

Original Article

Effect of whole-course nursing mode on the incidence of asphyxia, recurrence rate, hospitalization period and quality of life in patients with pulmonary tuberculosis and hemoptysis

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Abstract: Objective: This study aims to investigate the effect of whole-course nursing mode on the incidence of asphyxia, recurrence rate, hospitalization period and quality of life in patients with pulmonary tuberculosis and hemoptysis. Methods: A total of 50 patients with pulmonary tuberculosis and hemoptysis were randomly divided into the observation group and the control group, with 25 cases in each group. Patients in the control group were treated with traditional routine nursing, and patients in the observation group were treated with the whole-course nursing mode intervention; the aspiration/asphyxia risk scores, the incidence of asphyxia and hospitalization time, quality of life, the re-hospitalization rate, and the recurrence rate of hemoptysis, as well as nursing satisfaction were compared. Results: At discharge, the aspiration/asphyxia risk scores of the observation group were significantly decreased ($P<0.001$) compared with the control group. The incidence of asphyxia and hospitalization time were significantly less in the observation group than those in the control group (both $P<0.05$). The Barthel index score was significantly higher in the observation group than that in the control group ($P<0.001$). In the observation group, the re-hospitalization rate and the recurrence rate of hemoptysis were significantly lower than those in the control group, and nursing satisfaction was significantly higher than that in the control group (all $P<0.05$). Conclusion: The implementation of whole-course nursing mode in patients with pulmonary tuberculosis and hemoptysis can significantly reduce the risk of aspiration/asphyxia, reduce the occurrence of asphyxia, shorten the hospitalization time, reduce the re-hospitalization rate and the recurrence rate of hemoptysis, and improve quality of life of patients and nursing satisfaction.

Keywords: Whole-course nursing, tuberculosis, hemoptysis, effect

Introduction

Tuberculosis is a clinically common chronic infectious disease caused by infection with mycobacterium tuberculosis. Hemoptysis is one of the most serious complications of tuberculosis [1-3]. Studies have reported that the mortality rate of asphyxia caused by hemoptysis is about 15%-75% [4, 5]. Tuberculosis hemoptysis has become a serious threat to the patient's quality of life as well as physical and mental health, and causes great pain to the patients. Tuberculosis hemoptysis is treated by hemostatic drugs in clinical settings, but good nursing can reduce the incidence of asphyxia, improve risk awareness in patients and reduce

recovery time [6]. At present, the general nursing mode applied in clinical practice has no significant effects on the intervention of patients with tuberculosis hemoptysis nor the incidence of asphyxia, hospitalization time, rehospitalization rate, and recurrence rate of hemoptysis. It is completely unable to meet the needs of the patients with pulmonary tuberculosis and hemoptysis [7]. With the improving requirements of medical care, it is of great significance to find new nursing modes to intervene the patients.

In recent years, the individualized whole-course nursing mode has been applied to clinical care. In the whole process from admission to discharge, charge nurses provide whole-course

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nursing interventions for patients, including disease knowledge education, psychological intervention, and dietary intervention, etc. It is beneficial to enhance the self-care awareness in patients and nursing risk awareness in the nursing staff. Studies have reported that the whole-course nursing mode can provide patients with comprehensive physical and psychological care, which improves therapeutic effect and quality of life in patients [8]. Studies have reported that individualized whole-course nursing has a significant intervention effect on the chemotherapy of malignant tumors, but at present, there are few reports on the influences of whole-course nursing in patients with tuberculosis hemoptysis [9, 10]. To this end, this study selected 50 patients with pulmonary tuberculosis and hemoptysis as research subjects. The whole-course nursing mode was used for nursing intervention in the patients, providing an experimental basis for the clinical care of tuberculosis hemoptysis.

Materials and methods

Research subjects

A total of 50 patients with pulmonary tuberculosis and hemoptysis were selected as research subjects. Tuberculosis was classified according to different pathological changes and X-ray manifestation. The patients were randomly divided into two groups, with 25 patients in the control group, who were treated with routine nursing, and 25 patients in the observation group, who were treated with the whole-course nursing intervention on the basis of routine nursing. All patients were given routine symptomatic treatments, including hemostasis, anti-infection and anti-tuberculosis treatment after admission. All patients enrolled in the study signed informed consent and this study was approved by the Ethics Committee of Jiangxi Chest Hospital.

