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ORIGINAL

IMPACTS OF AN EVIDENCE-BASED MEDICAL APPROACH COMBINED WITH ATHLETE-CENTRIC NURSING ON ENHANCING TUBERCULOSIS SPUTUM SUBMISSION AND CARE QUALITY IN RESPIRATORY MANAGEMENT OF ATHLETES

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ABSTRACT

Objective: To evaluate the impact of an evidence-based medicine model combined with human-centered nursing on improving the submission rate of tuberculosis sputum samples and nursing quality for athletes in a respiratory department. **Methods:** A retrospective analysis was conducted on 142 athletes diagnosed with pulmonary tuberculosis in our sports medicine facility from January to July 2022, requiring sputum sample collection. They were randomly divided into an experimental group (71 athletes) receiving evidence-based medicine alongside human-centered nursing and a control group (71 athletes) receiving standard nursing care. The study assessed the submission rate of TB sputum samples, quality of life (SF-36) scores before and after nursing, and levels of nurse effectiveness and patient satisfaction. **Results:** The submission rate for TB sputum samples was significantly higher in the experimental group (87.32%) compared to the control group (71.83%) ($P < 0.05$). Quality of life metrics including physical, social, emotional, and mental health functions improved significantly post-nursing in both groups, with more pronounced improvements observed in the experimental group ($P < 0.05$). Patient satisfaction was also higher in the experimental group (95.77%) compared to

the control group (80.28%). **Conclusion:** The integration of an evidence-based medicine model with human-centered nursing significantly enhances the submission rate of tuberculosis sputum samples and overall nursing quality among athletes. This approach fosters closer relationships between nurses and athlete patients, heightening patient satisfaction and contributing to more timely and effective treatment outcomes in sports healthcare settings.

KEYWORDS: Pulmonary tuberculosis; Tuberculosis sputum submission rate; Evidence-based medicine model; Human centered nursing; Quality of care

1. INTRODUCTION

The effective management of tuberculosis (TB) in athletes requires meticulous attention to diagnostic and treatment protocols to ensure timely intervention and prevent the spread of the disease within sports facilities. Tuberculosis, particularly pulmonary tuberculosis, poses significant challenges in the sports community where close contact and strenuous activities can exacerbate health outcomes and facilitate the transmission of TB. The collection and submission of accurate diagnostic samples, such as sputum for TB, is crucial for the early detection and management of this infectious disease. Current standard practices in respiratory departments may not adequately address the specific needs of athletes, who require swift recovery and return to training. As such, there is a growing interest in exploring comprehensive care models that integrate evidence-based medicine with patient-centered approaches to enhance clinical outcomes. One such approach is the combination of evidence-based medicine models with human-centered nursing, which prioritizes the individual needs and experiences of athletes, potentially improving compliance and satisfaction with the treatment process. Human-centered nursing focuses on providing care that is respectful of and responsive to individual patient preferences, needs, and values, ensuring that patient values guide all clinical decisions (Beitzinger et al., 2021). In the context of athletes with tuberculosis, this approach could involve tailored educational programs about TB transmission, personalized scheduling of treatment sessions to align with training regimes, and psychological support to address concerns about performance and career impact (Delgado et al., 2022; Steingart et al., 2006). Additionally, evidence-based medicine—defined by the use of the best current evidence in making decisions about the care of individual patients—can further refine treatment protocols by integrating the latest research findings into clinical practice (Jamil, Wahab, Ali, & Yahaya, 2018; Nakiyingi et al., 2013; Sanoussi et al., 2019). For athletes, this means that interventions for TB are not only based on general clinical guidelines but are also adapted to ensure minimal disruption to their training and competitive schedules. The synthesis of these approaches presents a promising paradigm for enhancing the submission rates of tuberculosis sputum samples and improving the overall quality of nursing care in the respiratory departments

handling athletes (Kawka et al., 2021; Luo et al., 2021). This model not only promises better clinical outcomes but also ensures a more athlete-focused care pathway, potentially reducing downtime and improving the quality of life and satisfaction among this unique population(Omar et al., 2015).

2. Data Methods

2.1 General Information

Retrospective analysis was performed on the clinical information of 142 patients with pulmonary tuberculosis who were admitted to the respiratory unit of our hospital between January and July 2022 and required the collection of sputum samples.

2.1.1 Inclusion standards

(1) All patients had pulmonary tuberculosis and met the diagnostic criterion; (2) Those who were older than 18 years old; (3) Those with no mental illness or communication disorder; (4) Informed consent was provided by patients or their relatives; (5) the hospital ethics committee had authorized it; and (approval number: 2022b154).

2.1.2 Exclusion standards

(1) Patients with acute or ongoing infections; (2) Patients with COPD, asthma, and other respiratory conditions; (3) Women who are pregnant or nursing; (4) Those who cannot cooperate and with serious diseases such as tumor. 142 patients diagnosed pulmonary TB were split into both groups using the random number table method: the experimental group (n = 71) and the controlling group (n = 71).

They included 41 men and 30 women in the experimental group, with a mean lifespan of (32.43 ± 7.12) years and a hospital stay of (12.92 ± 2.90) days. There were 39 men and 32 women in the controlling group, with a mean lifespan of (32.69 ± 7.23) years and a hospital stay of (13.04 ± 2.77) days. The overall data for the both groups did not vary substantially (P > 0.05). See Table 1.

