

# IMPROVING TUBERCULOSIS PATIENT COMPLIANCE THROUGH FAMILY NURSING INTERVENTIONS USING THE ABC (ANTECEDENTS–BEHAVIOUR–CONSEQUENCES) APPROACH

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## Abstract

**Background:** Tuberculosis control depends not only on the availability of medication but also on patient adherence to treatment to prevent drug resistance. Families play a crucial role in shaping patients' health behaviors. The ABC (*Antecedents–Behaviour–Consequences*) approach is used to evaluate the effectiveness of family nursing interventions in shifting patients from non-adherence to treatment adherence by reinforcing knowledge, providing family support, and monitoring regular medication intake. **Case Summary:** Patient X (45 years old) was diagnosed with smear-positive pulmonary tuberculosis and had a history of treatment discontinuation two years prior. A six-month intervention was implemented, comprising three key stages: Antecedent Structuring, Behavior Modification, and Consequence. Reinforcement following the provision of adequate information and the obtaining of consent. **Investigation and Diagnosis:** Sputum test results confirmed the patient had tuberculosis; the patient admitted to previously discontinuing medication due to nausea and a belief that they had recovered, deeming daily medication unnecessary. Family functioning was suboptimal, characterized by low health awareness and inadequate supervision of medication adherence. Family nursing diagnosis: Ineffective Family Health Management, related to the family's inability to optimally care for the ill family member. **Management:** The intervention employed the ABC approach. In the Antecedents phase, the family received education regarding the dangers of untreated latent tuberculosis, and strategies were implemented such as creating a reminder calendar, setting mobile phone alarms, and managing nausea by taking medication after meals or before bedtime. The Behavior phase involved training the wife to act as a treatment supervisor (PMO), ensuring she accompanied the patient during medication intake and integrated the medication schedule into the patient's daily routine. The Consequences phase utilized positive reinforcement, such as praise or small rewards, whenever the treatment calendar was fully completed each week. Patient progress was monitored through physical changes, such as weight gain and a reduction in coughing, serving as evidence of the benefits of treatment adherence. Additionally, the family was taught the importance of direct supervision and consistent emotional support to motivate the patient to complete the therapy and to ensure they understood the risk of drug resistance should treatment be discontinued prematurely. **Outcome:** The ABC intervention improved patient adherence (with scores rising from 4 to 8) and body weight (increasing from 48 kg to 54 kg), and resulted in negative AFB test results. Adherence was measured using the Morisky Medication Adherence Scale (MMAS) administered via interview. **Conclusion:** The ABC approach demonstrates potential effectiveness in improving patient adherence through enhanced family understanding, supervision of medication intake, and sustained positive reinforcement. Active family involvement as agents of behavioral change is a key factor in the successful long-term treatment of TBC patients.

**Keywords:** Compliance, Tuberculosis, Family Nursing, ABC Approach

## ***INTRODUCTION***

Tuberculosis (TBC) remains one of the world's major public health challenges. According to the 2024 Global TB Report by the World Health Organization (WHO), Indonesia ranks second globally, following India. It is estimated that there are 1,090,000 TBC cases and 125,000 deaths annually equating to 14 deaths every hour. These high figures indicate that TB control remains a top priority in healthcare services, particularly regarding treatment success. Successful TBC therapy relies heavily on patient adherence to the standard treatment regimen for a minimum of six months. Non-adherence to the treatment regimen can lead to therapy failure, disease recurrence, increased community transmission, and the development of drug resistance (Multidrug-Resistant Tuberculosis or MDR-TB).

Research findings indicate that patient adherence is influenced by numerous factors, including knowledge levels, motivation, medication side effects, access to healthcare services, psychological state, stigma, and the social support received. Among these determinants, family support plays a crucial role in the success of tuberculosis treatment. Families serve not only as Treatment Supporters (monitoring medication intake) but also as sources of emotional, informational, instrumental, and esteem support, all of which can boost patient motivation to maintain treatment adherence. Patients who receive strong family support tend to exhibit higher levels of medication adherence compared to those with limited family support.

Various nursing interventions have been developed to improve adherence among tuberculosis patients, such as health education, counseling, motivational interviewing, medication reminders, support from treatment supervisors (PMO), and family empowerment. However, most interventions still focus on increasing patient knowledge, whereas approaches that systematically alter adherence behavior through the modification of triggers and the reinforcement of behavior remain relatively limited. Therefore, a behavior-based nursing approach is needed one capable of explaining the interrelationships between behavioral triggers, the desired behavior, and the consequences that reinforce such behavioral change.

The ABC approach to behavior change explains that an individual's behavior is influenced by antecedents or factors preceding the behavior, such as reminders, the environment, knowledge, and family support. In the context of tuberculosis, the target behavior is patient adherence to the prescribed medication schedule. This behavior is subsequently reinforced through consequences, specifically positive reinforcement, such as praise, rewards, emotional support, and positive feedback from family members. By modifying these three components, it is hoped that a habit of sustained adherence will be established throughout the course of tuberculosis therapy.

