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Case Report

Holistic Management in Pulmonary Tuberculosis Patients Through Family Medicine Approach: A Case Report

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Abstract. Background: *Tuberculosis (TB) remains a major health concern globally and in Indonesia, ranking among the leading causes of death from infectious diseases. The government targets TB elimination by 2030 through primary care and family doctor involvement, emphasizing not only treatment but also health promotion, prevention, and psychosocial support.* ***Purpose:*** *To apply evidence-based family medicine principles to a pulmonary TB patient by identifying risk factors, clinical problems, interventions, and monitoring progress using patient-centered and family approaches.* ***Method:*** *A case report using primary data from history taking, physical examination, home visits, and family folder documentation. Three visits were conducted, covering holistic diagnosis, intervention, and outcome evaluation, assessed qualitatively and quantitatively.* ***Results:*** *A 40-year-old female diagnosed with pulmonary TB was in the continuation phase of therapy. Main complaints were chronic cough and weight loss. Internal risks included limited knowledge and anxiety, external risk was family cigarette smoke exposure. Family function was good (APGAR 10). Interventions included education about TB (definition, symptoms, treatment, prevention), family counseling, adherence monitoring, high-calorie high-protein diet advice, and home ventilation improvement. After the interventions, the patient showed positive progress with weight gain (35 kg to 52 kg), good medication adherence, and improved family knowledge.* ***Conclusion:*** *Family medicine approaches effectively support TB therapy by addressing biological, psychological, social, and environmental factors. Continuous family education, monitoring, and behavioral changes enhance treatment success and prevent transmission.*

Keywords: *Tuberculosis; Family Medicine; Home Visits*

Introduction

Tuberculosis (TB) is one of the oldest infectious diseases that continues to pose a major global health challenge. In 1993, the World Health Organization (WHO) declared TB a *Global Emergency*, emphasizing its threat to public health worldwide [6]. Global data show an annual incidence of 8.9–11 million new TB cases, with 1.1–1.3

million deaths among HIV-negative individuals and 177,000–242,000 deaths among those living with HIV. Currently, approximately one-quarter of the global population is latently infected with M. tuberculosis, acting as asymptomatic carriers who risk progression to active, transmissible disease if their immune system becomes debilitated [2].

According to the 2021 WHO report, the majority of TB cases were found in Southeast Asia (45%), Africa (23%), and the Western Pacific (18%) (WHO. 2023). Eight countries account for more than two-thirds of the global burden, including Indonesia, which ranks second after India. In Indonesia alone, more than 800,000 TB cases were reported in 2023, with the highest distribution in West Java, East Java, and Central Java. The disease is also more prevalent among men in productive age groups [3], marking the highest record of case detection in history due to intensified screening efforts [8]. Furthermore, the majority of sufferers fall within the productive age group of 15-59 years, accounting for approximately 85.5% of cases in certain regional studies. This high prevalence in the productive age group is attributed to more frequent daily activities outside the home, increasing the likelihood of contact with TB patients [1].

Beyond its clinical impact, TB carries significant social, economic, and psychological consequences. Poor adherence to treatment leads to therapeutic failure, drug resistance, and increased risk of community transmission [4]. Moreover, the stigma associated with TB further reduces patients' quality of life, highlighting the need for a comprehensive approach that also addresses psychosocial aspects [5].

Under the *End TB Strategy* and the Sustainable Development Goals (SDGs), the global target for 2016–2035 is to reduce TB incidence by 80% and TB-related mortality by 90% [6]. Achieving these targets requires primary health care services to play a central role in case detection, standardized treatment, and long-term patient monitoring.

In this context, the family medicine approach is particularly relevant. Guided by the principles of being holistic, patient-centered, family-focused, and community-oriented, family physicians are able to identify biological, psychological, social, and environmental factors such as poor ventilation and housing density, are significant risk factors for TB incidence, as overcrowded living conditions facilitate the spread of *Mycobacterium tuberculosis* [9]. The involvement of families and communities is also essential to strengthen treatment adherence, improve patients' quality of life, and curb transmission. At the local level, primary health centers face significant challenges as TB cases continue to fluctuate and rise, mirroring national trends where cases can increase by over 70% in a single year due to intensified screening and the use of Molecular Rapid Tests (TCM). In regions like Bali, the high population density and specific communal living structures such as family compounds create environmental risks that demand specialized oversight. Furthermore, pervasive stigma and the fear of transmission often lead to social isolation, which can negatively impact a patient's

psychological state and treatment consistency. Therefore, this case report was prepared to evaluate the application of family medicine principles in a TB patient at the Mengwi II Public Health Center.

