

Adherence to treatment in pulmonary tuberculosis: Rodgers' evolutionary concept analysis

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Abstract

Background: Adherence to treatment is essential for the management of pulmonary tuberculosis. Nurses and healthcare professionals play a significant role in promoting adherence behavior among this population. Nevertheless, defining adherence to treatment within this particular population remains complex.

Objective: This study aimed to explore and clarify the concept of adherence to treatment among individuals with pulmonary tuberculosis.

Methods: Rodgers' evolutionary concept analysis was employed in this study. A literature search was conducted in the PubMed and Scopus databases to identify relevant studies published between July 2013 and July 2023.

Results: The attributes of adherence to treatment in pulmonary tuberculosis consist of multiple components: biological, individual, social, health service, and policy-making processes. Antecedents include various patient-related factors as well as factors associated with clinical conditions and patient-health professional engagement. Three consequences of the concept have emerged: enhanced treatment efficacy, increased commitment to tuberculosis treatment adherence, and improved health service quality.

Conclusion: This study provides a comprehensive operational definition of adherence to tuberculosis treatment, including its attributes, antecedents, and consequences. This framework will assist nurses in evaluating adherence more effectively. However, further research into the experiences of individuals adhering to tuberculosis treatment is needed to confirm and enhance these strategies.

Keywords

treatment adherence; pulmonary tuberculosis; concept analysis; health services

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Background

The End TB Strategy outlines the global effort to eliminate tuberculosis (TB) by targeting a 90% reduction in TB-related deaths by 2030 compared to 2015 levels. Nevertheless, TB, a leading cause of death worldwide, remains a significant concern today. TB was the primary cause of mortality resulting from a single infectious agent. Globally, the TB incidence rate stands at 133 cases per 100,000 individuals, positioning TB as one of the leading causes of mortality, according to the World Health Organization ([World Health Organization, 2021](https://www.who.int/news-room/fact-sheets/detail/tuberculosis)).

The effectiveness of treatment cannot be achieved unless patients consistently adhere to their TB treatment ([Burkhart & Sabaté, 2003](https://doi.org/10.1186/14752875300000000000000000000000)). Furthermore, adherence to treatment can impact the individual's health outcomes and the overall cost of healthcare ([Panahi et al., 2022](https://doi.org/10.1186/14752875300000000000000000000000)). However, research has shown that 50% of TB patients fail to complete their treatment ([Munro et al., 2007](https://doi.org/10.1186/14752875300000000000000000000000)), leading to extended periods of contagiousness, the likelihood of disease recurrence, and, eventually, death ([Volmink & Garner, 2007](https://doi.org/10.1186/14752875300000000000000000000000)). The long-term commitment required for chronic disease treatments, including TB, often impedes adherence to treatment.

Research has defined adherence to treatment using various sources. The World Health Organization defines adherence in psychology and social sciences ([Burkhart & Sabaté, 2003](https://doi.org/10.1186/14752875300000000000000000000000)). This concept emphasizes the importance of patients' decisions when following health experts' advice. Additionally, [Bissonnette \(2008\)](https://doi.org/10.1186/14752875300000000000000000000000) defines adherence as gaining individual agreement and placing more responsibility on health practitioners to build trust. Thus, adherence to treatment is vital for managing numerous diseases, as commonly acknowledged in this context ([Hyvert et al., 2022](https://doi.org/10.1186/14752875300000000000000000000000)).

The term adherence recognizes patient perspectives and acknowledges that medication alone is not an effective method ([Chakrabarti, 2014](https://doi.org/10.1186/14752875300000000000000000000000); [Martin et al., 2005](https://doi.org/10.1186/14752875300000000000000000000000)). Numerous studies agree that a core set of characteristics improves patient adherence to treatment. These elements include an objective assessment of patients' understanding and awareness of the treatment plan, skilled and articulate provider-patient communication, and the development of patient confidence and trust in the therapeutic alliance ([Kardas et al., 2013](https://doi.org/10.1186/14752875300000000000000000000000)). Hence, adherence to treatment includes not only the patient's individual responsibility but also a broader and more holistic viewpoint.

Regarding the TB population, adherence to treatment is influenced by socio-demographic and clinical components (Munro et al., 2007). Despite recent scientific attention, non-adherence behavior remains a substantial public health concern, particularly among the TB population (Kardas et al., 2013). This issue is seen in the complexity of treatment, which is inversely associated with adherence to treatment (Martin et al., 2005).

