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PROBLEM SOLVING IN PULMONARY TUBERCULOSIS AMONG YOUNG ADULTS USING A FAMILY HEALTH APPROACH: A CASE STUDY

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Abstract

Tuberculosis is one of the oldest infectious diseases and remains a health problem in Indonesia and globally. The Tangerang Regency Health Office in Banten has identified 5,000 residents in the area who are suffering from or have been exposed to tuberculosis. One program considered successful, particularly in empowering family health, is the Family Folder program for TB patients. This qualitative study employed a case study design. It was conducted by observing and examining in depth the family's influence on a single TB case using the Family Folder. Based on the results, it can be concluded that family participation is crucial for supporting the recovery of TB patients. Family support affects patient adherence to OAT therapy and influences the patient's life and environment. This study also found an improvement in the family's coping score, from 1 to 5, before and after the intervention, which included holistic and comprehensive management of TB patients.

***Keywords**: family health approach, pulmonary tuberculosis, young adult patient*

INTRODUCTION

Tuberculosis (TB) is an infectious disease caused by *Mycobacterium tuberculosis*. This disease most commonly infects the lung parenchyma and causes pulmonary TB, but it can also affect other organs outside the lungs (extrapulmonary TB), such as the pleura, lymph nodes, bones, and other organs (7). Tuberculosis is one of the oldest infectious diseases and remains a major health problem in Indonesia and worldwide. The highest number of cases is found in Southeast Asia (45%), followed by Africa (23%) and the Western Pacific region (18%). TB is still the leading cause of death after HIV/AIDS and ranks among the top 20 causes of death globally.

According to the *Global Tuberculosis Report 2022* published by the World Health Organization (WHO), Indonesia is the country with the second highest number of TB cases in the world after India (15). TB cases in Indonesia are estimated to reach 1.5 million, with around 969,000 confirmed cases. This figure represents a 17% increase compared to 2020, when there were 824,000 cases. The incidence rate of TB in Indonesia is 354 per 100,000

population, meaning that for every 100,000 people, 354 are affected by TB. The number of TB-related deaths in Indonesia reached 150,000 cases, an increase of 60% compared to 93,000 deaths in 2020, with a mortality rate of 55 per 100,000 population. Based on sex, TB cases are more common in men (56.5%) compared to women (32.5%) (15).

Mycobacterium tuberculosis is a rod-shaped, acid-fast bacterium, hence it is often referred to as Acid-Fast Bacilli (AFB). TB is transmitted from person to person through the air, especially via microscopic droplets or droplet nuclei released when an infected person coughs or sneezes (7). One of the key strategies in TB control is treatment. The main indicator used to evaluate TB treatment is the treatment success rate, which refers to the proportion of cured cases and completed treatments among all reported cases. The treatment success rate reflects the quality of TB treatment. In addition to cured cases, other treatment outcomes such as deaths, treatment failures, loss to follow-up, and unevaluated cases must also be monitored. The minimum target for the cure rate is 85%, while the overall treatment success rate should be at least 90% (8).

In Tangerang Regency, Banten, the Health Service detected around 5,000 residents suffering from TB, based on monitoring and screening of infectious diseases. As part of TB control efforts, the Tangerang Regency Health Service aims to successfully manage around 90% of detected cases. Data from 2024 show that Tangerang City has 5 TB cases per 1,000 residents, with 21% occurring in children under 15 years old. Despite this, the treatment achievement in Tangerang City is considered very good: 92% of patients were declared cured, and the TB SPM (Minimum Service Standards) coverage reached 100% (8).

Preliminary observations at Puskesmas Salembaran Jaya, Tangerang Regency, revealed that some TB patients still lack adequate education about TB transmission, and family participation in supervising medication adherence remains low. According to Crofton (2002), one of the factors contributing to TB transmission is insufficient knowledge among patients, families, and communities, coupled with poor environmental hygiene, overcrowded housing, and the absence of healthy living conditions. Several factors may cause patients to fail to seek medical care, including lack of information about TB treatment, treatment fatigue due to long duration and large quantity of medication, perceived recovery, side effects of drugs, financial difficulties, or lack of assistance in reaching health facilities. Patients who do not adhere to TB treatment are at risk of complications, in addition to experiencing negative social impacts such as stigma and discrimination.