Aim of Study

1. To identify risk factors, social determinants, and clinical problems in TB patients.
2. To apply family medicine services that are holistic, comprehensive, patient-centered, family-focused, and community-oriented.
3. To evaluate the contribution of families and communities in improving patient adherence to TB treatment.
4. To assess the impact of interventions on changes in knowledge, attitudes, and practices of patients and their families in TB control.

Method

This study is presented as a case report. Primary data were collected through direct history-taking with the patient and family (allo-anamnesis), physical examination, and home visits. Secondary data were obtained from the patient's medical records at Mengwi II Public Health Center. This case was identified and managed while the authors were conducting their clinical internship (internship rotation) at the Mengwi II Primary Health Center.

The assessment employed a holistic approach, covering biological, psychological, social, economic, environmental, and family function aspects. Interventions were conducted progressively through multiple home visits, applying the principles of family medicine namely patient-centered, family-focused, and community-oriented care. Evaluation was carried out to observe changes in the patient's and family's condition following the interventions.

Case Description

Case Report

Mrs. NLPA, 40 years old, represented by her sister-in-law for medication collection at the TB service room at Mengwi II Public Health Center, Badung District, Bali, Indonesia. The patient can not take her own medicine or come independently due to weakness and difficulty standing on her own. According to family members, the patient's complaints started with continuous cough for more than 2 weeks that worsened since November 2024, accompanied by high fever up to 40°C, decreased appetite, and night sweats. These symptoms were experienced for the first time. Patient complaints were also accompanied by significant weight loss from 64 kg to 35 kg. After several months of illness, the patient was hospitalized multiple times because complaints worsened and were accompanied by severe weakness. At the hospital, the patient underwent sputum examination and other supporting tests [7].

The doctor diagnosed tuberculosis and the patient underwent anti-tuberculosis treatment. The patient was then referred back to Mengwi II Health Center for routine TB treatment for 6 months.

The patient's occupation remains a housewife. While she was previously independent in all aspects of self-care, her current illness necessitates total assistance from family members for activities of daily living, including feeding, bathing, and dressing. Additionally, she has become dependent on adult diapers due to impaired mobility.

All family members have been examined for sputum by the health center and were declared negative. According to the patient's family, none of the family members or closest neighbors had tuberculosis. The patient's husband has poor lifestyle habits including smoking and alcohol consumption. Neither the patient nor other family members smoke. The patient rarely exercises [11].

The patient currently resides with her husband. She has two children from a previous marriage who live with their grandmother, and she does not have any children from her current marriage. Her psychological state has shown improvement, bolstered by strong spiritual beliefs and family support.

Biological Diagnosis and Psychosocial Diagnosis

General condition: Appears moderately ill.

Consciousness: compos mentis; temperature: 37.1°C; blood pressure: 120/85 mmHg; pulse rate: 80 x/minute, regular; respiratory rate: 18 x/minute; body weight: 52 kg (improved from 35 kg); height: 165 cm; BMI: 19.10 /kgm2; nutritional status: normal (improved).

Generalist Status:

Eyes, ears, nose, impression within normal limits. Neck, JVP not increased, impression within normal limits. No lymph node enlargement was found. Thoracic examination was found on inspection of the shape and movement of the chest within normal limits, on sonor percussion in both lung fields, there were supra sternal (+/+) and intercostal (+/+) retractions on vesicular auscultation (+/+), fine wet rhonchi (+/+), wheezing (-/-). Cardiac examination was within normal limits. Abdomen, looks flat, no organomegaly or ascites is found, there is no tenderness in any region, the impression is within normal limits. Musculoskeletal and neurological status impressions were within normal limits.