According to the patient's clinical symptoms, results of CT, MRI and other imaging examinations, bronchoscopy and pathogenic examination, the diagnosis of pulmonary tuberculosis combined with hemoptysis is in accordance with the *Guidelines for Diagnosis and Treatment of Tuberculosis* formulated by the Chinese Society for Tuberculosis, Chinese Medical Association in 2001.

Inclusion criteria: (1) Different degrees of low fever, fatigue, weight loss, cough and hemoptysis, etc.; (2) positive for acid-fast staining in the sputum smear; (3) imaging examination showing the manifestation of tuberculosis; (4) bronchial or pulmonary histopathology confirmed tuberculosis; age over 18 years old; no other pathogen infection.

Exclusion criteria: (1) Accompanied by tuberculosis in other parts, such as the kidney and spine; accompanied by hemoptysis caused by lung cancer and coagulopathy; (2) accompanied by other serious debilitating diseases, such as hyperthyroidism, systemic lupus erythematosus or malignant tumors; (3) combined with severe liver or kidney dysfunction; with severe cardiovascular or cerebrovascular diseases, with mental illness; (4) failed to cooperate with the investigators.

Methods

Patients in the control group were treated with routine nursing. The total amount of hemoptysis and vital signs (body temperature, heart rate, blood pressure, respiratory rate and oxygen saturation) of the patients during the hospitalization were recorded. The oxygen via nasal tube was inhaled at 3 L/min until discharge; according to the doctor's advice, medical treatment was given. Health education was also provided, such as introducing ward environment, the competent medical staff, and the relevant knowledge, precautions and possible situations of tuberculosis and hemoptysis.

The observation group was given the whole-course nursing on the basis of routine nursing, as follows: (1) hemoptysis care: Before hemoptysis, if the patient had symptoms such as itchy throat or foreign body sensation, chest tightness, cough and irritability, the patient was urged to have a rest on bed immediately, and keep the head to one side, gently cough up the blood to keep the airway open, and the information was passed to the clinician. The patient with a small amount of hemoptysis took the lateral position, which was conducive to discharging the blood clots or blood. When a large number of hemoptysis occurred, the patient was urged to take trendelenburg position, and nurse staff should tap the patient's back to facilitate the blood out. The patient was informed to eliminate tension rather than hold the breath

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Table 1. Aspiration/asphyxia risk score

Item	Score		
	0	1	2
History of aspiration/asphyxia	No	History of aspiration	History of asphyxia
Age	Less than 60 years old	60-75 years old	More than 75 years old
Consciousness	Clear	Somnolence	Lethargy
Eating status	Autonomous lying position	Semireclining position	Lying position
Complications: Alzheimer's disease, cerebrovascular accident, myasthenia gravis and Parkinson's disease	None	1	More than 1
Sputum	More than 100 mL, or not easy to cough up due to sticky sputum 6 points		
Cough	Difficulty in cough 6 points		
Hemoptysis/vomiting	Active bleeding 6 points		
Drinking water test	Positive 6 points		

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Table 2. Comparison of general information between the two groups of patients

Item	Control group	Observation group	t/X ²	P
Male/female (case)	15/10	13/12	0.325	0.569
Age (year)	47.8±3.5	47.2±3.1	0.642	0.524
Duration of disease (year)	8.4±1.2	7.9±1.0	1.600	0.116
Degree of hemoptysis (case)				
Mild	8	5	0.936	0.626
Moderate	11	13		
Severe	6	7		
Tuberculosis surgery				
Yes	3	5	0.149	0.700
No	22	20		
Type				
I	1	2	1.454	0.693
II	4	6		
III	16	15		
IV	4	2		
Cavity				
Yes	7	9	0.368	0.544
No	18	16		
Acid-fast staining of sputum smear				
Negative	8	11	0.858	0.651
Positive	17	14		
Medication control				
Progress period	4	5	0.377	0.828
Stable period	10	8		
Improving period	11	12		

when hemoptysis, in order to cough up blood and unblock the respiratory tract. (2) Medication care: The nurse staff informed patients of the importance of cooperating with treatment and care, and the side effects that might occur after medication; the occurrence of adverse reactions during the medication was observed, such as palpitation, dizzy and pale face; the patient was informed of the related knowledge of the medication they took, and mastered the method of taking the drug, the dosage and related precautions. (3) Psychological care: The nurse staff should understand the changes in the whole psychological activities of patients from admission to discharge, and provide timely guidance. The psychological discomfort of patients was minimized, and the belief of overcoming diseases was established to encourage patients actively cooperate with the treatment and nursing work, and increase their confi-

dence of rehabilitation. The families of patients were guided to provide scientific accompany and more concern and love for patients. (4) Diet care: Vitamin-rich diet with high-quality protein and high-calorie was provided to improve patients' resistance and immunity. The patients should eat fresh vegetables and fruits, milk, eggs, fish and meat reasonably, and avoid eating overheated or spicy food to prevent hemoptysis.

