THERAPEUTIC PATIENT EDUCATION: A CORNERSTONE OF ADHERENCE AND EFFECTIVENESS IN TUBERCULOSIS TREATMENT.

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ABSTRACT

Tuberculosis is a major cause of morbidity and mortality worldwide, affecting mainly low- and middle-income countries, but persisting in vulnerable populations in high-income countries. The effectiveness of tuberculosis treatments depends on strict adherence, which is often compromised by the length of the protocols, adverse drug effects, and unfavorable psychosocial determinants. Patient therapeutic education is a structured, multidisciplinary strategy aimed at strengthening the knowledge, self-management skills, and autonomy of patients with tuberculosis, whether they have latent tuberculosis infection or active tuberculosis disease. It is complementary, improving treatment adherence and clinical outcomes and helping to strengthen the fight against tuberculosis.

I - INTRODUCTION

Tuberculosis (TB) remains one of the leading causes of infectious disease mortality worldwide. In 2023, it affected approximately 10.8 million people and caused 1.25 million deaths, nearly 95% of which occurred in low- and middle-income countries [1]. In high-income countries, although the overall incidence is lower, tuberculosis persists among vulnerable populations, particularly migrants from highly endemic areas, immunocompromised individuals, those infected with HIV, and those living in conditions of extreme social deprivation [1,2].

The fight against tuberculosis relies on prevention, early diagnosis, and effective management of its various forms. Strict adherence to tuberculosis treatment is a major determinant of its effectiveness. However, the prolonged duration of treatment protocols, the frequency of adverse drug reactions, and unfavorable psychosocial factors often compromise patient adherence [3-5].

In this context, therapeutic patient education (TPE) appears to be an essential strategy for strengthening adherence to care. It aims to develop patients' knowledge, strengthen their self-management skills, and promote their autonomy in managing the disease. This article analyzes the role of TPE in the management of tuberculosis and examines its contributions, limitations, and prospects.

II - COMPREHENSIVE TUBERCULOSIS MANAGEMENT STRATEGY

Despite the progress made, the World Health Organization (WHO) targets for drastically reducing tuberculosis incidence and mortality by 2030 remain a long way off [2]. Eliminating tuberculosis requires an integrated approach combining risk factor control, access to care, and support for patients throughout their treatment journey.

II - 1. RISK FACTORS FOR TUBERCULOSIS.

Tuberculosis is mainly transmitted through the air from active pulmonary foci. Isolating contagious patients and wearing respiratory protection are effective measures for limiting transmission [1]. The risk of developing active tuberculosis is increased in people who are immunocompromised, have diabetes, are malnourished, use tobacco or alcohol, or live in socio-economically disadvantaged circumstances [1,3-5].

II - 2. LATENT TUBERCULOSIS INFECTION AND TUBERCULOSIS DISEASE

Latent tuberculosis infection (LTBI), which is asymptomatic, affects about a quarter of the world's population [1]. It can progress to active tuberculosis in 5 to 10% of cases. Preventive antibiotic treatment lasting three to six months can significantly reduce this risk, provided that it is taken consistently [6].

Tuberculosis disease (TD) results from active proliferation of *Mycobacterium tuberculosis*. It mainly affects the lungs, but can spread to all organs. Treatment consists of at least six months of multi-drug antibiotic therapy [4]. The duration of treatment and its adverse effects expose patients to interruptions or abandonment of therapy, promoting relapses, the emergence of drug resistance, and increased mortality [3].

III - THERAPEUTIC PATIENT EDUCATION APPLIED TO TUBERCULOSIS
III - 1. PRINCIPLES.

Therapeutic patient education (TPE) is a structured, progressive, and continuous process aimed at developing or strengthening the skills needed to manage a chronic disease. It is based on a collaborative effort between the patient and healthcare professionals and involves a multidisciplinary approach [7]. In tuberculosis, major health problem, TPE is particularly important due to the duration of treatment, its constraints, and the major impact of psychosocial factors on treatment adherence [8].

III - 2. SPECIFIC OBJECTIVES.

This educational strategy addresses complex and essential concepts: the distinction between LTBI and TD, risk factors, treatment modalities and duration, recognition of adverse drug reactions, consequences of non-compliance, management of comorbidities, and combating stigma, which is a major barrier to seeking care and adherence [9,10].

In the case of active tuberculosis, educational objectives include understanding modes of transmission and prevention measures, adherence to the treatment schedule, the ability to identify and report adverse effects, and the management of comorbidities and administrative procedures associated with the disease.

In the context of LTBI, TPE aims to promote understanding of the benefits of preventive treatment despite the absence of symptoms, to dispel negative perceptions associated with tuberculosis, and to reduce the dissonance between perceptions of good health and treatment constraints.

III - 3. TEACHING METHODS AND PROGRAM STRUCTURE.

Educational interventions are based on individual interviews, group workshops, or remote learning tools. They are tailored to patients' health literacy levels, language, cultural representations, and living conditions [6,8].

The program typically includes a shared educational assessment, the development of personalized goals, the planning and implementation of sessions, and then regular evaluation of learning to adjust the intervention [9,11] (**Figure 1**). This approach aims to actively involve the patient and make them an active participant in their care.