Local Status:

Posterior thoracic region

I : Symmetrical, scar (-), tumor (-), same color as surrounding skin, intercostal retraction (+)

P : Tenderness (-/-), Fremitus right = left P : sonor/sonor
A : Vesicular (+/+), smooth wet rhonchi (+/+), Wheezing (-/-)
Anterior thoracic region
I : Symmetrical, scar (-), tumor (-), same color as surrounding skin, intercostal retraction (+), suprasternal retraction (+)
P : Tenderness (-/-), Fremitus right = left P : sonor/sonor
A : Vesicular (+/+), smooth wet rhonchi (+/+), Wheezing (-/-)
Supporting investigation
BTA (+), Chest X-Ray showed bilateral upper lobe infiltrates with cavitary lesions in the right upper lobe and hilar lymphadenopathy
Clinical Diagnosis: Pulmonary Tuberculosis (ICD-10: A15.0)

Family Data

The patient is currently in her second marriage. Her current husband, aged 40, works as a daily worker and security guard; the couple does not have any children together. The patient has two children from her first marriage (to her deceased husband) who currently reside with their grandmother. Based on the Duvall cycle, this family is categorized in Stage V (Family with adolescent children).

Decision-making is discussed together with husband. Family relationship is good, though patient rarely meets children due to fear of transmission. Before TB illness, patient visited children 1-2 times per week. Family material needs are met by husband's income, though sometimes patient asks for financial help from siblings.

The family demonstrates strong health awareness and knowledge regarding disease prevention, evidenced by consistent use of masks, head covers, and gloves when changing patient's diapers to prevent disease transmission. All family members have health insurance through BPJS Kesehatan registered in East Denpasar. The family is very supportive of the patient's treatment and adherent to the ongoing medication regimen. Healthcare behavior is reflected in regular control visits that were initially conducted every 2 weeks and have now been reduced to monthly intervals.

The patient's family maintains good hygiene practices and environmental cleanliness. They have established protocols for infection control, including separating eating utensils and sterilizing equipment with hot water. The family also provides emotional support and motivation for the patient to complete treatment. Despite the challenges posed by the illness, family dynamics remain stable with effective communication and shared decision-making processes **Figure 1**.

Family APGAR Score

Adaptation 2
Partnership 2

Growth 2
Affection 2
Resolve 2
Total Family APGAR Score : 10 (good family function).