Munro et al. (2007) define adherence to treatment in pulmonary TB as a complex term involving system, social, economic, individual, therapeutic process, and personal elements. A new approach to therapeutic management emphasizes joint decision-making and commitment to the treatment plan, with person-centered empowerment as the focus of this strategy (Munro et al., 2007).

However, despite the term adherence to treatment being widely used for decades, there is still a lack of clarity around it, particularly among the TB population (Kardas et al., 2013). Previous research on adherence behavior in the TB population often mixed the terminology of medication adherence and adherence to treatment within studies (Gashu et al., 2021; Matakanye et al., 2021; Nezenega et al., 2020), using these two terms to define the medication-taking process only. Moreover, a study stated that there is still uncertainty surrounding the understanding of the characteristics or attributes associated with this concept (Valencia et al., 2016).

The goal of our study is to explore the concept of adherence to treatment in the TB population. This method evaluates evolutionary changes in the concept's semantic interpretations in a systematic and dynamic manner (Toftthagen, 2010). This concept analysis aims to establish a clearer definition of adherence to TB treatment, including its related attributes. By fully defining the concept, it is anticipated that the evaluation of the entire TB program can be more thorough, enabling the development of effective interventions that can lead to improved outcomes.

To explore the concept, this analysis employed the social-ecological approach. It has been stated that adherence to treatment is a multifaceted behavior that can be examined using the social-ecological approach (Poon & Ogboe, 2021). The model represents individuals as being situated within their environmental context, where they interact with one another to impact health behavior and outcomes (Golden & Earp, 2012). Utilizing the social-ecological model for comprehending non-adherence behavior enables nurses and healthcare professionals to consider patients within their social framework rather than solely concentrating on the solution (Golden & Earp, 2012). As previously mentioned, adherence to TB treatment involves the patient's responsibility and a more comprehensive and holistic perspective, which can be addressed through this approach.

The objective of this paper was to explore the concept of "adherence to treatment" in the context of individuals with pulmonary TB, using Rodgers' evolutionary method (Rodgers & Knaf, 2000). Consequently, the following inquiries were examined: 1) What are the surrogate terminologies and related concepts utilized in this context? 2) What are the attributes, antecedents, and consequences of the concept of adherence to treatment in pulmonary TB?

Concept Analysis of Adherence to Treatment in Pulmonary TB

Rodgers' evolutionary method was used to analyze the concept of adherence to treatment among individuals with pulmonary TB. This analysis identified characteristics, surrogates, related concepts, antecedents, and outcomes (Gunawan et al., 2023). The choice of Rodgers' model for conducting this concept analysis on adherence to treatment was based on its capacity to effectively demonstrate the evolution of concepts over time and their contextual influences. Furthermore, this approach does not provide conclusive findings but rather acts as a framework for future investigation (Rodgers, 1989, as cited in Gunawan et al., 2023).

The authors selected studies published in English available in the databases from 2013 to 2023. The initial selection was limited to scientific studies on adherence to treatment. To assess the existing knowledge across allied health disciplines, selected articles were restricted to the fields of nursing, public health, medicine, and pharmacy.

The search terms "(Pulmonary Tuberculosis OR Pulmonary TB) AND (Adherence to Treatment OR Treatment Adherence OR Adherence) AND (Tuberculosis Treatment OR Tuberculosis Program OR TB Treatment)" were used in PubMed and Scopus titles and abstracts to identify relevant studies. This review included studies that a) investigated adherence to treatment in pulmonary TB and b) were relevant to patients and healthcare professionals. Non-original research and non-pulmonary TB studies were excluded.

This review followed the PRISMA statement (Page et al., 2021). Figure 1 shows the analysis results. After removing duplicates, 121 of the 671 papers were reviewed, and 550 were thoroughly assessed. A total of 477 articles were excluded for not meeting the inclusion requirements. The concept analysis included 39 relevant articles after screening. These articles included studies from the disciplines of nursing, medicine, pharmacy, and public health and examined inpatient, outpatient, and community healthcare settings.