Table 1: Comparing of general data of the both groups [n (%) ($\bar{x} \pm s$)]

GROUPING	N	GENDER (MALE / FEMALE)	AGE (YEARS)	LENGTH OF STAY (D)
EXPERIMENTAL GROUP	71	41/30	32.43 ± 7.12	12.92 ± 2.90
CONTROLLING GROUP	71	39/32	32.69 ± 7.23	13.04 ± 2.77
X^2/T		0.204	0.292	0.319
P		0.651	0.771	1.000

2.2 Methods

The controlling group received routine caring intervention, and the nursing staffs distributed sputum specimen boxes to the patients according to the doctors' advice, and explained the method, amount and place of retention to them, and finally sent the sputum specimen boxes for examination by the work staffs. The experimental group adopted the evidence-based medicine model combined with human centered nursing intervention. The contents of the evidence-based medicine model were as follows:

(1) On the basis of evidence-based medicine strategy: The evidence-based group was established and the common problems in the nursing process were put forward according to the clinical manifestations and reasonable needs of patients, and the corresponding countermeasures were formulated.

(2) Evidence-based support: The literatures related to the submission of TB sputum samples and the quality of nursing in the Department of respiration were investigated and collected, and the literatures were searched through CNKI, NICE, RNAO, SIGN UP TO DATE and other databases, with Chinese Keywords: "tuberculosis / phthisis / consumption", "sputum / sputum samples / sputum", "collection / collection / retention", Foreign Keywords: "tuberculosis/phthisis/ pulmonary tuberculosis/consumption" "sputum / phlegm/sputamentum" "collection/collect/gather".

(3) Search results: A total of 32 Chinese literatures and 50 English literatures were obtained. After reading the abstracts and the full texts, 6 literatures related to the submission of tuberculosis sputum samples and the quality of nursing in the Department of respiration were obtained.

(4) Evidence integration: The obtained literatures were systematic analyzed, combined with the specific problems existing in the management of tuberculosis sputum examination in our hospital, the best and latest evidence summary contents were applied to clinical nursing work, the possible obstacle factors were analyzed and discussed, the causes were clarified, and the solutions were formulated.

(5) Specific measures: ① Strengthening health education. ② Improving sputum collection methods. ③ Carrying out nurse training. ④ Strengthening hand hygiene management. ⑤ Determining the time of collection for inspection. The contents of people-oriented nursing were as follows:

(1) People-oriented: The nursing staffs should actively communicate with patients, ask their psychological needs and meet their reasonable needs,

help patients solve problems within their capabilities, which can increase patients' trust in nursing staffs and establish a good nurse patient relationship.

(2) Reasonable arrangement of shifts: The ward was divided into regions, and a reasonable post rotation system was formulated to ensure that each region has relevant responsible nurses.

(3) Ward environment: It was necessary to provide patients with a good ward environment, open windows and ventilate, ensure indoor quiet and tidy, and improve comfort of patients.

(4) Psychological intervention: It was necessary to understand the doubts and state changes in patients' hearts, and give positive and effective psychological support to relieve their bad emotions.

2.3 Observation Indicators

(1) TB sputum specimen submission rate: the TB sputum specimen submission rate before and after caring of the both groups were recorded and compared.

(2) Nursing quality: the caring quality of the both groups were evaluated through the self-made caring quality questionnaire in our hospital, including environmental management, caring staff training, caring safety, disinfection and isolation, nursing monitoring, humanistic concern and nursing document management. The greater the grade, the greater the caliber of the caring.

(3) Living conditions: The SF-36 rating was utilized to compare the both groups' living conditions in terms of physical, social, emotional, and mental health prior to and after caring. The quality of living improves as the rating rises.

(4) Satisfaction: In our hospital, a self-made satisfaction questionnaire that was classified into three parts satisfied, usually satisfied, and dissatisfied—was utilized examine the care quality of the both groups. (Number of highly pleased patients + Number of generally satisfied instances) / Total Observed Cases × 100% = Nursing Satisfaction (%).

2.4 Statistical Methods

SPSS 21.0 was utilized to analyze the data. The x^2 test was applied for pairwise comparison, and the measurement results were reported as n (%). The independent sample t-test was utilized to do pairwise comparison on the count data, which were written as ($\bar{x} \pm s$). A clinically meaningful discrepancy was defined as $P < 0.05$.

3. Results

3.1 Analysis of the submission of sputum samples of tuberculosis in the both groups

Before nursing, In the experimental group, 51 instances of tuberculous sputum samples were sent for analysis; the submission rate was 71.83%; in the comparison group, 49 instances of tuberculous sputum samples were sent for analysis; the submission rate was 69.01%. The submission rate variation between the both groups was not clinically meaningful (P > 0.05). Following nursing, 61 instances of tuberculous sputum samples from the experimental group were sent for examination, with a submission rate of 87.32%, and 51 instances from the comparison group, with a submission rate of 71.83%. The disparity in submission rates of the both groups was clinically meaningful (*P* < 0.05). See Table 2, Figure 1 and Figure 2.