Despite various promotive and preventive efforts, the burden of infectious diseases, including TB, remains high. Contributing factors may include unhealthy lifestyle changes, lack of health awareness, and limited access to quality health services. A family-centered health approach can serve as an effective solution because families play an important role in supporting and encouraging healthy lifestyles. For example, families can help regulate healthy diets, support physical activity, and discourage smoking habits (1).

Family health approach emphasizes the role of the family in healthcare services. Many countries have implemented family-oriented healthcare approaches, which are based on the biopsychosocial model. Originally focused only on individuals, the model has expanded to include families and even surrounding communities. This approach views the family as a unit of care, where health services are aimed at the patient within the context of their family. Thus, the involvement of family members in establishing diagnoses and managing health problems represents active participation in healthcare services and disease management (14).

One important aspect of TB control is treatment adherence. Failure to achieve treatment success is often caused by poor patient compliance, inappropriate drug administration or dosage, and inadequate healthcare facilities, including data management. These challenges encourage researchers to study TB patients at Salembaran Jaya Community Health Center, Tangerang Regency, using a family medicine approach.

METHODS

This study employed a qualitative approach with a case study design. It was implemented by observing and studying in depth the family's influence on a single TB patient using a family health approach. This study was conducted through a home visit to one TB patient in the service area of the Puskesmas Salembaran Jaya, Tangerang Regency, from May 7th to June 13rd, 2025.

The data were carried out through interviews, physical examinations, and environmental analyses of the household, using the mandala of health for holistic diagnosis. Assessments of family functioning were performed, followed by the development of holistic and comprehensive intervention plans and subsequent follow-up activities.

The primary data in this study were obtained through a thorough anamnesis of the patient's family, including the patient's medical history, habits, dietary patterns, treatment-seeking behavior, environmental health conditions of the residence, and the family's social and economic status. Physical examinations included measurements of blood pressure, respiration, temperature, pulse, height, weight, and body mass index, as well as cranial nerve assessments.

Additional data were collected through household environmental analysis to evaluate external factors that could influence the patient's disease, such as house size, ventilation, lighting, water sources, waste management, and environmental cleanliness. Supplementary data were also obtained from the patient's chest X-ray conducted on April 25, 2025, at Mitra Husada Hospital, Tangerang, and from the patient's TCM test performed on May 2, 2025, at the Puskesmas Salembaran Jaya.

The daily dietary recall method was used to evaluate the patient's eating patterns in detail. Data regarding energy, protein, fat, and carbohydrate intake were calculated and compared with the recommended daily allowance. Based on this evaluation, dietary

recommendations were compiled to improve eating patterns through greater food variation and the provision of additional nutrition.

The intervention began with the selection of one patient and their family who agreed to participate in the study. The patient, a child with TB who had been receiving regular treatment at the Puskesmas Salembaran Jaya, was chosen with their family. Home visits were then conducted to examine the family's influence on the patient's treatment using the mandala of health, the Family APGAR tool, and the Family Coping Score analysis.

The mandala of health model describes four factors affecting individual and family health: biology, personal habits, psychosocial environment, and physical environment. This model is relevant for family health because it adopts a holistic approach and considers multiple determinants of health (12). The Family APGAR is a brief instrument used to evaluate family function and satisfaction across five aspects: adaptation, partnership, growth, affection, and commitment. It measures family support, satisfaction in family relationships, and family functioning. Scores range from 0 to 10, with 7–10 indicating good family functioning, 4–6 indicating moderate dysfunction, and 0–3 indicating severe dysfunction.

This study also employed the Family Coping Score, which uses the following scale: One (1) if the family is unaware of the problem; two (2) if the family is aware of the problem but does not know the solution; three (3) if the family knows the problem and its solution but is unable to implement it due to certain limitations; four (4) The family knows the problem and its solution and has partly implemented it but still requires; and five (5) if the family knows the problem and its solution and has implemented all measures independently.

The data collected from this study were analyzed descriptively to identify changes before and after the intervention. These changes reflected improvements in TB patient management and family support following education on accompanying TB patients throughout the treatment process.

RESULT AND DISCUSSION

A. Anamnesis

An alloanamnesis was conducted on May 2, 2025. The chief complaint and reason for the visit was to obtain the results of a sputum test. Additional complaints included recurrent fever in the afternoon and evening, accompanied by significant weight loss. The patient returned to the Puskesmas Salembaran Jaya on May 7, 2025, to obtain the results of the sputum examination.

