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Original Research Article

NURSING PROBLEM IN INPATIENTS WITH DRUG-RESISTANT TUBERCULOSIS AT SULIANTI SAROSO INFECTIOUS DISEASE HOSPITAL

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Abstract

Background: Tuberculosis is a worldwide health problem, including in Indonesia. Drug-resistant tuberculosis (DR-TB) is caused by spontaneous mutations in the chromosomes that cause resistance to first-line DR-TBugs.
Objectives: to determine the patient characteristics and nursing problems of patients with DR-TB.
Methods: We conducted a cross-sectional study of inpatients with DR-TB in the DR-TB isolation ward at Sulianti Saroso Infectious Disease Hospital from July to December 2021. The variables investigated in this study include patient characteristics, comorbid diseases, tuberculosis treatment history, nutritional status, psychological status, nursing problem, and subcategories of nursing problems.
Results: Most patients were 56-65 years old, male, high school graduates, unemployed, and married. Most of the populations had diabetes mellitus as a comorbid disease, a history of having received previous treatment, and long-term treatment regimens. Most patients had normal nutritional status and a calm and adaptive psychological history. Nursing problems were airway clearance, dietary deficits, and electrolyte imbalance. The sub-categories of nursing problems that appear most were nutrition and fluid intake, respiration, and ego integrity. This occurs due to physiological disturbances caused by the disease process and the side effects of DR-TBugs.
Conclusion: The process of Mycobacterium tuberculosis infection accelerates the body's metabolism as it combats the bacteria. This resulted in decreased appetite and reduced nutritional status. Consequently, nurses should focus on intensified care for DR-TB patients. This involves ensuring adequate nutrition and fluid intake, offering spiritual support to boost confidence, and educating patients on maintaining airway hygiene.

Keywords*: Nursing, Resistance, Treatment*

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INTRODUCTION

Drug-resistant tuberculosis (DR-TB) is one of the major global health issues. DR-TB is caused by spontaneous mutations in chromosomes, leading to resistance against first-line anti-tuberculosis drugs (ANTI-TB DRUGS). In 2020, it was estimated that there were 10 million TB cases, with 0.5 million of them being MDR TB/DR-TB (WHO 2021). In Indonesia, out of 824,000 tuberculosis (TB) cases in 2020, there were 7,921 cases of drug-resistant tuberculosis (DR-TB), with 4,590 still undergoing treatment (Kemenkes, 2022).

Inadequate treatment can cause bacterial resistance to anti-tuberculosis drugs (anti-TB drugs). This can be caused by several factors, including incorrect diagnosis by healthcare workers, inappropriate dosages, types, quantities, and duration of treatment, and limited patient education (Kemenkes 2020). The role of nurses is crucial in reducing drug-resistant tuberculosis (DR-TB) cases.

According to Law Number 38 of 2014, nursing care is a series of interactions between nurses, clients, and their environment (Indonesia 2014). This aims to empower clients to care for themselves and meet their needs. Nursing care includes five consecutive stages: assessment, diagnosis, intervention, implementation, and evaluation. According to Zori & Morrison, a nurse's competency in identifying patient problems and determining appropriate interventions depends on the sharpness of analysis and critical thinking following the evidence base (Zori and Morrison, 2009).

Nursing problems are one of the main components in nursing diagnosis and describe the essence of the patient's response to their health condition. Nursing problems are established based on the grouping of data and interpretation of data obtained from the patient's nursing assessment. Nursing assessment includes subjective data (patient complaints) and objective data (inspection, percussion, palpation, and auscultation) (Anggi 2018; Leniwita and Anggraini 2019).

The next step after nursing assessment is to identify problems and determine nursing issues such as patterns of nutritional metabolism, exercise activity patterns, and health management perceptions. Determining nursing problems in TB-DR patients is crucial for planning appropriate actions to address these nursing issues, thus preventing medication non-adherence and discontinuation of anti-TB drug treatment.

Often, nurses are the first point of contact when patients seek treatment and serve as cadres in their role as healthcare providers who administer or supervise the daily medication of patients. Nurses are also frequently the first to hear complaints about drug side effects from patients and, therefore, can promptly provide interventions. Thus, efforts are needed to help nurses identify symptoms that may indicate tuberculosis drug side effects; assess the severity of drug side effects and the possibility of other causes; and act appropriately to alleviate patient discomfort, reduce the progression of drug side effects, and support patients in completing their treatment (Raftery et al. 2018).