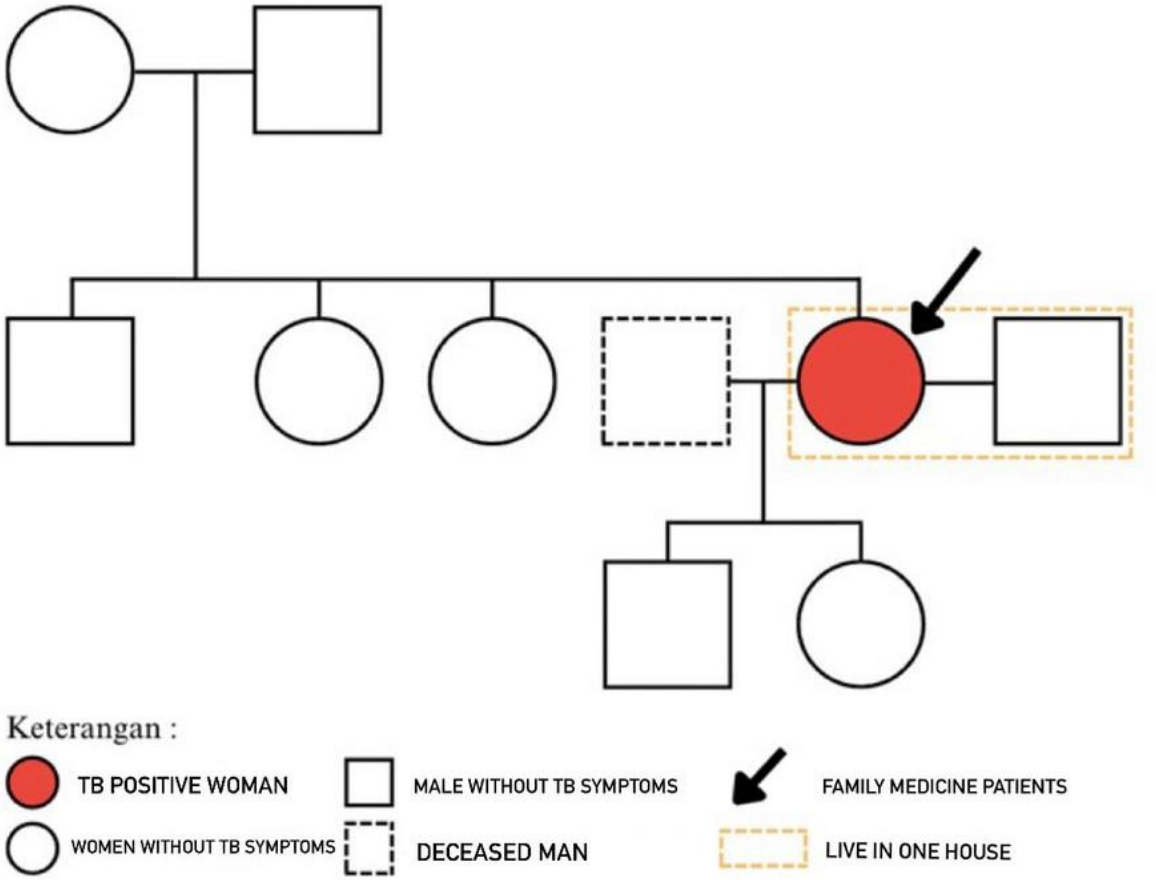

Figure 1. Mrs. NLPA Family Genogram

Genogram

The patient's first husband died approximately 24 years ago when the patient was around 16 years old, leaving her with two children. The cause of death is cardiac arrest based on patient's statement. The patient remarried at age 35 to her current husband who is 40 years old. The patient's parents are still alive, and there is no documented family history of tuberculosis or other chronic diseases among family members.

The patient is the eldest of four siblings (3 females, 1 male). Her two children from the first marriage currently live with their paternal grandmother in Sibang, Abiansemal District, Badung Regency, Bali. The first child is already working while the second child is still attending vocational high school (SMK). The patient and her current husband live together in the family compound, with the husband working multiple jobs as a daily worker at a villa and as security personnel.

Family Relations

Home Environment Data

Patient lives with husband in shared compound with brother-in-law's family (2 households total). House consists of 2 bedrooms, 1 kitchen, 1 bathroom with brick walls and ceramic floors, clean and well-maintained. Each room has windows with good ventilation for air circulation. Bathroom equipped with squat toilet and shower. Lighting uses prepaid electricity, clean water source from dug well. House appears clean and well-maintained. Patient and family have routine of cleaning house daily, sweeping every day and mopping 2-3 times daily, showing good awareness of environmental cleanliness importance **Figure 2**.

