ORIGINAL RESEARCH

Integrated Nursing and Psychological Intervention for Tuberculosis Complicated by Lung Cancer: Clinical Efficacy

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ABSTRACT

Context • The incidence of tuberculosis (TB) complicated by lung cancer has been increasing yearly worldwide. The overlapping effects of these two diseases leads to difficulties in clinical treatment and care. Single-care modalities fail to meet the clinical-care requirements of these complex diseases for both psychological and physical treatment.

Objective • The study intended to evaluate the clinical efficacy of integrated nursing plus a psychological intervention for patients with TB complicated by lung cancer.

Design • The research team conducted a randomized controlled study.

Setting • The study took place at the Affiliated Hospital of Hebei University in Baoding, Hebei, China.

Participants • Participants were 60 patients with pulmonary TB complicated by lung cancer who received treatment at the hospital between January 2022 and December 2022.

Interventions • The research team randomly assigned participants to one of two groups, each with 30 participants: (1) the control group, who received integrated nursing and (2) the intervention group who received integrated nursing plus a psychological intervention.

Outcome Measures • The research team evaluated: (1) short-term clinical efficacy; (2) quality of life, using the Medical Outcomes Study's (MOS') 36-item Short-form Health Survey (SF-36); (3) levels of anxiety and depression, using the Self-Rating Anxiety Scale (SAS) and Self-Rating Depression Scale (SDS), respectively; and (4) nursing satisfaction.

Results • No significant differences existed between the groups in demographic or clinical characteristics at baseline ($P > .05$). Compared to the control group, the intervention group's; (1) short-term clinical efficacy was significantly higher ($P = .035$); (2) scores on the SF-36 were significantly higher (all $P < .001$; (3) scores on the SAS and SDS were significantly lower (both $P < .001$); and (4) nursing satisfaction was significantly higher ($P = .000$).

Conclusions • Integrated nursing plus psychological intervention can improve the quality of life of patients with TB complicated by lung cancer, alleviate their negative emotions, and enhance nursing satisfaction, thereby promoting patients' recoveries. (*Altern Ther Health Med.* 2024;30(12):274-279).

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INTRODUCTION

In recent years, the incidence of pulmonary tuberculosis (TB) and lung cancer have been increasing year by year.[1,2] TB is a chronic infectious disease that Mycobacterium tuberculosis causes, which mainly manifests clinically as cough, sputum, and night sweats,[3,4] and lung cancer is a common malignant tumor.[5] According to Novitskaya et al's epidemiological data, the incidence of TB complicated by lung cancer has shown a yearly increase worldwide since 2021.[6]

Varol et al and Wu et al found that the frequency of the coexistence of TB and lung cancer was 0.44-0.75%.[7,8] Aoki found that the incidence of TB combined with lung cancer was 2-8% and that the most common pathological form was squamous cell carcinoma, followed by undifferentiated carcinoma.[9] Aoki also found that 78% of patients showed a history of TB for 5-20 years, and medical practitioners usually detected the lung cancer at an advanced stage.

Treatment

TB requires prolonged treatment, and patients are prone to recurrent attacks.[10] Cardona's clinical data suggest that TB

is a stimulus for the development of lung cancer and that tuberculous scarring presents a high risk of cancer development.[11] The overlapping effects of these two diseases leads to difficulties in clinical treatment and care.[12]

Most patients have low autoimmunity and fear of the diseases, resulting in higher requirements for clinical care. The traditional nursing model fails to meet patients' needs due to untimely exchange of medical and nursing information and lack of communication with patients.[13]

Nursing Care

The integrated nursing model is a current advanced nursing concept that focuses on the combination of clinical and nursing operations and improves the quality of nursing care according to patients' needs, so as to facilitate patients' recovery.

Nakweenda studies suggest that integrated nursing can prolong patients' survival and enhance their quality of life, can objectively and meticulously assess patients' conditions, and can maximally meet patients' care needs.[14] At present, the theories and practices of medical-nursing integration and nursing education are emerging, and medical practitioners have achieved good results.

Wang et al concluded that integrated nursing could effectively improve the quality of life of patients with TB complicated by lung cancer and boost the therapeutic effect.[15] However, due to the insidious manifestation of pulmonary TB combined with lung cancer, the lung cancer has usually progressed to an advanced stage by the time of diagnosis. In addition, the multiple adverse events and long dosing cycles of anti-TB drugs and chemotherapy drugs predispose patients to multiple negative emotions.[16,17]

In addition, patients with lung cancer combined with TB are subject to isolation and to discrimination by others for various reasons, resulting in more psychological pressure and disease burden and compromised treatment effects.[18] They are predisposed to negative emotions, which further aggravates the disease and reduces treatment compliance.