Based on a case study conducted at the referral hospital, there are five nursing problems in DR-TB patients: impaired gas exchange, ineffective airway clearance, imbalance nutrition, deficit knowledge, and sudden/acute pain related to biological sensory agents (Neni Lestari 2020; Sri Okta Novelia 2019). In addition, according to Rifqi Arafat's research (2019), nursing problems found in DR-TB patients include ineffective breathing patterns, ineffective health management (limited therapeutic knowledge), and ineffective family health management (complexity of therapeutic regimen) (Arafat, 2019).

Sulianti Saroso Infectious Diseases Hospital (SSIDH) is a referral centre for drug-resistant tuberculosis (DR-TB) patients. In 2019, 120 DR-TB cases were treated. SSIDH has been designated as a referral hospital for the management of drug-resistant tuberculosis. The

high number of cases has led to various nursing problems that may differ between individual DR-TB patients. Therefore, nurses must identify common nursing problems to determine appropriate interventions for DR-TB patients and the relevance between literature and the implementation of nursing care in the field.

Objective(s): to determine the characteristics of DR-TB patients treated and to identify common nursing problems among DR-TB patients at SSIDH.

METHOD

Study Design

This research is a descriptive quantitative study with a cross-sectional design.

Setting

This research was conducted in July to December 2021 at Sulianti Saroso Infectious Disease Hospital.

Research Subject

The population of this study comprises all DR-TB patients admitted to Dahlia 1 Ward from July to December 2021 are 36 patients. We use total population in this study. The sample consists of all inpatients diagnosed with DR-TB, >18 years old, and hospitalized once during the period from July to December 2021. The data source is secondary data from medical records, including patient characteristics, comorbidities, nutritional status, treatment history, subjective/objective data assessment, and nursing problems according to categories and sub-categories.

Instruments

The data collection instrument uses a Case Report Form (CRF). The measurement of the variables, nursing problems and subcategories of nursing problems, is based on the findings of the nursing assessment in the form of subjective and objective data. This data then analyzed to determine the nursing problems and subcategories of nursing problems. The classification of nursing problems and subcategories of nursing problems is based on the Indonesian Nursing Diagnosis Standard.

Based on subjective and objective data, they are categorized into major and minor. If 80%-100% major categories are found, then the nursing problem is actual. If less than 80%, then the nursing problem is a risk.

Data Analysis

Descriptive analysis will be conducted on all research variables in frequency (n) and percentage (%).

Ethical Consideration

This research has obtained ethical clearance from the Research Ethics Committee of SSIDH with approval number 40/XXXVIII.10/VII/2022.

RESULT

The research findings indicate that the common age group among respondents is 56-65, with the youngest being 19 and the oldest being 71. Most patients are male, have completed high school education, are unemployed, married, and reside in the Jakarta Bogor Depok Tangerang Bekasi (Jakarta Metropolitan Area) (Table 1).

Table 1. Patient Characteristics (n=36)

Sociodemographic	**n**	**%**
Age (Year)		
>18-25	6	16.7
26-35	5	13.9
36-45	7	19.4
46-55	7	19.4
56-65	10	27.8
> 65	1	2.8
Gender		
Male	21	58.3
Female	15	41.7
Level of Education		
Incomplete Primary School	3	8.3

Elementary School or Equivalent	6	16.7
Junior High School or Equivalent	7	19.4
High School or Equivalent	19	52.8
Diploma/Bachelor's Degree	1	2.8
Employment Status		
Unemployed	14	38.9
Daily labourer	4	11.1
Employee	12	33.3
Governance/Military Army/Police	5	13.9
Entrepreneur	1	2.8
Marital Status		
Married	26	72.2
Single	8	22.2
Divorced	2	5.6
Domicile		
Jakarta Metropolitan Area (JMA)	33	91.7
Outside JMA	3	8.3

Table 2 shows the medical history of TB-DR patients. The majority have comorbidities, the most common being diabetes mellitus (DM). Regarding treatment history, most have received previous treatment, with most receiving long-term treatment regimens. In terms of nutritional status, the majority are of normal weight. Based on psychological history, most are calm and adaptive.

