



## The Relationship between Nurses' Caring Behavior and Compliance with Anti-Tuberculosis Drugs in Pulmonary TB Patients at the Tilango Health Center, Gorontalo Regency

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### ABSTRACT

Pulmonary tuberculosis (TB) is an infectious disease that is still a public health problem in Indonesia. The success of TB treatment is greatly influenced by the patient's compliance in taking Anti-Tuberculosis Drugs (OAT). One of the factors that can increase patient compliance is the caring behavior of nurses in providing nursing services. This study aims to determine the relationship between nurses' caring behavior and compliance with taking anti-tuberculosis drugs in pulmonary TB patients at the Tilango Health Center, Gorontalo Regency. This study uses a quantitative method with a correlational design through a cross sectional approach. The sampling technique used purposive sampling with a sample of 62 respondents. The research instrument used the Caring Behavior Inventory-24 (CBI-24) and the Morisky Medication Adherence Scale (MMAS-8). Data analysis was carried out using the Spearman Rank test. The results showed that there was a relationship between nursing caring behavior and adherence to taking anti-tuberculosis drugs in pulmonary TB patients with a p-value = 0.019 ( $p < 0.05$ ) with a weak relationship strength. The results of this study are expected to encourage health workers, especially nurses, to improve caring behavior through providing health education, and more effective therapeutic communication to pulmonary TB patients so that adherence to taking OAT increases so that treatment runs optimally.

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### INTRODUCTION

Tuberculosis (TB) is a chronic and contagious disease caused by bacteria *Mycobacterium tuberculosis*. This disease generally affects the lungs regardless of age or gender. (Rasyid & Heryawan, 2023). *M. tuberculosis* is a Gram-positive intracellular bacterial pathogen that infects the human lungs via the aerosol route. Tuberculosis (TB) is a chronic infectious disease that is still a public health problem in the world. Indonesia is one of the countries that contributes greatly to contributing TB cases in the world (Mar'iyah & Zulkarnain, 2022).

According to the World Health Organization (WHO), in 2023 there will be around 10.8 million cases of pulmonary TB globally. Reports Global TB Report 2024 shows that Indonesia is the second country with the highest burden of TB after India, with an estimated 1,090,000 cases and around 125,000 deaths every year (World Health Organization, 2024). Based on data from the Indonesian Health Survey (SKI) in 2023, the prevalence of pulmonary TB in Gorontalo Province is 0.34%, higher than the national average of 0.30% (SKI, 2023).

Adherence to drug therapy is an important factor in the success of TB treatment. Treatment will be effective if the patient complies with the use of anti-tuberculosis drugs (OAT) according to the type, dosage, method, time, and duration of treatment based on national guidelines for TB control. However, in the field, TB patients are still found who do not undergo complete and regular treatment (Anwar et al., 2024).

In research Squirt et al., (2023) shows that the quality of care, social support, and health education from nurses have a significant effect on compliance with TB medication. Quality of care and social support play an important role in improving patient adherence through health education provided by nurses. The findings confirm that when patients do not feel support or behavior Caring from health workers, including the lack of education related to side effects and consequences of stopping therapy, the risk of non-compliance increases so that there is

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a risk of causing discontinuation of treatment, drug resistance, and TB transmission in the community.

Caring It is an attitude of concern between nurses to clients in providing nursing care by caring for clients with sincerity, sincerity, and affection, either through communication, providing support, or direct action (Laksono et al., 2024).

Based on the results of preliminary observations from data from the Gorontalo Provincial Health Office, the number of cases of pulmonary tuberculosis in January-July 2025 was recorded at 3,177 cases. The highest cases are in Gorontalo Regency (986 cases), followed by Gorontalo City (766 cases) and Bone Bolango (488 cases). Of the 23 health centers in Gorontalo Regency, the three with the highest number of patients are the Tilango Health Center (74 cases), the Batudaa Health Center (45 cases), and the Limboto Health Center (38 cases).