Single-care modalities fail to meet the clinical-care requirements of complex diseases for both psychological and physical treatment. Psychological care plays an irreplaceable and important role in the treatment of diseases.[19,20] Psychological interventions for such patients are of great significance.

Current Study

Currently, the prevalence of TB complicated by lung cancer is high in China, and single nursing methods have failed to meet the clinical-care needs for psychological and physical treatment of these complex diseases.

The current research team proposed the following hypothesis: The combined use of comprehensive nursing and psychological intervention will significantly improve the mental health, treatment compliance, and clinical treatment effect for patients with TB and lung cancer.

The current study intended to evaluate the clinical efficacy of integrated nursing plus psychological intervention for patients with TB complicated by lung cancer.

METHODS

Participants

The research team conducted a randomized controlled study at the Affiliated Hospital of Hebei University in Baoding, Hebei, China. The process of participant recruitment involved identifying potential candidates among patients with pulmonary TB complicated by lung cancer who received treatment at the hospital between January 2022 and December 2022. The recruitment process included the following steps:

(1) Identification: Patients meeting the criteria for inclusion were identified through medical records and clinical databases.

(2) Contact: After identifying potential participants, the research team approached them through their primary healthcare providers or attending physicians. Patients were informed about the study, its objectives, and the potential benefits and risks.

(3) Informed Consent: Those expressing interest were provided with detailed information about the study, and informed consent was obtained from willing participants. The consent process included clarification that the researchers were not their primary healthcare providers.

Regarding the selection of the 1380 participants for the evaluation of nursing satisfaction, it is essential to clarify that this number does not include the original 60 patients who may have participated in the pilot phase or earlier stages of the study.

The study included potential participants if they: (1) were aged >30 years and <79 years and (2) had imaging findings and clinical symptoms consistent with pulmonary TB[21] complicated by lung cancer; (3) the criteria related to patients being informed about the study, cooperation with the investigation and nursing intervention, and (4) good treatment compliance were not used as pre-screening measures.

It is acknowledged that issues such as lack of cooperation and poor compliance could be reasons to exclude participants from the analysis of results. During the study, participants were thoroughly informed about the study and the importance of cooperation, and treatment compliance was assessed during the course of the intervention. However, it is important to note that lack of cooperation and poor compliance were not used as pre-screening criteria, and participants meeting the age and clinical criteria were initially included in the study, with subsequent assessment of cooperation and compliance during the intervention. Any participants exhibiting significant issues in these areas were appropriately addressed, and their data may have been excluded from the final analysis if deemed necessary.

The study excluded potential participants if they: (1) had multidrug-resistant TB complicated by lung cancer, (2) had a history of non-adherence to standardized anti-TB treatment; (3) had language or consciousness impairment or an inability to communicate, (4) had a history of alcohol or drug abuse within the one year prior to the study; (5) had a history of allergy to anti-TB drugs or an allergic constitution (defined

as a predisposition to allergic reactions or a history of allergic conditions such as asthma, hay fever, or eczema). (6) had underlying diseases, such as diabetes mellitus and hypertension; or (7) had a hospitalization duration prior to the study of <15 d.

The research team informed all participants about the study, and they voluntarily signed an informed consent form. The study's protocol received approval from the ethics committee of the Affiliated Hospital Of Hebei University, Ethical No. 58916771. The study was conducted in accordance with the principles of the Helsinki Declaration, ensuring the rights, safety, and well-being of the participants throughout the research process.

Procedures

Interventions. The research team employed a randomization method to assign participants to different groups. Specifically, computer-generated random numbers. This ensured the allocation of participants to the intervention and control groups in a randomized and unbiased manner. And assigned participants to one of two groups, each with 30 participants: (1) the control group, who received integrated nursing and (2) the intervention group who received integrated nursing plus psychological intervention.

Outcome measures. The research team evaluated: (1) short-term clinical efficacy; (2) quality of life, using the 36-item Short-form Health Survey (SF-36); (3) levels of anxiety and depression, using the Self-Rating Anxiety Scale (SAS) and Self-Rating Depression Scale (SDS), respectively; and (4) nursing satisfaction.