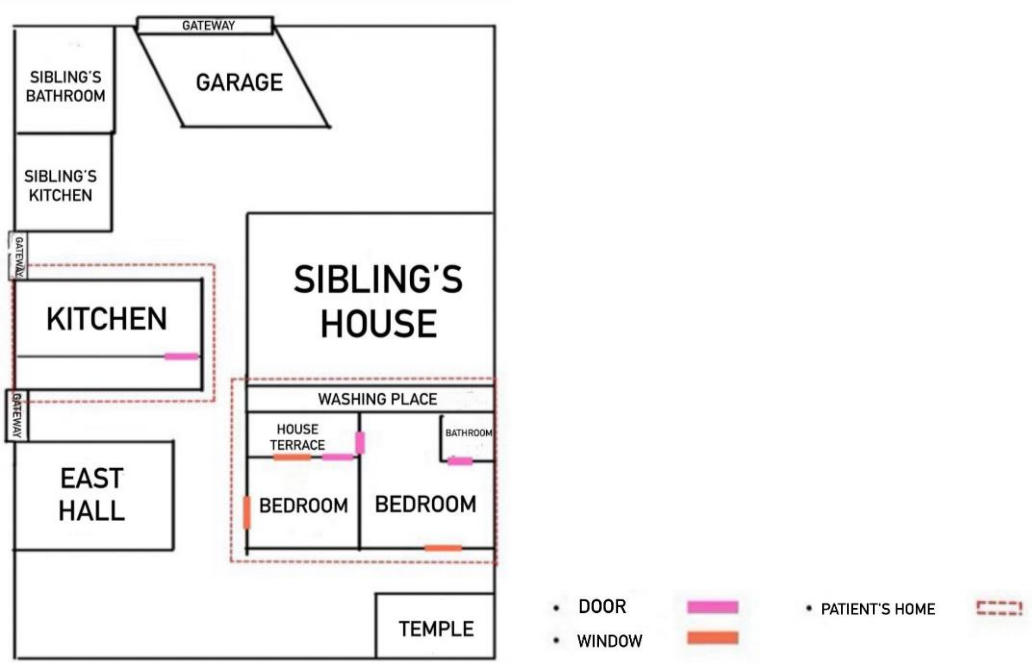

Figure 2. Mrs. NLPA House Plan

Early Holistic Diagnostics

1. Personal Aspect

- Reason for visit: experiencing persistent productive cough that has not improved, accompanied by high fever, decreased appetite, and weakness.
- Concerns: initially, the patient had very negative thoughts and wanted to die, but gradually hope for recovery and strong spiritual faith emerged.
- Perception: the patient initially did not know that they were infected with tuberculosis because no family members or neighbors around experienced similar conditions. The patient only felt anxious and afraid regarding the risk of transmission to close people.
- Hope: the patient has strong hope to fully recover from tuberculosis in order to return to normal life without fear of transmitting the disease to others, and to be able to meet their children at home again.

2. **Clinical Aspect**
   - Pulmonary TB BTA (ICD 10-A15.0)

3. **Internal Risk Aspect**
   - When initially diagnosed with tuberculosis, the patient's body weight experienced a very drastic decrease.
   - The patient's eating pattern lacks variety and does not meet balanced nutritional needs. The patient does not consume animal protein, only relies on tofu and tempeh as protein sources. The types of vegetables consumed are limited, while fruit consumption is also rarely done.
   - The patient's knowledge about tuberculosis is still limited.
   - The patient is not accustomed to exercising because they get tired easily and feel unable to walk for too long.
   - The patient rarely uses masks.

4. **External Risk Aspects**
   - The patient's relationship with family is considered good. The family continues to provide support for the patient's treatment and recovery.
   - Quite dense living conditions where 2 households live in 1 house compound.
   - Inadequate house ventilation where the patient rarely opens windows because their house is adjacent to a banana plantation, so the patient is afraid that a lot of dust and insects will enter their house through the open windows.
   - Low socioeconomic status results in limited patient access to health facilities, nutritious food, and decent housing.

5. **Functional Degree:** 4 (four), the patient was unable to perform even light activities and was very dependent on their husband, where at that time the patient could only lie weakly on the bed and used diapers for defecation and urination

Intervention Plan

Non-pharmacological efforts provided to the patient include education and counseling regarding tuberculosis disease, how to prevent transmission and complications, as well as identification of household contacts. The patient is also given guidance regarding medication usage rules, appointment of Treatment Observer (PMO), and the importance of follow-up examinations after completing therapy. Similar education is provided to the family, especially regarding the implementation of Clean and Healthy Living Behavior (PHBS), appropriate nutritional fulfillment, and family involvement in providing support and motivation during treatment. To ensure therapy success, periodic monitoring is conducted through home visits that function to evaluate the patient's condition, examine complaints, and assess treatment

adherence. Patients and families are also encouraged to actively visit the health center, both to collect medication, check health, and report condition developments. As an additional step, the authors provides support in the form of medication boxes and medication reminder alarms. This facility is prepared because although the patient is relatively compliant, medication omissions are still found when the patient is very tired and falls asleep. With these reminders, it is hoped that regularity of OAT consumption can increase, therapy effectiveness remains optimal, and the possibility of disease recurrence can be prevented.

Patient Centered

1. Education about TB (causes, transmission methods, disease progression, and prevention).
2. Emphasize medication adherence and routine control to prevent resistance & relapse.
3. Recommend healthy lifestyle: balanced nutrition, light exercise, sunbathing, good house ventilation.
4. Psychosocial support so patients are motivated, do not feel alone, and reduce anxiety.

