

PROJECT PROPOSAL

2025/6 Academic Entry Year – Cohort 4

Supervisory Team

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Project Details

Title: The impact of post TB lung disease in the migrant population in Leicester

Summary: Tuberculosis is a serious infection which every year affects 10 million people around the world and causes 1.5 million deaths. Information from other countries indicates that many patients (possibly up to 87%) experience ongoing health issues after treatment, including breathing problems, mental health issues and pain. In the UK, whilst most patients with TB survive, we do not know how many people will continue to suffer after finishing TB treatment, how long for and how severely. We also do not know how best to help them. Finding this out is important to improve health and health inequalities and allow these patients to live and contribute to society to their fullest potential. The prevalence of post TB lung disease is rising across Leicestershire largely in the immigrant community

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and effective management is a Trust and ICB priority. The project will describe the functional and psychological impact of post TB lung disease in Leicester, current data focuses on low- and middle-income countries. The project will explore the value of an adapted pulmonary rehabilitation programme with a focus on appropriate cultural and disease specific modifications with an embedded evaluation of potential cost effectiveness.

Aim: To describe the impact of post TB lung disease in a migrant population in Leicestershire and to test the impact of a modified pulmonary rehabilitation

Background: Accurate description of post-TB morbidity and mortality and co-development of effective interventions is important to meet the significant unmet need and may inform key preventive measures in the future. Improving long-term outcomes will reduce health inequalities, a key priority for the NHS.¹ Contrary to previous thinking that successful TB treatment equates to cure, recent evidence shows TB survivors are at elevated risk of various sequelae,²⁻⁴ often suffer impaired organ function, including decreased lung function, an increased risk of long-term pulmonary complications⁵, and other physical/mental health issues and musculoskeletal disabilities affecting quality of life after TB.⁵⁻⁷ Mortality post-TB may be up to three times higher than the general population.⁸ Increasing survival, a key global target,⁹ might increase the burden of long-term TB. Post TB lung disease (PTBLD) has been identified as a significant local challenge (UHL NHS Trust board). Leicestershire offers unique opportunities to examine medium- to-long-term outcomes because of the high prevalence of PTBLD in the local immigrant community (predominately south Asian). There are no data describing post-TB morbidity from the UK. TB is a barometer of health inequalities. In the UK, TB disease burden is unequally distributed, with migrant populations and ethnic minority groups including Black African and South Asians disproportionately affected.¹⁰ TB rates in the most deprived 10% of the population are >5 times higher than the least deprived decile.¹⁰ Many TB patients have social risk factors, including homelessness, drug or alcohol abuse or imprisonment (14% in 2019). Neglecting longer-term TB effects risks missing a significant burden of disease and adverse outcomes will impact on productivity and work ability, leading to worsening socioeconomic deprivation and financial burdens for individuals and society thereby further widening socioeconomic and health inequalities. The burden of PTBLD has been well described in low- and middle-income countries, less so in high income countries and not in the UK. Interventions to alleviate the disability associated with PTBLD has been examined in a recent systematic review and proposed that whilst pulmonary rehabilitation showed potential the data was inconclusive and of poor quality, focusing on lung function rather than functional or psychological outcomes¹¹. As part of the NIHR Global Research Group funding the team in Leicester have collaborated with colleagues in Kyrgyzstan and Uganda to develop and assess the clinical and cost effectiveness in post TB lung disease^{12,13} The pulmonary rehabilitation intervention developed with stakeholders was adapted to be culturally appropriate. The fully powered trials have been recently completed and have been disseminated at the European Respiratory Society meeting (2024) describing both the clinical and cost effectiveness of the intervention. This data has noted by the TB team at the WHO and will likely influence the next iteration of the WHO TB Report (currently being reviewed).

