

Original Article

Effect of continuous nursing intervention on the therapeutic outcome, compliance behavior and quality of life of patients with pulmonary tuberculosis

Chunhua Wan¹, Yunying Zhou²

¹Department of Internal Medicine 2, Jiangxi Chest Hospital, Nanchang, Jiangxi, China; ²Department of Cardiology, Jiangxi Provincial People's Hospital Affiliated to Nanchang University, Nanchang, Jiangxi, China

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Abstract: Objective: This study was designed to investigate the effect of continuous nursing intervention on the outcome, compliance behavior and quality of life of patients with pulmonary tuberculosis. Methods: Ninety-five patients with pulmonary tuberculosis admitted to our hospital from March 2018 to August 2019 were enrolled as participants for retrospective analysis. They were divided into two groups according to the modes of intervention, of which those in the control group were given routine nursing and those in the observation group were given continuous nursing. Then the patients were contrastively evaluated in terms of therapeutic outcome, compliance behavior, quality of life, uncertainty in illness, satisfaction towards nursing, and mastery of disease knowledge. Results: (1) After 6 months of intervention, the sputum conversion rate in the observation group was 97.92%, which was greater than that of 78.72% in the control group ($P<0.05$). (2) The total compliance rate in the observation group was 95.83%, which was higher than that of 70.21% in the control group ($P<0.05$). (3) Compared with the control group, the observation group patients who received intervention treatment for 6 months scored higher with respect to their mental health, role-emotional, social function, vitality, general health, body pain, role-physical, and physical functioning ($P<0.05$). (4) The score of uncertainty in illness in the observation group was 40.12 ± 1.02 , which was lower than that of 68.69 ± 1.25 in the control group ($P<0.05$). (5) Patients in the observation group also expressed more positively satisfaction towards nursing, as compared with the control group ($P<0.05$). (6) In the observation group, 97.72% of the patients had a good mastery of disease knowledge, which was higher than that of 74.47% in the control group ($P<0.05$). Conclusion: Continuous nursing intervention on patients with pulmonary tuberculosis had good effects on improving their sputum conversion rate, compliance behavior, satisfaction towards nursing and mastery of disease knowledge and quality of life.

Keywords: Pulmonary tuberculosis, continuous nursing intervention, therapeutic outcome, compliance behavior, quality of life

Introduction

Pulmonary tuberculosis is a common chronic infectious disease transmitted mainly through respiratory infection [1]. Long course of disease, strong infectivity, and somehow easy relapse pose it a serious threat to human health [2]. In China, the characteristics of tuberculosis epidemic of high prevalence, high infection rate, high mortality and high drug resistance rate, etc. keep reminding the urgency of solving this public health problem [3, 4].

Treatment for pulmonary tuberculosis usually lasts more than 6 months, and hospitalization

is only a part of the whole process [5]. In order to ensure the desired therapeutic effects and the effective control of the disease, quality nursing services are needed not only during the hospitalization, but also after discharge so as to ensure the continuity [6, 7]. Continuous nursing is the new mode of nursing that has emerged in recent years. As a continuation of the inpatient nursing, it emphasizes the coordination and continuity between inpatient nursing and post-discharge nursing and embodies the importance of post-discharge nursing to patients' quality of life and family rehabilitation [8]. In order to further improve the treatment outcome, compliance behaviors and quality of life

of pulmonary tuberculosis patients, continuous nursing interventions were applied to specific cases in this study.

Previously, clinical interventions for pulmonary tuberculosis patients would focus on the inpatient nursing rather than the post-discharge continuous nursing. To this end, this research investigated the effects of continuous nursing on patients with pulmonary tuberculosis after discharge in an innovative and feasible way.