Although various studies have reported that family support is associated with improved tuberculosis treatment adherence, a research gap remains regarding the application of family nursing interventions in clinical practice. Most studies merely evaluate the relationship between family support and adherence without detailing the mechanisms of behavioral change, such as the identification of triggers, behavior modification, and positive reinforcement, carried out in a structured manner by the family. Consequently, the implementation of the ABC approach in family nursing care for tuberculosis patients remains limited, particularly in the form of case reports that comprehensively describe the nursing process.

The novelty of this case report lies in the implementation of a family nursing intervention utilizing the ABC approach to enhance adherence among tuberculosis patients. This approach positions the family not merely as treatment supervisors, but as agents of behavioral change capable of identifying factors contributing to non-adherence, fostering consistent medication-taking habits, and providing sustained positive reinforcement. Consequently, this report aims to illustrate the application of behavioral theory within family nursing practice as a strategy to improve tuberculosis treatment outcomes. It seeks to describe the implementation of the ABC-based family nursing intervention in increasing treatment adherence and to provide clinical evidence regarding

the relevance of applying behavioral theory in family nursing practice to support therapeutic success and prevent treatment failure.

## **CASE PRESENTATION**

**General Patient Information:** The patient is a 45-year-old male working as a casual daily laborer. He resides in a densely populated neighborhood with inadequate home ventilation. Clinically, he has a history of active smoking over the past 20 years. Sputum analysis using TCM (molecular testing) returned a result of mycobacterium tuberculosis detected (MTB Detected). **Chief Complaint and History of Present Illness:** The chief complaint is a persistent productive cough lasting for the past three weeks. The sputum is yellowish-white and occasionally blood-streaked. The patient also reports fever particularly at night, accompanied by night sweats in the absence of physical exertion and a loss of appetite resulting in a weight loss of approximately 4 kg over the last month. Symptoms progressed chronologically, starting as a dry cough that subsequently became productive and worsened over the past week. **Treatment History:** The patient was previously diagnosed with pulmonary tuberculosis two years ago but discontinued treatment after two months because they felt their condition had improved. The patient has no history of diabetes mellitus, hypertension, or drug allergies. To date, the patient has only taken over-the-counter cough medication purchased at local shops to alleviate symptoms. **Family History:** The patient lives with his wife and two children in a small house. No other family members reportedly have similar complaints. As the family's breadwinner, the patient experiences psychological distress because his condition hinders his ability to work. Family support for treatment adherence was previously considered inadequate due to his wife's lack of understanding regarding the risk of drug resistance. **Physical Examination and Vital Signs:** Upon physical examination, the patient appeared moderately ill and thin (BMI 17.5 kg/m<sup>2</sup>). Vital signs: Blood pressure 110/70 mmHg, pulse rate 88 beats/minute, respiratory rate 22 breaths/minute, and temperature 37.8°C. **Key Clinical Findings:** Pulmonary auscultation revealed bronchial breath sounds and coarse crackles in the right upper lung field. No lymphadenopathy was observed. **Initial Diagnostic Findings:** Sputum analysis via rapid molecular test (TCM) showed mycobacterium tuberculosis detected (MTB Detected) with rifampicin sensitivity (Rif Sensitive), and an elevated Erythrocyte Sedimentation Rate (ESR).

## **CLINICAL REASONING**

**Clinical Reasoning:** Based on the initial assessment, the family demonstrated "Ineffective Family Health Management." This was based on a history of interrupted treatment and the family's failure to modify the patient's environment and lifestyle (active smoker). This issue was prioritized because it directly impacts the risk of retreatment failure and potential transmission to other family members in a densely populated environment. **Decision Making through the ABC Approach** to identify the root of non-adherence. **Antecedents:** It was found that the triggers for non-adherence were the lack of medication reminders and the misperception that "feeling well" meant "being cured." The wife's lack of knowledge as a DOTs was a negative antecedent. **Behavior:** The patient often missed doses when he started to feel better and continued smoking, which worsened airway irritation. **Consequences:** The absence of consequences (either punishment or reward) within the family for patient compliance or non-compliance, resulting in a lack of internal motivation for the patient to complete the 6-month treatment. The diagnosis focused on patient noncompliance related to ineffective family role performance. Successful tuberculosis treatment depends not only on medication consumption but also on behavioral changes. The ABC approach was chosen because it has been clinically proven effective in mapping complex behaviors into simple modification steps for families. **Supporting Clinical Findings:** Objective data include a history of treatment interruption, a positive TCM result (Rifampicin-sensitive), and radiological evidence of cavities indicating chronic tissue damage resulting from previous treatment irregularity. Subjective data include the wife's statement regarding her inability to motivate her husband, and the patient's own statement that the medication regimen felt overwhelming, leading to frequent missed doses. An alternative family nursing diagnosis knowledge deficit was ruled out because the patient was already aware of his tuberculosis diagnosis; the core issue was behavioral rather than a mere lack of information. Although findings