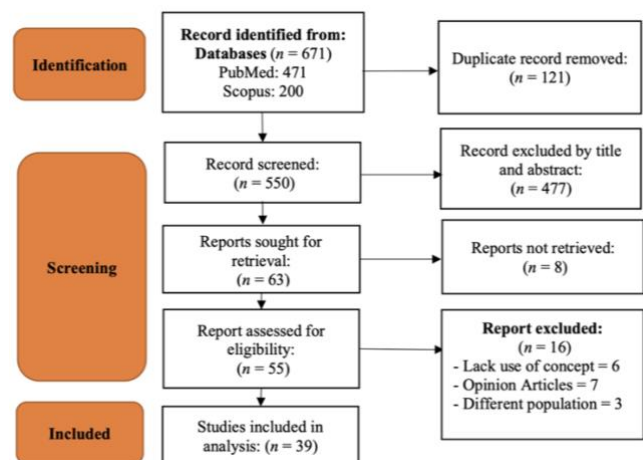


Figure 1 Data search and selection process using PRISMA flow diagram

Study results were categorized and organized using Rodgers' evolutionary model (Toftthagen, 2010). Surrogate terms use different terminology to explain the notion, while

related terms are distinct but share some traits. Antecedents are factors and conditions that precede and are necessary for the concept, though insufficient. The combined operation of characteristics leads to consequences (Rodgers & Knafli, 2000).

Concept of Interest, Surrogate Terms, and Related Concepts

Previous research predominantly derived the definition of adherence to treatment from the World Health Organization. It measures how well an individual's medicine, diet, and lifestyle changes align with health professionals' advice (Burkhart & Sabaté, 2003). Another similar paradigm emphasizes patient engagement in a mutually agreed-upon treatment plan (Balkrishnan, 2005). Both definitions stress the need for patient participation and dedication in therapeutic decision-making. Thus, adherence behavior assumes a proactive, intentional, and cooperative patient who is conscious of their well-being and dedicated to fulfilling their assigned obligations.

However, previous studies related to TB have solely examined how well people take their medications, ignoring other lifestyle changes required to optimize TB treatment outcomes (Burkhart & Sabaté, 2003). A study by Matakanye et al. (2021) defines adherence to treatment as taking TB medicine daily at specified times and doses until the patient is cured. Another study states that adherence to treatment is taking all prescribed medicine to provide TB patients with the best chance of recovery and to prevent TB from spreading (Gashu et al., 2021). These definitions do not fully reflect the complete range of pulmonary TB treatment, which includes medication-taking behavior and lifestyle changes, as revealed by studies (Burusie et al., 2020; Krapp et al., 2008; Samuel et al., 2016; Simpson et al., 2006; Srisurad & Phetphum, 2021; Weiangkham et al., 2022).

Due to surrogate terms, Abiz et al. (2020) propose that self-management is a conceptual term comprising a basic repertoire of abilities for people with pulmonary TB aimed at effectively managing routine tasks necessary to mitigate or minimize the effects of TB treatments on their daily functioning. Self-management generally includes generic and condition-specific features like treatment regimens, emotional well-being, and new life obligations (Liu et al., 2023). This notion goes beyond education to help patients discover and resolve medical difficulties (Anekwe & Rahkovsky, 2018; Grady & Gough, 2014).

The literature also discusses compliance, concordance, lifestyle management, commitment, and involvement. Compliance refers to how well a patient follows medical advice and involves passively following medical orders and instructions (Mir, 2023). This approach often reflects a paternalistic and inequitable attitude between patients and healthcare providers and tends to blame individuals without accounting for all chronic illness variables.

Concordance, on the other hand, relates to the quality and dynamics of health professional-patient communication and collaboration, rather than mere patient compliance with therapy. This concept assumes that healthcare professionals and patients collaborate and make decisions together (Royal Pharmaceutical Society of Great Britain, 1996). Each patient may value the risks and benefits of treatment differently from their healthcare providers (Alaszewski, 2005). Additionally,

concordance promotes a strong clinician-patient therapeutic relationship by fostering mutual agreement and understanding regarding treatment plans. This approach builds trust and cooperation, ensuring patients feel heard and respected. When patients are actively involved in decision-making, they are more likely to adhere to treatment recommendations, which strengthens the therapeutic alliance and enhances overall health outcomes.

Some researchers suggest integrating lifestyle management, which refers to patients' lifestyle changes and self-care activities as they incorporate the treatment into their daily routines (Park et al., 2022). The term 'treatment commitment' has recently been defined and used (Odone et al., 2018). Both concepts emphasize empowerment and are person-centered, focusing on active patient involvement in their health care. This approach not only improves adherence to treatment but also enhances overall well-being by fostering healthier habits and greater patient autonomy.