Material and methods

Material

Ninety-five patients with pulmonary tuberculosis admitted to our hospital from March 2018 to August 2019 were selected as participants for retrospective analysis. They were divided into two groups according to the modes of intervention, of which 47 patients, including 30 males and 17 females aged 15-47 years old, in the control group were given routine nursing, and 48 patients, including 32 males and 16 females aged 16-48 years old, in the observation group were given continuous nursing. Inclusion criteria: patients who had signed the informed consent; patients who met the Diagnostic Criteria for Pulmonary Tuberculosis as specified in *Diagnostic Criteria and Principles of Management of Pulmonary Tuberculosis* [9]; patients who had clinical symptoms such as loss of appetite, slight fever, chest pain, chest distress and shortness of breath, fatigue, expectoration, cough, body mass loss, hemoptysis and bloody sputum, etc.; patients who showed signs of pulmonary tuberculosis as the chest X-ray examination revealed. Exclusion criteria: patients who quit midway; who had severe heart, hepatic, or kidney failure; who had language communication disorders; or who had mental and cognitive disorder were excluded from the study. This study was approved by the Medical Ethics Committee of Jiangxi Provincial People's Hospital Affiliated to Nanchang University.

Methods

Patients in the control group were given routine nursing: the nursing staff gave general discharge guidance to the patients and instructed them to regularly return to the hospital for further consultation, and did not take any other intervention measures except to keep the contact information.

Patients in the observation group were given continuous nursing: (1) Create a file for each patient: the nursing staff paid a return visit for each patient who had finished the treatment and created an interview file. A nursing team by means of consulting nursing specialists, information retrieval and studying or any other feasible ways prepared pulmonary tuberculosis personal file for each patient based on the physical truth, containing basic condition, psychological status, exercise and diets, regular further consultation and tuberculosis related knowledge, etc. Each patient's personal file then was discussed between the nursing staff and the special patient, and revised according to the practical application, so as to fully collect information on the health needs of patients and their families. Based on patients' self-care ability and changes in the condition, the continuous nursing scheme was adjusted timely and accordingly. (2) Enhanced telephone follow-up: before each patient discharged, the nursing staff had their exact contact information and informed each patient of the administrative office telephone number of the hospital. After the patient discharged, telephone follow-up once a week was required to inquire the patient's drug use, daily life, psychological states, etc. in addition to chatting with the families to know some actual situations. On this basis, the targeted guidance and supervision might be helpful, that is, if the patient showed great compliance, the nursing staff was recommended to show praise and encouragement, otherwise it was necessary to tell the patient the risk of not taking medicines and ask the families to be a supervisor. If the patient was in a bad mood, the nursing staff would explain the proper ways for patients to relax and guide the patient to relax instead of just advising the patients to rest more. (3) Make full use of the WeChat platform: by creating a WeChat group, the nursing staff communicated with the patients through WeChat on the 1st day of their discharge and gave them specific health guidance; the nursing staff asked the patients to follow the doctor's advice and reminded them of hepatic and renal function, electrolytes and blood routine examinations every 5-7 days in case of adverse reactions by antituberculosis drugs; and made them keep in mind that if something unusual happened, they should return to the hospital in time so that their medication regimen could be adjusted appropriately. For this purpose, the department applied for

an official account of WeChat with which each patient could follow before discharge. Through the official account, the nursing staff regularly released relevant knowledge, cured cases, the necessity and importance of rational drug use and others to deepen their understanding of such diseases. (4) Enhanced home follow-up: a family follow-up plan was developed for special patients who were distrustful of the treatment, who were depressed, whose family caregivers were not fixed, and who had recurrent pulmonary tuberculosis. The family follow-up was performed every 2-3 weeks. Patients and their families were informed in advance of the date and time of follow-up. During the home visit, it was recommended to communicate actively with patients and their families to seek their inner thoughts, and then conduct face-to-face professional guidance in order to enhance their confidence on the treatment.

The period of intervention was 6 months in both groups.

Observed indicators

(1) Therapeutic outcome: the sputum conversion rates after intervention in both groups were observed. Patients whose consecutive 3 acid-fast bacilli sputum-smear showed as negative without reappeared positive could be treated as negative.

(2) Compliance behaviors: the patients were evaluated with respect to their psychological status, abstain from tobacco and drink, moderate rest and exercise, balanced diet, regular further consultation, and drug use on schedule, etc. Where, the scored 95% and above, 51-94%, and 50% and below were recorded with full compliance, not fully complying, and completely non-compliance, respectively.