Based on the results of initial observations and interviews at the Tilango Health Center, it was found that the adherence to taking drugs for tuberculosis patients is still low. Some patients admitted that they often forgot to take medication, inconsistently took medication during activities, and had difficulty following the treatment schedule so that therapy did not run regularly. In addition to patient factors, low support from health workers also affected non-compliance with treatment. Some patients admitted that they rarely communicate with nurses and did not receive education about the disease and treatment of pulmonary TB so that nurses' caring behavior in supporting medication adherence is not optimal.

Based on the above description which discusses the relationship between nurse caring behavior and compliance with taking anti-tuberculosis drugs in pulmonary TB patients and the phenomenon of observation results, namely the limitations of research studies in health centers, as well as existing data, the author is interested and wants to conduct a research entitled "The Relationship between Caring Behavior of Nurses and Compliance in Taking Anti-Tuberculosis Drugs in Pulmonary TB Patients".

## RESEARCH METHODS

This study is a quantitative research with a correlational design through a cross sectional approach that aims to determine the relationship between the behavior of caring nurses and the adherence to taking anti-tuberculosis drugs in pulmonary TB patients at the Tilango Health Center, Gorontalo Regency. The research was carried out on January 1 - January 29, 2026 with a sample of 62 respondents selected using the purposive sampling technique. The research instrument used the Caring Behavior Inventory-24 (CBI-24) and the Morisky Medication Adherence Scale (MMAS-8). Data collection was carried out through filling out questionnaires by respondents. Data analysis was carried out univariate and bivariate using the Spearman Rank test with a significance level of  $\alpha = 0.05$ .

## RESEARCH RESULTS

### Respondent Characteristics

Table 1 Characteristics of Respondents by Age of Pulmonary TB Patients

Age	N	%
17-25 Years (Late Teens)	10	16,1
26-35 years old (early adult)	7	11,3
36-45 Years (Late Adult)	9	14,5
46-55 Years (Early Seniors)	21	33,9
56-65 Years (Late Seniors)	10	16,1
>65 years old (Senior)	5	8,1
<b>Total</b>	<b>62</b>	<b>100</b>

Based on table 1, most of the respondents were in the early elderly group (46–55 years), which was 21 respondents (33.9%).

Table 2 Characteristics of Respondents by Gender of Pulmonary TB Patients

Gender	N	%
Male	40	64,5
Women	22	35,5
<b>Total</b>	<b>62</b>	<b>100</b>

Based on table 2, it can be seen that the majority of respondents are male, namely 40 respondents (64.5%).

Table 3 Characteristics of respondents based on Pulmonary TB Patient Education

Education Level	N	%
No School	2	3,2
SD	23	37,1
Junior High School	10	16,1

High School	25	40,3
College	2	3,2
<b>Total</b>	<b>62</b>	<b>100</b>

Based on table 3, it can be seen that the education level of the respondents is dominated by high school graduates, namely 25 people (40.3%).

Table 4. Characteristics of respondents based on Occupation of Pulmonary TB Patients

<b>Jobs</b>	<b>N</b>	<b>%</b>
IRT	14	22,6
Labor	11	17,7
Merchant	16	25,8
Fisherman	8	12,9
Farmer	3	4,8
Self-employed	5	8,1
Retirees	2	3,2
Village Officials	1	1,6
Students	1	1,6
Not Working	1	1,6
<b>Total</b>	<b>62</b>	<b>100</b>

Based on table 4, it can be seen that most of the respondents work as traders, namely 16 people (25.8%).

Table 5 Characteristics of respondents by Length of Treatment of Pulmonary TB Patients

<b>Duration of Treatment</b>	<b>N</b>	<b>%</b>
Less than 2 Months	13	21
2-3 Months	14	22,6
4-6 Months	34	54,8
More than 6 Months	1	1,6
<b>Total</b>	<b>62</b>	<b>100</b>

Based on table 5, it can be seen that most of the respondents underwent treatment for 4-6 months, which is as many people (54.8%).

Table 6 Characteristics of respondents based on previous disease history of pulmonary TB patients

<b>Previous History of Illness</b>	<b>N</b>	<b>%</b>
Never	47	75,8
Diabetes	8	12,9
Had TB Before	7	11,3
<b>Total</b>	<b>62</b>	<b>100</b>

Based on table 6, it can be seen that most of the respondents have never had a history of the disease before, which is as many as 47 people (75.8%).