Research Plan:

WP1. Systematic review summarizing current evidence of exercise-based interventions. **WP2**

Quantifying medium-to-long-term health consequences of TB in a cohort of migrants in Leicestershire (prospective cohort to explore the functional and psychological impact of PTBLD. **WP3.** Refinement of

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PR for a PTBLD population (in clinic survey/ qualitative focus groups)/ individual interviews. **WP4.**
Feasibility trial of PTBLD (with embedded measures of muscle quality and mass).

Expected outcomes and impact: For the individual 1. Accurate description and assessment of medium-to-long-term health and economic impacts of PTBLD to identify needed support and services early 2. Mitigation of impacts for individuals with PTBLD through a co-designed intervention package (pulmonary rehabilitation): 3. Higher productivity and prevention of adverse socioeconomic consequences.

For the NHS, public health and the wider society benefits will include- 1. A strengthening of evidence for potential benefits of rehabilitation services. 2. Mitigation against increasing health inequalities in ethnic minorities and underserved populations

References:

1. Global Tuberculosis Report 2021. Geneva: World Health Organization; 2021.
2. Hnizdo E, Singh T, Churchyard G. Chronic pulmonary function impairment caused by initial and recurrent pulmonary tuberculosis following treatment. *Thorax* 2000; 55(1): 32-8.
3. Ravimohan S, Kornfeld H, Weissman D, Bisson GP. Tuberculosis and lung damage: from epidemiology to pathophysiology. *Eur Respir Rev* 2018; 27(147).
4. Tiberi S, Torrico MM, Rahman A, et al. Managing severe tuberculosis and its sequelae: from intensive care to surgery and rehabilitation. *J Bras Pneumol* 2019; 45(2): e20180324.
5. Alene KA, Wangdi K, Colquhoun S, et al. Tuberculosis related disability: a systematic review and meta-analysis. *BMC Med* 2021; 19(1): 203.
6. Allwood B, vanderZalm M, Makanda G, Mortimer K. The long shadow post-tuberculosis. *Lancet Infect Dis* 2019; 19(11): 11701.
7. Schoeman I, Sifumba Z. Tuberculosis care does not end at treatment completion- a perspective from tuberculosis survivors. *Lancet Infect Dis* 2021; 21(7): 896-7.
8. Rao VG, Muniyandi M, Sharma RK, Yadav R, Bhat J. Long- term survival of patients treated for tuberculosis: a population based longitudinal study in a resource-poor setting. *Trop Med Int Health* 2021; 26(9): 1110-6.
9. World Health Organization. Implementing the end TB strategy: the essentials. Published 2015/2016.
10. Public Health England. Tuberculosis in England: 2019. 2020 report (presenting data to end of 2019). 2020.
11. Mbanje C, Kuhn I, Musakwa N, Calvi M, Boccia D, Muhwa JC, Mvusi L, Jaramillo E, Evans D, Meghji J. A scoping review of interventions to address TB associated respiratory disability. *EClinicalMedicine*. 2024 May 27;73:
12. Katagira W, Orme MW, Jones AV, Kasiita R, Jones R, Barton A, Miah RB, Manise A, Matheson JA, Free RC, Steiner MC, Kirenga BJ, Singh SJ. Study protocol for a randomised controlled trial assessing the impact of pulmonary rehabilitation on maximal exercise capacity for adults living with post-TB lung disease: Global RECHARGE Uganda. *BMJ Open*. 2021 Aug 10;11(8):e047641.
13. Akyllbekov A, Orme MW, Jones AV, Mademilov M, Muratbekova A, Aidaraliev S, Mirzaliev G, Oleinik A, Magdieva K, Taalaibekova A, Rysbek Kyzy A, Yusuf ZK, Rupert J, Barton A, Miah RB, Manise A, Matheson JA, Malcolm D, Free RC, Steiner MC, Sooronbaev T, Singh SJ. Culturally adapted pulmonary rehabilitation for adults living with post-tuberculosis lung disease in Kyrgyzstan: protocol for a randomised controlled trial with blinded outcome measures. *BMJ Open*. 2022 Feb 21;12(2):e048664.