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Original Research/Systematic Review

Nursing Care for Oxygen Deficiency in Patients with Pulmonary Tuberculosis

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ABSTRACT

Background: *Schizophrenia is a serious mental health problem that requires full attention. One ofhe symptoms of schizophrenia is chronic low self-esteem.Chronic low self-esteem is an aspect that is often associated with mental disorders and the psychological well-being of patients with mental disorders. One of the psychological therapies for patients with low self-esteem can be done with Al-Quran reading therapy, including psychoreligious therapy that can help patients to increase self-esteem, optimism, improve the process of adaptation to others and is able to prevent and cure mental disorders. The study aims to apply the therapeutic intervention of reading the Qur'an in psychiatric nursing care for patients with low self-esteem by helping patients to increase their self-esteem.*

Methods: *This is a descriptive qualitative study. The study was conducted in the Pulmonary Ward of Dr. M. Djamil General Hospital in Padang. The study period spanned from December 2024 to June 2025. The study population was comprised of all pulmonary TB patients with oxygen deficiency in the Pulmonary Ward of Dr. M. Djamil General Hospital in Padang. One patient diagnosed with primary pulmonary TB in the Pulmonary Isolation Room at Djamil General Hospital in Padang was selected using purposive sampling for a study that involved interviews and measurements. Data collection methods included interviews, measurements, physical examinations, and documentation.*

Results:*. The results showed complaints of shortness of breath, coughing up phlegm, difficulty sleeping, night sweats, and paleness. The nursing diagnosis was gas exchange disorder. The care plan included respiratory monitoring, oxygen therapy, chest physiotherapy, and promoting effective coughing. The evaluation showed improvement in all symptoms.*

Conclusion: *Nursing implementation was carried out as part of the nursing plan, which was developed with the expectation that the results achieved would be in line with the objectives and criteria that had been set. Nursing implementation was carried out over a 5-day treatment period in the form of respiratory control, chest physiotherapy, and effective coughing.*

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INTRODUCTION

Basic human needs are the satisfaction of essential needs that are human in nature and necessary for survival. To survive, humans have basic or fundamental needs. The basic human needs that are the focus of nursing care include biological,

psychological, social, and spiritual aspects as a whole. Physiological needs are the most basic needs and must be fully met in order to maintain biological balance and the survival of each individual. Physiological needs are more urgent than other needs. Physiological needs include oxygen, fluids, nutrition, elimination, rest, sleep, freedom from pain, body temperature regulation, as well as sexual and other aspects (Susanto & Fitriana, 2017).

Oxygen is a basic human need that is used to maintain the metabolism of body cells in order to sustain life and the functioning of various organs or cells. Oxygen is used as a basic human need to maintain the cellular ecosystem. Oxygen is very important for the body to function properly. A lack of oxygen can cause damage to brain tissue. If this condition continues over a long period of time, it can lead to death. The systems that play a role in meeting the body's needs include the respiratory, nervous, and cardiovascular systems (Susanto & Fitriana, 2017). A lack of oxygen in the body can cause physiological damage, including to the lungs, which can later lead to susceptibility to bacterial infections, including tuberculosis (Saranani, Rahayu, & Ketrin, 2020).

Pulmonary tuberculosis is a chronic disease caused by Mycobacterium tuberculosis, which attacks the parenchymal tissue of the lungs. Tuberculosis is an infectious disease caused by Mycobacterium tuberculosis that occurs when a person with tuberculosis coughs up sputum or sneezes, unintentionally spreading bacteria in the form of sputum into the air. Pulmonary tuberculosis is caused by bacteria in the lower respiratory tract, from the bronchi to the alveoli. Transmission occurs through throat fluids or droplets expelled by the patient. Pulmonary tuberculosis generally affects adults of productive age. However, the risk applies to all age groups (Rahmawati, 2022).

Pulmonary tuberculosis is caused by bacteria that infect the lower respiratory tract, from the bronchi to the alveoli. Transmission occurs through throat fluids or droplets expelled by the patient. The main symptoms that arise in patients with pulmonary TB are usually fever, chills, night sweats, and malaise. Additionally, symptoms may also appear in the respiratory system, such as chest pain, coughing, and rales due to the accumulation of secretions. The production of secretions due to lung infection causes coughing that is quite disturbing to patients throughout the day (Ningsih & Novitasari, 2023).