### Univariate Analysis

#### Caring Behavior of Nurses in Pulmonary TB Patients at the Tilango Health Center, Gorontalo Regency

Table 7 Caring Behavior of Nurses in Pulmonary TB Patients at Tilango Health Center, Gorontalo Regency

<b>Caring Behavior of Nurses</b>	<b>N</b>	<b>%</b>
Height	46	74,2
Medium	16	25,8
Low	0	0
<b>Total</b>	<b>62</b>	<b>100</b>

Based on table 7, it can be seen that most of the respondents have high category of caring caregiver behavior, namely 46 respondents (74.2%).

## Compliance with Taking Anti-Tuberculosis Drugs in Pulmonary TB Patients at the Tilango Health Center, Gorontalo Regency

Table 8 Medication Compliance in Pulmonary TB Patients at the Tilango Health Center, Gorontalo Regency

Medication Compliance		N	%
	Height	0	0
Medium		18	29
Low		44	71
<b>Total</b>		<b>62</b>	<b>100</b>

Based on table 8, it can be seen that most of the respondents have low drug adherence, namely 44 respondents (71%).

### Bivariate Analysis

Table 9 Relationship between Nurses' Caring Behavior and Compliance with Anti-Tuberculosis Drugs in Pulmonary TB Patients at the Tilango Health Center, Gorontalo Regency

	Behavior Caring Nurse	Compliance Drink Medication
<b>Behavior Caring Nurses</b>		
<i>Correlation Coefficient</i>	1.000	0.296*
<i>Sig. (2-tailed)</i>	.	0.019
<b>N</b>	62	62
<b>Compliance Taking Medication</b>		
<i>Correlation Coefficient</i>	0.296*	1.000
<i>Sig. (2-tailed)</i>	0.019	.

Based on table 9, the results of the Spearman's rho test showed a value of  $r = 0.296$  with  $p = 0.019$  ( $p < 0.05$ ), so there was a relationship between nurses' caring behavior and medication adherence. Positive correlation values showed that the better the nurse's caring behavior, the more adherence to taking medication tended to increase. However, the strength of the relationship is in the weak category, This shows that the caring behavior of nurses is not the dominant factor in influencing medication adherence, because there are still various other factors that play a role.

## DISCUSSION

### Caring Behavior of Nurses in Pulmonary TB Patients at the Tilango Health Center, Gorontalo Regency

Based on the results of the study, it was found that the caring behavior of nurses in pulmonary TB patients at the Tilango Health Center was mostly in the high category, namely as many as 46 respondents (74.2%), while respondents with moderate category caring behavior were 16 respondents (25.8%). The lowest category is the low category of caregiver caring behavior, which is there are no respondents (0%).

The results showed that the majority of respondents, namely 46 respondents (74.2%), assessed the Caring behavior of nurses to be in the high category. The results of the analysis showed that 81.4% of respondents' statements on the Caring CBI-24 indicator were in the high category, especially in the dimensions of assurance, knowledge and skill, and connectedness. The majority of respondents assessed that nurses are able to provide a sense of security, have good knowledge and skills, and build positive relationships and communication with TB patients.

These results are in line with the theory Caring according to Jean Watson, which emphasizes that Caring is at the core of nursing practice that involves care, empathy, communication, and therapeutic relationships between nurses and patients. Behavior Caring high indicates that nurses have implemented humanistic values in nursing practice, so that patients feel safe and comfortable in receiving health services (Gunawan et al., 2022).

Based on the characteristics of the respondents, most patients underwent treatment for 4–6 months (54.8%). This shows that the majority of patients are in the advanced phase of TB treatment and are still undergoing outpatient therapy. The longer the patient undergoes treatment, the more often the patient makes visits for medication collection, control, and evaluation of health conditions, so that interactions with nurses also occur repeatedly.

This is supported by research Shawn, (2024) that interpersonal communication and behavior Caring play a role in forming positive relationships between nurses and patients. In addition, the length of treatment that causes the frequency of visits to increase also provides opportunities for nurses to provide education repeatedly.