Table 2: Comparing of tuberculosis sputum submission rates of the both groups

GROUPING	NUMBER OF CASES	BEFORE NURSING		AFTER NURSING	
		Number of cases	Submission rate (%)	Number of cases	Submission rate (%)
EXPERIMENTAL GROUP	71	51	71.83	61	87.32
CONTROLLING GROUP	71	49	69.01	51	71.83
X^2			0.135		4.226
P			0.713		0.040

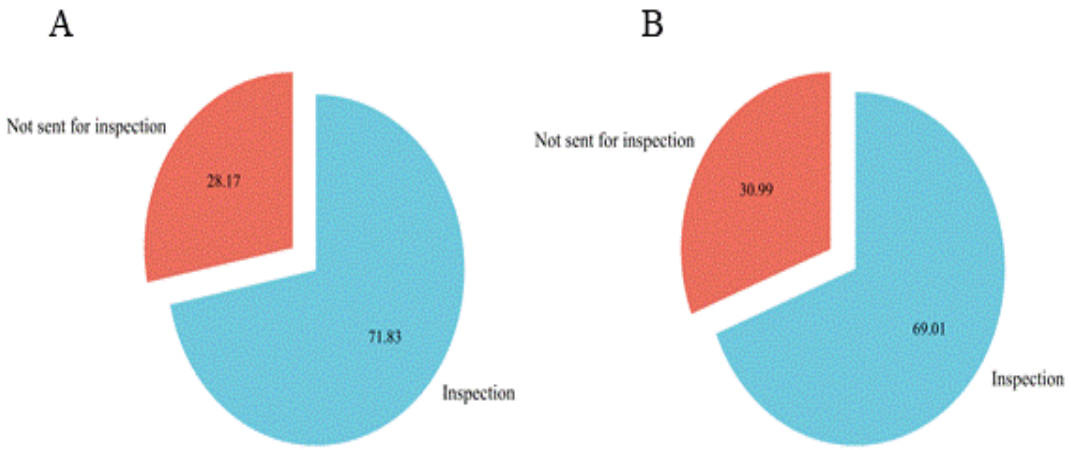

Figure 1: Distribution of tuberculosis sputum samples submission situations in the both groups before nursing

Note: *Figure A: Distribution of tuberculosis sputum samples submission situations before nursing in the observation group; Figure B: Distribution of tuberculosis sputum samples submission situations in the controlling group before nursing*

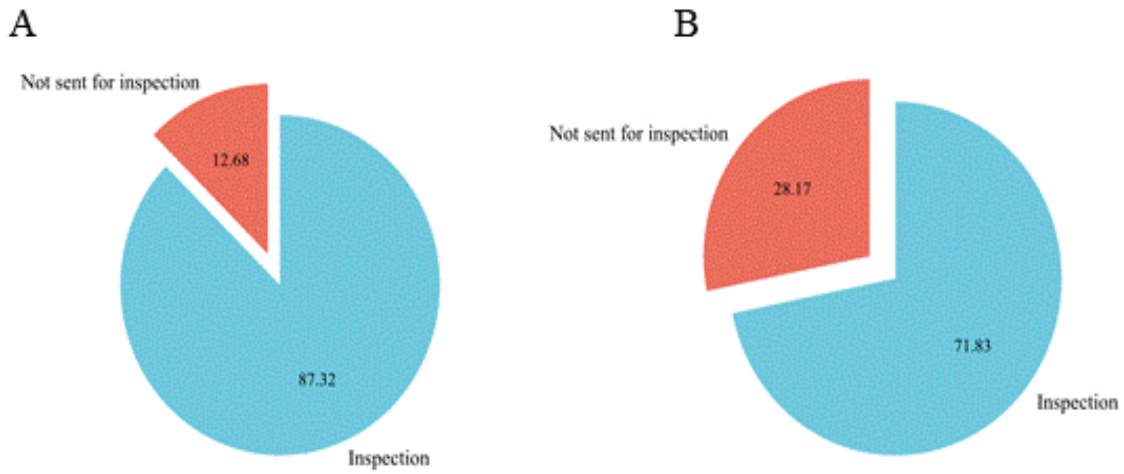

Figure 2: Distribution of tuberculosis sputum samples submission situations after nursing in the both groups

Note: *Figure A: Distribution of tuberculosis sputum samples submission situations in the observation group after nursing; Figure B: Distribution of tuberculosis sputum samples submission situations in the controlling group after nursing*

3.2 Analysis of nursing quality in the both groups

The marks of environmental management, nursing staff training, nursing safety, disinfection and isolation, nursing monitoring, the experimental group greatly outperformed the controlling group in terms of humanistic concern and nursing record management, and the discrepancy was highly meaningful ($P < 0.05$). See Table 3 and Figure 3.