Table 2. Comorbid Disease History (n=36)

Comorbid Diseases	**N**	**%**
Presence of Comorbidities		
Yes	21	58.3
No	15	41.7
Type of Comorbidities		
DM	15	41.7
Hypertension	3	8.3
HIV	14	38.9
Hepatitis B	2	5.6
Heart disease	1	2.8
Autoimun	1	2.8
History of Previous Treatment		
Yes	22	61.1
Discontinued	10	27.8
Never	4	11.1
Regimen		
Long-Term	35	97.2
Short-Term	1	2.8
Nutritional Status		
Undernourished	15	41.7
Normal	20	55.6
Overnourished	1	2.7
Psychological		
Anxious	16	44.4
Calm and Adaptive	18	50.0
Not Assessed	2	5.6

The most common nursing issues are airway clearance, nutritional deficit, and electrolyte imbalance. All of patients have more than one nursing problems (Table 3).

Table 3. Nursing Problems

Nursing Problems	**N**	**%**
Airway Clearance	23	26.1
Impaired Gas Exchange	1	1.1
Ineffective Breathing Pattern	5	5.7
Nutritional Deficit	20	22.7
Electrolyte Imbalance	10	11.4
Blood Glucose Instability	8	9.1
Activity Intolerance	1	1.1
Impaired Peripheral Perfusion	5	5.7
Anxiety	9	11.4
Risk of Infection	1	1.1
Discomfort/Pain Disorder	2	2.3
Acute Pain	1	1.1
Skin Integrity Impairment	1	1.1

The most frequent subcategories of nursing problems are nutrition and fluid, respiratory, and ego integrity. The majority of patients have more than subcategories of nursing problems (Table 4).

Table 4. Subcategories of Nursing Problems

Subcategories of Nursing Problems	N	%
Respiration	23	29.9
Circulation	6	7.8
Nutrition and Fluid	31	40.3
Activity and Rest	1	1.3
Safety and Protection	2	2.6
Pain and Comfort	3	3.9
Ego Integrity	11	14.3

DISCUSSION

Patient Characteristics

More patients are at 56-65 years old by range (19-71 years old). Meanwhile, a study by Manggasa and Suharto (2022) showed that DR-TB patients ranged from 16 to 30 years old (Manggasa and Suharto, 2022). Another study states that most patients fall within the age range of 18-40 years (80%), while those above 40 years old account for 20% (Wibowo, Burhan, and Putra 2021). The study by Munawwarah et al., cited in Tri Wahyuni, mentions that age significantly influences the higher resistance to anti-TB drugs, with the highest resistance observed among the age group of 31-40 years, at 46.7% (Wahyuni 2020).

The highest incidence of MDR-TB patients occurs in the productive age group because, during this period, there is frequent social interaction with others and high mobility, consequently increasing the risk of transmission to others and the surrounding environment (Azwar, Noviana, and Hendriyono 2017). Furthermore, non-compliance with medication increases the risk of resistance (Horter et al. 2014). The WHO report states that most tuberculosis patients in developing countries are in the working age group (15-54 years old).

In this study, the majority of DR-TB cases are found in males. Similar findings are reported in Dr. H. Chasan Bosoirie Ternate Hospital, where male patients outnumber female patients (Bayan, Prihanto, and Anwar 2022; Manggasa and Suharto 2022). The WHO report indicates that the prevalence of TB in males is 1.7 times higher than in females. This is attributed to biological, cultural, and social factors, where males often engage in activities outside the home more frequently than females.

The risk of the disease is not influenced by gender, but males tend to be at higher risk due to smoking behaviour. Patients with a history of smoking are more susceptible to TB infection compared to non-smokers (Anisah, Sumekar, and Budiarti 2021). Furthermore, other research (Chuchottaworn et al. 2015) suggests that adherence to anti-TB drugs among male patients is relatively not lower than that of females, hence the higher prevalence of MDR-TB among males (Chuchottaworn et al. 2015).

Based on education, the majority of DR-TB patients have completed secondary education, specifically high school. In a study conducted at the Umbulharjo Primary Health Center in Yogyakarta, most respondents, family members of pulmonary TB patients, graduated from high school or equivalent (50.0%). Secondary education makes it easier to receive information, thus influencing thoughts, actions, and increasing knowledge (Notanti-TB drugsmojo 2018).

This research proves that the majority of DR-TB patients have higher education levels, but their knowledge about the risk factors for DR-TB is minimal. Additionally, there is a lack of awareness regarding medication adherence and completing the treatment regimen (Bijawati, Amansyah, and Nurbiah, 2018). Having a higher education level does not guarantee that someone's knowledge about a particular topic, including the occurrence of DR-TB, will be better than those with lower

education. However, exposure to information also plays a significant role in shaping one's knowledge.