Total Compliance = full compliance + not fully complying.

(3) Quality of life: the medical outcomes study 36-item short form health survey (SF-36) in Chinese was applied to evaluate patient's quality of life. The form has 8 dimensions, including mental health, role emotional, social function, vitality, general health, body pain, role-physical and physical functioning. The total score of each dimension is 100 points, and the quality of life is proportional to the score [10]. The Cronbach's α is 0.88.

(4) Uncertainty in illness: uncertainty in Illness Scale was used for evaluation. The total score is 125 points and higher score indicated the stronger patient's uncertainty in illness and the greater suspicion of the treatment [11]. The Cronbach's α is 0.86.

(5) Satisfaction towards nursing: through the Satisfaction towards Nursing Questionnaire prepared by the hospital, the satisfaction towards nursing was assessed in the both groups, including the staff's attitude, professional knowledge, professional skills, and responsibility, etc. within a total score of 100 points. Satisfaction is proportional to the score. The Cronbach's α is 0.83.

(6) Mastery of disease knowledge: based on literature related domestic and foreign, Acquisition of Disease Knowledge Questionnaire was designed and prepared by the medical staffs of the department and reviewed by two experts. In the questionnaire, one who scored 85 points out of the total 100 points was recorded as qualified. Content of the assessment included causes of pulmonary tuberculosis, drug use, route of transmission, dietary considerations, schedule of reexamination, knowledge of prevention and treatment of complications and knowledge of disinfection and isolation etc. The Cronbach's α is 0.89.

Statistics

SPSS22.0 was used for statistical analysis. Measurement data were expressed as mean $\pm$ standard deviation where those conforming the normal distribution were analyzed with independent-samples T test and those not conforming the normal distribution were analyzed by Mann-Whitney U test. Paired t-test was used for intra-group comparison before and after treatment. Enumeration data were expressed as [n (%)], and X^2 test was used for comparison among groups. $P < 0.05$ indicates statistical significance.

Results

Comparison of general information of both groups

Patients in the observation group included 32 males (66.67%) and 16 females (33.33%) aged 16-48 years, averaged 30.12 ± 2.15 years.

Table 1. Comparison of general information of both groups [n (%)]/ ($\bar{x} \pm sd$)

Item	Observation (n=48)	Control (n=47)	t/ χ^2	P
Gender (cases)				
Male	32 (66.67)	30 (63.83)	0.084	0.772
Female	16 (33.33)	17 (36.17)		
Age (years)	30.12 $\pm$ 2.15	30.09 $\pm$ 2.18	0.068	0.946
Disease type				
Type I	1 (2.08)	1 (2.13)	0.025	0.668
Type II	5 (10.42)	6 (12.77)		
Type III	36 (75.00)	35 (74.47)		
Type IV	6 (12.50)	5 (10.64)		
Educational level				
Junior high and below	15 (31.25)	14 (29.79)	0.024	0.877
High school and above	33 (68.75)	33 (70.21)		

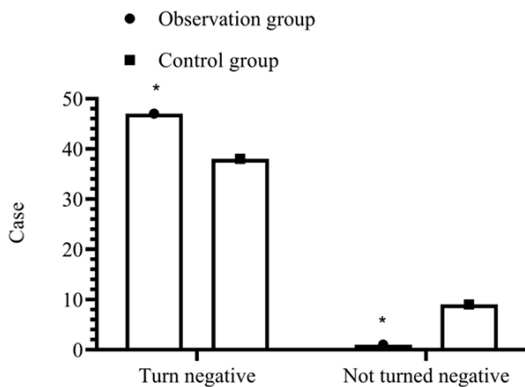


Figure 1. Comparison of therapeutic outcome of both groups. The sputum conversion rate in the observation group was 97.92%, which was higher than that of 78.72% in the control group, $P<0.05$. *means it is compared with the control group, $P<0.05$.

