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Barriers Affecting Tuberculosis Treatment Adherence among Patients on Directly Observed Treatment Short-Course (DOTS) in Selected Local Government Areas of Taraba State, Nigeria

Ande Iliya Iramae*, Tomen E. Agu, Muhammad Kabiru Usman, Namumma Sylvanus Giwa, Josephus Boniface, and Ayuba Faith Jonathan

Department of Public Health, Faculty of Health Sciences, Taraba State University, Jalingo, Nigeria

Keywords

Tuberculosis, Treatment Adherence, DOTS, Barriers, Patient

Abstract

Tuberculosis (TB) remains a major public health challenge, particularly in developing countries where poor treatment adherence contributes to ongoing transmission and the emergence of drug-resistant strains. This study assessed barriers influencing TB treatment adherence among patients receiving Directly Observed Treatment Short-course (DOTS) services in Jalingo, Ardo-Kola, and Lau Local Government Areas of Taraba State, Nigeria. A descriptive cross-sectional survey design was adopted. From a target population of 736 registered TB patients, 359 respondents were selected using a convenience sampling technique. Data were collected using a structured questionnaire and analysed using frequencies, percentages, and Chi-square statistics. Findings showed high awareness of TB treatment protocols (76.9%–86.9%). However, socioeconomic barriers (75.3%–81.6%), including poor nutrition, transportation costs, distance to clinics, and work-related challenges, significantly affected adherence. Patient-related barriers (59.6%–84.1%) included treatment fatigue, drug side effects, stigma, forgetfulness, and psychological distress. Health system barriers (58.5%–83.8%), such as long waiting times, inadequate staffing, overcrowding, poor communication, and drug stock-outs, also influenced adherence. The study concluded that TB treatment adherence is affected by multiple interrelated socioeconomic, patient, and health system factors. It recommends strengthening continuous health education and counseling in DOTS clinics to improve treatment adherence.

1. Introduction

Tuberculosis (TB) remains one of the leading infectious diseases worldwide and continues to pose a significant public health challenge despite decades of coordinated control efforts. Caused by Mycobacterium tuberculosis, the disease affects millions of people each year. It disproportionately impacts low- and middle-income countries, where poverty, overcrowding, malnutrition, and limited access to quality healthcare contribute to sustained transmission. According to the World Health Organisation (WHO, 2023), an estimated 10.6 million people developed TB in 2022, while approximately 1.3 million people died from the disease, making it the leading cause of death from a single infectious agent globally (WHO, 2023). To improve treatment outcomes and reduce disease transmission, the WHO continues to recommend the Directly Observed Treatment, Short-course (DOTS) strategy, which provides structured supervision and

*Corresponding Author: Ande Iliya Iramae
Email Address: andeiliya86@gmail.com

support to help patients complete the prescribed course of anti-tuberculosis medication (Lönnroth et al., 2021).

Nigeria is among the 30 high TB burden countries and contributes substantially to the global incidence of the disease. The National Tuberculosis and Leprosy Control Programme (NTBLCP) estimates that approximately 440,000 new TB cases occur annually in the country, accounting for more than 4% of the global TB burden (NTBLCP, 2023). The situation is further complicated by the high prevalence of HIV co-infection, widespread poverty, malnutrition, and the increasing occurrence of multidrug-resistant tuberculosis (MDR-TB), all of which negatively affect treatment outcomes (Ukwaja et al., 2021). Although the DOTS strategy has significantly improved treatment success by promoting medication adherence and reducing treatment interruption, many patients in Nigeria still struggle to complete the recommended six-month treatment regimen. Poor adherence contributes to treatment failure, disease relapse, continued community transmission, and the emergence of drug-resistant TB, which is considerably more difficult and costly to manage (Adepoju et al., 2021).

In Taraba State, northeastern Nigeria, these challenges are further intensified by socioeconomic inequalities, dispersed rural settlements, inadequate transportation networks, and limited healthcare infrastructure, all of which affect access to quality tuberculosis services (National Bureau of Statistics, 2023). Although the National Tuberculosis and Leprosy Control Programme has expanded DOTS services across the state, local contextual factors may continue to hinder treatment adherence and programme effectiveness (Abdulkareem et al., 2022). Evidence on the barriers affecting adherence to TB treatment in Taraba State remains limited, making it difficult for programme managers and policymakers to design interventions that adequately respond to local needs. Understanding the factors influencing treatment adherence among patients receiving DOTS in Jalingo, Ardo-Kola, and Lau Local Government Areas is therefore essential for strengthening tuberculosis control programmes, improving treatment outcomes, reducing disease transmission, and supporting Nigeria's commitment to achieving the WHO End TB Strategy and the Sustainable Development Goals by 2030 (WHO, 2023).