IV - TREATMENT ADHERENCE AND THERAPEUTIC EDUCATION

Adherence to anti-tuberculosis treatment is essential for recovery, preventing relapse, and limiting the emergence of drug resistance. Directly observed treatment (DOT) aims to ensure that patients take their medication effectively, but its long-term effectiveness remains debatable when used in isolation [12].

Digital health technologies offer interesting prospects for improving adherence, particularly in resistant forms [13-15]. However, their effectiveness depends on the integration of personalized educational support and patient-specific feedback [15].

Therapeutic patient education acts as a complementary lever by strengthening patients' understanding, motivation, and long-term adherence. A meta-analysis [16] showed that educational interventions were associated with a significant improvement in treatment completion (RR = 1.71; 95% CI : 1.32–2.22), cure rates (RR = 2.15; 95% CI: 1.58–2.92), and adherence (RR = 1.83; 95% CI: 1.14–2.92) compared to standard care [16].

V – CHALLENGES AND PROSPECTS

For people in highly precarious situations (homeless people, prison, psychiatric disorders, drug addiction), the management of tuberculosis requires a comprehensive approach that integrates TPE, the management of comorbidities, and the intervention of multidisciplinary teams [8,17,18]. These strategies promote continuity of care and reduce loss to follow-up, sometimes more effectively than material incentives [19].

Patient-centered care models, the development of mobile teams, and mobile health (mHealth) devices can simultaneously strengthen therapeutic education and adherence, particularly among vulnerable populations [20,21].

Artificial intelligence tools using predictive or language models also offer promising prospects for early identification of patients at risk of dropping out, personalizing educational support, improving treatment adherence, and promoting tuberculosis recovery [22,23].

VI – CONCLUSION.

Patient education is a key part of managing tuberculosis ; by strengthening knowledge, autonomy and adherence to treatment, it effectively complements therapeutic supervision and public health strategies. When integrated into innovative, patient-centred approaches, it helps to prevent treatment abandonment, limit the emergence of drug resistance and improve the long-term results of the tuberculosis control.

LINKS OF INTEREST

The authors declare that they have no links of interest in relation to the writing of this article.

REFERENCES

1. Global tuberculosis report 2024. Geneva: World Health Organization; 2024. Licence: CC BY-NC-SA 3.0 IGO. Available from: https://www.who.int/teams/global-programme-on-tuberculosis-and-lung-health/tb-reports/global-tuberculosis-report-2024
2. Implementing the end TB strategy: the essentials, 2022 update. Geneva: World Health Organization; 2022. Licence: CC BY-NC-SA 3.0 IGO. Available from: https://www.who.int/publications/i/item/9789240065093
3. WHO consolidated guidelines on tuberculosis. Module 4: treatment and care. Geneva: World Health Organization; 2025. Licence: CC BY-NC-SA 3.0 IGO. Available from: https://iris.who.int/server/api/core/bitstreams/f663f086-5d97-4355-beea-0635d47f1227/content
4. Dellal M, Batoui S, Aassem Y, Habbari K. Factors influencing adherence to anti-tuberculosis treatment in Morocco: a cross-sectional study from the Béni Mellal-Khénifra region. Osong Public Health Res Perspect. 2025 Oct;16(5):476–485. doi:10.24171/j.phrp.2025.0153. Epub 2025 Sep 19. PMID: 41025160; PMCID: PMC12611531.
5. Munro SA, Lewin SA, Smith HJ, Engel ME, Fretheim A, Volmink J. Patient adherence to tuberculosis treatment: a systematic review of qualitative research. PLoS Med. 2007 Jul 24;4(7):e238. doi:10.1371/journal.pmed.0040238. PMID: 17676945; PMCID: PMC1925126.
6. Latent tuberculosis infection: updated and consolidated guidelines for programmatic management. Geneva: World Health Organization; 2018. Licence: CC BY-NC-SA 3.0 IGO. Available from: https://iris.who.int/server/api/core/bitstreams/d68456c8-2a25-419b-83eb-1dc9df1b838f/content
7. World Health Organization Regional Office for Europe. Therapeutic patient education: continuing education programmes for health care providers in the field of prevention of chronic diseases: report of a WHO working group. Copenhagen: WHO Regional Office for Europe; 1998. Available from: https://iris.who.int/items/38eea932-59cf-4af9-be3c-826d99ad1f94
8. Tola HH, Shojaeizadeh D, Tol A, Garmaroudi G, Yekaninejad MS, Kebede A, et al. Psychological and educational intervention to improve tuberculosis treatment adherence in Ethiopia based on Health Belief Model: a cluster randomized control trial. PLoS One. 2016 May 11;11(5):e0155147. doi:10.1371/journal.pone.0155147. PMID: 27167378; PMCID: PMC4864292.
9. Perriot J, Masson M, Peiffer G. Strengthening therapeutic education for tuberculosis patients. Rev Infirm. 2025 Dec;74(316):41–43. doi:10.1016/j.revinf.2025.10.031. Epub 2025 Nov 26. PMID: 41371817.

