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Oman, a Pathfinder Towards Tuberculosis Elimination

The journey begins

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Tuberculosis (tb) remains a global public health issue with an estimated 10 million cases reported in 2020 despite international efforts to combat the problem. It remains the leading cause of death from a single infectious agent worldwide and the leading cause of death among people living with HIV.1 The COVID-19 pandemic has had a severe impact on TB services such as TB notification and death across many countries which necessitates urgent resource re-prioritisation to manage expected TB resurgence.2

The World Health Organization (WHO) vision for the post-2015 global TB strategy is "a world free of TB", also expressed as "zero deaths, disease and suffering due to the disease". The goal is to end the global TB epidemic by reducing global TB incidence and mortality rates by 80% and 90%, respectively, in 2030 compared to 2015.3 However, despite progress made by the United Nations in bringing countries together to set goals and the development of the WHO End TB Strategy, the world is still not on track and efforts are required to amplify and expand the TB curative and preventive treatments to meet upcoming targets.3

Oman is a low TB incidence country with an annual incidence rate of less than 7.0 cases per 100,000 in 2020. Out of a total population of 4.6 million, 38% are expatriates from South East Asia who travel to Oman for employment.4 The epidemiology of TB in Oman follows that of low incidence countries and active TB is mainly diagnosed in the expatriate community arriving from South East Asia as a result of reactivation of latent TB infection (LTBI) acquired in their country of origin.5

The End TB Strategy – Oman

Considering the current national incidence rate, Oman is positioned to achieve the pre-elimination phase (<1 case per 100,000) by 2035. This requires a reduction in the incident rate of 10% per year and it should take into consideration the risk of importation of active TB cases from high burden countries [Figure 1]. Such a rate will not be reached unless a new innovative approach is implemented. Therefore, Oman adopted the End TB Strategy aimed at strengthening detection using molecular diagnostics, optimising disease management through a patient-centred approach, focusing on prevention by expanding on LTBI management, promoting community awareness and intensifying research.[6]

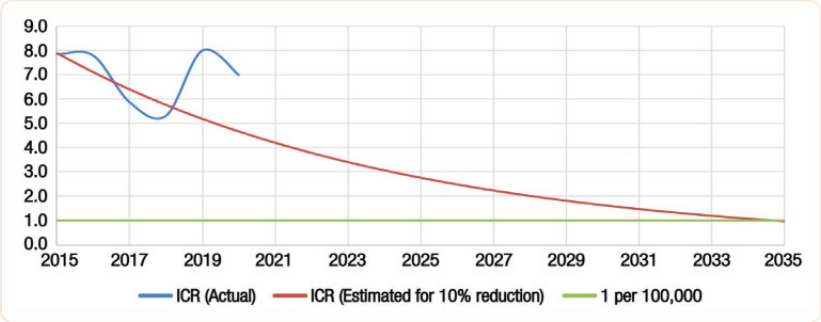

Figure 1

Projected 10% reduction (compared to 2015) in tuberculosis incidence rate (ICR) versus actual ICR.

ICR = incidence rate.

End TB Strategic Pillars

Oman launched its national End TB Strategy during World TB Day on 24th of March 2021, the strategy was endorsed by WHO as Oman is set to be one of the pathfinders for the global TB elimination initiative. In this editorial, we will summarise Oman's End TB Strategy and the opportunities and challenges in meeting its targets before 2035.

Oman's End TB Strategy is articulated into four pillars – detect, treat, prevent and promote. This editorial will highlight key interventions under each pillar we believe to be steps to quality improvement in the TB programme that impact the progression towards End TB targets.