Table 3: Comparing of nursing quality of the both groups ($\bar{x} \pm s$)

GROUPING	EXPERIMENTAL GROUP (N=71)	CONTROLLING GROUP (N=71)	*T*	*P*
ENVIRONMENTAL MANAGEMENT	13.93 ± 2.79	10.90 ± 2.53	6.623	0.000
NURSING STAFF TRAINING	14.74 ± 2.58	7.33 ± 2.70	16.599	0.000
NURSING SAFETY	13.08 ± 3.47	10.17 ± 3.69	4.898	0.000
DISINFECTION AND ISOLATION	14.12 ± 2.16	9.15 ± 2.90	11.497	0.000
NURSING MONITORING	14.16 ± 1.75	8.37 ± 3.26	13.045	0.000
HUMANISTIC CONCERN	14.01 ± 2.44	9.11 ± 2.95	10.482	0.000
NURSING DOCUMENT MANAGEMENT	13.85 ± 3.30	9.02 ± 3.07	8.860	0.000

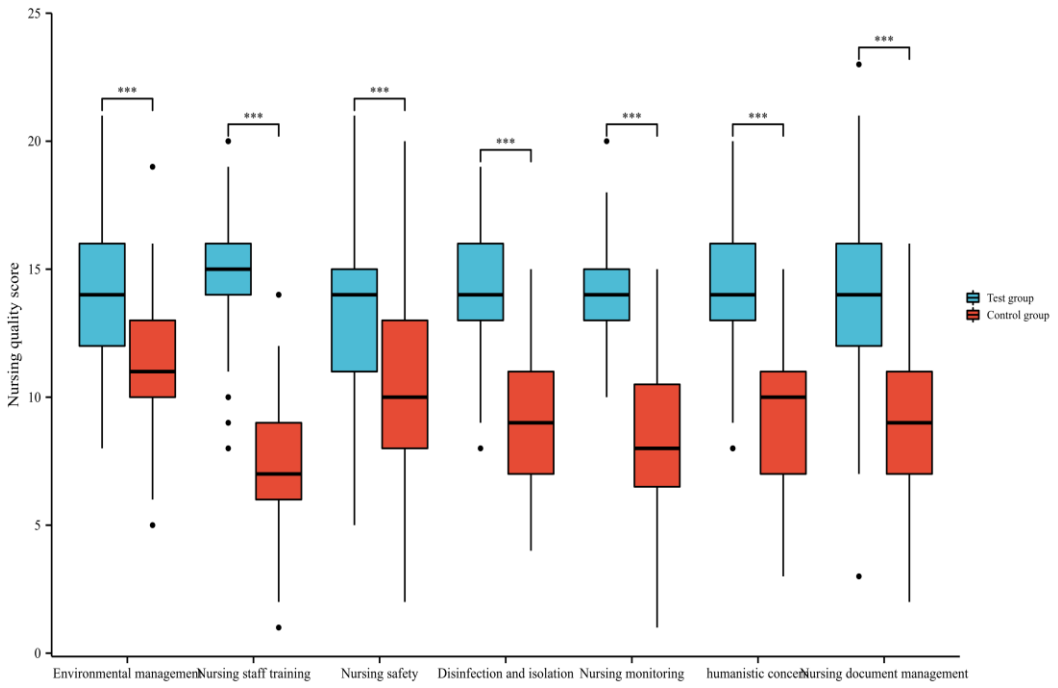

Figure 3: Comparing of nursing quality of the both groups

3.3 Analysis of quality of living of tuberculosis patients of the both groups

Following caregiving, both groups' ratings for physiological function, social function, emotional function, and mental health were much greater than they had been. This variation was highly meaningful ($P < 0.05$).

Following caregiving, the experimental group rated higher on measures of physiological function, social function, emotional function, and mental health than did the controlling group, and this variation was highly meaningful ($P < 0.05$). See Table 4 and Figure 4.

Table 4: Comparing of SF-36 marks of the both groups ($\bar{x} \pm s$)

GROUPING	TIME	PHYSIOLOGICAL FUNCTION	SOCIAL FUNCTION	EMOTIONAL FUNCTION	MENTAL HEALTH
EXPERIMENTAL GROUP(N=71)	Before nursing	61.49 ± 6.80	53.93 ± 5.81	48.54 ± 6.38	64.33 ± 7.83
	After nursing	88.43 ± 9.98*#	84.30 ± 8.12*#	87.02 ± 10.11*#	88.38 ± 9.12*#
CONTROLLING GROUP (N=71)	Before nursing	62.44 ± 7.71	53.40 ± 6.45	48.70 ± 5.53	63.84 ± 8.74
	After nursing	77.10 ± 7.93*	76.33 ± 7.98*	77.09 ± 8.33*	79.12 ± 8.22*

Note: ** indicates a difference of P<0.05 from the pre-nursing value. # denotes P<0.05 when compared to the control group after breastfeeding.*