Outcome measures

Aspiration/asphyxia risk scores between the two groups were compared [11]. The aspiration/asphyxia risk assessment form included 9 items: history of aspiration/asphyxia, age, consciousness, eating status, complications (Alzheimer's disease, cerebrovascular accident, myasthenia gravis and Parkinson's disease), sputum, cough, hemoptysis/vomiting and drinking water test, with a total score of 34 points.

The score greater than 6 was classified as the high-risk patient, who might have a possibility of aspiration/asphyxia. See **Table 1.**

The incidence of asphyxia and hospitalization time were compared between the two groups, and the incidence of asphyxia = number of asphyxia cases/total number of cases * 100%.

The patients' quality of life between the two groups was compared. The Barthel Index Rating Scale designed and developed by Dorothea Barthel in 1965 was used to assess the patients' quality of life [12]. It includes 10 items of daily activities: eating, bathing, bedecking, dressing, control of defecating, control of urination, toilet, transfer between bed and chair, walking 45 meters on the ground and up and down stairs with a total score of 100 points. The higher the score is, the better quality of life is.

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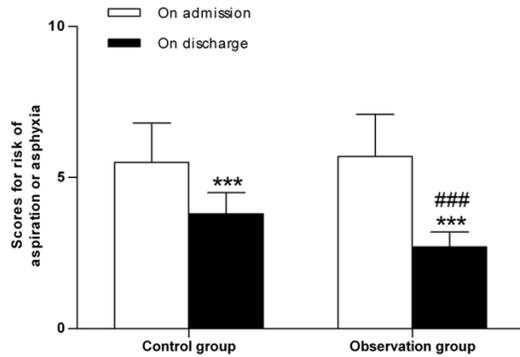


Figure 1. Comparison of aspiration/asphyxia risk scores between the two groups. On discharge, the aspiration/asphyxia risk scores of the two groups are compared with those on admission, *** $P < 0.001$; on discharge the risk scores of aspiration/asphyxia before and after the treatment in the observation group are compared with those of the control group, ### $P < 0.001$.

The re-hospitalization rate and the recurrence rate of hemoptysis were recorded and compared between the two groups. The re-hospitalization rate = the number of re-hospitalization cases/the total number of cases * 100%. The recurrence rate of hemoptysis = the recurrence number of hemoptysis/total number of cases * 100%.

The nursing satisfaction between the two groups was compared. The nursing satisfaction was subjectively evaluated by the patients in the ward environment, health education, effects and nurses' proficiency and work attitude, with a total score of 100 points. 90 points or more meant that they were very satisfied, 80-90 points as satisfactory, 60-79 points as general; below 60 points as not satisfied [13].

Statistical analysis

The experimental data were processed by SPSS19.0 software. Measurement data are expressed by mean \pm standard deviation, and the difference between the two groups was compared by an independent sample t test; a paired t test was used to compare the difference before and after the intervention within groups. Count data are expressed by the number of cases/percentages, and the chi-square test was used for comparison between groups. The difference was statistically significant at $P < 0.05$.

Results

Comparison of general information

There were no significant differences in the general information of age, gender, duration of disease and the degree of hemoptysis between the two groups (all $P > 0.05$), as shown in **Table 2**.

Comparison of aspiration/asphyxia risk scores

At admission, there was no significant difference in the risk scores of aspiration/asphyxia between the two groups. The scores of aspiration/asphyxia risk at discharge was significantly lower in both groups than those at admission, and the differences were statistically significant (both $P < 0.001$). At discharge, the risk score of aspiration/asphyxia in the observation group was significantly lower than that in the control group, and the difference was statistically significant ($P < 0.001$). The difference of the risk scores of aspiration/asphyxia between admission and discharge in the observation group was significantly higher than that in the control group, which was statistically significant ($P < 0.001$), as shown in **Figure 1** and **Table 3**.