Attributes

The main attributes of adherence to treatment in pulmonary TB are presented using an ecological model approach, covering biological, individual, social, health services, and policy-making levels (Table 1).

Studies have identified biological and genetic components linked to adherence to treatment. Attributes at this level include age (Abdelhadi et al., 2015; Basa & Venkatesh, 2015; Cherkaoui et al., 2014; Lalor et al., 2013; Saibannavar & Desai, 2016) and gender (Basa & Venkatesh, 2015; Saibannavar & Desai, 2016).

At the individual level, key attributes include treatment literacy (Ali & Prins, 2016; Cherkaoui et al., 2014; Roy et al., 2015; Tupasi et al., 2016), experiences with medication side effects (Basa & Venkatesh, 2015; Cherkaoui et al., 2014; Roy et al., 2015; Tupasi et al., 2016), lifestyle modifications (Mekonnen & Azagew, 2018; Nezenega et al., 2020; Tesfahuneygn et al., 2015), and the perception of feeling better (Abdelhadi et al., 2015; Basa & Venkatesh, 2015; Cherkaoui et al., 2014; El-Muttalut & Elnimeiri, 2017), all of which define how individuals with pulmonary TB adhere to their treatment.

At the social level, support from family and peers (Ahmed & Prins, 2016; Basa & Venkatesh, 2015; Cherkaoui et al., 2014; Tupasi et al., 2016) has been shown to help individuals adhere to TB treatment. Conversely, social stigma is a negative factor affecting adherence among individuals with pulmonary TB (Abdelhadi et al., 2015; Hashim & Mohamed, 2017).

At the health service level, staff receptiveness (Ahmed & Prins, 2016; Hashim & Mohamed, 2017; Nezenega et al., 2013; Roy et al., 2015; Tupasi et al., 2016), treatment regimens (Basa & Venkatesh, 2015; Lalor et al., 2013; Vasudevan et al., 2014), and the application of DOTS (Vasudevan et al., 2014) significantly impact adherence to TB treatment. Additionally, the accessibility of health services also affects adherence behavior (Basa & Venkatesh, 2015; Saibannavar & Desai, 2016). The appearance of health centers (Ahmed & Prins, 2016) may influence treatment adherence at the policy level, although there is limited research on this aspect.

Table 1 Attributes of adherence to treatment in pulmonary TB

Attributes		Sources
Biological	Age	(Abdelhadi et al., 2015), (Saibannavar & Desai, 2016), (Basa & Venkatesh, 2015), (Cherkaoui et al., 2014), (Lalor et al., 2013)
	Gender	(Saibannavar & Desai, 2016), (Basa & Venkatesh, 2015)
Individual	Treatment Literacy	(Tupasi et al., 2016), (Cherkaoui et al., 2014), (Roy et al., 2015), (Ali & Prins, 2016)
	Side Effects Experience	(Tupasi et al., 2016), (Cherkaoui et al., 2014), (Roy et al., 2015), (Basa & Venkatesh, 2015)
	Lifestyle Modification	(Tefahuneaygn et al., 2015), (Mekonnen & Azagew, 2018), (Nezenega et al., 2020)
	Feeling Better	(Abdelhadi et al., 2015), (El-Muttalut & Elnimeiri, 2017), (Cherkaoui et al., 2014), (Basa & Venkatesh, 2015)
Social	Support of Families and Peers	(Tupasi et al., 2016), (Cherkaoui et al., 2014), (Ahmed & Prins, 2016), (Basa & Venkatesh, 2015)
	Social Stigma	(Abdelhadi et al., 2015), (Hashim & Mohamed, 2017)
Health Services	Staff Receptiveness	(Tupasi et al., 2016), (Roy et al., 2015), (Ahmed & Prins, 2016), (Nezenega et al., 2013), (Hashim & Mohamed, 2017)
	Treatment Regimen	(Lalor et al., 2013), (Vasudevan et al., 2014), (Basa & Venkatesh, 2015)
	DOTS Application	(Vasudevan et al., 2014)
	Accessibility	(Saibannavar & Desai, 2016), (Basa & Venkatesh, 2015)
Policy Maker	Health Center Appearance	(Ahmed & Prins, 2016)