Comperehensive

1. Primary Prevention: Family education on transmission, healthy lifestyle (nutrition/ventilation), early contact screening, and HIV risk assessment.
2. Secondary Prevention: Sputum BTA/TCM and X-ray diagnosis, monthly control for adherence, monitoring drug side effects, and HIV PITC (Provider-Initiated Testing and Counseling).
3. Tertiary Prevention: Family psychological support, medication supervision by a PMO to prevent relapse, and nutritional rehabilitation to prevent disability.

Continous

1. Regular home visits to monitor patient conditions and complaints.
2. Encourage patients/families to be active at health centers for medication, examinations, and complaint reporting.
3. Addition: medication box and reminder alarm to reduce medication forgetfulness & maintain therapy effectiveness.

Coordinative and Collaborative

1. Clinical Coordination: Collaborate with the Pulmonologist at the referral hospital to monitor clinical progression, evaluate chest X-ray findings, and manage potential drug side effects or complications.

2. TB Program Integration: Consult with TB officers and educators at Mengwi II Public Health Center regarding OAT (Anti-Tuberculosis Drugs) availability and adherence monitoring.
3. Nutritional Support: Coordinate with Nutrition Officers to design a high-calorie, high-protein diet, which is essential for immune recovery and weight gain in patients experiencing severe weight loss.
4. Environmental Health: Collaborate with Sanitation/Environmental Health Officers to evaluate home ventilation, humidity, and lighting to reduce the risk of transmission within the family compound.
5. TB-HIV Collaborative Care: Liaise with the HIV Program Officer to ensure the patient receives HIV screening (PITC) as part of standard protocol, given the 18-fold higher risk of TB in co-infected individuals.
6. Social & Community Engagement: Involve the family (husband as PMO) for medication supervision and engage community leaders to provide psychosocial support and reduce stigma/discrimination within the neighborhood.

Family Focused

1. Comprehensive family understanding about disease progression, complication risks, relapse.
2. Family PHBS education (masks, distance, cleanliness, nutrition, adequate rest).
3. Family actively accompanies patient (remind medication taking, help daily needs).
4. Encourage routine control to health center so therapy is not interrupted.
5. Conduct early screening for all household family members.

Community Oriented

1. Increase community education about TB, early symptoms, and importance of early detection.
2. Educate neighbors & surrounding community so they understand transmission risks.
3. Implement PHBS in the environment: house ventilation, sunbathing, not smoking inside the house.
4. Reduce stigma & discrimination of TB patients through community activities & local leaders.

Pharmacology

Pharmacological therapy in this patient is as follows:

Anti-Tuberculosis Drugs (OAT) are given in Fixed Dose Combination (FDC) form containing Rifampicin 150 mg, Isoniazid 75 mg, Pyrazinamide 400 mg, and Ethambutol 275 mg. This combination aims to increase treatment effectiveness while preventing drug resistance. FDC is taken once daily, one hour after dinner to minimize gastric side effects.

Final Holistic Diagnosis

1. **Personal Aspect**
   - Reason for visit: routine control.
   - Concerns: patient remains enthusiastic, has hope for recovery, and holds onto spiritual faith.
   - Perception: patient & family already understand TB disease, transmission methods, and importance of treatment discipline.
   - Hope: wants to fully recover to live normally without transmitting disease.

2. **Clinical Aspect**
   - Pulmonary TB BTA (ICD 10-A15.0)

3. **Internal Risk Aspect**
   - Patient is medication compliant and regularly controls to prevents resistance.
   - Body weight increases due to better eating patterns.
   - Light physical activity begins to be performed although not yet routine exercise.
   - Consistent mask wearing when interacting.
   - Patient's understanding of TB increases.

4. **External Risk Aspects**
   - Family actively supports treatment, reminds medication taking & control.
   - Maintains house cleanliness (ventilation, routine cleaning) to reduces transmission risk.
   - Provides encouragement & emotional support.

5. **Functional Degree** 1 (one), patient is able to perform daily activities, but has limitations for heavy activities (intense exercise, physical work).

Case Discussion

Common symptoms such as productive cough, night sweats, chest pain, and decreased appetite are frequently observed in pulmonary TB patients, including those in older age groups, which can lead to poor nutritional status [10]. In patient Mrs. NLPA, tuberculosis was diagnosed after comprehensive history taking, physical examination, and supporting investigations. The patient presented with classic tuberculosis symptoms including persistent productive cough for more than 2 weeks, accompanied by constitutional symptoms of high fever up to 40°C, night sweats, significant weight loss from 64 kg to 35 kg, and severe functional decline requiring assistance with activities of daily living.