This study aims to assess the barriers affecting tuberculosis treatment adherence among patients receiving DOTS in Jalingo, Ardokola and Lau Local Government Areas of Taraba State, Nigeria. Specific Objectives includes:

1) To assess the level of awareness of TB treatment protocols among patients on DOTS in Jalingo, Ardo-Kola, and Lau LGAs of Taraba State.
2) To assess socioeconomic barriers affecting tuberculosis treatment adherence among patients on DOTS in Jalingo, Ardo-Kola and Lau Local Government Areas of Taraba State.
3) To assess patient-related barriers affecting tuberculosis treatment adherence in Jalingo, Ardo-Kola and Lau Local Government Areas of Taraba State.
4) To assess health system barriers affecting tuberculosis treatment adherence in Jalingo, Ardo-Kola and Lau Local Government Areas of Taraba State.

2. Materials and Methods

2.1 Description of Study Area

The study was carried out in Jalingo, Ardo-Kola, and Lau Local Government Areas of Taraba State, Nigeria, where selected health facilities provide tuberculosis diagnosis and DOTS services under the National Tuberculosis and Leprosy Control Programme (NTBLCP).

2.2 Research Design

A descriptive cross-sectional study was conducted to assess the barriers affecting tuberculosis treatment adherence among patients receiving Directly Observed Treatment, Short-course (DOTS) services.

2.3 Study Population

The study population comprised 736 tuberculosis patients receiving DOTS services in selected health facilities across the three Local Government Areas, according to NTBLCP records.

2.4 Sampling and Sample Techniques

A sample size of 359 participants was determined using Yamane's formula at a 95% confidence level and a 5% margin of error. Participants were selected using a convenience sampling technique based on their availability and willingness to participate during the study period.

2.5 Data Collection Instrument

Data were collected using a structured questionnaire developed from the study objectives. The instrument obtained information on socio-demographic characteristics and barriers to tuberculosis treatment adherence. The questionnaire underwent face and content validation by experts in public health and tuberculosis control to ensure that it adequately measured the study variables.

2.6 Data Analysis

Data were coded and analysed using the Statistical Package for the Social Sciences (SPSS) version 26. Descriptive statistics were used to summarise the data, while chi-square tests assessed associations between variables. Statistical significance was set at $p < 0.05$.

2.7 Ethical Considerations

Ethical approval was obtained from the Adamawa State Ministry of Health and Human Services Ethics Committee. Permission was also obtained from the NTBLCP and the participating health facilities, while written informed consent was obtained from all respondents before data collection.

3. Results

Table 4.2.1 Socio-Demographic Characteristics of Respondents (N = 359)

Variables	Category	Frequency (f)	Percentage (%)
Age	15–24 years	72	20.1
	25–34 years	118	32.9
	35–44 years	84	23.4
	45–54 years	56	15.6
	55 years and above	29	8.1
Gender	Male	201	56.0
	Female	158	44.0
Marital Status	Single	102	28.4
	Married	238	66.3
	Widowed	11	3.1
	Divorced	8	2.2
Educational Level	No formal education	142	39.6
	Primary education	109	30.4
	Secondary education	76	21.2
	Tertiary education	32	8.9
Occupation	Unemployed	38	10.6
	Self-employed	121	33.7
	Civil servant	34	9.5
	Farmer	136	37.9
	Others	30	8.4
Monthly Income	Below ₦20,000	132	36.8
	₦20,000–₦50,000	141	39.3
	₦50,000–₦100,000	63	17.5
	Above ₦100,000	23	6.4
LGA of Residence	Jalingo	161	44.8
	Ardo-Kola	119	33.1
	Lau	79	22.0
Duration on TB Treatment	2 months	108	30.1
	3 months	146	40.7
	4–6 months	105	29.3
	Above 7 months	0	0.0
Household Size	1–3	74	20.6
	4–6	149	41.5
	7–9	92	25.6
	10 and above	44	12.3
	Total	359	100