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10. Courtwright A, Turner AN. Tuberculosis and stigmatization: pathways and interventions. Public Health Rep. 2010 Jul–Aug;125 Suppl 4:34–42. doi:10.1177/00333549101250S407. PMID: 20626191; PMCID: PMC2882973.

11. Scheen AJ, Bourguignon JP, Guillaume M. Therapeutic education: a solution to reduce therapeutic inertia and noncompliance. Rev Med Liege. 2010 May–Jun;65(5–6):250–255. PMID: 20684402.

12. Karumbi J, Garner P. Directly observed therapy for treating tuberculosis. Cochrane Database Syst Rev. 2015 May 29;2015(5):CD003343. doi:10.1002/14651858.CD003343.pub4. PMID: 26022367; PMCID: PMC4460720.

13. Olowoyo KS, Esan DT, Adeyanju BT, Olawade DB, Oyinloye BE, Olowoyo P. Telemedicine as a tool to prevent multi-drug resistant tuberculosis in poor resource settings: lessons from Nigeria. J Clin Tuberc Other Mycobact Dis. 2024 Feb 24;35:100423. doi:10.1016/j.jctube.2024.100423. PMID: 38435000; PMCID: PMC10907208.

14. Subbaraman R, de Mondesert L, Musiimenta A, Pai M, Mayer KH, Thomas BE, et al. Digital adherence technologies for the management of tuberculosis therapy: mapping the landscape and research priorities. BMJ Glob Health. 2018 Oct 11;3(5):e001018. doi:10.1136/bmjgh-2018-001018. PMID: 30364330; PMCID: PMC6195152.

15. Ridho A, Alfian SD, van Boven JFM, Levita J, Yalcin EA, Le L, et al. Digital health technologies to improve medication adherence and treatment outcomes in patients with tuberculosis: systematic review of randomized controlled trials. J Med Internet Res. 2022 Feb 23;24(2):e33062. doi:10.2196/33062. PMID: 35195534; PMCID: PMC8908199.

16. Alipanah N, Jarlsberg L, Miller C, Linh NN, Falzon D, Jaramillo E, et al. Adherence interventions and outcomes of tuberculosis treatment: a systematic review and meta-analysis of trials and observational studies. PLoS Med. 2018 Jul 3;15(7):e1002595. doi:10.1371/journal.pmed.1002595. PMID: 29969463; PMCID: PMC6029765.

17. Story A, Garber E, Aldridge RW, Smith CM, Hall J, Ferenando G, et al. Management and control of tuberculosis in socially complex groups: a research programme including three RCTs. Southampton (UK): NIHR Journals Library; 2020 Oct. PMID: 33119243.

18. Jadgal KM, Nakhaei-Moghadam T, Alizadeh-Seiouki H, Zareban I, Sharifi-Rad J. Impact of educational intervention on patients' behavior with smear-positive pulmonary tuberculosis: a study using the Health Belief Model. Mater Sociomed. 2015 Aug;27(4):229–233. doi:10.5455/msm.2015.27.229-233. PMID: 26543411; PMCID: PMC4610657.

19. Lutge EE, Wiysonge CS, Knight SE, Volmink J. Material incentives and enablers in the management of tuberculosis. Cochrane Database Syst Rev. 2012 Jan 18;(1):CD007952. doi:10.1002/14651858.CD007952.pub2. Update in: Cochrane Database Syst Rev. 2015 Sep 3;(9):CD007952. doi:10.1002/14651858.CD007952.pub3. PMID: 22258976.

20. Riccardi N, Rodari P, Duranti S, Villa S, Assante LR, Castellotti P, et al. How to improve TB outpatient service in a low-endemic country during the SARS-CoV-2 pandemic. J Prev Med Hyg. 2021 Jun 5;62(1 Suppl 3):E50–E52. doi:10.15167/2421-4248/jpmh2021.62.1S3.2008. PMID: 34622084; PMCID: PMC8452285.

21. Bao Y, Wang C, Xu H, Lai Y, Yan Y, Ma Y, et al. Effects of an mHealth intervention for pulmonary tuberculosis self-management based on the integrated theory of health behavior change: randomized controlled trial. JMIR Public Health Surveill. 2022 Jul 14;8(7):e34277. doi:10.2196/34277. PMID: 35834302; PMCID: PMC9335179.

22. Filho FGSDS, Falcão IWS, de Souza TM, Carneiro SR, da Rocha Seruffo MC, et al. Integrated artificial intelligence framework for tuberculosis treatment abandonment prediction: a multi-paradigm approach. J Clin Med. 2025 Dec 6;14(24):8646. doi:10.3390/jcm14248646. PMID: 41464549; PMCID: PMC12733801.

23. Zhao CY, Song C, Jiang CY, Liu RH, Wei LY, Zeng CM, et al. Large language models in tuberculosis patients' health consultation and patient education: a comprehensive performance analysis study. J Infect. 2025 Jul;91(1):106527. doi:10.1016/j.jinf.2025.106527. Epub 2025 Jun 2. PMID: 40466746.

Figure 1: Overview of a therapeutic education program for tuberculosis patients.