This study's results indicate that most DR-TB patients are unemployed. This is consistent with the findings at Dr. H. Chasan Boesoirie Ternate Hospital, where most DR-TB patients are also unemployed (31.8%) (Bayan et al. 2022). Flora et al.'s study on the risk factors of DR-TB in Bangladesh reported that 51 controls (33.6%) and 46 cases (34.1%) are unemployed (Flora et al. 2013).

Occupation is closely related to income, which impacts purchasing power in meeting daily needs, including nutritional requirements. Adequate nutrition strongly influences nutritional status through parameters such as BMI. Nutritional status affects the body's immunity, which makes individuals vulnerable to diseases, including tuberculosis (A Dwi Sarwani; Nurlaela, Sri 2012).

Medical History

Most DR-TB patients have comorbid DM, and this finding is consistent with research in China, which shows that DR-TB patients with DM are more prevalent, at 17.7%, compared to DR-TB patients without DM, which is 9.3% (p-value <0.01). According to Zhang Qing et al., DM can worsen TB infection, prolong treatment duration, reduce medication adherence, and increase the frequency of treatment side effects. Irregular DM medication intake leads to uncontrolled blood sugar levels, making TB infection challenging to cure. Also, due to low immunity, DM patients may become re-infected with DR-TB strains. TB-DM cases may also have a poor prognosis if relapse occurs within two years, requiring new DM therapy and effective treatment for DR-TB patients with DM (Fauziah 2013).

A systematic review states that patients with DM are at a higher risk of experiencing MDR compared to those without DM because DM causes lower immunity, leading to a more severe prognosis of tuberculosis infection (Restinia et al., 2021). Additionally, the results are more lung inflammation (Utomo, Nugroho, and Margawati 2016).

Based on treatment history, the majority have received previous treatment. This finding is consistent with the research by Triandari & Rahayu (2018), which suggests a relationship between the history of prior TB treatment outcomes and DR-TB. Patients with a history of treatment discontinuation are three times more likely to experience DR-TB compared to patients without a history of treatment discontinuation. Therefore, the treatment history is the most dominant factor in the occurrence of drug resistance. Treatment failure and discontinuation are causes of DR-TB (Triandari and Rahayu 2018) and MDR TB (Manggasa and Suharto 2022). Having more than one history of TB treatment increases the risk of DR-TB occurrence, which is related to previous treatment outcomes, such as treatment discontinuation, treatment failure, relapse, or patients who have undergone DR-TB treatment.

DR-TB means the TB bacteria are resistant to drugs that can kill them, so the principle of treating DR-TB is to use antibiotics that are still expected to kill the TB bacteria within 9-24 months, depending on which drugs the patient can use. Treatment is divided into two types: Short Treatment Regimen (STR), which requires a minimum of 9 months, and Individual Treatment, which involves a minimum of 20 months. Each treatment is divided into two stages: the initial phase, which lasts about 4-6 months, and the continuation phase (Dinas Kesehatan Provinsi NTB 2023).

The results indicate that the majority are receiving long-term treatment regimens. Treating DR-TB requires a longer duration (18-24 months) compared to regular TB (6-8 months). This is because the bacteria causing TB are already resistant to first-line anti-TB drugs, so treating DR-TB requires more potent anti-TB drugs and often involves more injections and medication (Aviana, Jati, and Budiyanti 2021).

The previous treatment regimen for DR-TB required a long period of treatment. Therefore, in May 2016, WHO recommended a new DR-TB treatment regimen involving a short-term guideline. This new regimen aims to make the treatment period more effective, thus reducing the overall treatment duration and minimising treatment interruption. With a prolonged treatment period, DR-TB patients are at risk of treatment interruption, which can ultimately lead to treatment failure. This recommendation is based on observational studies conducted in countries that have implemented short-term treatment regimens, including Bangladesh, Benin, Burkina Faso, Burundi, Cameroon, Central Africa, Congo, Niger, Swaziland, and Uzbekistan. WHO reports show that short-term treatment success rate is higher than long-term regimens. Shorter treatment durations and more effective treatment outcomes are expected to increase treatment enrollment, reduce interruption rates, and improve success rates for DR-TB patients in Indonesia (Agustina, Maulida, and Yovsyah 2018).