Interventions

Both groups received integrated nursing, and the intervention group additionally received psychological intervention.

Integrated nursing. The Affiliated Hospital of Hebei University in Baoding established a professional, medical-and-nursing integrated nursing team and systematically trained the team members in the diagnosis, treatment, and care of patients with TB and lung cancer. The team developed patients' treatment protocols and timely satisfied the their treatment and care needs. The Affiliated Hospital of Hebei University in Baoding standardized the various diagnostic and treatment services for patients throughout their hospitalizations.

The team strengthened medical and nursing communication through several strategies. These included regular interdisciplinary meetings where medical and nursing staff discussed patient cases, shared insights, and coordinated care plans. Additionally, the implementation of a centralized communication platform facilitated real-time information exchange between medical and nursing teams, ensuring seamless collaboration. The use of standardized communication protocols and training sessions further enhanced communication skills and fostered a culture of effective teamwork among healthcare professionals and clarified changes in patients' conditions and nursing statuses during shift changes to ensure comprehensive and effective treatment and care. The team enhanced communication with patients through various measures. These included implementing patient education sessions to improve health literacy and ensure a better understanding of their treatment plans. Additionally, the use of visual aids, such as diagrams and pamphlets, helped convey complex medical information more effectively. Regular feedback sessions were conducted to address patient concerns and preferences, fostering an open and transparent dialogue. These initiatives collectively aimed at improving patient-provider communication and promoting a patient-centered approach to provide respiratory care[22] and the team implemented several strategies to enhance patients' comfort, confidence, and treatment compliance. These included personalized counseling sessions to address patient concerns and fears, creating a supportive and empathetic healthcare environment. Additionally, the provision of educational materials and clear instructions about the treatment regimen contributed to increased patient confidence and understanding. Regular follow-up appointments and check-ins allowed healthcare providers to monitor patient progress, address any issues promptly, and reinforce the importance of treatment adherence. These combined efforts aimed at fostering a sense of comfort, building patient confidence, and promoting better treatment compliance.

Psychological intervention. The team developed psychological interventions according to the different negative emotions that patients might have: (1) To address patients' fears, the team implemented strategies to promote a positive psychological state and emotional well-being, ultimately enhancing treatment compliance. This involved regular psychosocial support sessions where patients could express concerns, receive counseling, and learn coping mechanisms to manage fear and anxiety related to their condition. Additionally, the incorporation of relaxation techniques, mindfulness exercises, and access to support groups further contributed to maintaining a positive psychological state. By focusing on holistic patient care and addressing emotional well-being, the team aimed to create a conducive environment for improved treatment compliance; (2) To alleviate anxiety and irritability, the team ensured timely communication with patients, providing clear explanations of their medical conditions and the expected treatment outcomes. Tailoring the information to match each patient's psychological tolerance allowed for a more patient-centered approach. By offering comprehensive and easily understandable information, patients gained a better understanding of their situation, fostering a sense of control and reducing uncertainties. This personalized communication approach aimed to empower patients, helping them maintain a positive state of mind conducive to rapid recovery; (3) for doubt, the team educated patients about the disease's occurrence and development as well as the latest treatment methods, so as to increase the patient's confidence in the

treatment; (4) To address patient doubt, the team implemented a multifaceted approach. First, patients were educated about the occurrence and development of the disease, including insights into the latest treatment methods. This educational initiative aimed to increase patients' understanding and confidence in the effectiveness of the treatment. Examples of educational sessions included one-on-one discussions with healthcare professionals, group seminars, and the distribution of informational pamphlets.

Additionally, to enhance treatment confidence, various rehabilitation activities were organized. These activities encompassed supervised physical exercises tailored to individual patient needs, occupational therapy sessions focused on regaining daily life skills, and psychological support groups to foster a sense of community and shared experiences. These rehabilitation efforts were designed to provide tangible recovery benefits, contributing to an overall improvement in patients' confidence in the treatment process.

