, quality of life, and reduces the risk of respiratory complications of post-stroke patients. However, the quality of related studies included in this study is low. Therefore, it is necessary to further strengthen the design of the original study, formulate specific continuity of care programs and evaluation criteria, in order to provide more reliable evidence-based knowledge.

## Footnotes

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