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EDITORIALS AND COMMENTARIES

Strengthening Tuberculosis Diagnostics and Healthcare Amidst COVID-19: A Call to Action

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Abstract

The COVID-19 pandemic has impeded various health systems worldwide, causing a decline in the surveillance, diagnosis and treatment of various other infectious diseases, including major diseases like tuberculosis. The challenges associated with the pandemic have adversely impacted tuberculosis control efforts globally, resulting in a decline in tuberculosis detection, surveillance and healthcare provision. This is attributed to the redirection of diagnostic, healthcare and treatment services to the COVID-19 response, and the persistence of public stigma towards tuberculosis and COVID-19 patients, amongst other challenges. To avoid a further decline in tuberculosis control efforts, the necessary approaches recommended include improvement of tuberculosis detection by employing rapid diagnostic techniques, upgrading of treatment administration to reduce the risk of transmission and drug resistance, engagement of governments, policymakers and non-governmental bodies on the need for enhanced tuberculosis eradication strategies, and implementation of awareness campaigns to reduce the associated public stigma. As tuberculosis has remained a major public health threat over the years, it is pertinent to minimize the impediments and ensure continuity of global tuberculosis control efforts amidst the COVID-19 pandemic. This will ensure progress in line with the World Health Organization's global strategy to end tuberculosis.

Keywords: Tuberculosis, COVID-19, Healthcare, Diagnosis, Treatment

Introduction

The Coronavirus Disease – 2019 (COVID-19) pandemic remains one of the greatest challenges to global public health in recent times, with the outbreak causing major impediments in the intervention strategies of various other priority infectious diseases, of which tuberculosis is included. As of February 8, 2022, there were over 397 million cases of COVID-19, with a mortality rate of about 5.3 million cases worldwide [1]. On the other hand, Tuberculosis (TB) cases amounted to about 10 million annually, with 1.5 million annual deaths from the disease as at 2021 [2]. A number of recent studies have highlighted the adverse impact of the COVID-19 pandemic on tuberculosis, especially in terms of diagnostics and healthcare provision. These span a number of challenges stemming from the diversion of disease intervention strategies to the COVID-19 response, resulting in reduced attention for tuberculosis, as well as stigma and public misconceptions arising from the juxtaposition of COVID-19 and tuberculosis symptoms. This paper outlines the challenges responsible for the impediment of global tuberculosis responses amidst the COVID-19 pandemic, and also recommends a number of approaches necessary to recover from the descent and avoid a reversal in global efforts to eradicate tuberculosis.

Challenges Impeding Tuberculosis Control Amidst COVID-19

Decrease in TB Detection and Surveillance

The greatest impact of the COVID-19 pandemic on tuberculosis is the decline in tuberculosis surveillance, diagnosis and reporting. The 2021 Global Tuberculosis Report by the World Health Organization (WHO) showed an 18.3% decline in the number of newly diagnosed tuberculosis cases - from 7.1 million recorded earlier in 2019, to about 5.8 million cases in 2020, which was proportional to the statistics of tuberculosis cases back in 2012 [3]. In comparison, this figure is not proportional to the approximate number of about 10 million individuals who developed tuberculosis in the year 2020. Various studies have reported similar results, such as those of Visca et al (2021) and Migliori et al (2021), both assessing the global impact of COVID-19 on tuberculosis (TB), and other sources across various continents and countries [4,5]. A study in China showed a sharp drop in TB notifications due to disruptions in TB service delivery systems, reallocation of health workers to the COVID-19 response, and lack of access to diagnostic services as a result of movement restrictions [6]. Another study by Buonsenso et al (2020) in Sierra Leone showed a decline in the number of visits to clinical diagnostic centers and an accompanying fall in the number of TB

cases reported [7]. According to Bardhan et al (2021), the decreasing rates of detection in India were as a result of difficulty in accessing medical facilities due to the lockdowns, and fear of nosocomial COVID-19 transmission in the medical centers [8]. Similar findings were also reported in the Western Pacific region [9], all confirming a local and global decline in TB detection rates.