The patient had undergone a chest X-ray on April 25, 2025, at Mitra Husada Hospital due to a cough that had persisted for more than six months. The cough first appeared after the patient participated in a mountain climbing activity with six friends, which lasted for three days and two nights. During the climb, the patient slept in a tent with a male friend who had a productive cough that worsened at night. This friend was approximately 162 cm

tall and weighed 50 kg. The patient also shared a water bottle with him. The climb reached an altitude of approximately 1,000 meters above sea level, with clear weather and no rain. The patient admitted that he was not accustomed to mountain climbing.

The last time the patient met this friend, the latter no longer had a cough and was working at Soekarno-Hatta Airport. However, the patient has since had no further contact with him. The patient stated that he had never undergone medical treatment and denied any history of sexual contact. He also mentioned that about one year ago, a high school friend had been diagnosed with glandular TB and underwent nine months of treatment.

In addition to chronic cough, the patient reported systemic symptoms, including fever every afternoon and evening, chills, and excessive night sweats. He felt increasingly weak and experienced significant weight loss, from 53 kg to 36 kg over the last six months, without any changes in dietary patterns.

On May 2, 2025, based on clinical suspicion of pulmonary tuberculosis, the patient was immediately started on anti-tuberculosis (OAT) therapy, and sputum samples were sent for molecular rapid testing (TCM). The patient returned on May 7, 2025, to review the TCM results, which confirmed Mycobacterium tuberculosis without rifampicin resistance. Screening for HIV and diabetes mellitus was also performed, and both tests were negative.

Before becoming ill, the patient worked eight hours a day. None of his coworkers had a chronic cough similar to his.

Developmental History

No abnormalities were reported in the patient's growth and development.

Habits

1) Patient: The patient usually sleeps between 9:00 and 10:00 p.m. and wakes at 5:00 a.m. He often consumes fried foods and does not engage in any particular form of exercise, although he enjoys sunbathing in the morning. Since becoming ill, he has not socialized with neighbors or friends. He smokes one cigarette per day but has never consumed alcohol or illicit drugs.
2) Family: The patient's father smokes 2–3 cigarettes per day but does not consume alcohol or illicit drugs.

Dietary Patterns

1) Patient: The patient usually eats 2–3 times per day. His meals, prepared by his mother, typically consist of rice accompanied by fried eggs, fried tempeh, fried tofu, and vegetables. He drinks approximately 1 liter of water per day.
2) Family: The patient's family, consisting of his mother, father, and two brothers, also eats 2–3 times per day. Their meals, cooked by the mother, generally consist of rice with fried eggs, fried tempeh, fried tofu, and vegetables. Each family member consumes about 1 liter of water per day.

Healthcare-Seeking Behavior

The patient had never previously visited a doctor or community health center. He relied on cough medicine purchased from roadside stalls; however, his symptoms did not improve.

Environmental Health

The patient is a 19-year-old male who is currently unemployed. He previously worked at an online shop, where he live-streamed on TikTok. Since becoming ill, he has been unable to work. He lives with his father, mother, and two siblings in the same house. His living space is cleaned daily by his younger sibling. The family obtains clean water from a water vendor. The area around the patient's home is damp, and a birdcage in the yard is rarely cleaned.

B. APGAR Results

Family support for the patient was assessed as follows:

1. Holistic Assessment
   a. Biological: The biological condition of the patient's family was not disturbed.
   b. Psychological: The psychological condition of the patient's family was good.
   c. Socioeconomic: The socioeconomic condition of the patient's family was moderate.

2. Physiological

Table 1. The Patient's Family APGAR Assessment

Assessment Aspects	0 (Rarely/ Never)	1 (Sometimes)	2 (Often/Always)
Adaptation: The ability of family members to adapt to one another and to receive support and advice from other members.			✓
Partnership: The extent to which family members communicate, share responsibilities, and support one another in addressing family problems.			✓
Growth: The family's support for new activities or endeavors undertaken by its members.			✓
Affection: The degree of emotional closeness, affection, and interaction among family members.			✓
Resolve: The satisfaction of family members with the time spent together and their shared commitment to one another.		✓	

Total score APGAR Family = 9 (good family function)

3. Pathological

a. **Social (S):** The interaction of the patient with neighbors and the community is good.
b. **Cultural (C):** The patient and his family respect one another, uphold cultural values in society, and practice politeness.
c. **Religious (R):** The family of the patient adheres to Islam and performs religious worship regularly.
d. **Economic (E):** The economic status of the patient's family is insufficient, as the household income is not adequate to meet daily needs.
e. **Educational (E):** The patient highest educational attainment is at the senior high school level.
f. **Medical (M):** The patient is registered under the BPJS PBI health insurance scheme.