Antecedents

Antecedents are factors that influence a patient's decision to follow medical advice. Personal antecedents of treatment adherence in individuals with pulmonary TB include socio-demographic factors such as education (El-Muttalut & Elnimeiri, 2017; Lackey et al., 2015; Saibannavar & Desai, 2016), financial situation (El-Muttalut & Elnimeiri, 2017; Hashim & Mohamed, 2017; Saibannavar & Desai, 2016), perceived barriers (Diriba Daksa et al., 2016; Tola, 2017), residential location (Ahmed & Prins, 2016; El-Muttalut & Elnimeiri, 2017; Vasudevan et al., 2014), and employment status (Basa & Venkatesh, 2015). Clinical factors such as a history of alcohol intake (Basa & Venkatesh, 2015; Hashim & Mohamed, 2017; Roy et al., 2015; Tupasi et al., 2016) and a history of substance abuse (Gelmanaova, 2007; Lackey et al., 2015) are also significant socio-demographic antecedents.

The second group of antecedents involves patient-health professional engagement in treatment. Factors such as long waiting times for healthcare services (Ayele et al., 2017; Mekonnen & Azagew, 2018; Tefahuneaygn et al., 2015), healthcare inaccessibility (Diriba Daksa et al., 2016; Mohammed & Adem, 2014; Woimo et al., 2017), travel expenses (Nezenega et al., 2013; Woimo et al., 2017), poor healthcare provider-patient relationships including communication gaps (Gebremariam et al., 2021; Getahun & Nkosi, 2017; Mekonnen & Azagew, 2018; Nezenega et al., 2013), patient satisfaction (Nezenega et al., 2013; Tadesse et al., 2013; Tefahuneaygn et al., 2015), and lack of health information (Mekonnen & Azagew, 2018; Mindachew et al., 2014; Woimo et al., 2017) are also essential antecedents for adherence to pulmonary TB treatment (see **Table 2**).

Table 2 Antecedents of adherence to treatment in pulmonary TB

Antecedents	Sources	
Socio-demographic factors	Education	(Lackey et al., 2015), (El-Muttalut & Elnimeiri, 2017), (Saibannavar & Desai, 2016)
	Financial Situation	(El-Muttalut & Elnimeiri, 2017), (Saibannavar & Desai, 2016), (Hashim & Mohamed, 2017)
	Perceived Barriers	(Diriba Daksa et al., 2016), (Tola, 2017)
	Patients' Residential Location	(El-Muttalut & Elnimeiri, 2017), (Ahmed & Prins, 2016), (Vasudevan et al., 2014)
	Employment Status	(Basa & Venkatesh, 2015)
Clinical Factors	History of Alcohol Intake	(Tupasi et al., 2016), (Hashim & Mohamed, 2017), (Basa & Venkatesh, 2015), (Roy et al., 2015)
	History of Substance Abuse	(Lackey et al., 2015), (Gelmanaova, 2007)
Engagement between Patients and Health Professionals	Long Waiting Time Services	(Mekonnen & Azagew, 2018), (Ayele et al., 2017), (Tefahuneaygn et al., 2015)
	Healthcare Inaccessibility	(Mohammed & Adem, 2014), (Diriba Daksa et al., 2016), (Woimo et al., 2017)
	Travel Expenses	(Nezenega et al., 2013), (Woimo et al., 2017)
	Communication Gaps	(Mekonnen & Azagew, 2018), (Gebremariam et al., 2021), (Getahun & Nkosi, 2017), (Nezenega et al., 2013)
	Patient Satisfaction	(Tefahuneaygn et al., 2015), (Tadesse et al., 2013), (Nezenega et al., 2013)
	Lack of Health Information	(Mekonnen & Azagew, 2018), (Mindachew et al., 2014), (Woimo et al., 2017)

Consequences

Several consequences have been observed as a result of adherence to TB treatment. These consequences relate to improved clinical and social outcomes, the level of adherence to treatment, and healthcare quality (see **Table 3**). Numerous articles link improved adherence to beneficial clinical and social outcomes. These include being cured (Alipanah et al., 2018; Nezenega et al., 2020; Tesfahuneygn et al., 2015; Vernon et al., 2019), preventing relapse (Alipanah et al., 2018; Gashu et al., 2021; Mamo et al., 2021; Zong et al., 2018), reducing mortality rates (Gupta et al., 2022; Kayigamba et al., 2013; Mamo et al., 2021; Nezenega et al., 2020; Vernon et al., 2019), preventing prolonged infection (Adisa et al., 2021; Khamis et al., 2022; Nezenega et al., 2020; Tesfahuneygn et al., 2015), and preventing drug resistance (Chantana et al.,

2019; Nezenega et al., 2020; Xing et al., 2021). These are significant personal benefits of adhering to TB treatment.