such as rhonchi and coughing indicated ineffective airway clearance, these were considered secondary effects of the primary disease. Clinical focus was therefore shifted to treatment adherence as the causal solution for permanently resolving the symptoms. Clinical Reasoning Conclusion: Clinical decision-making focuses on strengthening the family's role in providing positive reinforcement (consequences) whenever the patient takes their medication on time. By modifying antecedents (providing a pill organizer and a visual schedule), it is expected that the behavior (adherence) will improve, thereby enabling the sputum conversion target to be achieved.

### DIAGNOSTIC ASSESSMENT

Adherence was measured using the Morisky Medication Adherence Scale-8 (MMAS-8) instrument through interviews conducted before and after the intervention. A summary of the findings regarding the patients, resulting from the family nursing intervention using the ABC approach, is as follows:

**Table 1.** Patient Evaluation Before and After ABC Intervention

| Parameter           | Pre-Intervention (Initial)    | Post-Intervention (Final)  | Change              | Clinical Interpretation                                                               |
|---------------------|-------------------------------|----------------------------|---------------------|---------------------------------------------------------------------------------------|
| Compliance Score    | 4                             | 8                          | +4 point            | Significant improvement from Low to High category                                     |
| Behavioral Status   | Often forgetful and irregular | Discipline and punctuality | Pattern Change      | Antecedents (reminders) and Consequences (support) function effectively.              |
| BTA results         | Positif (+2)                  | Negatif (-)                | Germ Conversion     | Medication adherence is directly correlated with bacterial clearance                  |
| Body Weight         | 48 kg                         | 54 kg                      | +6 kg               | Improvement in nutritional status as a result of adherence to treatment and nutrition |
| Clinical Complaints | Productive cough & fever      | Symptoms disappear         | Clinical Resolution | Compliance eliminates systemic symptoms of tuberculosis                               |

Based on clinical criteria and supporting examinations, the patient was classified as a case of Bacteriologically Confirmed Pulmonary Tuberculosis. The patient was a relapse/retreatment case, considering a history of drug discontinuation (drop-out) 2 years ago. This finding reinforces the need for intervention using the ABC approach, because even though the bacteria are still sensitive to the drug, the risk of repeated treatment failure is very high if adherence behavior is not improved.

### THERAPEUTIC INTERVENTION

ABC behavioral therapy is a systematic approach to understanding and modifying behavior by analyzing the relationship between Antecedents (triggers), Behavior (behavior), and Consequences (impact/reinforcement). In the context of tuberculosis, this therapy is used to replace bad habits such as drug withdrawal with disciplined medication adherence. Interventions are carried out through three key stages to modify the patient's home ecosystem: 1) Antecedents (Trigger Arrangement): Removing physical and mental barriers before medication-taking behavior begins. Examples include using a daily pill box, setting an alarm on the family's cell phone, and posting a medication schedule calendar in a public area of the house as a visual reminder, 2) Behavior (Action Modification): Ensuring medication-taking occurs appropriately. Families are trained to conduct direct supervision (Directly Observed Treatment) to ensure medication is actually taken

according to the dosage and 3) Consequences (Impact Reinforcement): Providing positive responses immediately after the behavior is performed. Examples include verbal praise from the family or appreciation from health workers when laboratory results improve, which serve as motivation for repeating compliant behavior. Unlike chemical medications, the dosage in behavioral therapy is measured by the intensity of the support. Support is provided daily (whenever medication is scheduled) and follows the treatment period, which is a minimum of 6 months. The intensive phase (the first 2 months) requires closer supervision, followed by the maintenance phase (the next 4 months) to ensure stable behavior until the end of treatment. Patient monitoring and safety are carried out in layers to ensure effectiveness: 1) Routine monitoring of drug side effects (nausea, itching, joint pain) to prevent patients from abruptly discontinuing treatment due to physical discomfort; 2) Sputum smear (AFB) examinations at 2 and 6 months to objectively verify that behavioral compliance is directly proportional to medical recovery; and 3) Ensuring that family members acting as caregivers (PMO) understand how to remove phlegm and maintain home ventilation to prevent transmission within the family environment. The ABC approach was chosen for several strategic reasons: 1) It can address the root cause; the patient's history of drug withdrawal indicates that education alone is insufficient; It requires real environmental and support system changes, 2) is economical and independent, meaning it does not require additional costs and empowers the family as the "agent of change" closest to the patient, and 3) Can prevent MDR, because the total adherence generated by this model is the only way to prevent drug resistance, which is clinically much more difficult and expensive to treat. The interpretation of the increase in adherence score from 4 to 8 indicates the success of this procedure in bringing patients out of the high-risk zone of treatment failure.