Among them, the number of cases with type I, type II, type III and type IV pulmonary tuberculosis was 1 (2.08%), 5 (10.42%), 36 (75.00%), and 6 (12.50%), respectively. As for educational levels, 15 (31.25%) were classified into the category of junior high school and below and 33 (68.75%) senior high school and above.

Patients in the control group included 30 males (63.83%) and 17 females (36.17%) aged 15-47 years, averaged 30.09 $\pm$ 2.18 years. Among them, the number of cases with type I, type II, type III and type IV pulmonary tuberculosis was 1 (2.13%), 6 (12.77%), 35 (74.47%), and 5 (10.64%), respectively. As for educational levels, 14 (29.79%) were classified into the category of junior high school and below and 33

(70.21%) senior high school and above. There were no statistically significant differences between the two groups in terms of gender, age, disease type and education level ($P>0.05$) (**Table 1**).

Comparison of therapeutic outcome of both groups

After 6 months of intervention, 47 patients in the observation group were reported with sputum bacterium turned into negative and the sputum conversion rate was 97.92%, while in the control group, 38 patients were reported with sputum bacterium turned

into negative and the sputum conversion rate was 78.72%. Clearly, the sputum conversion in the observation group went higher than that in the control group ($\chi^2=7.343$, $P<0.05$) (**Figure 1**).

Comparison of compliance behavior of both groups

Patients who were in the observation group assessed as full compliance, not fully complying and completely non-compliance held a number of 30 cases (62.50%), 16 cases (33.33%), and 2 cases (4.17%), respectively, and patients in the control group assessed as the same included 23 cases (48.94%), 10 cases (21.28%), and 14 cases (29.79%), respectively. The total compliance of the observation group was 95.83%, which was higher than that of 70.21% in the control group ($\chi^2=11.130$, $P<0.05$) (**Figures 2 and 3**).

Comparison of quality of life in both groups

Compared with those in the control group, patients in the observation group scored significantly higher after 6 months of intervention with respect to quality of life, role emotional, social function, vitality, general health, body pain, role-physical and physical functioning ($P<0.05$) (**Table 2**).

Comparison of uncertainty in illness of both groups

Following the intervention, patients in the observation group had a general score on uncer-

Full compliance
 Not fully complying
 Completely non-compliance

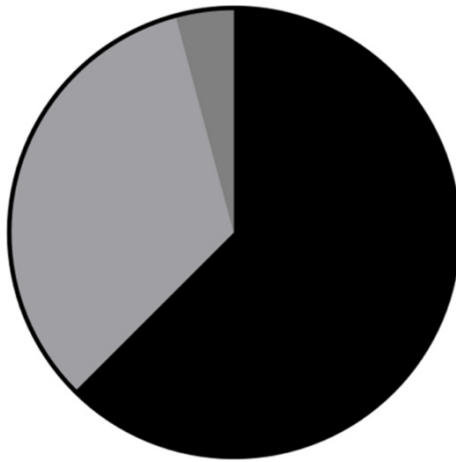


Figure 2. Compliance behaviors after intervention of the observation group. Patients who were in the observation group assessed as full compliance, not fully complying and completely non-compliance held a number of 30 cases (62.50%), 16 cases (33.33%), and 2 cases (4.17%), respectively. The total compliance was 95.83%.

Full compliance
 Not fully complying
 Completely non-compliance

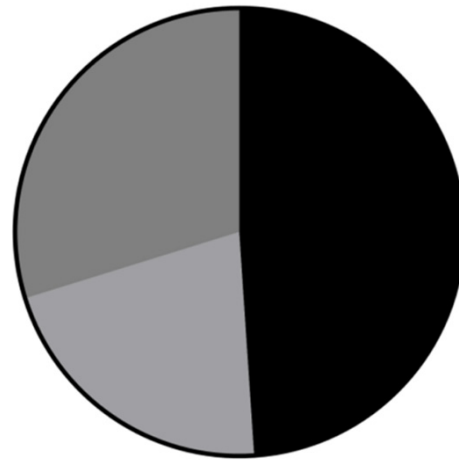


Figure 3. Compliance behaviors after intervention of the control group. Patients in the control group who were assessed as full compliance, not fully complying and completely non-compliance include 23 cases (48.94%), 10 cases (21.28%), and 14 cases (29.79%), respectively. The total compliance was 70.21%.

tainty in illness of 40.12 ± 1.02 , which was significantly lower than that of 68.69 ± 1.25 in the control group ($t=122.172$, $P<0.05$) (**Figure 4**).