Table 4.2.1 presents the socio-demographic characteristics of the 359 respondents included in the study. The findings indicate that the largest proportion of respondents were aged 25–34 years (32.9%), followed by those aged 35–44 years (23.4%), while respondents aged 55 years and above constituted the smallest group (8.1%). More than half of the respondents were male (56.0%), and the majority were married (66.3%). Regarding educational attainment, 39.6% had no formal education, 30.4% had primary education, 21.2% had secondary education, and only 8.9% had tertiary education. In terms of occupation, farmers accounted for the highest proportion (37.9%), followed by self-employed respondents (33.7%), while 10.6% were unemployed. Most respondents earned between ₦20,000 and ₦50,000 monthly (39.3%), whereas only 6.4% earned above ₦100,000. By place of residence, 44.8% were from Jalingo LGA, 33.1% from Ardo-Kola, and 22.0% from Lau. Concerning treatment duration, 40.7% had been on TB treatment for three months, 30.1% for two months, and 29.3% for four to six months. Household size was predominantly between four and six members (41.5%), followed by seven to nine members (25.6%), indicating that most respondents lived in moderately sized households.

Table 4.2.2 Awareness of Tuberculosis Treatment Protocols among Patients on DOTS in Jalingo, Ardo-Kola and Lau LGAs of Taraba State (n = 359)

Variables	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
I understand how TB is transmitted from one person to another.	176 (49.0%)	128 (35.7%)	12 (3.3%)	27 (7.5%)	16 (4.5%)
I know the importance of completing the full course of TB treatment.	189 (52.6%)	121 (33.7%)	10 (2.8%)	24 (6.7%)	15 (4.2%)
I am aware of the consequences of stopping TB treatment prematurely.	171 (47.6%)	133 (37.0%)	11 (3.1%)	28 (7.8%)	16 (4.5%)
I believe TB can be completely cured if treatment is followed correctly.	183 (51.0%)	126 (35.1%)	9 (2.5%)	25 (7.0%)	16 (4.5%)
I have adequate information about the side effects of TB drugs.	144 (40.1%)	132 (36.8%)	18 (5.0%)	42 (11.7%)	23 (6.4%)
I know the duration of TB treatment under the DOTS program.	158 (44.0%)	137 (38.2%)	14 (3.9%)	33 (9.2%)	17 (4.7%)
I am aware of the free availability of TB drugs at the DOTS clinic.	201 (56.0%)	109 (30.4%)	8 (2.2%)	27 (7.5%)	14 (3.9%)
I have received adequate counselling about TB treatment protocols.	149 (41.5%)	136 (37.9%)	15 (4.2%)	38 (10.6%)	21 (5.8%)
I know the importance of attending all scheduled clinic appointments.	194 (54.0%)	118 (32.9%)	9 (2.5%)	25 (7.0%)	13 (3.6%)
I believe adherence to TB treatment prevents drug resistance.	182 (50.7%)	124 (34.5%)	10 (2.8%)	28 (7.8%)	15 (4.2%)

Table 4.2.2 presents respondents' awareness of tuberculosis treatment protocols among patients receiving DOTS in Jalingo, Ardo-Kola, and Lau LGAs of Taraba State. Overall, the findings indicate a high level of awareness regarding TB treatment protocols, with the majority of respondents either strongly agreeing or agreeing with all the statements. Most respondents understood how TB is transmitted (84.7%), recognised the importance of completing the full course of treatment (86.3%), and were aware of the consequences of stopping treatment prematurely (84.6%). Similarly, 86.1% believed that TB can be completely cured when treatment is correctly followed, while 82.2% knew the recommended duration of TB treatment under the DOTS programme. Awareness was also high regarding the free availability of TB drugs at DOTS clinics (86.4%), the importance of attending scheduled clinic appointments (86.9%), and the role of treatment adherence in preventing drug resistance (85.2%). However, awareness of the side effects of TB medications (76.9%) and the adequacy of counselling received on TB treatment protocols (79.4%) was comparatively lower, suggesting the need for strengthened patient education and counselling to improve treatment adherence further.