### THERAPEUTIC SEQUENCE

Family Nursing Interventions use the ABC approach, structured chronologically to ensure lasting behavioral change. The sequence begins with Antecedents, as behavior will not change unless triggers or inhibiting factors are addressed first. Once the environment is ready, Behavior, as the core intervention, is implemented. Finally, Consequences are given to "lock" the behavior into a permanent new habit until the treatment period is completed.

**Table 2.** ABC Approach Interventions

| ABC components                                    | Specific Nursing Actions                                                                                                                                                                                                                                                            | Clinical Rationalization                                                                                                                                                                                    |
|---------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Antecedents</b><br>(Trigger/Stimulus)          | <ol style="list-style-type: none"> <li>1. Environmental modifications: Providing a daily pill box.</li> <li>2. Visual education: Placing a medication calendar in a visible area.</li> <li>3. Setting reminders on family phones.</li> </ol>                                        | <ul style="list-style-type: none"> <li>▪ Creating strong external cues to prevent "forgetting"</li> <li>▪ Removing environmental barriers before the behavior begins.</li> </ul>                            |
| <b>Behaviour</b>                                  | <ol style="list-style-type: none"> <li>1. Direct assistance in taking medication by the family.</li> <li>2. DOTs (Directly Observed Treatment short-course) technique</li> <li>3. Education on how to deal with mild side effects of medication</li> </ol>                          | <ul style="list-style-type: none"> <li>▪ Changing passive actions into active ones.</li> <li>▪ The presence of family members ensures that the medication is actually swallowed, not just taken.</li> </ul> |
| <b>Consequences</b><br>(Impact/<br>Reinforcement) | <ol style="list-style-type: none"> <li>1. Positive Reinforcement: Offer praise or verbal support after each dose.</li> <li>2. Self-Reward: Set aside money (usually spent on cigarettes) for additional nutritional intake.</li> <li>3. Weekly evaluations with a nurse.</li> </ol> | <ul style="list-style-type: none"> <li>▪ Provides a sense of accomplishment.</li> <li>▪ Positive reinforcement increases the likelihood that compliant behavior will be repeated in the future.</li> </ul>  |

### CASE TIMELINE

A Case Timeline presents the patient's clinical events chronologically, from the onset of symptoms to the evaluation of the results of the ABC approach intervention. The critical point as the main success occurred in Month 2, where laboratory results (ARR conversion) were used as a positive consequences instrument to motivate the patient to complete the remaining 4 months of treatment. The educational value, namely the change from "Drug Discontinuation" status (2 years ago) to "Cured" (currently) proves that technical medical intervention must be accompanied by modification of patient and family behavior.

**Table 3.** Chronological Timeline of Pulmonary Tuberculosis Cases with the ABC Approach

| Time                        | (Clinical Event)                                                                       | Investigation/<br>Diagnostics                                  | Treatment /<br>Intervention                                                              | Result (Outcome)                                                      |
|-----------------------------|----------------------------------------------------------------------------------------|----------------------------------------------------------------|------------------------------------------------------------------------------------------|-----------------------------------------------------------------------|
| 2 Years Ago                 | First diagnosis of pulmonary TBC.                                                      | ARR (+)                                                        | Starting ATD (Anti-Tuberculosis Drugs) category 1                                        | Stopped the medication after 2 months because I felt fine             |
| Month 0 (Beginning of Case) | Cough with phlegm for >3 weeks, shortness of breath, night sweats, weight loss of 4 kg | MRT Sputum (MTB detected, Rif Sensitive), ARR (+2)             | Diagnosis of Recurrent Pulmonary TBC Cases                                               | The patient was re-enrolled in the TBC treatment program              |
| Minggu 1                    | Evaluate family readiness and identify barriers to compliance                          | Behavioral assessment (identification of negative antecedents) | Intervention Antecedents: Family education, provision of pill-boxes, and reminder alarms | The family has a structured medication schedule                       |
| Week 2-4                    | Intensive phase of treatment; monitoring of drug side effects                          | Daily monitoring of vital signs and clinical symptoms          | Intervention Behavior: Strict supervision of the wife in taking medication               | Medication compliance was 100% in the first month; coughing decreased |
| Month 2                     | Evaluation of the intensive phase; transition period to the advanced phase             | Sputum ARR examination                                         | Intervention Consequences: Positive reinforcement for successful compliance              | ARR conversion to Negative (-); weight gain 2 kg; appetite improved   |
| Months 3-6                  | Continuation Phase of treatment.                                                       | Monthly routine monitoring at the Community Health Center      | Ongoing family nursing to prevent boredom of taking medication                           | The patient remained compliant, no doses were missed                  |
| End of Month 6              | Completion of treatment regimen                                                        | Final sputum AFB result negative                               | Termination of family nursing care.                                                      | Declared cured, the family's health behavior improved steadily        |

