

Tuberculosis Elimination in the Era of COVID-19: A Moving Target

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The COVID-19 pandemic is likely to be the defining global health crisis of the 21st century with over 25 million cases and 800 000 deaths recorded since the emergence of the novel severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) virus [1]. In addition to the direct health impact of the COVID-19 pandemic, there has been detrimental disruption in the provision of healthcare services for other diseases such as human immunodeficiency virus (HIV) and tuberculosis (TB). The TB epidemic in particular could suffer devastating consequences from COVID-19 related disruption, with modelling studies predicting an additional 6.3 million cases of TB and 1.4 million deaths over the next five years. This translates to a five to eight-year setback in TB control, receding even further away from the 2030 target of TB elimination [2].

In this issue, Liu and colleagues describe the impact of a temporary disruption in health services due to COVID-19 mitigation measures on diagnosis and treatment of TB in the Jiangsu province of China. The study tracked weekly TB notification data from January 2015 to May 2020 from the Tuberculosis Management Information System for the province. The results highlight three significant consequences for TB control arising from the pandemic. Firstly, their analysis of TB case notifications between January to May 2020, demonstrates a drastic decrease of 36% and 52% in overall notifications compared to the same period in 2019 and 2015, respectively. Secondly, TB treatment completion rates reduced from 60.2% in 2019 to 51% for the same period in 2020. Thirdly, they report significantly lower rates of screening for TB drug-resistance during 2020. This work contributes to the growing global *corpus* of reports demonstrating a decline in TB case notifications documented during the COVID-19 pandemic [3].

TB notification rates have decreased by 78% in India, 47.8% in Shanghai China, 43% in Uganda, 34% in Nigeria, 33% in South Africa, 33% in Japan, 24% in South Korea and 20% in Taiwan in early 2020 compared to the same period over the last 2-5 years [4-11]. Most settings are now reporting an increase in TB notification rates as COVID-19 rates decline and restrictive social measures are being lifted. It is therefore evident that the short-term infection control measures implemented to reduce COVID-19 transmission does not directly influence TB incidence rates as TB has a long and varying incubation period. Thus, the resulting decline in case notifications is likely an unintended consequence of limited access to health care services during the pandemic.

All through history the burden of TB has been impacted by major disruption resulting from natural disasters, war and infectious disease pandemics. The 1889 Russian and 1918 Spanish influenza pandemics resulted in increased TB related mortality [12]. During the first and second world wars, a quarter of the resulting deaths were attributed to TB [13]. With the HIV pandemic in 1980, TB emerged as an opportunistic infection leading to widespread mortality [14]. Similarly, the 2001 severe acute respiratory syndrome (SARS) outbreak in Hong Kong, 2013-2016 Ebola outbreaks in West Africa and 2014 Middle East respiratory syndrome coronavirus (MERS-CoV) in Saudi Arabia have impacted TB programs increasing the disease burden and mortality in the affected regions in subsequent years [15-17]. The negative impact of COVID-19 on the TB epidemic is becoming more apparent as in-country TB programs report substantial decreases in the TB case notifications increasing the risk for TB-related mortality. TB diagnosis and treatment coverage are inherent ongoing challenges in high-burden settings. During an unprecedented and large-scale disruption such as COVID-19, the impact of these challenges is likely to be magnified. Declines in TB detection,

resulting from limited access to diagnosis and treatment, could potentially escalate TB related mortality have a lasting impact on TB burden. TB-related mortality is projected to increase by an additional 20% over the next five years [18]. The marked decreased in TB case detection due to missed diagnoses has resulted in an accumulation of undetected TB, contributing to ongoing TB transmission, and higher rates of latent TB infection. Latent TB infections could potentially take years to manifest into active TB infection. Thus, disruption to health care services will likely result in short term escalation in TB mortality and post-lockdown surge in TB case notification, followed by a sustained increase in TB incidence and mortality over the next several years, with long-term consequences on TB elimination.

As a result of the strict physical distancing measures implemented, many individuals were deterred from seeking medical care. This was compounded by patient concerns of increased exposure to the SARS-CoV-2 virus at healthcare facilities. Health facilities reported a decline in the number of patients collecting treatment on schedule during lock-down periods. This could have severe consequences for TB control, importantly the development of drug-resistant TB. The re-allocation of laboratory infrastructure and health services to control COVID-19 could have inadvertently impacted TB diagnosis and treatment [19]. In a survey conducted in 106 countries, 78% of TB programs reported widespread disruption to TB services as a result of COVID-19 [20]. Twenty high-burden TB countries further reported that TB program staff were engaged in COVID-19 related activities, disrupting TB services [21]. Routine immunization programs also faced disruption during this time, with some settings reporting a decrease in BCG immunization by 66.8% [22]. A further challenge threatening the diagnosis of TB is the overlap of symptoms between the two diseases. Both affect the respiratory system with an overlap in symptoms such as cough, fever and difficulty in

breathing with varying severity and duration. These similarities could have potentially hindered the diagnosis of TB as patients presenting with respiratory symptoms are more likely to be prioritized for COVID screening.

What comes next for TB control? It is apparent that measures taken in response to the COVID-19 pandemic will have far reaching consequences on the TB epidemic. In order to mitigate the consequences of COVID-19 on TB and preserve the gains made over the last decade in the fight against TB, it is important for control programs to strengthen TB control strategies and prioritize delivery of TB services. Such strategies should include intensified case finding, scale-up of contact tracing efforts, community engagement to maintain awareness of symptoms suggestive of TB and vaccine catch-up, the use of digital health tools for remote management of TB in settings still affected by COVID-19 disruption and ensuring continuity of TB treatment and care, including uninterrupted access to drugs and diagnostics, for all TB patients. Above all, prioritized funding and mobilization of resources will be required to overcome the formidable challenges imposed by the COVID-19 pandemic.

None of the authors has any conflicts to disclose.

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