Based on their nutritional status, most subjects are in the normal weight category. Other research indicates that the majority of their study populations are still within the normal range (49.2%) (Wibowo et al. 2021) (Santy 2020). In contrast, a study in India found that the majority of TB patients had low body mass index (BMI) (Bhargava et al. 2013), which can be a risk factor for drug resistance. Nutritional status plays a crucial role in tuberculosis treatment, as good dietary status leads to better treatment response. BMI is used as an indicator to assess nutritional status. Increasing body weight during treatment can accelerate the improvement of nutritional status, leading to faster sputum conversion and clinical improvement of the lung (Wibowo et al. 2021).

Based on their psychological history, most patients are calm and adaptive (50%) and anxious (44.4%). Acceptance of the disease becomes a problem for DR-TB patients. This issue is prevalent among adults and older people and affects teenagers. Many of them struggle to adjust to their condition and face limitations in carrying out daily activities, which often leads to feelings of despair. Therefore, self-acceptance and support from those around them can help patients cope with their daily lives.

Nursing Problems

The most prevalent nursing problem in DR-TB cases is ineffective airway clearance. This finding is consistent with research by Rifki (2019) and SO Novela (2019), which also identified ineffective airway clearance as the primary issue in DR-TB patients. This is due to the mycobacterium tuberculosis bacteria attacking the lungs through the inflammatory process in the alveoli, leading to excessive sputum buildup and resulting in problems with ineffective airway clearance (Nurarif and Kusuma 2015). According to SDKI in 2016, airway clearance problems are caused by airway spasms, hypersecretion of the airway, and retained secretions characterised by excessive coughing with sputum. Airway clearance is the second-highest nursing problem after nutrition and fluid-related concerns.

A prospective study conducted at Hebei Chest Hospital found that, in comparison to routine nursing care, targeted nursing interventions combined with psychological counseling significantly improve the quality of life and reduce negative emotions in patients with XDR-TB, as well as decrease the incidence of complications (Lu et al. 2021).

Nutritional deficit is also a significant nursing problem in TB MDR cases, accounting for 22.73%. According to Garba Garuda's 2020 analysis, the most prevalent dietary status among TB patients, as measured by Body Mass Index (BMI), is underweight (50.27%). This is due to the *Mycobacterium tuberculosis* infection process, which increases metabolism in the body as it fights against the bacteria. Consequently, this increased metabolism leads

to side effects such as decreased appetite and reduced nutritional status. Nutritional deficit nursing problems are caused by increased metabolic needs and the inability to digest food and are defined as a weight loss of more than ten per cent of the ideal range. The most prevalent subcategory of nursing problems is nutrition and fluid-related concerns (40.26%). This is attributed to physiological disturbances due to the disease process and the side effects of DR-TB medications.

Based on the research findings, the nursing problem of the risk of electrolyte imbalance is the highest. Reviono's study (2014) demonstrated that DR-TB patients experience hypokalemia (52.6%), nausea (79.8%), and vomiting (78.9%) (Reviono et al. 2014). Syefi Nuraeni Fitriana (2023) stated that 70.45% of DR-TB patients receiving kanamycin treatment experienced hypokalemia (Fitriana, Zulkarnain, and Yulimanida, 2023). The causes of electrolyte imbalance are multifactorial, possibly due to drug side effects and gastrointestinal disturbances. The subcategory of nursing problems related to psychological issues is ego integrity, which is caused by high levels of anxiety, helplessness, and despair. The high prevalence of ego integrity problems is attributed to the side effects of medication.

These findings provide insights for nurses to provide more intensive care for DR-TB patients, especially regarding nutritional and fluid management, religious care to foster belief in recovery, and educating patients on maintaining airway clearance independently.

CONCLUSION

Based on the medical history of DR-TB patients, the majority have the highest comorbidity of DM, have received or previously received treatment, are undergoing long-term treatment regimens, have normal weight nutritional status, and have calm and adaptive psychological histories. The most prevalent nursing problems are airway clearance, nutritional deficit, and electrolyte imbalance. The most pervasive subcategories of nursing problems are nutrition and fluid-related concerns, respiration, and ego integrity.

RESEARCH LIMITATIONS

This study focuses on one referral hospital for DR-TB cases; therefore, its findings cannot be generalised. Further limitations include a small sample size. One reason for the small sample size is the COVID-19 pandemic in 2021, during which SSIDH only treated COVID-19 patients. In October-December 2021, inpatient services for DR-TB patients resumed.

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AUTHOR CONTRIBUTION

Veronika Hutabarat: Compiling research ideas, as a leader in the research process.

Murtiani: Assist in data processing.

Nuraidah: Assist in data processing.

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