Drug Resistant Tuberculosis: Treatment Options and Challenges in Underdeveloped Countries

Sabrina Chemsear and Dr. Hannah Baughman

Division of Sciences & Mathematics, University of Washington | Tacoma, Tacoma, WA 98402

INTRODUCTION

- Tuberculosis (TB) is an infectious disease caused by mycobacterium tuberculosis.
- This disease primarily affects the lungs.
- One of the leading causes of death globally.
- Two stages of Tuberculosis:
    - Latent Tuberculosis Infection (LTBI)
    - Active Tuberculosis Disease
- Cases of Tuberculosis are higher in underdeveloped countries.
- Low-income families face several challenges when dealing with tuberculosis such as: limited access to healthcare, malnutrition, inadequate treatment, cost of treatments and socioeconomic status. (WHO, 2023)

METHODS

- To assess the treatments, drug resistant TB, and the challenges faced by families in underdeveloped countries, I conducted a literature review of 21 secondary and primary scientific articles. Studies were collected from published literature and databases.
- The clinical study was conducted in South Africa. Cohorts of patients were interviewed to determine points in patients pathway from the start of TB symptoms to treatment completion, identifying those most vulnerable to these costs. (Foster et al, 2015)

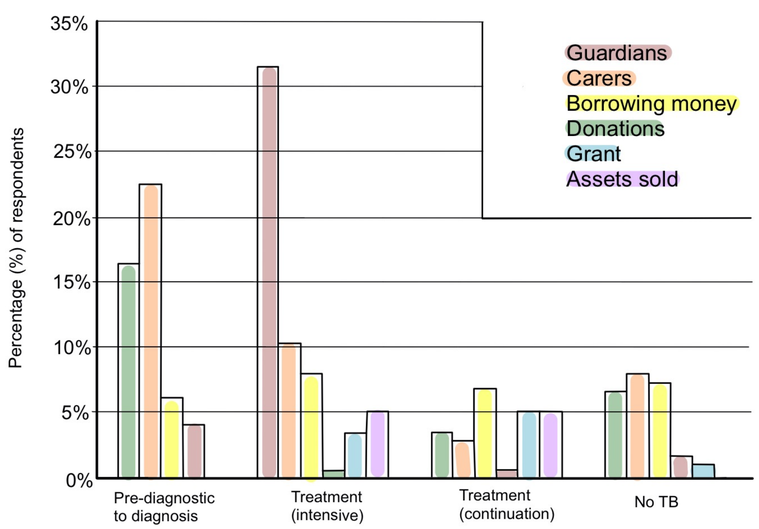

Figure 1: This is a percentage of respondents that used a coping method to assist with TB. (Figure from Foster et al, 2015).

DISCUSSION

- First-line drugs are effective in treating TB.
- Second-line drugs are used to treat multidrug-resistant TB (MDR-TB) and extensively-drug resistant TB (XDR-TB).
- If LTBI is left untreated the disease can become active.
- Inadequate treatment of the first-line drugs or the second-line drugs can result in an ongoing active TB infection causing a decrease in efficacy and eventually leading to a drug tolerance. (WHO, 2023)
- Treating drug resistant TB can be costly because a longer treatment regimen is necessary.
- Coping strategies that patients employed included relying on guardians and carers for assistance and borrowing money to a greater extent during the intensive phase of treatment.
- Patients with access to healthcare, still had to pay expenses out of pocket. (Foster et al, 2015)

	Total cost to patient, mean	Total cost, mean
Total direct costs, mean	111.83	111.83
Loan interest, mean	43.32	43.32
Reported income loss, mean	54.82	54.82
Guardian costs, mean	x	32.11
Carer costs, mean	x	81.99
Total episode cost	209.97	324.07

Table 1: Pre-treatment and treatment indirect and total cost of individuals with access to healthcare. This data represents employed individuals with expenses in response to TB diagnosis and treatments. (Table from Foster et al, 2015).

CONCLUSIONS

- Tuberculosis patients who have access to healthcare services still incur substantial cost, despite free diagnosis and treatments.
- First-line drugs for treating TB are highly effective and could cost less than the second-line drugs, so it is important to complete the treatment regimen to prevent a drug tolerance.
- Patients relied on coping strategies to improve treatment outcomes.
- Greatest financial cost was incurred in the time between the first symptoms and start of treatment. (Foster et al, 2015)

FUTURE DIRECTIONS

- Completing the entire treatment regimen can prevent and reduce further complications.
- Providing patient support and treatments to those affected by TB including drug resistant TB.
- Early diagnosis of TB including universal drug-susceptibility testing, and systemic screening of TB affected high-risk groups.
- Accessible and preventative treatment for individuals at high risk and vaccinate them against TB.
- Global leadership to end TB through strategy development and improved research.
- International recommended treatment regimen. (Lönnroth et al, 2010 and WHO, 2023)

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References:

1. [WHO] World Health Organization. Geneva. 2023 Nov 7. Tuberculosis. Available at: https://www.who.int/news-room/fact-sheets/detail/tuberculosis
2. [WHO] World Health Organization. Geneva. 2023. Global Tuberculosis Repot 2023. Available at https://iris.who.int/bitstream/handle/10665/373828/9789240083851-eng.pdf?sequence=1
3. Knut Lönnroth, Kenneth G Castro, Jeremiah Muhwa Chakaya, Lakhbir Singh Chauhan, Katherine Floyd, Philippe Glaziou, Mario C Raviglione. 2010 May 22-28. Tuberculosis control and elimination 2010–50: cure, care, and social development, The Lancet. Available at https://www.sciencedirect.com/science/article/pii/S0140673610604837?fr=RR-1&ref=cra_js_challenge
4. Nicola Foster, Anna Vassall, Susan Cleary, Lucy Cunnama, Gavin Churchyard, Edina Sinanovic. 2015 April. The economic burden of TB diagnosis and treatment in South Africa, Social Science & Medicine. Available at https://www.sciencedirect.com/science/article/pii/S0277953615000726