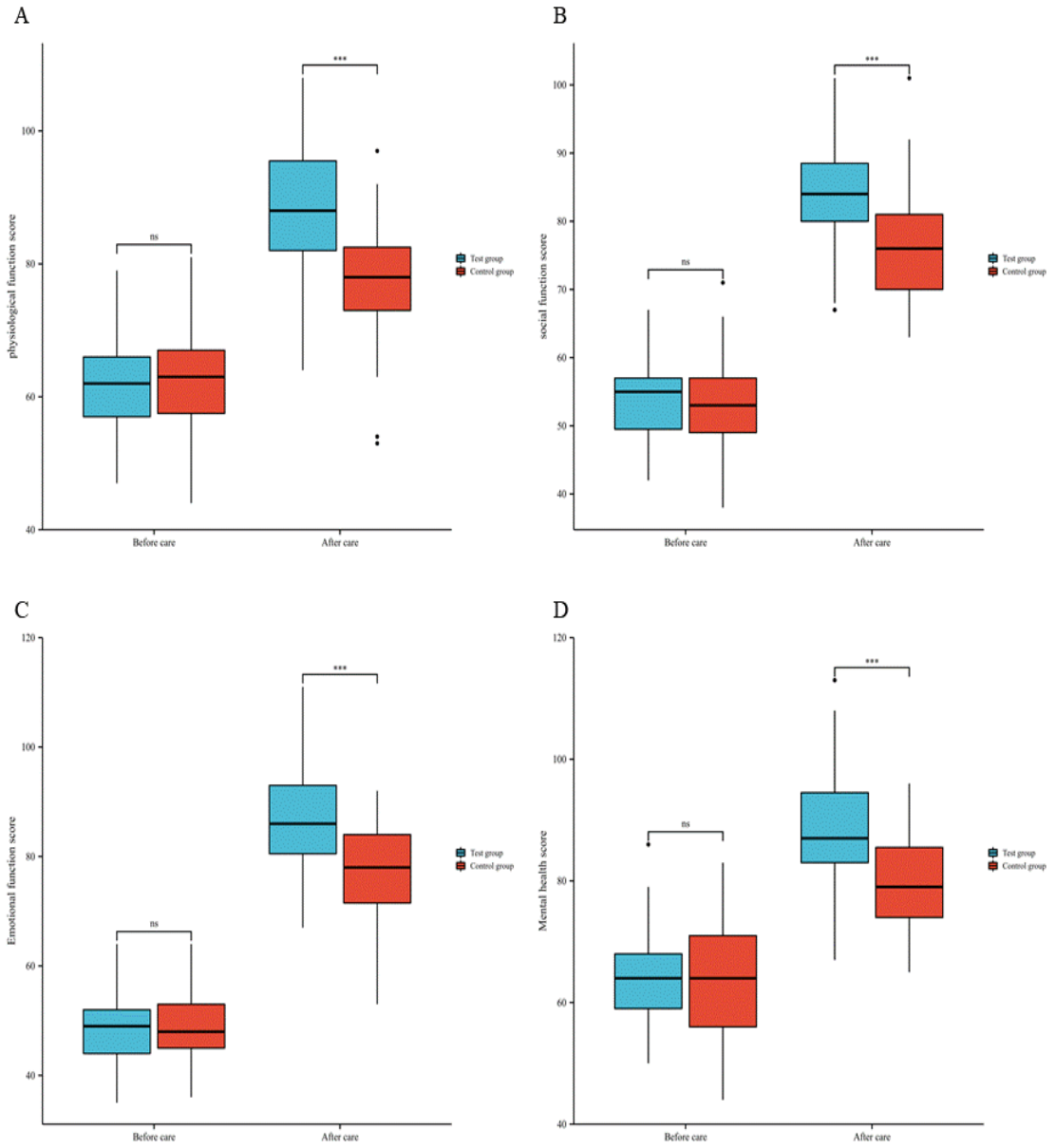

Figure 4: Comparing of SF-36 marks of the both groups

Note: *Figure A: Comparing of physiological function marks of the both groups; Figure B: Comparing of social function marks of the both groups; Figure C: Comparing of emotional function marks of the both groups; Figure D: Comparing of mental health marks of the both groups.* *** *denotes that following nursing, in comparison to the controlling group, P < 0.05.*

3.4 Analysis of nursing satisfaction of the both groups

35 instances in the experimental group were extremely happy, 33 instances were fairly satisfied, and 95.77% of the instances were completely satisfied. In the comparison group, there were 30 instances that were usually satisfied and 27 instances that were extremely satisfied, making the overall satisfaction rate 80.28%. There was a clinically meaningful variation of the both groups' overall satisfaction levels ($P < 0.05$). See Table 5 and Figure 5.

Table 5: Comparing of nursing satisfaction of the both groups n (%)

GROUPING	N	VERY SATISFIED	GENERALLY SATISFIED	DISSATISFIED	TOTAL SATISFACTION
EXPERIMENTAL GROUP	71	35 (49.30)	33 (46.47)	3 (4.23)	68 (95.77)
CONTROLLING GROUP	71	27 (38.03)	30 (42.25)	14 (19.72)	57 (80.28)
X^2					8.086
P					0.005

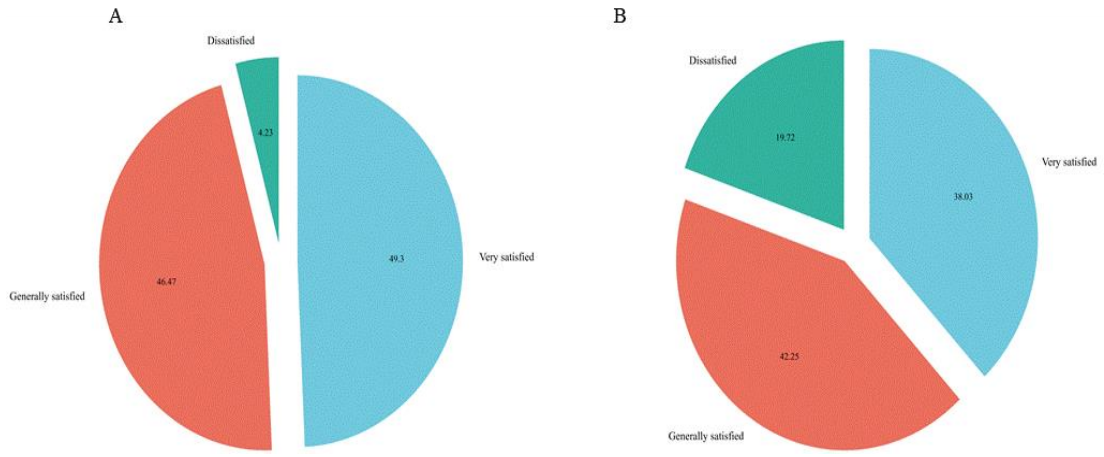

Figure 5: Analysis of the distribution of nursing satisfaction in the both groups