Table 4.2.3 Socioeconomic Barriers Affecting Tuberculosis Treatment Adherence among Patients on DOTS in Jalingo, Ardo-Kola and Lau LGAs of Taraba State (n = 359)

Variables	Strongly Agree f (%)	Agree f (%)	Neutral f (%)	Disagree f (%)	Strongly Disagree f (%)
Lack of money for transport prevents me from attending DOTS clinics regularly.	168 (46.8%)	121 (33.7%)	10 (2.8%)	38 (10.6%)	22 (6.1%)
Time spent attending DOTS clinics interferes with my ability to earn a living.	149 (41.5%)	132 (36.8%)	12 (3.3%)	41 (11.4%)	25 (7.0%)
Distance from my home to the DOTS clinic affects my ability to attend treatment regularly.	172 (47.9%)	118 (32.9%)	8 (2.2%)	40 (11.1%)	21 (5.8%)
My work and daily activities make it hard to follow the TB treatment schedule strictly.	161 (44.8%)	127 (35.4%)	9 (2.5%)	39 (10.9%)	23 (6.4%)
Household responsibilities reduce the time available for me to attend DOTS services.	138 (38.4%)	134 (37.3%)	12 (3.3%)	49 (13.6%)	26 (7.2%)
Poor nutrition during treatment affects my strength to continue clinic visits.	174 (48.5%)	119 (33.1%)	8 (2.2%)	37 (10.3%)	21 (5.8%)
Lack of family or social support affects my adherence to TB treatment.	142 (39.6%)	128 (35.7%)	12 (3.3%)	49 (13.6%)	28 (7.8%)

Table 4.2.3 presents the socioeconomic barriers affecting tuberculosis treatment adherence among patients receiving DOTS in Jalingo, Ardo-Kola, and Lau LGAs of Taraba State. The findings reveal that socioeconomic challenges were common among the respondents, with the majority either strongly agreeing or agreeing with all the listed statements. Most respondents reported that lack of money for transportation affected their ability to attend DOTS clinics regularly (80.5%), while 80.8% indicated that the distance to the clinic limited regular treatment attendance. Similarly, 78.3% stated that the time spent attending DOTS clinics interfered with their ability to earn a living, and 80.2% reported that work and daily activities made it difficult to adhere strictly to the treatment schedule. Furthermore, 75.7% agreed that household responsibilities reduced the time available for clinic visits, 81.6% indicated that poor nutrition during treatment affected their strength to continue attending the clinic, and 75.3% reported that inadequate family or social support negatively influenced their treatment adherence.

Table 4.2.4 Patient-Related Barriers Affecting TB Treatment Adherence among Patients on DOTS in Jalingo, Ardo-Kola and Lau LGAs of Taraba State (n = 359)

Variables	Strongly Agree f (%)	Agree f (%)	Neutral f (%)	Disagree f (%)	Strongly Disagree f (%)
I feel stigmatised when people know I am on TB treatment.	161 (44.8%)	125 (34.8%)	3 (0.8%)	45 (12.5%)	25 (7.0%)
Fear of rejection by family and community discourages me from attending clinics.	149 (41.5%)	125 (34.8%)	4 (1.1%)	49 (13.6%)	32 (8.9%)
I sometimes forget to take my drugs as prescribed.	136 (37.9%)	132 (36.8%)	2 (0.6%)	56 (15.6%)	33 (9.2%)
Side effects of TB drugs make me want to stop treatment.	171 (47.6%)	120 (33.4%)	2 (0.6%)	42 (11.7%)	24 (6.7%)
I believe traditional medicine is more effective than hospital treatment.	108 (30.1%)	121 (33.7%)	4 (1.1%)	78 (21.7%)	48 (13.4%)
I feel tired of taking TB drugs for many months.	182 (50.7%)	120 (33.4%)	2 (0.6%)	36 (10.0%)	19 (5.3%)
I feel too weak or sick to attend DOTS clinic appointments.	166 (46.2%)	121 (33.7%)	3 (0.8%)	45 (12.5%)	24 (6.7%)
I stop taking my TB drugs when I begin to feel better.	119 (33.1%)	132 (36.8%)	6 (1.7%)	68 (18.9%)	34 (9.5%)
Substance use (alcohol or smoking) makes me skip my treatment.	97 (27.0%)	117 (32.6%)	5 (1.4%)	84 (23.4%)	56 (15.6%)
I feel depressed or hopeless, which reduces my motivation to continue treatment.	151 (42.1%)	125 (34.8%)	2 (0.6%)	48 (13.4%)	33 (9.2%)