Several studies also describe adherence to treatment as a dynamic process that enhances patient-clinician collaboration (Khamis et al., 2022; Nezenega et al., 2020; Tesfahuneygn et al., 2015). This approach improves relationships between patients and healthcare personnel (Mindachew et al., 2014; Nezenega et al., 2013; Tesfahuneygn et al., 2015; Woimo et al., 2017), which affects treatment satisfaction. Additionally, adherence to treatment impacts healthcare quality by reducing the number of hospitalizations and re-hospitalizations (Gashu et al., 2021; Zong et al., 2018) and decreasing hospitalization costs (Kwon et al., 2022; Nezenega et al., 2020; Yang et al., 2022). Thus, the consequences of adhering to TB treatment span various levels, from individual benefits to improvements in healthcare (see **Figure 2**).

Table 3 Consequences of adherence to treatment in pulmonary TB

Consequences		Sources
Enhanced Efficacy of TB Treatment	Being Cured	(Tefahuneygn et al., 2015), (Alipanah et al., 2018), (Vernon et al., 2019), (Nezenega et al., 2020)
Increased Commitment to Adhere	Prevention of Relapse	(Alipanah et al., 2018), (Gashu et al., 2021), (Zong et al., 2018), (Mamo et al., 2021)
	Reduced Mortality Rate	(Kayigamba et al., 2013), (Vernon et al., 2019), (Nezenega et al., 2020), (Mamo et al., 2021), (Gupta et al., 2022)
	Prevention of Prolonged Infection	(Nezenega et al., 2020), (Khamis et al., 2022), (Tefahuneygn et al., 2015), (Adisa et al., 2021)
	Prevention of Drug Resistance	(Chantana et al., 2019), (Nezenega et al., 2020), (Xing et al., 2021)
Improvement of Health Service Quality	Better Patient's - Healthcare Professionals Relationship (Patients Satisfaction)	(Nezenega et al., 2013), (Mindachew et al., 2014), (Tefahuneygn et al., 2015), (Woimo et al., 2017)
	Lower Rates of Re- hospitalizations	(Zong et al., 2018), (Gashu et al., 2021)
	Reduction in Hospitalization Expenses	(Kwon et al., 2022), (Nezenega et al., 2020), (Yang et al., 2022)

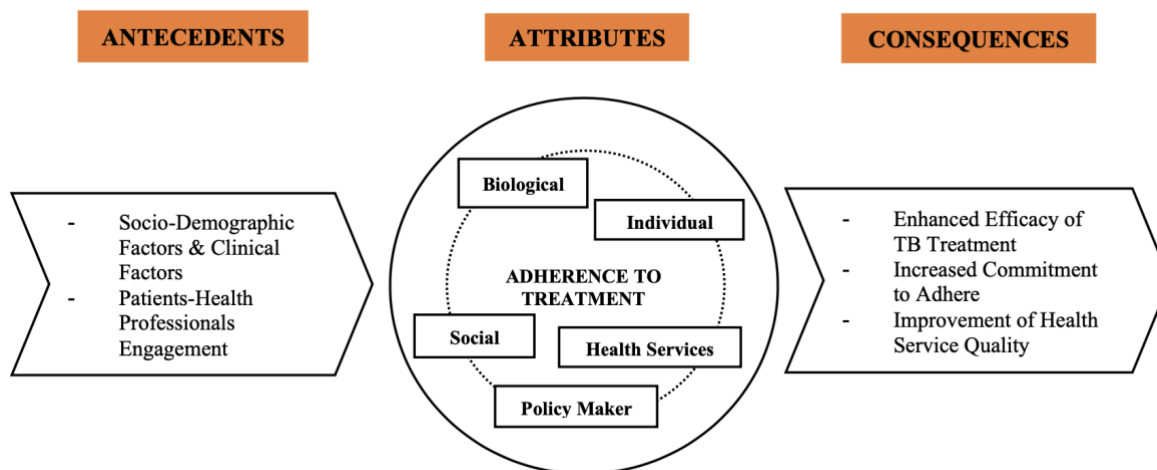


Figure 2 Attributes, antecedents, and consequences of adherence to treatment in pulmonary TB