Comparison of the incidence of asphyxia and hospitalization time

Compared with the control group, the incidence of asphyxia ($P = 0.027$) and hospitalization time ($P < 0.001$) were significantly decreased in the observation group with statistically significant differences. See **Table 4**.

Comparison of quality of life

At admission, there was no significant difference in the Barthel index scores between the two groups. In both groups, the Barthel index scores at discharge were significantly higher than those at admission, with statistically significant differences (both $P < 0.001$). At discharge, the difference of Barthel index scores in the observation group was significantly higher than that in the control group, with statistical difference ($P < 0.001$). See **Figure 2** and **Table 5**.

Comparison of the re-hospitalization rate and recurrence rate of hemoptysis

Two patients in the observation group were hospitalized again after discharge, and the re-hospitalization rate was 8%. In the control

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Table 3. Comparison of aspiration/asphyxia risk scores between the two groups of patients

Group	Number of cases	At admission	At discharge	t	P	Difference value
Control group	25	5.5±1.3	3.8±0.7	16.195	<0.001	1.7±0.4
Observation group	25	5.7±1.4	2.7±0.5	23.214	<0.001	3.0±0.6
t value		0.523				9.014
P value		0.603				<0.001

Table 4. The incidences of asphyxia and hospitalization time in the two groups of patients

Group	Case	Incidence of asphyxia	Hospitalization time (d)
Control group	25	8 (32%)	15.4±2.7
Observation group	25	1 (4%)	18.6±3.1
t		4.878	3.892
P		0.027	<0.001

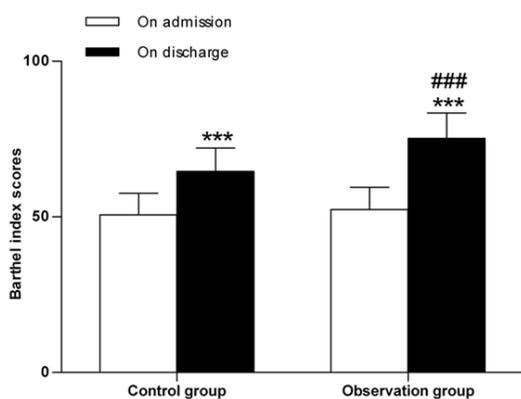


Figure 2. Comparison of Barthel index scores between the two groups. On discharge, the Barthel index scores of the two groups are compared with those on admission, ***P<0.001; on discharge, the Barthel index scores before and after treatment in the observation group are compared with the control group, ###P<0.001.

group, 9 patients were hospitalized again after discharge, and the re-hospitalization rate was 36%. There was a statistically significant difference in the re-hospitalization rates between the two groups ($\chi^2=5.711$, $P=0.017$). The recurrence rate of hemoptysis in the observation group was 20% (5/25), which was significantly lower than that in the control group (48%, 12/25), with statistical difference ($\chi^2=4.367$, $P=0.037$). See **Figure 3**.

Comparison of nursing satisfaction

There were 2 cases of dissatisfaction in the observation group, and nursing satisfaction was 92%, but 10 cases of dissatisfaction in the control group, and nursing satisfaction was

60%. The difference between the two groups was statistically significant ($\chi^2=7.018$, $P=0.008$), as shown in **Figure 4**.

Discussion

Hemoptysis is one of the most dangerous symptoms of pulmonary tuberculosis, with acute onset and serious condition, which causes complications such as asphyxia and hemorrhagic shock, and seriously threatens life and health of patients [14-16]. With the change of clinical nursing concepts and the continuous updating of nursing mode, the quality of medical care is of value in the process of improving the therapeutic effect of patients. This study adopts a new type whole-course nursing, mainly includes hemoptysis care, medication care, psychological care and diet care for patients with tuberculosis hemoptysis, to closely monitor the changes of condition in patients. Studies have reported that the whole-course nursing mode can reduce the negative emotions caused by the disease through systematic normative nursing intervention, and make patients actively cooperate with various treatments and nursing work, in order to improve the patient's clinical symptoms, quality of life and mental health, and finally obtain satisfactory results [17].