The patient's clinical presentation aligns with typical pulmonary tuberculosis manifestations. In pulmonary TB, the main symptom is productive cough lasting more than 2 weeks, followed by additional symptoms including dyspnea, weight loss,

malaise, night sweats, and fever. The dramatic weight loss experienced by this patient, representing a 45% reduction in body weight, indicates severe disease progression and malnutrition, which significantly impacts immune function and treatment outcomes.

Physical examination revealed icterus (+/+), though respiratory examination showed improvement with vesicular breath sounds and absence of pathological sounds like rhonchi or wheezing, indicating positive response to treatment. The patient's current BMI of 19.10 kg/m², while within normal range, represents significant improvement from the severely underweight status during acute illness. Malnutrition in TB patients is associated with higher mortality rates and poor treatment outcomes, as inadequate calories, protein, vitamins, and minerals affect immune system function and increase susceptibility to infectious diseases.

The patient was diagnosed with pulmonary tuberculosis based on positive sputum BTA examination, categorizing her as a smear-positive pulmonary tuberculosis patient. Current treatment follows standard anti-tuberculosis regimen with good compliance, taking medication at 7 PM after meals to minimize gastrointestinal side effects. The patient experiences typical rifampin side effects including yellow discoloration of urine, which is explained as normal to maintain treatment adherence.

Interventions implemented follow patient-centered and family-focused approaches. Patient-Centered Care involves managing patients by respecting individual preferences, needs, values, and ensuring clinical decision-making incorporates patient-desired values. Family-focused approach recognizes the patient as part of a family unit, engaging family members in supporting patient recovery and preventing disease transmission.

Patient and family education covers comprehensive TB knowledge including disease pathophysiology, transmission modes, treatment duration, potential side effects, and importance of medication adherence. The DOTS (Directly Observed Treatment Shortcourse) method is implemented with the husband serving as PMO (Pengawas Minum Obat/Medication Supervisor) to prevent treatment default and drug resistance development. Additional interventions include providing pill organizer and medication reminder alarms to address occasional medication forgetfulness, particularly when the patient experiences fatigue.

Nutritional intervention focuses on high-calorie, high-protein (TKTP) diet to restore nutritional status and support immune recovery. Given the patient's food allergies to eggs and fish, alternative protein sources including chicken, beef, and dairy products are recommended. The diet aims to provide 40-45 kcal/kg body weight and 2.0-2.5 g protein/kg body weight to meet increased metabolic demands and promote weight gain.

Environmental modifications address infection control and disease transmission prevention. The family implements proper hygiene protocols including mask use, hand hygiene, separation of eating utensils, and improved ventilation. Despite living in a shared compound with two households, infection control measures have prevented secondary transmission among family members, as evidenced by negative sputum examinations in all household contacts.

The patient's functional improvement from Grade 4 (complete dependence) to Grade 1 (independent with minor limitations) demonstrates successful treatment response. Psychological support through family involvement and spiritual beliefs contributes to treatment motivation and adherence. The Family APGAR score of 10 indicates excellent family function, providing strong social support for sustained recovery.

Monitoring includes regular follow-up visits, initially bi-weekly then monthly, to assess treatment response, medication adherence, and potential complications. The comprehensive approach addressing medical, nutritional, psychological, and social aspects provides optimal conditions for treatment success and prevents treatment failure or drug resistance development.

Conclusion

Home visits to the patient were carried out three times, on August 14, 18, and 21, 2025, as part of the integrated monitoring program in family medicine. During these visits, the medical interns conducted direct anamnesis with the patient, heteroanamnesis with the husband and the patient's in-laws, regular vital signs examination and general status evaluation, as well as providing education regarding the patient's condition at each visit.

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Author's Declaration

Authors' contributions and responsibilities

All authors made substantial contributions to the conception and design of the case report or manuscripts developments. The authors took responsibility for patient examination, management, follow up, etc. The authors read and approved the final manuscript.

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Competing interests
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Additional information
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