Outcome Measures

Short-term efficacy. The research team defined: (1) complete remission (CR) as the complete disappearance of all clinical and radiological evidence of both pulmonary TB and lung cancer, with no detectable signs of disease; (2) partial remission (PR) as a significant reduction in the size of the pulmonary TB lesions and lung-cancer tumors, with improvement in clinical symptoms and no appearance of new lesions; (3) stable disease (SD) as cases where no significant change in the size of lesions and no worsening of clinical symptoms had occurred; and (4) progressive disease (PD) as cases where an increase in the size of lesions, the appearance of new lesions, or a worsening of clinical symptoms had occurred. According to the above criteria for efficacy evaluations, the team classified each participant's efficacy into CR, PR, SD, and PD and calculated the total effective rate as complete remission + partial remission, with total efficacy = (CR+PR)/total number of cases × 100%.

Quality of life. At baseline and postintervention, the research team used the Medical Outcomes Study's (MOS') 36-item Short-form Health Survey (SF-36) to assess patients' quality of life with pulmonary TB and lung cancer. It includes five dimensions—physical, emotional, role, social, and cognitive function, and the score for each dimension runs from 0 to 100. A higher score indicates a higher quality of life.

Negative emotions. At baseline and postintervention, the research team used the Self-Rating Anxiety Scale (SAS) to assess patients' anxiety status and the Self-Rating Depression Scale (SDS) to assess patients' depression status. The scales have 20 items each, with a total score of 100, and 50-70 = mild anxiety or depression, 71-90 = moderate anxiety or depression, and >90 = severe anxiety or depression. A higher score indicates a higher degree of anxiety or depression in patients.

Nursing satisfaction. For the evaluation of nursing satisfaction, the 1380 participants included in the study were divided into relevant groups based on specific criteria such as severity of the condition. These criteria were chosen to ensure that the groups were comparable and that the evaluation of nursing satisfaction captured meaningful differences among participants. The combination of groups for the nursing satisfaction analysis was conducted in a manner that allowed for robust statistical comparisons and meaningful interpretation of the results.

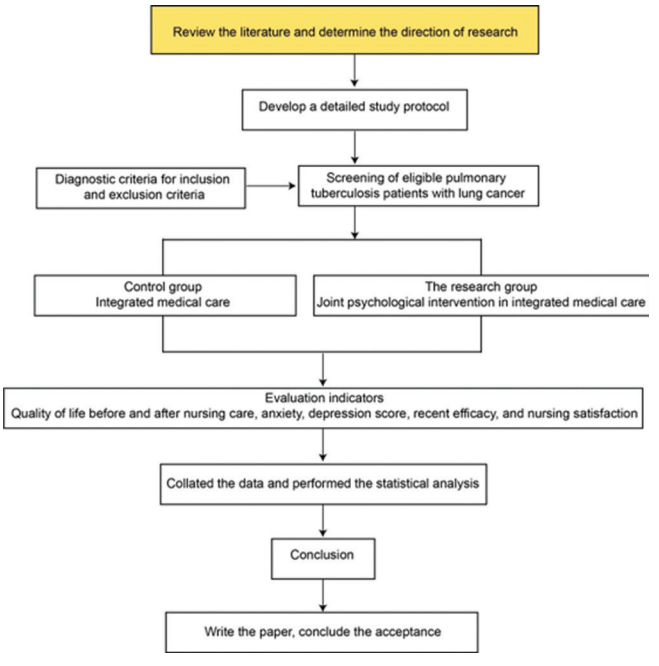
The hospital's scoring method for the nursing-satisfaction scale employed the following categorization: (1) Highly Satisfied: Patients who expressed an exceptionally positive view of their nursing care experience, indicating a high level of contentment and confidence in the provided care. (2) Satisfied: Patients who reported overall satisfaction with their nursing care, indicating a positive perception of the services received. (3) Moderately Satisfied: Patients who expressed a moderate level of satisfaction with their nursing care, indicating some areas for improvement or aspects that met expectations but did not exceed them. (4) Dissatisfied: Patients who reported dissatisfaction with their nursing care, indicating significant concerns or issues that negatively impacted their experience. This categorization allowed for a nuanced assessment of patients' nursing satisfaction, capturing a range of sentiments and experiences based on the hospital's established criteria. Satisfaction = (Highly satisfied + satisfied + moderately satisfied) / total number of cases × 100%.

Technical route. Figure 1 details the specific technical route.

Statistical Analysis

The research team analyzed the data using the SPSS 20.0 software . The team: (1) expressed continuous data as means ± standard deviations (SDs) and compared the groups using

Figure 1. Technical route



an independent sample *t* test; (2) for comparisons involving multiple groups or time points, applied multiple comparisons; and (3) expressed categorical data as numbers (N) and percentages (%s) and compared the groups using the Chi-square (χ^2) test. $P < .05$ indicated statistically significant differences.