Note: *Figure A shows an assessment of the caring satisfaction distribution in the experimental group; Figure B shows an assessment of the caring satisfaction distribution in the comparison group.*

4. Discussion

Tuberculosis is caused by Mycobacterium tuberculosis. People may not get sick immediately after infection. However, under the stimulation of environmental, psychological and other factors, the immunity of people carrying Mycobacterium tuberculosis is reduced, which causes high allergy of cells, finally resulting in the occurrence of the symptoms of tuberculosis (Anye et al., 2020; Benabdessalem et al., 2019; Gebretsadik, Ahmed, Kebede, Mohammed, & Belete, 2020). Studies have shown that Mycobacterium tuberculosis has relatively strong viability and can adapt to dry, cold, acid, alkali and other environments. It can survive for months in a dark and humid environment, and for years in a dry environment (Mesman et al., 2021; Misra et al., 2019). Therefore, if patients do not check sputum in time, the infectious source cannot be controllingled in time, causing the spread of Mycobacterium tuberculosis, and then leading to cross infection, which brings serious harm to the society (Beitzinger et al., 2021). (Ervin et al., 2020; Jensen et al., 2019) Sputum tuberculosis detection is an important mean of diagnosing pulmonary tuberculosis, with high accuracy, simple operation and low cost, which is easy for patients to accept (Amelio et al., 2019). Researches have shown that

nursing intervention can effectively improve the compliance of patients with sputum retention, so timely sputum examination and detection of infectious sources, and timely and effective intervention are conducive to reducing the occurrence risk of tuberculosis (Lu et al., 2021; Xu, Chen, & Li, 2021). Therefore, this study intervened the patients with pulmonary tuberculosis in the experimental group and the controlling group through the evidence-based medicine model combined with people-oriented nursing and routine nursing, respectively (Corbett et al., 2020; Yohannan, 2020). The findings revealed that after caregiving, the experimental group's TB sputum submission rate was 87.32%, which was substantially higher than the controlled group's (71.83%) rate ($P < 0.05$), showing that evidence-based medicine model combined with human centered nursing can improve the submission rate of sputum samples of tuberculosis of patients in respiratory Department. The reason may be that health education for patients through nursing intervention is conducive to correctly mastering the methods and steps of retaining sputum samples (Epola Dibamba Ndanga et al., 2022; Shivalli et al., 2020). The nursing staffs should select the most specific and beneficial sputum sample collection method according to the patients' own situations, which is conducive to improving the quality of sputum sample collection (Mhalu et al., 2015). In addition, strengthening hand hygiene management is beneficial to help patients form good hand hygiene and reduce the contamination rate of sputum specimens (Shu et al., 2010). The marks of environmental management, nursing staff training, nursing safety, disinfection and isolation, nursing monitoring, humanistic concern and nursing document management in the experimental group were higher than those in the controlling group ($P < 0.05$), showing that the quality of caring can be greatly enhanced by utilizing an evidence-based medicine approach in conjunction with human-centered caring. It may be due to the development of nursing staff training and regular assessment and evaluation, this is helpful for increasing the nursing staffs' interest for both studying and working, and improving their health education level (Bisallah et al., 2018). In addition, cultivating the clinical thinking ability of nursing staffs can improve their ability to find problems, solve problems and reflect on problems. And actively exploring methods of improving the quality of sputum collection is conducive to improving the efficiency of clinical nursing work and nursing quality (Kigozi, Heunis, Engelbrecht, Janse van Rensburg, & van Rensburg, 2017). SF-36 score is an important method to evaluate the quality of life of patients, which has been widely used in clinic. In this study, SF-36 score was used to evaluate the quality of life of both groups of patients with pulmonary tuberculosis. The findings demonstrated that the experimental group's marks on physiological function, social function, emotional function, and mental health were markedly larger than those of the comparison group after healthcare ($P < 0.05$), demonstrating that the evidence-based medicine model in conjunction with human-centered nursing can successfully improve patients' quality of living. It is so because combining the two strategies can increase the comfort of

patients, better address their physical and psychological demands, lower the likelihood of adverse events, and ultimately improve the quality of living for those who have pulmonary tuberculosis (Liu, Zhang, Hu, He, & Zhou, 2011; Yu & Dong, 2022). The nurse satisfaction of the two patient groups in this study was also examined using a self-made satisfaction survey created by our institution. The findings revealed that the experimental group's overall nursing satisfaction was 95.77 percent, which was substantially larger compared to the controlling group's (80.28) ($P < 0.05$), showing that evidence-based medicine model combined with human centered nursing can significantly improve nursing satisfaction and establish a harmonious and good nurse patient relationship (STAECK, OTTONI, & SCHINDLER, 2022). The integration of evidence-based medicine and human-centered nursing holds significant promise for enhancing the management of tuberculosis in athletes, particularly in the realm of improving sputum sample submission rates and overall nursing quality. This approach ensures that treatments are not only grounded in robust scientific evidence but are also tailored to meet the unique needs and circumstances of athletes, thereby fostering better compliance and satisfaction. By focusing on personalized care strategies that consider the rigorous demands of athletes' schedules and the psychological impacts of illness on performance, such models of care can profoundly impact health outcomes. Ultimately, this holistic strategy enhances the efficacy of tuberculosis management in athletic populations, ensures faster recovery times, and supports the athletes' return to their peak performance levels, all while maintaining rigorous standards of care and infection control within sports environments.