Based on the SCREEM assessment, the family of the patient demonstrates adequate functioning in the cultural, religious, educational, and medical domains. However, problems were identified in the social and economic domains, particularly limited social support and insufficient household income to meet daily needs.

Based on the data presented above, it can be concluded that the patient is satisfied with his family's acceptance of his expressed feelings. In addition, the patient receives strong social and cultural support from his family. The following are the results of the Family Coping Score assessment prior to the intervention:

C. Mandala of Health

Mandala Health represents a holistic approach to well-being, inspired by the ancient symbol of the mandala, which means "circle" or "wholeness." A mandala is made up of balanced, symmetrical patterns radiating from a center point symbolizing unity, harmony, and the interconnection of all aspects of life. When this concept is applied to health, it suggests that true wellness arises from balance and integration among the different parts of ourselves. Mandala Health views a person as an interconnected system body, mind, emotions, and spirit where each element affects the others. Instead of treating only physical symptoms, this perspective emphasizes nurturing all areas of life to achieve harmony and vitality.

1. *Body*

a) The patient is a 19-year-old male.
b) He has been diagnosed with pulmonary tuberculosis (TB).

2. *Mind:*

a) He is aware that he is currently suffering from pulmonary tuberculosis and has been prescribed therapy for the next six months.
b) He perceives his illness as not dangerous.

3. ***Spirit:*** The patient demonstrates a willingness to manage and control his illness.

Level One

a. *Human Biology:* No genetic abnormalities were identified in the patient.
b. *Family*
    1) The patient lives with both parents and one younger brother.
    2) His father passed away in 2012 due to bladder disease.
    3) His second younger brother lives in a house adjacent to the patient's residence together with their grandfather and grandmother.
    4) The relationship among family members is good.
c. *Personal behavior*
    1) The patient consumes food that does not meet his daily nutritional needs.
    2) The patient eats meals prepared or purchased by his younger brother.
    3) His daily activities are limited to sitting and playing on his mobile phone, and he only goes outside in the morning to sunbathe.
    4) The patient consumes fruit purchased from fruit vendors who pass by his house each day.
    5) The patient dislikes drinking water because he feels it causes nausea.
    6) The patient takes his medication regularly.
d. *Psycho-socio-economic environment*
    1) His socializes with his neighbors and friends to a limited extent.
    2) The economic status of the patient is categorized as lower–middle class.
e. *Physical environment*
    1) The patient lives in a densely populated residential area, where the houses are separated only by adjoining walls.
    2) The walls of his house are constructed from brick, coated with cement, and painted.
    3) The size of the house is insufficient to comfortably accommodate three occupants.
    4) Both permanent and temporary ventilation in the house is inadequate.
    5) Natural and artificial lighting inside the house is insufficient.
    6) Access to clean water is inadequate.
    7) Fecal waste disposal is adequate.
    8) Solid waste management is inadequate.

Level Two

a. *Sick care system*
    1) The distance from the patient's house to the Puskesmas Salembaran Jaya is 4.5

km, while the distance to the Rawa Burung Village Office, which functions as a community health post, is 650 m with reasonably good road access. The nearest hospital with a pulmonary specialist, Bun Hospital, is located 6 km away. Transportation is available for the patient to access these facilities.

2) The Puskesmas Salembaran Jaya is adequately staffed, with 2 general practitioners, 1 dentist, 17 midwives, 7 nurses, 4 pharmacists, and several other health workers.
3) The availability of medications at the Puskesmas Salembaran Jaya is relatively complete.
4) The Puskesmas Salembaran Jaya is equipped with a laboratory that provides various diagnostic services.
5) The Puskesmas also has an ambulance facility.
6) In addition, the Puskesmas Salembaran Jaya conducts village health post (Poskesdes) activities for disease screening in Rawa Burung Village.

b. *Work*

The patient is currently unemployed and spends most of his time at home, primarily using his mobile phone.

c. *Lifestyle*

1) The patient does not exercise regularly.
2) The patient does not have a habit of drinking coffee or tea.
3) The patient does not smoke smoking.
4) The patient often takes a walk in the morning to sunbathe.