RESULTS

Participants

The research team included and analyzed the data of 60 participants, 30 in each group (Table 1). The intervention group included 18 males (60.00%) and 12 females (40.00%), aged 32-75 y with a mean age of 49.84 ± 6.29 y. The group's body mass index (BMI) ranged from 19 to 23.9 kg/m^2, with a mean BMI of 21.25 ± 0.88 kg/m^2. In terms of pathological type, nine participants in the group had adenocarcinoma (30.00%), 13 had adenosquamous carcinoma (43.33%), and eight had squamous carcinoma (26.67%), and in terms of clinical stage, 11 participants were stage I (36.67%), nine were stage II (30.00%), and 10 were stage III (33.33%).

The control group included 16 males (53.33%) and 14 females (46.67%), aged 35-78 y with a mean age of 50.11 ± 6.09 y. The group's BMI ranged from 19.8 to 23.9, with a mean BMI of 21.08 ± 0.94 kg/m^2. In terms of pathological type, 10 participants in the group had adenocarcinoma (33.33%), 11 had adenosquamous carcinoma (36.67%), and nine had squamous carcinoma (30.00%), and in terms of clinical stage, 10 participants were stage I (33.33%), 11 were stage II (36.67%), and nine were stage III (30.00%).

No significant differences existed between the groups in their demographic or clinical characteristics at baseline ($P > .05$).

Table 1. Patient characteristics ($\bar{x} \pm s$)

		Study	Control	*t*	*P* value
n	-	30	30	-	-
Sex	Male	18	16	-	-
	Female	12	14	-	-
Age(years)	-	32-75	35-78	-	-
	Mean	49.84±6.29	50.11±6.09	0.169	.866
BMI(kg/m^2)	-	19-23.9	19.8-23.9	-	-
	Mean	21.25±0.88	21.08±0.94	0.723	.437
Pathological type	Adenocarcinoma	9	10	-	-
	Adenosquamous carcinoma	13	11	-	-
	Squamous carcinoma	8	9	-	-
Clinical Stages	I	11	10	-	-
	II	9	11	-	-
	III	10	9	-	-

Table 2. Short-term efficacy (%)

	Study	Control	χ^2	*P* value
n	30	30	-	-
Complete remission	4(13.33)	2(6.67)	-	-
Partial remission	19(63.33)	14(46.67)	-	-
Stable disease	6(20.00)	6(20.00)	-	-
Progressive disease	1(3.33)	8(26.67)	-	-
Clinical efficacy	76.7	53.3	3.000	.035

Table 3. Quality of life ($\bar{x} \pm s$)

	Domains	Study	Control	*t*	*P* value
n	-	30	30	-	-
Before intervention	Somatic function	44.94±5.23	45.01±5.65	0.050	.960
	Emotional function	53.21±5.45	53.26±5.24	0.036	.971
	Role Function	48.89±5.54	48.73±5.74	0.110	.913
	Social Function	50.15±5.25	50.44±5.49	0.209	.835
	Cognitive function	54.92±5.15	54.89±5.32	0.022	.983
After intervention	Somatic function	70.01±5.94	58.51±6.17	7.354	<.05
	Emotional function	75.21±5.25	64.36±5.39	7.898	<.05
	Role Function	69.35±5.98	54.71±6.19	9.317	<.05
	Social Function	66.84±6.08	56.89±5.14	6.845	<.05
	Cognitive function	73.25±5.77	60.23±5.56	8.900	<.05

Table 4. SAS and SDS scores ($\bar{x} \pm s$)

		Study	Control	*t*	*P* value
n	-	30	30	-	-
Before intervention	SAS	68.25±2.96	68.09±2.82	0.214	.831
	SDS	70.25±2.36	70.17±2.44	0.129	.898
After intervention	SAS	39.94±3.25	50.94±4.01	11.673	<.001
	SDS	44.17±3.14	56.56±4.45	12.460	<.001

Short-term Efficacy

Table 2 shows that CR occurred in the intervention group for four participants (13.33%), PR for 19 (63.33%), SD for six (20.00%), and PD for one (3.33%). In the control group, CR occurred for two participants (6.67%), PR for 14 (46.67%), SD for six (20.00%), and PD for eight (26.67%).