More than 80% of cases and deaths occur in low- and middle-income countries. Pulmonary TB occurs in every part of the world. In 2022, 1.3 million people died from pulmonary TB, and an estimated 10.6 million people worldwide were infected with tuberculosis,including 5.8 million men, 3.5 million women, and 1.3 million children. In 2022, the highest number of new TB cases occurred in the African Region (23%) and the Western Pacific (18%). Approximately 87% of new pulmonary TB cases occurred in 30 countries with a high TB burden, with more than two-thirds of the global total occurring in Bangladesh, China, the Democratic Republic of the Congo, India, Nigeria, Pakistan, and the Philippines (WHO, 2024).

Indonesia's commitment to tackling pulmonary TB is evident in the improvement of its detection and reporting system, reaching the highest number of cases ever reported in 2022 and 2023. More than 724,000 cases of pulmonary TB were identified in 2022, increasing to 809,000 cases in 2023 (Kemenkes, 2024). The incidence of pulmonary tuberculosis in Padang City is quite high compared to other districts or cities, with 5,721 cases of pulmonary tuberculosis from 2019 to 2023 (Laporan Tahunan Dinas Kesehatan Kota Padang 2023, Edisi 2024).

The city of Padang has several hospitals that provide treatment for TB patients, one of which is Dr. M. Djamil General Hospital Padang. Based on data obtained by researchers from the medical records of Dr. M. Djamil General Hospital Padang, the incidence of TB from 2022 to 2023 was recorded as 2022, 329 people were treated for pulmonary TB, in 2023 there were 269 people treated for pulmonary TB, and in the last three months there were 75 people

treated for pulmonary TB. From the data obtained, it can be seen that the number of patients suffering from pulmonary TB has decreased from year to year (Rekam Medis Dr. M, Djamil Padang, 2024).

A preliminary survey conducted by researchers on December 2, 2024, in the pulmonary TB isolation room at Dr. M. Djamil General Hospital in Padang found that there were seven patients being treated for pulmonary TB, two with MDR-TB, two with and 3 suspected pulmonary TB cases. The patients consisted of 4 females and 3 males. The researcher also conducted an interview with one of the patients, whose complaints included shortness of breath, coughing up sputum, nasal cannula at 5L per minute, and night sweats. Based on the interview results, the patient is an active smoker. An interview with one of the nurses in the room revealed that the nursing interventions performed included effective coughing techniques and deep breathing exercises. The nurse in the room stated that chest physiotherapy is rarely performed on pulmonary TB patients.

MATERIALS AND METHOD

The research design used is a research method conducted with the aim of creating an objective description or overview of a situation using a case study approach. A case study is a study of an event, the actual conditions of a particular situation or circumstances, and the conditions of a person or thing (Ilmiah & Pendidikan, 2024). This study is used to describe how nursing care with Oxygen Deficiency Disorders in Pulmonary TB Patients in the Pulmonary Isolation Room of Dr. M. Djamil Hospital in Padang in 2025.

The population in this study was all pulmonary TB patients with oxygen deficiency in the Pulmonary Ward of Dr. M. Djamil Hospital in Padang. The sample in this study was Mr. H, with a sample size of 1 person with oxygen deficiency. Sampling was conducted using non-probability sampling, namely purposive sampling. The inclusion criteria in this study were: patients who were willing to be respondents, and patients who were cooperative and had good verbal communication skills. The exclusion criteria in this study were: patients who experienced a decrease in consciousness, patients with plans to go home, and patients with MDR-TB (Yuliawuri, Raudah, Pristina, Mardalena, & Kaisar, 2023).

RESULTS

The nursing assessment was conducted on March 3, 2025. The assessment revealed that the patient had complaints of shortness of breath, coughing with phlegm that was difficult to expel, with a respiratory rate of 26 breaths per minute. The patient had experienced continuous shortness of breath since being admitted to the hospital. The physical examination of the patient revealed vital signs of blood pressure 139/95 mmHg, pulse 101 times per minute, and respiration 31 times per minute, with a saturation level of 93%.