PILLAR 1: DETECT

TB in expatriates constitutes the majority of TB cases in Oman, 68% and 70% in 2019 and 2020, respectively.[1] These cases are detected during medical fitness screening for residency. Though pre-entry screening is the norm, it does not necessitate LTBI screening. This creates a challenge as the majority of expatriates come from TB endemic countries, such as Bangladesh, India, Pakistan and Philippines, with incidence rates of over 150/100,000.[1] In individuals exposed to the disease in their home countries, the risk of reactivation to active TB upon arrival to Oman due to many factors such as socioeconomic stress, is increased. In a study conducted in expatriates new to Oman in North Batinah Governorate using interferon gamma reaction assay (IGRA); 22.4% (30.9% were of African and 21.2% of Asian descent) tested positive for LTBI. Of these, 24.7% of participants had strong IGRA positivity defining a sub-population with an increased risk of progression to active disease within two years of arrival.[7]

Many studies have compared tests for detecting LTBI such as the IGRA and the Mantoux test.[8] The latest modelling study using Oman's data showed that the use of IGRA and three months of preventive treatment with rifapentine and isoniazid is the most cost-effective intervention.[9] Therefore, while the strategy continues to strengthen screening contacts for LTBI, it also aims to identify those who are at an increased chance of reactivation using a Mycobacterium TB-specific test. IGRA is the test best suited as it only requires one visit and can easily be integrated into the migrant screening protocol. Oman is considering the implementation of this strategy through a public-private mixed approach under monitoring and governance as part of the fitness testing programme to avoid the load on the healthcare system. Such a strategy is thought to break the cycle of sustaining the TB rate in the community.

For active TB detection, Oman has achieved several milestones in the diagnostic pathway. Rapid molecular diagnostic testing was introduced in 2014; initially, it was set-up to confirm acid fast bacilli positive samples and was subsequently introduced to all governorates. The national policy for TB testing was updated so that rapid molecular tests became the initial diagnostic test for all presumptive TB cases. This strategy aims to expand the utilisation of molecular techniques, such as genome sequencing, from its limited use as part of outbreak investigation to routine confirmation tools.

In addition, the notification system has been upgraded to an electronic platform to link all presumptive and confirmed cases in government and private healthcare institutions to treatment facilities and initiate contact-tracing. Digital surveillance will also allow monitoring and evaluation of all TB programme activities at the governorate and national levels which will ensure achieving the targets of TB elimination such as 100% contact-screening and an over 90% treatment success rate.

PILLAR 2: TREAT

Given the continuous influx of expatriates to Oman from high TB burden countries (600,000 yearly), the risk of importation will continue during their initial years of arrival. LTBI prevalence is probably higher in some migrant populations, which could drive higher active TB incidence within

these populations.6 Moreover, treatment initiation, follow-up and completion is challenge, especially with this higher number of expatriates.

There is more than sufficient evidence that preventive treatment of LTBI should be part of a comprehensive and epidemiologically sound strategy for TB elimination. 10 The WHO has published a recommendation for low incidence countries to consider systematic LTBI testing and treatment in expatriates;11 consequently, many countries have adapted this recommendation for expatriates from high TB endemic countries alongside other high-risk groups. Integrating the treatment initiation to the subset of expatriates with positive IGRA test results (priority for those originating from highly endemic countries) should be undertaken as part of the expansion of the TB programme for LTBI care.

A recent systematic review has shown TB preventive treatment, initiation and completion in expatriates has improved from 2010 to 2020. Data from expatriates who tested positive and were initiated on treatment showed that the pooled estimate for the true proportion of positive LTBI initiated on treatment was 69% and those who completed treatment was 74%.12 The availability of shorter regimens were found to have similar effectiveness to six- to nine-month isoniazid treatments.13,14 Based on these concepts, the LTBI management guidelines in Oman have been updated to include additional shorter therapy which can improve compliance, reduce complications and side effects, and ultimately have a positive effect on treatment completion rates.

Many factors throughout the cascade of care of LTBI management can influence the effectiveness of screening and treatment programmes involving expatriates; therefore, understanding these barriers, to identify where to target interventions to improve the outcome, is essential.

Regarding an active TB in-hospital treatment approach, although it meets the standards for direct observation therapy (DOT), factors such as the cost of hospitalising patients for two months and the risk of the exposure to hospital-acquired pathogens make community DOT (cDOT) preferred for providing TB care in Oman. Furthermore, considering the deficiency of hospital beds and isolation rooms for TB, which the COVID-19 pandemic illuminated, cDOT is the more realistic and achievable approach. The strategy of cDOT, while providing universal access to TB care and support within the universal health coverage (UHC) concept, provides social protection and addresses social determinants of TB for expatriates as an important at-risk group.