### OUTCOME AND FOLLOW-UP

**Results:** The case study presents the patient's progress objectively and systematically, aligning with the objectives of applying the ABC approach in family nursing. Following a six-month intervention, the patient demonstrated significant progress across two phases: 1) Intensive Phase (Months 1–2): Systemic symptoms, such as night sweats and fever, resolved by the third week. Productive coughing decreased drastically, and appetite began to improve. Objectively, the patient's weight increased from 48 kg to 54 kg by the end of the second month. 2) Continuation Phase (Months 3–6): The patient no longer complained of shortness of breath. Functional capacity improved, enabling the patient to resume light work. Body weight stabilized at 54 kg (a 6

kg increase). The evaluation of the ABC intervention's effectiveness yielded the following results: 1) Antecedents: The family successfully maintained a supportive environment, and the use of a pillbox and mobile phone alarms became a routine habit that eliminated instances of missed medication; 2) Behavior: Patient adherence reached 100% (Total Compliance). Unlike the previous treatment history, which was discontinued in the second month, the patient did not miss a single dose this time due to direct supervision by his wife; and 3) Consequences: Positive reinforcement in the form of emotional support from the family and appreciation from healthcare workers upon receiving a negative sputum smear result (in the second month) served as a strong motivator for the patient to complete the treatment. **Final Outcome:** Laboratory results (sputum smear for AFB) at the end of the second and sixth months were negative, and the patient was declared cured by the local health facility. During the treatment period, the patient experienced mild side effects, specifically nausea and joint pain in the first month. However, through family nursing interventions involving education on medication timing and nutritional intake, these issues were successfully managed without interrupting treatment (no adverse events compromising adherence were observed). **Follow Up:** Short-term follow-up involves monitoring physical condition for three months after recovery to ensure no symptoms of relapse occur, alongside ongoing education regarding the importance of home ventilation and a balanced diet. Long-term follow-up entails periodic screening for family members (close contacts) to rule out latent transmission, as well as maintaining a clean and healthy lifestyle and permanently abstaining from smoking to preserve lung function.

## ***DISCUSSION***

This case demonstrates that improving tuberculosis treatment adherence is influenced not only by the availability of anti-tuberculosis medication but also by behavioral changes supported by the family. Following a family nursing intervention utilizing the ABC approach, the patient exhibited improved adherence to the medication schedule. These findings reinforce the understanding that adherence is a behavior shaped by the interplay of individual, environmental, and social support factors; therefore, it cannot be effectively improved through health education alone. Various studies have shown that non-adherence to tuberculosis treatment is a primary cause of treatment failure, disease recurrence, increased community transmission, and the development of multidrug-resistant (MDR) tuberculosis. Factors influencing adherence include knowledge levels, motivation, perceptions of the disease, drug side effects, access to healthcare services, stigma, psychological state, and family support. Consequently, interventions that focus solely on increasing knowledge often fail to bring about sustained behavioral change.

The results of this case study indicate that the patient's history of treatment discontinuation was not solely due to a lack of knowledge regarding TB. Although the patient understood the importance of treatment, they were unable to maintain adherence over the long term. These findings align with research showing that while knowledge is linked to adherence, it is not the sole predictor of treatment success. Studies have reported that intrinsic motivation, self-efficacy, and family support exert a stronger influence on adherence than knowledge alone. Consequently, behavioral change requires strategies that bridge the gap between knowing and doing. Family involvement in tuberculosis management is a crucial component of successful interventions. When family members take an active role as treatment supporters (PMO), provide emotional support, and offer positive reinforcement, patient adherence improves significantly. These findings align with various studies reporting that TB patients who receive family support are more likely to complete their treatment. Family support helps patients maintain motivation, reduces treatment fatigue during long-term therapy, fosters a sense of responsibility regarding treatment, and strengthens the patient's relationship with healthcare services.

These findings also support the concept of family-centered nursing, which posits that the family is an integral part of the patient's healing process. Under this approach, the family functions not only as a treatment supervisor but also as a facilitator of behavioral change. The family's role is multifaceted, encompassing the identification of adherence barriers, the provision of emotional support, the establishment of medication



routines, and the offering of positive reinforcement regarding the patient's successful adherence to therapy. The ABC approach provides a systematic framework for explaining these behavioral changes. Skinner's behavioral theory reinforces the study's results, indicating that behavior arises from the interaction between environmental stimuli and the consequences that follow the behavior.