Based on the results of the assessment conducted on the patient obtained a nursing diagnosis: impaired gas exchange associated with changes in the alveolus-capillary membrane. This diagnosis was raised based on the findings of the subjective data analysis: the patient complained of shortness. Objective data: nasal breathing, PCO2 33 mmHg, saturation 93%, there are additional breath sounds (ronchi), abnormal breathing patterns (fast, regular), tachycardia (N: 101x/min), respiratory frequency (31x/min).

Based on patient data with dyspnea, RR 31x/min, SpO_2 93%, ronchi, and tachycardia, a diagnosis of Gas Exchange Disorders associated with changes in the alveolus-capillary membrane was established. The nursing goal is to improve gas exchange with indicators: decreased dyspnea, improved breathing patterns, reduced ronchi, decreased nostrils, and improved tachycardia. Interventions include: respiratory control by observing frequency, pattern, depth of breath and sputum production; oxygen therapy by ensuring flow, effectiveness, and maintaining airway patency; chest physiotherapy through positioning,

percussion, vibration, and suction if necessary; and effective cough training with education on breathing techniques and collaboration in giving mucolytics or expectorants. Patient and family education is also provided regarding the use of oxygen at home and effective coughing techniques.

The nursing care was given in 5 days of care to the patient starting on March 3 - March 7, 2025. The nursing implementation carried out on the diagnosis of impaired gas exchange associated with changes in the alveolocapillary membrane is: on the first day of March 3, 2025 monitor the frequency of breaths (26x/min), tachycardia (N: 101x/i), PCO2 33mmHg, saturation 93%, additional breath sounds (ronchi), monitor breathing patterns (fast, regular), set the patient's position fowler, provide education on how transmission of Pulmonary TB and compliance with taking medication. On the fifth day, March 7, 2025, the researcher continued implementation, namely monitoring respiratory frequency (22x/min), pulse 94x/i, saturation 96%, monitoring breathing patterns, monitoring the production of sputum, adjusting the patient's fowler position, performing chest physiotherapy, and performing effective coughing.

The following report summarises the findings of the evaluation which was conducted five days after the commencement of the patient's treatment. The following text concerns the diagnosis of gas exchange disorders in cases where there is an associated change. The results obtained from the alveolus-capillary membrane are as follows: On the first day of the patient's illness, they exhibited signs of dyspnoea (2) and a ronchi breath sound (2). The patient exhibited symptoms of restlessness (3), PCO_2 (3), tachycardia (3) and breathing pattern (3). The patient's second day The patient exhibited symptoms including shortness of breath (3), ronchi (3), restlessness (4), and PCO2 (3). The patient exhibited symptoms consistent with tachycardia and dyspnoea. On the third day, the patient exhibited symptoms including shortness of breath (3), ronchi (3), restlessness (4), PCO2 (3), tachycardia (5), and a respiratory pattern (5). On the fourth day, the patient exhibited signs of respiratory distress, characterised by shortness of breath and the presence of ronchi, both of which were graded as 5 on the scale. The patient exhibited symptoms including restlessness (5), elevated partial pressure of carbon dioxide (4), tachycardia (5) and a respiratory pattern (4). The patient was observed on the fifth day. The following symptoms were observed: shortness of breath (5), ronchi (4), restlessness (5), and PCO2 (5). The patient exhibited symptoms consistent with tachycardia and dyspnoea.

DISCUSSION

The nursing assessment was conducted on March 3, 2025. The assessment results showed that the patient complained of shortness of breath and difficulty coughing up phlegm, with a respiratory rate of 26 breaths per minute. The patient had experienced continuous shortness of breath since being admitted to the hospital. This aligns with the theory from the 2021 Indonesian Tuberculosis Diagnosis and Management Guidelines, which states that patients with pulmonary tuberculosis indeed experience shortness of breath, coughing with phlegm, and difficulty expectorating phlegm due to the pathophysiological inflammatory process caused by the bacteria, leading to the accumulation of exudate in the alveoli (Perhimpunan Dokter Paru Indonesia, 2021).