Level Three

a. The Community

1. Limited socialization with neighbors.
2. Interactions with neighbors restricted to family-related matters.
3. Neighbors generally familiar with one another.
4. Majority of surrounding residents classified as lower-middle socioeconomic group.

b. Human-Made Environment

The patient resides in a densely populated settlement located near rice fields.

c. Culture

1. The local community tends to use medication only when symptoms arise.
2. Residents usually visit the community health center only when their health complaints become more serious.
3. There is a common belief in the community that taking medication daily may cause kidney damage.

d. Biosphere

Clean water sources are scarce in the area surrounding the patient's residence; therefore, the family relies on purchasing clean water from external vendors.

D. *Holistic Diagnosis*

Holistic Diagnosis is an approach to understanding a person's health by looking at the whole person, rather than just isolated symptoms or diseases. The word "holistic" comes from "whole" meaning that health and illness are seen as the result of interactions among body, mind, emotions, lifestyle, environment, and spirit. In a holistic diagnosis, the practitioner seeks to understand the *root causes* of imbalance, not only the visible symptoms. The goal is to discover why a person is unwell, and how different factors in their life contribute to that condition.

1. Aspect I (Personal):
   a. Persistent cough for the past six months.
   b. Significant weight loss.
   c. Evening fevers.
2. Aspect II (Clinical):
   a. Primary diagnosis: Pulmonary tuberculosis.
   b. Secondary diagnoses: Glandular tuberculosis and underweight status.
3. Aspect III (Internal):
   a. The patient has limited understanding of his disease and associated risk factors.
   b. The patient does not consistently wear a mask when leaving the house.
   c. The patient frequently experiences loss of appetite.
4. Aspect IV (External):
   a. Poor air circulation due to inadequate household ventilation.
   b. Insufficient lighting in the house, increasing the risk of falls.
5. Aspect V (Functional):
   The patient's functional status is 5, indicating that he is able to perform daily activities independently and without difficulty.

Based on the results, the family's coping score prior to the intervention was 1. Therefore, the researchers developed a holistic and comprehensive management plan, which is presented in Table 2 below.

Table 2. Holistic and Comprehensive Management Plan

No	Holistic Diagnosis	Plan Management Holistic and Comprehensive
1.	Aspect 1 • Cough persists, and body weight has not recovered to baseline.	**Pharmacological:** • Rx: Ambroxol tablets 30 mg Sig: Take one tablet three times daily for one week • Rx: Multivitamin tablets Sig: Take one tablet once daily **Non-Pharmacological:** • Provide education to the patient and his family that the complaints experienced are symptoms of pulmonary tuberculosis. • Teach the patient and his family about proper cough etiquette and the importance of wearing masks. • Instruct the patient to return for follow-up when the sputum test results are available and to initiate treatment promptly.
2.	Aspect 2 • TB Lungs • Underweight	**Management Plan for Pulmonary Tuberculosis** **Pharmacological:** • Fixed-Dose Combination (FDC) therapy: 3 tablets once daily during the initial phase, continued for up to 6 months. **Non-Pharmacological:** • Emphasize the importance of taking medication daily at the same time each day to maximize treatment effectiveness. • Instruct family members to serve as *Pengawas Minum Obat* (PMO; Medication Monitors). • Provide education to the patient and his family about tuberculosis, including its definition, causes, modes of transmission, signs and symptoms, treatment, complications, and preventive measures. **Management Plan for Underweight Status** • Explain to the patient that his weight loss is due to insufficient nutritional intake. • Develop a dietary plan that includes an additional **200–500 calories per meal**, with increased meal frequency and smaller portion sizes.
3.	Aspect 3 • The patient does not understand the disease • The patient doer not have a good appetite • The patient has the habit of not wearing a mask when leaving the house.	1. Provide education about the disease, its modes of transmission, possible side effects of the medication, and the consequences of discontinuing therapy. 2. Counsel the patient and family regarding the type and amount of nutritional intake required, as well as appropriate meal frequency. 3. Educate the patient on the importance of wearing a face mask when leaving the house to prevent transmission.