Table 4.2.4 presents the patient-related barriers affecting tuberculosis treatment adherence among patients receiving DOTS in Jalingo, Ardo-Kola, and Lau LGAs of Taraba State. The findings indicate that several patient-related factors negatively influenced treatment adherence. A majority of respondents reported feeling stigmatised because of their TB status (79.6%) and feared rejection by family or the community (76.3%). Many respondents also acknowledged forgetting to take their medications as prescribed (74.7%), while 81.0% indicated that the side effects of TB drugs made them consider discontinuing treatment. Similarly, 84.1% reported becoming tired of taking TB medication for many months, and 79.9% stated that weakness or illness affected their ability to attend DOTS clinic appointments.

Furthermore, 69.9% admitted stopping their medication once they began to feel better, whereas 59.6% reported that alcohol consumption or smoking contributed to missed doses. More than three-quarters of the respondents (76.9%) also indicated that feelings of depression or hopelessness reduced their motivation to continue treatment. However, belief in traditional medicine over hospital treatment received comparatively lower agreement (63.8%). Overall, the findings demonstrate that stigma, medication fatigue, drug side effects, forgetfulness, poor psychological well-being, and misconceptions about treatment are important patient-related barriers to tuberculosis treatment adherence.

Table 4.2.5 Health System Barriers Affecting TB Treatment Adherence among DOTS Patients in Jalingo, Ardo-Kola and Lau LGAs of Taraba State (n = 359)

Variables	Strongly Agree f (%)	Agree f (%)	Neutral f (%)	Disagree f (%)	Strongly Disagree f (%)
The DOTS clinic is too far from my home	112 (31.2%)	98 (27.3%)	3 (0.8%)	76 (21.2%)	70 (19.5%)
Frequent changes in health workers affect continuity of care	141 (39.3%)	122 (34.0%)	2 (0.6%)	54 (15.0%)	40 (11.1%)
Long waiting times discourage attendance	182 (50.7%)	119 (33.1%)	2 (0.6%)	34 (9.5%)	22 (6.1%)
Clinic is overcrowded and uncomfortable	164 (45.7%)	122 (34.0%)	2 (0.6%)	47 (13.1%)	24 (6.7%)
Not enough staff at DOTS clinic	176 (49.0%)	118 (32.9%)	2 (0.6%)	42 (11.7%)	21 (5.8%)
TB drugs are always available at the clinic	32 (8.9%)	41 (11.4%)	2 (0.6%)	182 (50.7%)	102 (28.4%)
Health workers do not give proper counselling	132 (36.8%)	127 (35.4%)	3 (0.8%)	68 (18.9%)	29 (8.1%)
Health workers do not treat patients with respect	118 (32.9%)	119 (33.1%)	4 (1.1%)	73 (20.3%)	45 (12.5%)
Poor communication affects understanding of TB treatment	139 (38.7%)	132 (36.8%)	2 (0.6%)	52 (14.5%)	34 (9.5%)
Poor facility conditions reduce motivation	161 (44.8%)	123 (34.3%)	3 (0.8%)	48 (13.4%)	24 (6.7%)

Table 4.2.5 presents the health system barriers affecting tuberculosis treatment adherence among patients receiving DOTS in Jalingo, Ardo-Kola, and Lau LGAs of Taraba State. The findings indicate that several health system-related factors hindered treatment adherence. Most respondents agreed that frequent changes in health workers affected continuity of care (73.3%), long waiting times discouraged clinic attendance (83.8%), overcrowded and uncomfortable clinic environments reduced their willingness to attend treatment (79.7%), and inadequate staffing at DOTS clinics posed a challenge (81.9%). In addition, 72.2% reported inadequate counselling by health workers, 66.0% believed they were not always treated with respect, 75.5% indicated that poor communication affected their understanding of TB treatment, and 79.1% stated that poor health facility conditions reduced their motivation to continue treatment. Although 58.5% considered the distance to the DOTS clinic a barrier, the majority of respondents disagreed that TB drugs were always unavailable at the clinic, indicating that drug availability was generally not a major challenge. Overall, the findings suggest that deficiencies in service delivery, including long waiting times, inadequate staffing, poor communication, and unfavourable clinic conditions, are important health system barriers to tuberculosis treatment adherence.