The results of the study also showed that as many as 16 respondents (25.8%) assessed the caring behavior of nurses to be in the medium category. These findings show that although in general the Caring behavior of nurses is considered good, there are still some patients who have not fully felt the Caring of Nurses optimally.

Based on the analysis of indicators Caring on the CBI-24 instrument, the behavior of Caring The medium category is indicated by the majority of respondents answering on the Respectful indicator of 43%. This shows that nurses have been polite and attentive to patients, but have not been consistently felt in every service. These results are in line with research Faridasari et al., (2021) that finds that the behavior Caring Nurses are not always felt equally by all patients.

Absence of respondents with behavioral categories Caring Low indicates that the nurse has applied a caring attitude and provided support to the patient during treatment. Caring is at the core of nursing practice that emphasizes interpersonal relationships, empathy, therapeutic communication, and attention to patient needs during treatment (Fransiska et al., 2023).

### **Compliance with Taking Anti-Tuberculosis Drugs in Pulmonary TB Patients at the Tilango Health Center, Gorontalo Regency**

Based on the results of the study, it can be seen that the majority of respondents have a low category of medication adherence, namely 44 respondents (71%). Furthermore, respondents in the medium category were 18 respondents (29%). The lowest category is high compliance, which is no respondents (0%).

A total of 44 respondents (71.0%) were in the category of low drug adherence. The results of the MMAS-8 analysis showed that most of the respondents still forgot to take their medication, experienced side effects, did not consistently take their medication when they were outside the home, and did not understand the importance of compliance, with a percentage of 43.2%. This shows that there are still various conditions that affect the regularity of patients in taking anti-tuberculosis drugs.

According to the researcher's assumption, patient adherence is influenced by various factors such as the patient's knowledge of the disease, perception of the benefits of treatment, drug side effects, and the patient's habits in undergoing long-term therapy. The length of TB treatment can cause saturation and reduce patient adherence, so education and support of health workers are needed. (World Health Organization, 2023).

Low compliance is influenced by age, gender, therapy, and daily activities play a major role in shaping compliance behavior. In this study, the majority of respondents were aged 46–55 years old and male (64.5%) who generally had high outdoor activities and a less regular lifestyle that affected medication adherence. Research Elizah, (2024) which states that age affects adherence to tuberculosis treatment, in which productive-age patients with high activity are more at risk of therapeutic irregularities.

In the therapeutic dimension, the duration of TB treatment, which lasts at least six months, is an important factor that increases the risk of saturation and fatigue of patients. The longer the treatment is undertaken, the more likely it is that the patient will experience a decrease in motivation and consistency in taking medication, especially if it is not accompanied by reinforcement of education and ongoing support. In research Dwiningrum et al., (2021) states that stating that treatment failure can cause a recurrence so that the patient must undergo retreatment of a longer duration.

In the dimension of the health service system, the lack of optimal monitoring, mentoring, and education can affect patient compliance. This is in line with research Siregar et al., (2026) which states that the quality of health services is related to the level of compliance of tuberculosis patients.

A total of 18 respondents (29.0%) were in the category of moderate drug adherence. Based on the MMAS-8 indicator, the majority of respondents answered on the indicators of forgetting to take medication, negligence, side effects, following the schedule, and awareness of the importance of compliance with a percentage of 90.1%. However, it was still found that a small number of respondents answered the indicator of forgetting to take medication by 30.6%, so patient compliance is still in the medium category.

If associated with Health Belief Model (HBM), moderate adherence can be explained through the patient's perception of disease and treatment. Patients in this category generally have a perception of vulnerability and seriousness of TB disease, so there is an awareness to take medication. However, there are still perceived obstacles (perceived barriers), such as forgetting, daily activities, and schedule irregularities, which cause compliance to be suboptimal (Hannan et al., 2025).

The high compliance category was not found in the respondents (0%), which indicates that there are still behavioral, knowledge, and family support factors that affect the patient's compliance in undergoing OAT therapy. Research Ulandari et al., (2025) demonstrated that knowledge, positive attitudes toward treatment, and family support play an important role in improving patient adherence to OAT treatment.