Based on the results of the assessment that has been carried out on the patient, researchers found nursing diagnoses based on the case, namely: Gas exchange disorders associated with changes in the alveolus-capillary membrane characterized by dyspnea. The characteristic limitations found according to the 2017 SDKI are dyspnea, tachycardia, additional breath sounds, anxiety, abnormal breathing patterns. While the limitations of the characteristics that appear in patients include subjective data of patients complaining of shortness of breath, and objective data of tachycardia, additional breath sounds, abnormal

breathing patterns. Based on this, the researchers raised the diagnosis of impaired gas exchange associated with changes in the alveolus-capillary membrane in accordance with the characteristic limitations in the classification of nursing diagnoses SDKI, because at the time of the assessment subjective data and objective data were found in accordance with these characteristics (DPP PPNI, 2017).

The intervention carried out in the nursing diagnosis of gas exchange disorders associated with changes in the alveolar-capillary membrane characterized by tachypnea aims to increase gas exchange with the outcome criteria of decreased dyspnea, decreased additional breath sounds, decreased nasal flaring, improved breathing pattern, and improved tachycardia. The interventions implemented include respiratory control, oxygen therapy, chest physiotherapy, and effective coughing techniques aimed at improving the patient's breathing and sputum clearance. In developing the plan for this patient, there is no gap between theory and the case found in determining the interventions to be performed. The nursing care plan developed by the researcher is based on the most fundamental needs required by the patient in the effort to restore the patient's health status.

Nursing implementation is a series of activities carried out by nurses to help patients overcome health problems and achieve a state of health that meets the established outcome criteria. The criteria for implementing actions include: involving clients in the implementation of nursing actions, collaborating with other health teams, performing nursing actions to address clients' health, and educating clients and families about self-care skills (Bustan, 2023).

The implementation carried out on patients diagnosed with gas exchange disorders related to changes in the alveolar-capillary membrane was chest physiotherapy, which is an action with identified indications. Based on research by Berutu, et al., (2024) entitled "The effect of chest physiotherapy on breathing patterns and frequency in tuberculosis patients," chest physiotherapy in pulmonary TB patients affects breathing patterns and frequency and increases sputum production through non-medical therapy (Berutu, Ramadhan, Anggeria, & Ardila, 2024).

The next step in effective coughing is identifying coughing ability. Based on the results of research by Ningsih & Novitasari (2023) entitled "The Effectiveness of Effective Coughing in Patients with Pulmonary Tuberculosis," effective coughing in patients with pulmonary TB is effective for sputum removal and can help clear secretions in the airways and overcome shortness of breath in patients with pulmonary TB (Ningsih & Novitasari, 2023). Based on the researchers analysis of the results, the study shows that the implementation of chest physiotherapy and coughing is effective in improving breathing ability and reducing cough symptoms in patients with pulmonary tuberculosis.

The research evaluation was conducted in SOAP format. In this study, the researcher conducted a nursing evaluation of the actions that had been given to patients for 5 days, starting from March 3 to March 7, 2025. According to the researcher's analysis, there were changes in the patient from day to day, which were seen on the first and second days. The patient was still short of breath and coughing up sputum. On the third day, the patient said that the shortness of breath had decreased, as seen from the improving saturation, but they still coughed up sputum and still appeared short of breath. On the fourth day, the patient reported that their shortness of breath had decreased, their coughing up sputum had decreased, and they were no longer short of breath. On the fifth day, the patient reported that their shortness of breath had decreased, their coughing up sputum had decreased, and they were no longer short of breath.

CONCLUSION

In result of the assessment, the client with pulmonary tuberculosis showed symptoms of shortness of breath, coughing up sputum that was difficult to expel, use of accessory breathing muscles, and increased respiratory rate. The nursing diagnosis was gas exchange impairment related to changes in the alveolar-capillary membrane. The planned interventions refer to the SLKI and SIKI books, including respiratory control, chest physiotherapy, and effective coughing exercises. Nursing implementation was carried out during five days of treatment with actions according to the plan that had been prepared. Evaluation using the SOAP method every day showed that the diagnosis of gas exchange impairment had not been completely resolved, although there was improvement in the patient's condition.

Based on this case study for Dr. M. Djamil Padang General Hospital, it is recommended that nurses in the Pulmonary Isolation Room, when performing nursing procedures, conduct effective coughing exercises by first performing chest physiotherapy to facilitate the removal of sputum. Effective coughing exercises can be performed 2-3 times a day on pulmonary TB patients with impaired oxygen supply. Education for families on the transmission of pulmonary TB and adherence

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