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References

Amelio, P., Portevin, D., Hella, J., Reither, K., Kamwela, L., Lweno, O., . . . Ding, S. (2019). HIV infection functionally impairs Mycobacterium tuberculosis-specific CD4 and CD8 T-cell responses. *Journal of virology, 93*(5), 10.1128/jvi. 01728-01718.

Anye, C. S., Nkfusai, C. N., Yankam, B. M., Wirsiy, F. S., Tsoka-Gwegweni, J. M., & Cumber, S. N. (2020). A four-year hospital-based retrospective study of the predictors of tuberculosis in people living with hiv and receiving care at bamenda regional hospital, cameroon. *International Journal of Maternal and Child Health and AIDS, 9*(2), 167.

Beitzinger, B., Gerbl, F., Vomhof, T., Schmid, R., Noschka, R., Rodriguez, A., . . . Walther, P. (2021). Delivery by Dendritic Mesoporous Silica

Nanoparticles Enhances the Antimicrobial Activity of a Napsin-Derived Peptide Against Intracellular Mycobacterium tuberculosis. *Advanced Healthcare Materials, 10*(14), 2100453.

Benabdessalem, C., Othman, H., Ouni, R., Ghouibi, N., Dahman, A., Riahi, R., . . . Fathallah, M. D. (2019). N-glycosylation and homodimeric folding significantly enhance the immunoreactivity of Mycobacterium tuberculosis virulence factor CFP32 when produced in the yeast Pichia pastoris. *Biochemical and Biophysical Research Communications, 516*(3), 845-850.

Bisallah, C., Rampal, L., Iye, M., Mohd, s. s., Ibrahim, n., iliyasu, Z., & onyilo, m. (2018). effectiveness of health education intervention in improving knowledge, attitude, and practices regulating tuberculosis among HIV patients in general hospital Minna, Nigeria - a randomized control trial PLoS one *13* (2), e0192276.

Corbett, T. K., Cummings, A., Lee, K., Calman, L., Fenerty, V., Farrington, N., . . . Wiseman, T. (2020). Planning and optimising CHAT&PLAN: A conversation-based intervention to promote person-centred care for older people living with multimorbidity. *Plos one, 15*(10), e0240516.

Delgado, L. G., Postigo, M., Cuadrado, D., Gil-Casanova, S., Martínez, Á. M., Linares, M., . . . Bassat, Q. (2022). Remote analysis of sputum smears for mycobacterium tuberculosis quantification using digital crowdsourcing. *Plos one, 17*(5), e0268494.

Epola Dibamba Ndanga, M., Achimi Agbo Abdul, J. B. P., Edoa, J. R., Chester Mevyann, R., Adegbite, B. R., Mfoumbi, A., . . . McCall, M. B. (2022). Non-tuberculous mycobacteria isolation from presumptive tuberculosis patients in Lambaréné, Gabon. *Tropical Medicine & International Health, 27*(4), 438-444.

Ervin, J. N., Rentes, V. C., Dibble, E. R., Sjoding, M. W., Iwashyna, T. J., Hough, C. L., . . . Sales, A. E. (2020). Evidence-based practices for acute respiratory failure and acute respiratory distress syndrome: a systematic review of reviews. *Chest, 158*(6), 2381-2393.

Gebretsadik, D., Ahmed, N., Kebede, E., Mohammed, M., & Belete, M. A. (2020). Prevalence of tuberculosis by automated GeneXpert rifampicin assay and associated risk factors among presumptive pulmonary tuberculosis patients at Ataye District Hospital, North East Ethiopia. *Infection and Drug Resistance*, 1507-1516.

Jamil, N. I. N., Wahab, W. N. A. W. A., Ali, I. A., & Yahaya, M. L. (2018). Direct resazurin microplate assay in drug susceptibility testing of smear-positive sputum samples against mycobacterium tuberculosis. *The Malaysian journal of medical sciences: MJMS, 25*(6), 59.

Jensen, E. A., Dysart, K., Gantz, M. G., McDonald, S., Bamat, N. A., Keszler, M., . . . Duncan, A. F. (2019). The diagnosis of bronchopulmonary dysplasia in very preterm infants. An evidence-based approach. *Am J Respir Crit Care Med, 200*(6), 751-759.

Kawka, m., brzostek, a., dzitko, K., kryczka, J., Bednarek, R., strapagiel, D., . . . dziadek, B. (2021). Mycobacterium tuberculosis bindings human serum amyloid A, and the interaction modulates the colonization of human macrophages and the transcriptional response of the pathogen Cells. *10*(5), 1264.