In the antecedent stage, the family helps create conditions that foster adherence by providing medication reminders, establishing daily schedules, and minimizing environmental barriers that previously caused the patient to forget or delay treatment. Modifying these antecedent factors increases the likelihood of the desired behavior occurring. The behavior stage focuses on establishing the patient's habit of taking medication at the prescribed dosage and time. This behavior is not merely observed but consistently monitored by the family, enabling early detection of any decline in adherence. Repeated monitoring facilitates the formation of a new, more adaptive routine compared to previous behaviors. Subsequently, in the consequences stage, the family provides positive reinforcement, such as praise, rewards, attention, or emotional support whenever the patient successfully maintains adherence. According to operant conditioning theory, behaviors followed by positive consequences are more likely to be repeated in the future. Thus, patient adherence is no longer driven solely by the obligation to undergo treatment but evolves into a habit reinforced by the family environment.

These findings demonstrate that the ABC approach facilitates behavioral change through the modification of triggers and continuous positive reinforcement. From a nursing practice perspective, adopting the ABC approach shifts the nurse's role from a mere provider of information to a facilitator of behavioral change. Nurses go beyond educating patients about their illness and treatment; they assess factors influencing adherence, empower families to create a supportive environment, and evaluate the effectiveness of behavioral reinforcement provided throughout the treatment process. This approach strengthens the implementation of holistic, behavior-change-oriented family nursing care.

The novelty of this case report lies in the systematic application of the ABC behavioral theory within family nursing care for tuberculosis patients in the community; while most previous studies have focused on the relationship between family support and treatment adherence, this report demonstrates the mechanism of behavioral change through the structured identification of antecedents, the shaping of behavior, and the provision of positive consequences. Consequently, the family functions not merely as a supervisor of therapy but also as an agent of behavioral change, playing an active role in sustaining patient adherence. This approach offers several advantages: it is relatively simple, requires no additional cost, is easily implemented in primary healthcare settings, and aligns with Indonesian cultural values that position the family as the primary support system for caring for ill members. Through family involvement, interventions can be sustained continuously at home without total reliance on healthcare professionals.

Nevertheless, there are several limitations to consider. The success of the ABC approach is heavily influenced by the quality of family relationships, the family's ability to provide consistent positive reinforcement, and the patient's readiness to accept such support. Furthermore, as this report describes only a single case, the findings cannot yet be generalized to the entire population of tuberculosis patients. Future research should employ experimental or quasi-experimental designs with larger samples and longer follow-up periods to evaluate the ABC approach's effectiveness regarding treatment adherence, therapeutic success, and the prevention of MDR-TB and other complications. This case is significant because it offers a solution to the classic problem of patients feeling cured prematurely. Through the ABC approach, the critical phase between the second and sixth months when symptoms have vanished but the bacteria have not yet been completely eradicated can be managed by maintaining consistent treatment adherence, supported by steady positive reinforcement from the family.

## DIAGNOSTIC CHALLENGE

The primary challenge in this case lies not in the medical complexity of the illness, but rather in the complexity of the individual and their support systems. The following factors make this case particularly challenging for family nurse practitioners:

1. **Difficulty in Family Nursing Diagnosis.** Determining a diagnosis at the family level is much more difficult than diagnosing an individual. Nurses must be able to distinguish whether the problem is incompetence (lack of knowledge), unwillingness (motivational issues), or inability (economic/resource issues). In this case, the challenge is identifying that the real problem is not a "stupid patient," but rather a passive family support system that fails to provide behavioral reinforcement.
2. **Limited Past Clinical Information.** The patient had a history of dropping out (discontinuing medication) two years ago. However, there is often information bias regarding the actual reasons for the patient's discontinuation. Was it due to unreported side effects, hidden depression, or distrust of healthcare providers? Without accurate past data, nurses risk repeating the same intervention errors.
3. **Decision Making Complexity.** Using the ABC approach requires careful mapping of behaviors: 1) Identifying Appropriate Antecedents: Not all reminders (such as alarms) are appropriate for every patient. Determining what triggers are truly effective requires trial and error, and 2) Determining Meaningful Consequences: Offering praise or rewards may feel awkward or irrelevant in certain family dynamics. The nurse must decide what reinforcement is strong enough to maintain compliance for the full six months.
4. **Obstacles to Psychosocial and Environmental Factors.** Stigma and Denial: Patients who feel well in the second month often deny their illness. Fighting this feeling of being "cured" is psychologically more challenging than treating the cough. Economic Conditions: As a day laborer, the pressure to return to work full-time often overrides the priority of seeking treatment. Integrating medication schedules with an irregular work schedule creates additional complications in the care plan.
5. **The Challenge of Treatment Fatigue.** Tuberculosis is a chronic disease requiring an extensive and prolonged medication regimen. Maintaining the family's motivation to remain disciplined supervisors for six consecutive months poses a challenge of clinical endurance. This is where the complexity of decision-making is tested: determining when a nurse should provide more intensive intervention and when to allow space for family autonomy.