Empirical Referents

Assessing adherence to treatment presents several challenges. Various methods have been used in research, including pill counts, laboratory data monitoring, self-report measures, and electronic surveillance (Valencia et al., 2016). However, most previous studies, including those focused on the TB population, have relied primarily on self-report measures. The Morisky Medication Adherence Scale-8 (MMAS-8) is one of the most commonly used self-report tools

in TB research (Mkopi et al., 2014; Nezenega et al., 2013; van den Boogaard et al., 2011; Zhou et al., 2012). This scale evaluates adherence to TB treatment and has an internal consistency score of up to 0.87. It is known for its good predictive and concurrent validity and consists of eight questions that require a “yes” or “no” answer (Morisky & DiMatteo, 2011).

Svarstad et al. (1999) developed the Brief Medication Questionnaire (BMQ), a short and sensitive tool designed to

detect various types of non-adherence. The BMQ includes a regimen screen with five questions to identify frequent and random deviations from the treatment plan. It is noted for its sensitivity and thoroughness in identifying reasons for non-adherence, though scoring at the point of care can be challenging and requires a detailed list of patient medications.

The Medication Adherence Rating Scale (MARS) was created to assess adherence specifically related to medication-taking behaviors (Thompson, 2000). Initially evaluated on patients with schizophrenia, this 10-item scale has an internal consistency score of 0.75 and is used to measure treatment adherence in clinical and daily settings. However, the sensitivity and precision of MARS have not been thoroughly investigated. It assesses medication use and satisfaction with a simple scoring method.

Developed with input from clinical experts and patient focus groups, the Tuberculosis Medication Adherence Scale (TBMAS) includes 30 items (Yin et al., 2012). It has demonstrated reliability with Cronbach's alpha, test-retest reliability, and split-half reliability scores of 0.87, 0.83, and 0.85, respectively. Convergent validity is supported by statistically significant correlations between TBMAS scores and adherence behaviors. However, the scale's components may be challenging to use in a busy hospital setting.

Although these scales have been developed to measure adherence behavior, they primarily focus on the medication-taking process rather than the multidimensional aspects of adherence to TB treatment described in our study. Therefore, there is a need for a new instrument that addresses this multidimensionality, providing a more comprehensive evaluation of adherence.

Exemplar Case Study

An exemplar case was identified after defining the concept of adherence to TB treatment.

Mr. G, a 24-year-old unmarried individual, lives with his parents and works part-time at a fabric manufacturer while attending university. He has no personal or family medical history of pulmonary TB. He smokes and has a large social circle. He began experiencing symptoms of pulmonary TB, such as persistent coughing and sweating, which had been ongoing for five weeks. Due to Mr. G's illness, his mother visited the nearest public health clinic, where pulmonary TB was diagnosed. After discussing his situation with the TB clinic nurse, Mr. G agreed to start the prescribed medication. The treatment plan included daily drug administration under parental supervision and required lifestyle changes, such as smoking cessation.

Initially, Mr. G's health improved following the nurse's advice. However, he began to experience side effects from the medication, including stomach pain, nausea, and loss of appetite. These side effects affected his social interactions and decreased his self-esteem, impacting his academic and professional performance. Consequently, he stopped taking his medication and continued smoking, leading to a resurgence of his symptoms. He also ceased visiting the TB nurse. This situation persisted for six months.

His parents contacted the nurse, who recommended a reassessment of Mr. G's condition. A comprehensive evaluation was conducted, focusing on symptoms, non-

adherence issues, personal beliefs, internalized stigma, and the overall treatment experience. Healthcare providers involved the family in the treatment process, leading to individual and family education. Mr. G also joined a community support group. The TB clinic nurse managed both interventions. According to TB treatment guidelines, a new medication regimen was established, and a digital tool was introduced to provide medication reminders and promote a healthy lifestyle.

These interventions resulted in consistent and monitored care, improved collaboration with healthcare professionals, increased satisfaction, better adherence to treatment, and reduced costs and time spent. Since the implementation of these measures, Mr. G has actively participated in all consultations and adhered to his treatment regimen, significantly enhancing his quality of life.