Kigozi, N. G., Heunis, J. C., Engelbrecht, M. C., Janse van Rensburg, A. P., & van Rensburg, H. D. (2017). Tuberculosis knowledge, attitudes and practices of patients at primary health care facilities in a South African metropolitan: research towards improved health education. *BMC public health, 17*, 1-8.

Liu, B., Zhang, Y., Hu, J., He, L., & Zhou, X. (2011). Thinking and practice of accelerating transformation of traditional Chinese medicine from experience medicine to evidence-based medicine. *Frontiers of medicine, 5*, 163-170.

Lu, Y., Wang, H., Zhu, J., Wang, N., Cui, D., & Li, L. (2021). Effect of targeted nursing intervention plus psychological counseling on quality of life, negative emotions, and complications in patients with extensively drug-resistant tuberculosis. *American journal of translational research, 13*(12), 13950.

Luo, H. L., Pi, J., Zhang, J. A., Yang, E. Z., Xu, H., Luo, H., . . . Song, C. M. (2021). Circular RNA TRAPPC6B inhibits intracellular Mycobacterium tuberculosis growth while inducing autophagy in macrophages by targeting microRNA-874-3p. *Clinical & Translational Immunology, 10*(2), e1254.

Mesman, A. W., Baek, S.-H., Huang, C.-C., Kim, Y.-M., Cho, S.-N., Ioerger, T. R., . . . Murray, M. B. (2021). Characterization of drug-resistant lipid-dependent differentially detectable Mycobacterium tuberculosis. *Journal of Clinical Medicine, 10*(15), 3249.

Mhalu, G., Hella, J., Doulla, B., Mhimbira, F., Mtutu, H., Hiza, H., . . . Seimon, T. (2015). Do instructional videos on sputum submission result in increased tuberculosis case detection? A randomized controlled trial. *Plos one, 10*(9), e0138413.

Misra, R., Menon, D., Arora, G., Virmani, R., Gaur, M., Naz, S., . . . Maji, A. (2019). Tuning the Mycobacterium tuberculosis alternative sigma factor sigf through the multidomain regulator Rv1364c and osmosensory kinase protein Kinase D. *Journal of Bacteriology, 201*(7), 10.1128/jb. 00725-00718.

Nakiyingi, L., Bwanika, J. M., Kirenga, B., Nakanjako, D., Katabira, C., Lubega, G., . . . Manabe, Y. C. (2013). Clinical predictors and accuracy of empiric tuberculosis treatment among sputum smear-negative HIV-infected adult TB suspects in Uganda. *Plos one, 8*(9), e74023.

Omar, S. V., Peters, R. P., Ismail, N. A., Dreyer, A. W., Said, H. M., Gwala, T., . . . Fourie, P. B. (2015). Laboratory evaluation of a specimen transport medium for downstream molecular processing of sputum samples to

detect Mycobacterium tuberculosis. *Journal of microbiological methods, 117*, 57-63.

Sanoussi, C. N. D., de Jong, B. C., Affolabi, D., Meehan, C. J., Odoun, M., & Rigouts, L. (2019). Storage of sputum in cetylpyridinium chloride, OMNIgene. SPUTUM, and ethanol is compatible with molecular tuberculosis diagnostic testing. *Journal of Clinical Microbiology, 57*(7), 10.1128/jcm. 00275-00219.

Shivalli, S., Hondappagol, A., Akshaya, K. M., Nirgude, A., Varun, N., Reddy, R. H. R., & Sharath, B. N. (2020). Does mobile phone instructional video demonstrating sputum expectoration improve the sputum sample quality and quantity in presumptive pulmonary TB cases? Protocol for a prospective pragmatic non-randomised controlled trial in Karnataka state, India. *BMJ open, 10*(3), e032991-.

Shu, C.-C., Wang, J.-T., Lee, C.-H., Wang, J.-Y., Lee, L.-N., & Yu, C.-J. (2010). Predicting results of mycobacterial culture on sputum smear reversion after anti-tuberculous treatment: a case control study. *BMC Infectious Diseases, 10*, 1-7.

STAECK, W., OTTONI, F. P., & SCHINDLER, I. (2022). Mikrogeophagus maculicauda, a new dwarf cichlid (Teleostei: Cichlidae) from the eastern drainage of the upper Rio Guaporé, Brazil. *FishTaxa, 24*, 49-58.

Steingart, K. R., Ng, V., Henry, M., Hopewell, P. C., Ramsay, A., Cunningham, J., . . . Pai, M. (2006). Sputum processing methods to improve the sensitivity of smear microscopy for tuberculosis: a systematic review. *The Lancet infectious diseases, 6*(10), 664-674.

Xu, Z., Chen, W., & Li, X. (2021). Effects of comprehensive nursing intervention combined with respiratory functional exercises on pulmonary function and self-care ability in patients with pulmonary tuberculosis: results of a randomized trial. *Ann Palliat Med, 10*, 7543-7550.

Yohannan, S. (2020). Psychosocial support for families of persons with dementia through home based care programme from a developing country: Process of intervention development and pilot testing. *International Journal of Aging Research, 3*(4), 71-71.

Yu, H., & Dong, W. (2022). Effect of Human-Oriented Fine Nursing on Psychological Emotion, Life Quality, and Nursing Satisfaction of Patients Undergoing Laparoscopic Radical Nephrectomy. *Evidence-Based Complementary and Alternative Medicine, 2022*.