Compared with the control group, the risk score of aspiration/asphyxia and the incidence of asphyxia in the observation group were significantly decreased, indicating that the whole-course nursing could correctly evaluate the possible risks in the patient's respiratory tract, and provide timely intervention to reduce the occurrence of asphyxia [18]. The hospitalization time of patients in the observation group was significantly less than that in the control group, indicating that after the whole-course nursing, the clinical symptoms of patients were relieved rapidly, and the patient recovered quickly [19]. Compared with the control group,

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Table 5. Comparison of Barthel index scores between the two groups

Group	Case	At admission	At discharge	t	P	Difference of Barthel index scores
Control group	25	50.7±6.8	64.6±7.5	19.542	<0.001	13.9±3.1
Observation group	25	52.4±7.1	75.3±8.1	22.186	<0.001	22.9±4.3
t		0.865				8.489
P		0.392				<0.001

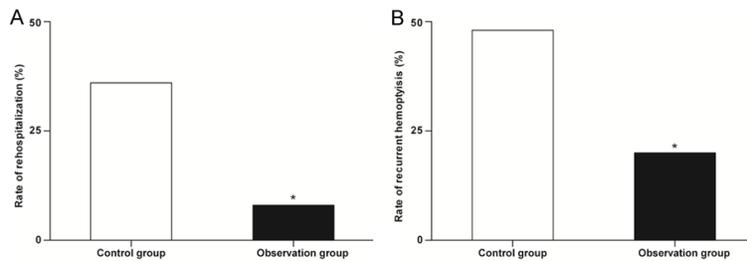


Figure 3. Comparison of the re-hospitalization rate and the recurrence rate of hemoptysis between the two groups of patients. Compared with the control group, *P<0.05. A: the re-hospitalization rate; B: the recurrence rate of hemoptysis.

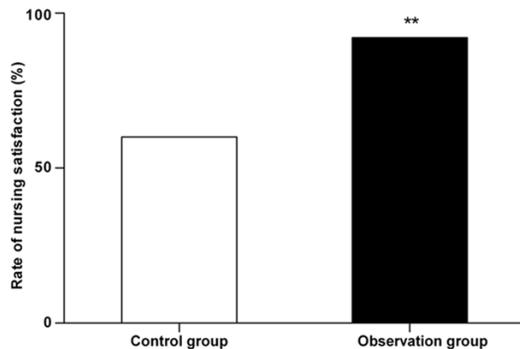


Figure 4. Comparison of nursing satisfaction between the two groups of patients. Compared with the control group, **P<0.01.

the re-hospitalization rate and the recurrence rate of hemoptysis of the observation group were significantly decreased. This may be due to the fact that during the whole-course nursing mode, the specialist nurses provided the patient with knowledge education, medication care, hemoptysis care, psychological care and discharge guidance. Patients can more actively cooperate with treatment and nursing work, and more consciously follow the doctor's advice in taking drugs after discharge, thus effectively reducing the re-hospitalization rate and the recurrence rate of hemoptysis [20].

The antipathy and fear of patients with pulmonary tuberculosis and hemoptysis seriously

affect the daily life of patients. The Barthel Index Rating Scale is a measure of functional status of a patient's daily activities. The score is primarily determined by the measurement of a series of independent activities. Due to the high credibility and sensitivity as well as simple operation of the Barthel index, it is widely used in clinical practice. It is mainly used to predict the therapeutic effect and

prognosis of the disease, and it reflects the degree of nursing for patients with chronic diseases [21]. For patients with tuberculosis hemoptysis, the Barthel Index Rating Scale reflects the degree of nursing required by the patients. The results of this study showed that the Barthel index score of the observation group was significantly higher than that of the control group, and the difference was statistically significant, indicating that the whole-course nursing improved the self-help ability and psychological rehabilitation of patients, and ensured their good compliance [22].

In terms of nursing satisfaction, the whole-course nursing intervention improved the professional level of the nursing staff, and enabled them to understand the nursing content more accurately for patients with pulmonary tuberculosis and hemoptysis, so as to offer more meticulous care. This study showed that the nursing satisfaction of the observation group was significantly higher than that of the control group, which was statistically different. This result is basically similar to previous research reports [23]. However, this study also has certain limitations, such as small sample size, single-center, lack of long-term follow-up results, and no classified comparison. More multicenter randomized controlled trials with large samples and long-term follow-up are needed for further validation in future studies.

In summary, whole-course nursing mode intervention can meet the nursing needs of patients with pulmonary tuberculosis and hemoptysis. It can effectively reduce the risk of aspiration/asphyxia, decrease the length of hospital stay as well as the occurrence of re-hospitalization and hemoptysis, and improve the patients' quality of life and clinical nursing satisfaction, which is worthy of promotion in clinical care.

Disclosure of conflict of interest

None.

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