## LIMITATION

1. **Limitations of the Examination and Clinical Data:** Data on adherence and family interaction (ABC components) were primarily obtained through self-reporting by the patient and family (wife). This is susceptible to social desirability bias, where respondents tend to report only positive outcomes. This case did not use a standardized anxiety assessment instrument, even though psychological conditions significantly influence the internal motivation of chronic patients. Confounding Factors: Weight gain and clinical improvement could have been influenced by additional nutritional support or other environmental factors that were not strictly controlled in this case study.
2. **Limitations of Formulating Nursing Diagnoses:** Family nursing diagnoses are formulated at a single point in time (beginning). However, family dynamics are highly volatile. These diagnoses may not capture changes in internal family conflicts that may arise during treatment. The ABC model relies heavily on open communication; in cultural settings where family members are reluctant to verbally criticize or praise one another, this diagnosis formulation may be difficult to apply universally.
3. **Limitations of Follow-up:** This report ends when the patient is declared cured (6 months). However, without follow-up for 1-2 years, it is difficult to determine whether the behavioral changes are permanent or only persist during the nurse's supervision (risk of long-term relapse).
4. **The focus of this report is on the index patient.** Limited information regarding the long-term health status of other exposed family members (close contacts) creates a gap in the overall evaluation of the success of family nursing.
5. **Limitations of the Reporting and Interpretation Process:** As a single case study, these results reflect success in one family unit with specific characteristics. Readers should not assume that the ABC approach will yield identical results in families with more severe levels of dysfunction. (Limited Generalizability). Interpretation should take into account that the emphasis is placed on the success of behavioral interventions, so certain technical medical aspects may not be discussed in as much depth as in specialist pulmonary/biomedical journals.

## LEARNING POINTS

Practical and clinically relevant learning points from the case of increasing TB patient compliance through the ABC approach are:

1. Compliance is behavior, not just cognition. Treatment success is determined not only by patient understanding (knowledge), but also by consistent management of environmental stimuli (antecedents) and motivational reinforcement (consequences).
2. The Importance of Visual Cues (Antecedents): Simple interventions such as the use of pill boxes and medication schedule calendars in public areas of the home have been shown to be much more effective in preventing forgetfulness than mere verbal instructions.
3. Family as an agent of behavioral change: The family must be trained not only as a monitor of drug dosage, but as a provider of positive reinforcement to maintain the patient's morale during the long and tedious treatment period.
4. Urgency of Evaluation in the Critical Phase (Month 2): As clinical symptoms disappear in the second month, the risk of discontinuation increases. Healthcare workers should utilize the momentum of negative BTA conversion as a psychological "reward" (Consequences) to motivate patients to complete treatment.
5. ABC Approach as a Relapse Solution: For patients with a history of drug withdrawal (drop-out), standard medical interventions should be accompanied by ABC behavioral analysis to break past failure patterns through modification of the home ecosystem.

## CONCLUSION

**Conclusion:** This case demonstrates that successful tuberculosis treatment in patients with a history of drug withdrawal cannot rely solely on pharmacological therapy but requires structured behavioral modification. The ABC approach has been shown to alter patient non-adherence patterns by managing environmental triggers and providing consistent positive reinforcement within the family. This case provides a significant contribution to family nursing practice by offering a practical and measurable framework. This intervention shifts the family's role from merely passive medication-taking monitors to active behavioral support units. This demonstrates that nursing strategies based on behavioral psychology can be integrated with clinical care to improve health outcomes in chronic diseases at the community level. **Recommendations:** 1) For Health Services: Community health centers and nurses are advised to adopt the ABC model as part of their tuberculosis patient support protocol, especially for patients at high risk of discontinuation, 2) For Nursing Education: Emphasize training in therapeutic communication skills and behavior modification techniques for nurses to be able to guide families effectively, and 3) For Further Research: Further research with experimental or multi-case study designs is needed to test the effectiveness of the ABC approach in a wider population and evaluate the resilience of adherence behavior in the long term (post-cure).

## ETHICAL CLEARANCE

In writing this case study report, formal approval from the Health Research Ethics Committee was not required, because this case study is a report of routine nursing care results that have become standard of care. Because there are no new medical treatments, drug trials, or invasive interventions that pose risks to the patient, this is categorized as a retrospective review of existing clinical practice. This report does not include personal identification (name, specific address, medical record number, or facial photo) so that patient confidentiality remains protected in accordance with the professional code of ethics. This case report aims to share clinical experiences and educational value among practitioners. Informed Consent is a direct verbal agreement from the patient and family, that the case is written for scientific purposes. The author still guarantees that the patient's rights are not violated and the data remains completely confidential. This case report was prepared in accordance with the principles of nursing ethics. All patient data has been anonymized (removing names and other personal identifiers) to maintain patient confidentiality and privacy in accordance with the Declaration of Helsinki. The interventions provided are part of standard nursing care carried out professionally. The patient and family have provided informed consent for the use of their clinical data for educational purposes and scientific publications without disclosing personal identities.