### **The Relationship between Nurses' Caring Behavior and Compliance with Anti-Tuberculosis Drugs in Pulmonary TB Patients at the Tilango Health Center, Gorontalo Regency**

The results of the Spearman's rho correlation test obtained a correlation coefficient value ( $r$ ) of 0.296 with a  $p$  value of 0.019 ( $p < 0.05$ ). Because  $p < 0.05$ ,  $H_0$  is rejected and  $H_1$  is accepted, so there is a relationship between the nurse's caring behavior and the level of adherence to taking medication. Based on the interpretation

of the correlation coefficient (range  $-1$  to  $+1$ ), the value of  $0.20-0.39$  belongs to the weak category, so  $r = 0.296$  indicates a weak relationship. However, the value of the correlation coefficient that is in the weak category indicates that the relationship is not very strong. Nurse caring behavior is not the only factor that affects patient compliance. Medication adherence is also influenced by internal factors such as motivation, forgetfulness, and medication saturation, as well as external factors such as family support, medication side effects, health worker support, and social conditions.

Behavior Caring Nurses are an attitude of care that is shown through attention, empathy, support, and good communication to patients. Caring It is reflected in actions such as providing comfort, listening to patient complaints, providing encouragement, building trust, and showing presence in the treatment process. This behavior not only focuses on the physical aspect, but also includes the psychological, social, and spiritual aspects of the patient. Through behavior Caring, nurses can help increase patient comfort, confidence, and motivation in undergoing treatment (Karo et al., 2023).

Medication adherence is the patient's behavior in following the recommendations of health professionals related to the use of drugs, both in terms of dose, time, and duration of treatment. This adherence is one of the important factors in determining the success of therapy, especially in tuberculosis patients who require long-term treatment (Hardianita, 2025). Adherence to taking medication is influenced by internal and external factors. Internal factors include the patient's motivation, awareness, and condition, while external factors include family support, the role of health workers, and the social environment. In addition, the length of treatment and therapy monitoring can also affect patient compliance in undergoing treatment (Kalsum, 2026).

This is in line with research Nisah et al., (2025) which shows that even though health workers have provided education and monitoring, there are still patients who do not comply with OAT therapy because they are influenced by various internal and external factors, so that the relationship between behavior Caring Nurses and adherence to medication are in the weak category.

In addition, the research Annas et al., (2024) also shows that the Caring nurses are concerned with the treatment adherence of pulmonary TB patients. However, even if the nurse has demonstrated good caring, empathy, and therapeutic communication, the patient's adherence is not necessarily optimal because it is influenced by other factors such as motivation, family support, busyness, and boredom during long-term treatment.

## CONCLUSION

The Caring Behavior of Nurses in Pulmonary TB Patients at the Tilango Health Center was obtained in the high category of 46 respondents (74.2%) and the medium category of 16 respondents (25.8%). Compliance with Taking Anti-Tuberculosis Drugs in Pulmonary TB Patients at the Tilango Health Center, Gorontalo Regency was obtained in the Low Compliance category as many as 44 respondents (71.0%) and as many as 18 respondents (29.0%) were in the medium category.

There was a relationship between the behavior of caring nurses and the level of medication adherence to taking medication in pulmonary TB patients at the Tilango Health Center, Gorontalo Regency using the Spearman's rho test obtained a P-value of  $0.019$  ( $p < 0.05$ ). But nurses' caring behavior is not the dominant factor in influencing medication adherence, because there are still various other factors that also affect patient adherence.

## ADVICE

### For Puskesmas

The researcher hopes that the results of this researcher can be an input for the Puskesmas to improve the quality of health services. The health center is also expected to encourage nurses to implement caring behavior so that patient compliance in undergoing treatment and the success of therapy can increase.

### For Respondents

The researcher hopes that the results of the researcher can increase respondents' awareness of the importance of compliance in undergoing treatment. Respondents are also expected to be more motivated to take medication regularly to support the success of therapy and improve their health.

### For the Next Researcher

The researcher hopes that the researcher's results can be a reference for future researchers in developing research related to nurse caring behavior and patient compliance. Researchers are further advised to use a larger sample size, longer research time, and consider other factors to make the results more comprehensive.

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