Comparison of satisfaction towards nursing in both groups

Patients in the observation group expressed obviously higher satisfaction with the nursing services, as compared with those in the control group ($P<0.05$) (**Table 3**).

Comparison of mastery of disease knowledge in both groups

The proportion of patients who had a good mastery of disease knowledge in the observation group was 97.72% superior to 74.47% from the control group ($P<0.05$) (**Table 4**).

Discussion

Clinically pulmonary tuberculosis is categorized as a chronic infectious disease caused by mycobacterium tuberculosis, which may invade multiple visceral organs after onset. The most common is pulmonary tuberculosis infection

[12, 13]. Pulmonary tuberculosis is highly infectious and is irregular on the time of attack. Worse, the period of treatment may take a long time [14]. Considering better outcomes, compliance behaviors and quality of life of patients, it is, in addition to various positive treatment measures, necessary to properly apply enhanced nursing intervention [15].

Premature discontinuation of medication or irregular chemotherapies is considered to be the primary and the most common cause of failure in chemotherapy of such patients [9]. Thoroughly cure requires not only doctors' scientific therapeutic regimen but also the patient's good compliance, that is, the patient must take drugs following the doctors' advice [10, 13]. Approaching the destination of cure, besides the scientific therapeutic regimen, the patient's belief in health, knowledge, lifestyle and compliance behaviors are closely related [14]. As Mancusos et al. [16] pointed out, poor compliance of treatment is strongly linked to the lack of knowledge and understanding. Compliance behavior reflects the goodness of fit between the behaviors of the patient who sought medical advice and the doctor's orders.

Effect of continuous nursing intervention on tuberculosis

Table 2. Comparison of quality of life in both groups ($\bar{x} \pm sd$, points)

Groups	Mental health	Role emotional	Social function	Vitality	General health	Body pain	Role-physical	Physical functioning
Observation (n=48)	92.63±1.22*	95.63±3.28*	90.28±2.88*	92.98±1.88*	93.32±2.58*	92.17±1.27*	93.36±3.38*	96.12±0.28*
Control (n=47)	70.12±2.63	71.16±2.36	72.18±1.25	75.16±3.12	71.12±2.63	70.06±2.18	72.15±1.26	70.15±0.36
<i>t</i>	53.695	41.663	39.586	33.799	41.532	52.369	55.158	42.298
<i>P</i>	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Note: *means it is compared with the control group, $P<0.05$.

Effect of continuous nursing intervention on tuberculosis

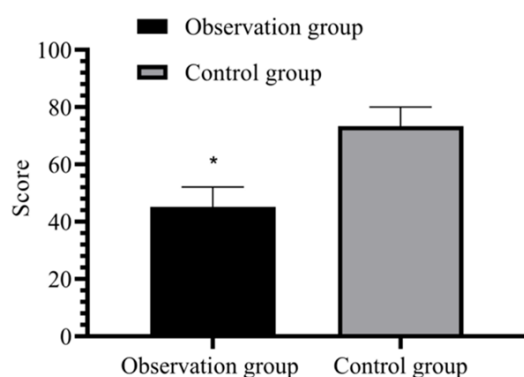


Figure 4. Comparison of uncertainty in illness of both groups. Following the intervention, patients in the observation group had a general lower score on uncertainty in illness, $P<0.05$. *means it is compared with the control group, $P<0.05$.

Table 3. Comparison of satisfaction towards nursing in both groups ($\bar{x} \pm sd$, points)

Groups	Scores
Observation (n=48)	92.28±1.28*
Control (n=47)	78.12±2.88
t	31.076
P	0.000

Note: *means it is compared with the control group, $P<0.05$.