Operational Definition

A literature search was conducted to identify and define the concept under investigation and its unique characteristics. Adherence to treatment is defined as "the application of recovery-oriented strategies to follow a healthcare expert's treatment plan, which includes both regular medication and necessary lifestyle changes. This requires self-awareness, knowledge, self-control, and sufficient resources to achieve, sustain, or enhance optimal functioning, health, and well-being. These abilities are shaped by personal, interpersonal, and community aspects, which can either support or hinder adherence. The concept includes biological, individual, social, health services, and policy-making components. Additionally, adherence behavior can fluctuate, evolve, and transition between non-adherence and adherence over time."

It is noted that how healthcare professionals communicate their recommendations can influence patients' decisions to adhere to or not adhere to treatment. Patients may resist adherence if they perceive the suggested changes as conflicting with their worldview. Enhancing personal motivation, readiness for change, the quality of the treatment alliance, collaborative decision-making, community support, and healthcare quality can help address and prevent such challenges.

Study Limitations

This study has several limitations. First, only two databases were utilized, which may have led to the oversight of relevant scholarly articles. The methodological framework of this study permits stakeholders in policy and practice to apply the findings. However, the study did not explore the utilization and impact of adherence to TB treatment across interconnected healthcare sectors. Additionally, the limited research on policy-making and adherence to treatment restricts the literature. Finally, the analysis included only English-language articles and focused exclusively on adult patients.

Implications of the Study

Rodgers' approach provides valuable insights for conceptual development (Tofthagen, 2010). This concept analysis highlights the connections between the attributes of adherence to treatment, which include not only individual factors but also social and healthcare aspects. By thoroughly evaluating these attributes, targeted interventions can address

the complexities of adherence to treatment, which may vary across disciplines. These interventions can assist patients in following their treatment plans and offer benefits for social and health policies, such as reducing treatment costs.

Several key factors are often emphasized in the context of nursing, which plays a critical role in TB programs. At the onset of pulmonary TB, patients may be overwhelmed by information and constraints. Therefore, nursing interventions should focus on enhancing patients' understanding of TB treatment to address their concerns, correct misconceptions, and reduce anxiety. This approach promotes effective coping strategies and behavioral change. Techniques such as building rapport with patients (Mindachew et al., 2014; Nezenega et al., 2013; Tesfahuneygn et al., 2015; Woimo et al., 2017), engaging family caregivers (Cherkaoui et al., 2014; Tupasi et al., 2016), and increasing patient understanding and empowerment (Ahmed & Prins, 2016; Basa & Venkatesh, 2015) are essential. When patients are empowered, they are more likely to direct their own adherence behavior, leading to improved treatment adherence.

Positive reinforcement is crucial for maintaining adherence behavior. Successful patients who share their experiences of lifestyle changes can support those less experienced with adherence and boost their self-confidence. Therefore, nurses must adapt their care based on patient assessments. Given their significant interaction with patients, nurses are pivotal in ensuring long-term adherence to therapy (Slyer, 2022; Thuy et al., 2020). Enhancing adherence has the potential to improve treatment effectiveness (Gashu et al., 2021; Zong et al., 2018), reduce medical costs (Kwon et al., 2022; Nezenega et al., 2020; Yang et al., 2022), and foster positive relationships between patients and healthcare professionals (Mindachew et al., 2014; Nezenega et al., 2013; Tesfahuneygn et al., 2015; Woimo et al., 2017).

Conclusion

This study highlights the multifaceted nature of adherence to TB treatment, covering biological, individual, social, health services, and policy-making aspects. Understanding the attributes, antecedents, and consequences of adherence, alongside its operational definition, reveals both the challenges and opportunities in managing TB effectively. Critical nursing interventions, such as improving patient understanding, building rapport, and involving family support, are crucial for fostering adherence. Positive reinforcement and tailored care are essential for maintaining adherence and improving patient outcomes. By addressing these components through targeted interventions and enhancing patient-health professional interactions, healthcare professionals can boost treatment effectiveness, strengthen patient commitment, and elevate health service quality. Future research should focus on developing multidimensional tools to better assess and support adherence behaviors, ensuring more effective and sustained TB treatment strategies.

Declaration of Conflicting Interest

The authors declare that there is no conflict of interest.

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Data Availability

Not applicable.

Ethical Considerations

Ethical approval for this article is not applicable. This paper is a part of the dissertation of the first author (YAP) entitled "The Development of Adherence to Treatment Scale for Persons with Pulmonary Tuberculosis."

Declaration of Use of AI in Scientific Writing

The authors did not use generative AI in the writing process of this article.

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