4.	Aspect 4 • The patient's family has limited understanding of tuberculosis. • The patient lives in an environment with unhygienic, and inadequate ventilation.	1. Provide education about TB to all family members and household residents. Conduct TB screening for the entire family, initiate tuberculosis preventive therapy (TPT), and provide treatment if results are positive. 2. Educate the family on maintaining a clean household environment, including opening windows regularly to improve air circulation. 3. Instruct the family to consistently wear masks and minimize unnecessary interactions with others. Additionally, provide education about TB and motivate the patient and family to adhere to treatment until it is completed and cure is declared.
5.	Aspect 5 Scale functional: 5	Motivation to comply with doctor's advice and maintain good function.

Based on the table above, the authors implemented holistic and comprehensive management across five important aspects, which were expected to produce improvements for the TB patient. The following are notes on the development of health problems after the holistic and comprehensive management was carried out.

Table 3. Patient Progress After Holistic and Comprehensive Intervention

No	Date	Results
1.	07-05- 2025	The patient came to the TB clinic to read the results of his sputum TCM test, presenting with a complaint of cough and a body weight of 36 kg (underweight). On May 2, 2025, the TCM result was positive (**TCM [+]**). Therapy was initiated at the community health center. **Pharmacological Management:** • Initial phase therapy: Rifampicin 150 mg + Isoniazid 150 mg (Fixed-Dose Combination), 3 tablets once daily at 9:00 PM.
2.	05-20-2025	• Conduct anamnesis regarding the patient's complaints, disease progression, family history, as well as treatment history and preventive efforts against disease transmission. • Assess the condition of the patient's home environment. • Perform a physical examination. • Provide education on proper cough etiquette and the use of masks to prevent transmission.
3.	05-27- 2025	• The patient still reported a cough and a reduced food intake. • The patient had already applied proper cough etiquette and consistently wore a face mask. • Vital signs were measured. • Screening was conducted for all family members related to the patient's illness. • The patient was educated to increase protein intake (e.g., fish, eggs, tempeh) and to add meal portions.

4.	03-06- 2025	• The patient's cough decreased, and his appetite began to improve. • The patient's body weight increased to **37.1 kg**. • The patient was educated to continue increasing food intake and to maintain the consumption of high-protein foods.

After the intervention, the patiens's coping score increased to 5. This case study was conducted using a home visit approach resulted in the development of a Family Folder, a document containing patient data, notes from anamnesis, and examination results (1). This is information can be used for various purposes, including assisting patients in making treatment decisions and providing valuable references for families at risk of inheritable diseases.

The analysis using the Family APGAR instrument showed that the patient's family provided strong emotional support, which played a crucial role in maintaining the patient's motivation during the long treatment process. This finding aligns with the theory that a well-functioning family can provide significant support to sustain patient motivation and encourage therapeutic success (2). Other studies also demonstrate that internal family support, as measured through the Family APGAR, increases patient adherence to treatment by facilitating adaptation to therapy routines, partnership in managing side effects, and the family's problem-solving capacity throughout the treatment process.

A family-based health approach is one of the important pillars in tuberculosis management, as it ensures that patients receive optimal support during therapy. According to family medicine theory, the family plays a central role in providing emotional, logistical, and social support, especially during long-term treatments such as OAT therapy for tuberculosis lymphadenitis (4). Family support, acting as a continuous support system that is ready to provide assistance when needed, is a key determinant of treatment adherence. TB patients who belong to supportive and harmonious families feel more motivated, comfortable, and confident in their recovery, which directly improves treatment compliance (10).

In this case study, the integration of family health services with strong internal and external family support made a significant contribution to the patient's treatment success. Overall, combining these two instruments through the Family Folder approach offers a holistic framework that strengthens TB treatment at both the family and community levels (5)

CONCLUSION AND SUGGESTION

Based on the findings of this study, it can be concluded that family support plays a crucial role in the recovery of TB patients. Family participation positively influences patient adherence to OAT therapy and contributes to the patient's overall quality of life and surrounding environment. This research also demonstrated a notable improvement in the family coping score of the patient, increasing from 1 before the intervention to 5 after the implementation of holistic and comprehensive management.

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