In this paper, the total compliance of the observation group, 95.83%, was higher than 70.21% of the control group ($P<0.05$), suggesting that continuous nursing intervention after discharge facilitated the patient's compliance with the doctor's orders, in addition to the continuity in nursing. This benefited from the fact that each patient involved was, based on their physical conditions, given individualized and in-the-course adjustable guidance such as on mental health, exercise, diet and medication. Furthermore, the sputum conversion in the observation group after 6 months of intervention was 97.92%, higher than that in the control group, 78.72% ($P<0.05$). This could be linked with the improved compliance of the patient. Telephone follow-up, WeChat follow-up and other approaches led the patient to be supervised to follow the medical orders and the treatment effects therefore became better.

Carvalho et al. [17] in their studies suggested that compared with healthy people, patients with pulmonary tuberculosis suffered from poor quality of life. Out of this, paying more attention

Table 4. Comparison of mastery of disease knowledge in both groups [n (%)]

Groups	Cases	Proportion of good mastery
Observation	48	47 (97.72)*
Control	47	35 (74.47)
χ^2		11.055
P		0.001

Note: *means it is compared with the control group, $P<0.05$.

to their social function and mental health to improve their living quality is as important as the physical functioning or physical signs [18, 19]. Factors affecting the quality of life of patients with pulmonary tuberculosis include commonly role and function, social status, treatment-related factors, economic conditions, and infectivity of the disease. These interacted threats ultimately put a serious impact on the quality of life of patients [20, 21]. As the results of this study showed, compared with those in the control group, patients in the observation group scored significantly higher after 6 months of intervention with respect to quality of life, role emotional, social function, vitality, general health, body pain, role-physical and physical functioning ($P<0.05$). This indicated that enhanced continuous nursing intervention was conducive to a good quality of life. Besides, following the intervention, patients in the observation group had a general lower score on uncertainty in illness ($P<0.05$), which further proved the effectiveness of continuous nursing in releasing uncertainty feelings. The possible driving force behind could be that each patient involved in this paper was, based on the comprehensive analysis of each patient's social support, lifestyle, exercise, diet, drug use, treatment, and mental states, provided with targeted, individualized guidance, and especially for those with negative emotions, emotional supports, so as to recover their healthy mentality and correct those inner misconceptions [22]. In view of the serious lack of disease related knowledge of some tuberculosis patients, this study strengthens health education to guide them to improve their knowledge and understanding of tuberculosis, and at the same time develops scientific and reasonable exercise programs based on each patient's actual situation, which is beneficial to improve patients' knowledge of disease and improve

their compliance behavior. The results showed that the proportion of patients who had a good understanding about such disease was 97.72% higher than that of 74.47% in the control group ($P<0.05$). In comparison of routine nursing, continuous nursing is more scientific. Follow-up visit and home visit play roles in encouraging long-term supervision, feedback and guidance on patients' followership with exercise, rest and drug use orders. WeChat offers a platform for communication between patients and medical workers and for patients to learn disease-related knowledge so as to get perfect self-care awareness [23]. In this paper, patients in the observation group expressed obviously more satisfaction with the nursing services after intervention, as compared with those in the control group ($P<0.05$), indicating that continuous nursing improved patients' satisfaction. It could be explained as continuous nursing is closer to patients' physical reality and the individual nursing plan, and management is much more targeted and feasible.

In conclusion, continuous nursing intervention for patients with pulmonary tuberculosis is conducive to improve the sputum conversion, patients' compliance, satisfaction towards nursing, mastery of disease-related knowledge and quality of life.

However, the results of this study were not representative enough due to small sample size. Further research is warranted to use enlarged samples.

Disclosure of conflict of interest

None.

Address correspondence to: Yuning Zhou, Department of Cardiology, Jiangxi Provincial People's Hospital Affiliated to Nanchang University, No. 152, Patriotic Road, Nanchang 330006, Jiangxi, China. Tel: +86-0791-86896205; E-mail: zhou300yy@163.com

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