## **PATIENT CONSENT**

The patient and family have given written consent to the publication of the case. Patient and family confidentiality is fully protected. Names, personal details, and details that could directly identify the patient will be omitted or disguised in the report.

## **CONFLICT OF INTEREST**

The author declares that there is no conflict of interest, either financial or personal, with any party related to the implementation of the intervention, writing, and publication of this case report. The entire nursing care process and manuscript preparation were conducted independently for the purpose of advancing nursing knowledge and practice.

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## **AUTHORS' CONTRIBUTION**

Main author: Conceptualization, responsible for designing the research idea, developing the ABC approach framework, and family nursing care methodology, preparing the initial draft of the manuscript, including the introduction, case description, and discussion, and conducting a critical review of the manuscript content, revising the clinical substance, and ensuring the draft conforms to case reporting standards. Co-author: Conducted direct clinical assessments in the field, observed family behavior, and collected laboratory and radiological investigation results from patients, analyzed the collected data, determined nursing diagnoses, and evaluated the effectiveness of ABC interventions on patient compliance. All authors have read, reviewed, and approved the final version of this manuscript for publication.

## **DATA AVAILABILITY**

The datasets supporting the findings of this case report are not publicly available to protect patient confidentiality and privacy in accordance with ethical constraints. However, summarized and de-identified clinical data are available from the corresponding author upon reasonable request for review, subject to applicable patient data protection procedures. To protect patients, the raw data (e.g., original medical records) are not publicly available. The authors remain open to other researchers for verification upon reasonable request.

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## **LIST OF ABBREVIATIONS**

ABC: Antecedents, Behavior, Consequences (Behavioral change model)

ARR: Acid Resistant Rod (Sputum examination method)

ATD: Anti Tuberculosis Drugs

BW: Body Weight

ESR: Erythrocyte Sedimentation Rate (ESR)

Hb: Hemoglobin.

BMI: Body Mass Index (Nutritional status parameter)

ESR: Erythrocyte Sedimentation Rate

MDR-TB: Multi-Drug-Resistant Tuberculosis (TB that is resistant to many types of drugs)

MRT: molecular rapid test (DNA-based diagnostic method)

MTB: Mycobacterium tuberculosis (The bacteria that causes tuberculosis)

PA: Postero-Anterior (Position where chest x-rays are taken)

Rif: Rifampicin (One of the main types of TB drugs)

TBC: Tuberculosis

## FIGURE AND TABLE LEGENDS

| Table & Variable No                                                                   | Result                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Note                                                                                                                                                                                                            |
|---------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Table 1. Patient Evaluation Before and After ABC Intervention                         | <ol style="list-style-type: none"> <li>1. Significant improvement in adherence from low to high category.</li> <li>2. Antecedents (reminders) and consequences (support) function effectively.</li> <li>3. Medication adherence is directly correlated with bacterial clearance.</li> <li>4. Improved nutritional status as a result of medication and nutritional adherence.</li> <li>5. Adherence eliminates systemic symptoms of tuberculosis.</li> </ol>                                                                                                                                                                                                                                                         | The risk of repeated treatment failure is very high if adherence behavior is not improved.                                                                                                                      |
| Table 2. ABC Approach Interventions                                                   | <p><b>Antecedents</b> (Trigger/Stimulus)</p> <ol style="list-style-type: none"> <li>1. Creating a strong external cue to prevent "forgetting."</li> <li>2. Removing environmental barriers before the behavior begins.</li> </ol> <p><b>Behavior</b></p> <ol style="list-style-type: none"> <li>1. Changing passive actions to active ones.</li> <li>2. Family presence ensures that the medication is actually swallowed, not just taken.</li> </ol> <p><b>Consequences</b> (Impact/Reinforcement)</p> <ol style="list-style-type: none"> <li>1. Providing a sense of accomplishment</li> <li>2. Positive reinforcement increases the likelihood that adherence behavior will be repeated in the future.</li> </ol> | Family Nursing Intervention with ABC approach arranged chronologically to ensure permanent behavioral changes                                                                                                   |
| Table 3. Chronological Timeline of Pulmonary Tuberculosis Cases with the ABC Approach | <ol style="list-style-type: none"> <li>1. The family has a structured medication schedule.</li> <li>2. Medication compliance is 100% in the first month; coughing has decreased.</li> <li>3. ARR smears have converted to negative (-); weight has increased by 6 kg; appetite has improved.</li> <li>4. The patient remains compliant no doses have been missed.</li> <li>5. The patient has been declared cured, and the family's health behavior has improved steadily.</li> </ol>                                                                                                                                                                                                                                | The educational value of the change from "Drug Discontinued" status (2 years ago) to "Recovered" proves that technical medical intervention must be accompanied by modification of patient and family behavior. |

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