4. Discussion

The findings of this study revealed that respondents had a high level of awareness and understanding of tuberculosis (TB) treatment protocols. The majority understood how TB is transmitted (84.7%), recognised the importance of completing the full course of treatment (86.3%), were aware of the consequences of treatment interruption (84.6%), and believed that TB can be completely cured when treatment is properly followed (86.1%). Similarly, 86.4% knew that TB drugs were provided free of charge, 86.9% recognised the importance of attending scheduled clinic appointments, and 85.2% understood that adherence prevents drug resistance. Despite this high level of awareness, knowledge of drug side effects (76.9%) and the adequacy of counselling received (79.4%) were relatively lower, suggesting the need for improved patient education. Furthermore, chi-square analysis showed a statistically significant relationship between awareness of TB treatment protocols and treatment adherence ($\chi^2 = 18.72$, $p = 0.001$), indicating that better awareness was associated with improved adherence. These findings are consistent with those of Daniel et al. (2019) and WHO (2023), who reported that adequate patient knowledge enhances treatment adherence and improves TB treatment outcomes.

The study also identified substantial socioeconomic and patient-related barriers affecting treatment adherence. Financial constraints, poor nutrition, and accessibility challenges were common, with 81.6% of respondents reporting that poor nutrition affected their ability to continue treatment, 80.8% indicating that long distances to DOTS clinics hindered attendance, and 80.5% stating that transportation costs prevented regular clinic visits. In addition, 80.2% reported that work and daily activities interfered with treatment schedules, while 75.3% indicated that inadequate family or social support negatively affected adherence. Patient-related barriers were equally prominent, as 84.1% experienced treatment fatigue, 81.0% reported that drug side effects discouraged treatment continuation, 79.9% felt too weak to attend clinic appointments, 79.6% experienced stigma, and 76.9% reported depression or hopelessness during treatment. The chi-square analysis further demonstrated a significant relationship between socioeconomic factors and treatment adherence ($\chi^2 = 22.46$, $p < 0.001$), confirming that these factors significantly influence adherence. These findings agree with Adepoju et al. (2020) and Mekonnen et al. (2022), who identified poverty, poor nutrition, stigma, and financial hardship as major determinants of poor TB treatment adherence.

Health system-related barriers also played a significant role in influencing adherence to tuberculosis treatment. Most respondents reported that long waiting times discouraged clinic attendance (83.8%), inadequate staffing affected service delivery (81.9%), overcrowded clinics reduced treatment motivation (79.7%), and poor facility conditions discouraged continued attendance (79.1%). Furthermore, 75.5% indicated that poor communication affected their understanding of treatment, 72.2% reported inadequate counselling from health workers, and 73.3% believed that frequent changes in healthcare providers disrupted continuity of care. Although 58.5% considered the distance to DOTS clinics a challenge, many respondents also indicated concerns regarding the consistency of drug availability. These findings suggest that health system deficiencies remain important obstacles to successful treatment completion. Similar findings were reported by Adejumo et al. (2020) and Tadesse et al. 2022), who emphasised that strengthening health systems through adequate staffing, improved patient-provider communication, reliable drug supply, and patient-centred service delivery is essential for improving TB treatment adherence.

5. Conclusion

This study concludes that although tuberculosis (TB) patients receiving Directly Observed Treatment, Short-course (DOTS) services in Jalingo, Ardo-Kola, and Lau Local Government Areas demonstrated a high level of awareness of TB treatment protocols, treatment adherence remains significantly influenced by socioeconomic, patient-related, and health system barriers. Financial hardship, transportation costs, poor nutrition, stigma, treatment fatigue, medication side effects, inadequate counselling, long waiting times, and shortages of healthcare workers were identified as major obstacles to successful treatment completion.

6. Recommendations

1. The National Tuberculosis and Leprosy Control Programme (NTBLCP) and Taraba State Ministry of Health should strengthen patient education and counselling on TB treatment, particularly regarding medication side effects, treatment completion, and the consequences of treatment interruption.
2. Health facilities providing DOTS services should improve service delivery by ensuring adequate staffing, reducing waiting times, maintaining uninterrupted drug supplies, and promoting respectful patient-centred care to enhance treatment adherence and treatment outcomes.

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