The Ministry of Health in Oman is in the process of establishing a public–private partnership between the government and the private health sector; this includes IGRA testing of all expatriates on arrival and will link those with IGRA-positive tests with healthcare institutions to initiate treatment for LTBI under the universal health approach.

PILLAR 3: PREVENT

LTBI in expatriates will continue to fuel the TB burden in low incidence countries. The stable incidence rate for expatriates and the slow decrease for nationals in the last 10 years potentially reflects the Mycobacterium TB transmission from the expatriate population.[15] Yet, a recent study from Europe did not show a clear pattern between TB transmission and immigration. However, a significant positive correlation between migration and TB was seen in Germany, Italy and Norway.[16] In Oman only close contacts and people living with HIV (PLHIV) are currently screened for TB. The rate of LTBI screening in PLHIV is improving dramatically and reached 86% in 2020 (Unpublished data from National AIDS Programme).

Therefore, scaling up LTBI screening and prevention by expanding the at-risk group to healthcare workers and expatriates while strengthening household contacts screening is predicted to reduce the incidence of new active cases especially among expatriates during the first two years of arrival with subsequent reduction of community transmission to the local population. However, the decision to screen should be a decision to treat in order to meet the proposed national incidence target rate.

A national policy for screening and vaccination of healthcare workers was issued in February 2021, and the screening and treatment for LTBI has already been rolled out for all healthcare workers including students and subcontractors. To support this intervention, several studies provide strong evidence of the cost effectiveness of screening for LTBI in expatriates arriving from high endemic countries.[17,18]

PILLAR 4: PROMOTE

Oman's TB programme database has been maintained in electronic form and used for routine programme evaluation. Additionally, several studies have been published addressing the burden of disease and mapping at-risk groups, but the kind of intensified research required to accelerate the process for ending TB are lacking and therefore require strong leadership, including from the governorates as well as financial investment, coordination and collaboration between stakeholders such as the private sector.

During the 73rd World Health Assembly in 2020, Member States adopted the global strategy for TB research and innovation to support efforts by governments and partners to accelerate TB research and innovation as well as to improve equitable access to the benefits of research in line with the commitments made in the WHO End TB Strategy.[19]

Another example from Oman involves allocation of budgets to fund innovative TB research as a priority in areas such as molecular epidemiology and geospatial data addressing TB transmission between different TB communities in order to stop this cycle and achieve end TB strategy targets. Therefore, creating a research-enabling environment and enforcing the priority for budget allocation for TB research and identifying resources is a quality improvement step in the TB programmes by identifying gaps and bridging them with the best evidence-based approach.

Conclusion

Oman's aim is to use this adaptation of the End TB Strategy to understand the current gaps in its TB programme at all levels using innovative measures to make a significant shift in TB incidence. This decision relies on a strong political commitment and universal government-funded healthcare coverage and strong surveillance, quality and rational use of medicines, and infection prevention and control. This can be achieved by strengthening the detection using molecular testing, treatment with a patient-centred approach, a focus on prevention (particularly in expatriates LTBI screening using IGRA) and treatment using a short regimen containing rifamycin alongside the expansion on screening and treatment of at-risk groups. Additionally, partnership with other stakeholders including private sector institutions is a crucial step in implementing these strategies to meet TB elimination targets. Although the continuous influx of expatriates might challenge these interventions, choosing an appropriate cascade of care in an evidence-based approach through intensifying research and promoting community awareness using innovative and new technology in addition to having a strong monitoring and evaluation system will facilitate a firmer implementation of the strategic plan. This approach will ensure meeting UHC targets by providing quality and equity in TB care and by effective implementation of key interventions of the End TB Strategy which would position Oman as a pathfinder towards TB elimination and make it a role model for the region and the world.

Footnotes

AUTHORS' CONTRIBUTION

FAY and SA-A contributed to the conceptualisation, drafting and editing of the manuscript. Both authors approved the final version of the manuscript

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