The intervention group had significantly higher short-term efficacy, at 76.7% for 23 participants, than the control group did, at 53.3% for 16 participants ($P = .035$).

Quality of Life

Table 3 shows that no significant differences existed between the groups at baseline in the quality of life ($P > .05$). Postintervention, the intervention group's mean somatic function was 70.01 ± 5.94, emotional function was 75.21 ± 5.25, role function was 69.35 ± 5.98, social function was 66.84 ± 6.08, and cognitive function was 73.25 ± 5.77. Postintervention, the control group's mean somatic function was 58.51 ± 6.17, emotional function was 64.36 ± 5.39, role function was 54.71 ± 6.19, social function was 56.89 ± 5.14, and cognitive function was 60.23 ± 5.56.

The intervention group's SF-36 scores were all significantly higher than those of the control group (all $P < .001$).

Negative Emotions

Table 4 shows that no significant differences existed between the groups at baseline in negative emotions ($P > .05$). Postintervention, the intervention group's mean SAS scores and SDS scores were 39.94 ± 3.25 and 44.17 ± 3.14, respectively, and the control group's mean scores were 50.94 ± 4.01 and 56.56 ± 4.45, respectively.

The intervention group's SAS and SDS scores were significantly lower than those of the control group postintervention, suggesting a better psychological status for patients receiving integrated nursing plus psychological intervention compared to those given integrated nursing alone (both $P < .001$).

Nursing Satisfaction

Table 5 shows that the 169 participants in the intervention groups were highly satisfied (24.50%), 395 were satisfied (57.25%), 95 were moderately satisfied (13.77%), and 31 were dissatisfied (4.49%). In the control groups, 55 participants were highly satisfied (7.97%), 318 were satisfied (46.09%), 207 were moderately satisfied (30.00%), and 110 were dissatisfied (15.94%).

Table 5. Nursing satisfaction (%)

	Study	Control	χ^2	*P* value
n	30*23	30*23	-	-
Highly satisfied	169(24.50)	55(7.97)	-	-
Satisfied	395(57.25)	318(46.09)	-	-
Moderately satisfied	95(13.77)	207(30.00)	-	-
Dissatisfied	31(4.49)	110(15.94)	-	-
Satisfaction	95.507	84.058	152.132	.000

The intervention group's nursing satisfaction, at 95.51% for 659 participants, was significantly higher than that of the control group, at 84.06% for 580 participants ($P = .000$).

DISCUSSION

The current study found that integrated nursing plus psychological intervention resulted in significantly higher SF-36 scores, treatment efficacy, and nursing satisfaction and significantly lower SAS and SDS scores compared to integrated nursing alone.

The hospital in the present study, by combining integrated nursing care and psychological care for patients with pulmonary TB combined with lung cancer, used scientific and reasonable nursing methods to provide patients with scientific psychological guidance, reduce patients' psychological burdens and negative emotions, and enhance their treatment confidence, thus improving the treatment effect. The current study's results suggest that integrated nursing plus psychological intervention can effectively eliminate patients' negative emotions, enhance the treatment effect, promote patients' physical and mental health, and provides prognostic benefits.

The current study's innovation is the combination of integrated nursing care and psychological care for patients with pulmonary TB complicated by lung cancer to enhance patients' confidence in treatment, improve their quality of life, give full play to the role of nursing care. and promote patients' recovery with scientific and reasonable nursing care. This study has supported a new treatment alternative for the care of patients with pulmonary TB combined with lung cancer, contributing to the improvement of patient outcomes.

The current study had some limitations, including the small sample size and short-term follow-up. The current research team intends to perform future studies with a larger sample size and long-term follow-up to provide more solid evidence. To address these limitations more explicitly, future research endeavors will focus on larger sample sizes, longer follow-up periods, and multicenter collaborations to provide more robust and generalizable evidence regarding the benefits of integrated nursing and psychological interventions for patients with pulmonary TB complicated by lung cancer.

The current study recognized the importance of addressing both the physical and the mental aspects of health. It can serve as a steppingstone for future research to further explore the potential benefits of such interventions and to expand their application to a broader range of healthcare settings [23] and patient populations.

CONCLUSIONS

Integrated nursing plus psychological intervention can improve the quality of life of patients with TB complicated by lung cancer, alleviate their negative emotions, and enhance nursing satisfaction, thereby promoting patients' recoveries.

AUTHORS' DISCLOSURE STATEMENT

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