Table 1. COVID-19-related factors contributing to global decline in TB notifications

Impeding Factors	Form of impact
Lockdowns and movement restrictions	Prevents patients from accessing TB services
Fear of COVID-19 transmission	Reluctance to access TB diagnostic and healthcare services
Reallocation of healthcare workers to COVID-19 response	Deficit of healthcare workers for TB service delivery
Diversion of diagnostic equipment and resources to COVID-19 detection	Shortage of resources for TB detection and monitoring
Reallocation of PPE to COVID-19 response	Reluctance of health workers to implement TB elimination programmes
Juxtaposition of TB and COVID-19 symptoms	Delay in TB diagnosis, as patient may be suspecting COVID-19 infection
COVID-19-related economic inflation	Difficulty paying for TB medications and healthcare services

Redirection of TB Diagnostic Capacity to COVID-19

The direct impact of COVID-19 on laboratory diagnostic services has also been reported to be a major reason for the decline in tuberculosis detection. Medical laboratory diagnostics is a vital aspect in the response and control of any infectious diseases, and just like COVID-19, laboratory testing plays a key role in global tuberculosis elimination efforts. A study by Nikolayevskyy et al (2021) among 30 national tuberculosis reference laboratories across Europe depicted a significant impact of the pandemic on tuberculosis laboratory services over a period of 4 months earlier in 2020 [10]. About 56.7% of the laboratories classified the impact as being "very significant" and "significant", while a little over 40% of the laboratories categorized the impact as minor or insignificant [10]. These laboratories experienced impediments in their tuberculosis diagnostic services such as unavailability of staff due to COVID-19 redeployment, illness or lockdowns, laboratory space constraints and shortage of personal protective equipment as a result of reallocation to COVID-19 diagnostics, and even temporary suspension of selected activities like drug susceptibility testing and external quality assessment. A similar trend was observed by Sarinoglu et al (2020) and Nkereuwem et al (2021), where most of the laboratory diagnostic capacity in Turkey and West African countries like The Gambia, Benin Republic and Nigeria were redirected for COVID-19 diagnosis [11, 12]. These results depict that beyond the developing countries, even developed countries with good medical diagnostic standards suffered direct or indirect impact on the level of output and consistency of tuberculosis diagnostics and surveillance, due to the rapid mobilization of manpower and resources for the COVID-19 response.

Decline in Provision of TB Healthcare and Treatment Services

In addition to tuberculosis surveillance and diagnostics, the COVID-19 pandemic has also exerted a major impeding effect on the administration of healthcare and treatment to tuberculosis patients. According to a report from the Global Tuberculosis Network (GTN), the far-reaching effects of the pandemic were experienced in about 33 tuberculosis healthcare centers across 16 countries worldwide, where the administration of tuberculosis healthcare services was significantly impacted, as there was a reduction in TB-related hospital discharges, newly diagnosed cases of active TB, and total active TB outpatient visits [13]. A number of countries external to the GTN study also reported similar impact on their tuberculosis services [14,15,16,17], confirming the fact that this may be a global trend, and could have adverse impact on the progress made in the fight against tuberculosis over the years. The movement restrictions peculiar to the pandemic not only decreased the diagnosis and notification of tuberculosis cases, but also negatively affected the health seeking behaviour and required treatment of TB-suspected individuals [18]. A similar trend of

interruption of tuberculosis prevention and control programmes was also observed during the 2014 Ebola outbreak, specifically in West African countries such as Liberia, Guinea and Sierra-Leone [19]. According to McQuaid et al (2021), the COVID-19 pandemic period featured an increase in household contacts, treatment interruptions and treatment delays, along with decreased BCG vaccination coverage, which resulted in increased susceptibility to TB infection and emergence of drug resistance [20]. Between 2019 and 2020, there has been a 21% global drop in TB prophylactic treatment, and a 15% fall in the provision of treatment for patients with drug resistant TB infections [3]. This was also accompanied by an 8% increase in TB death rates worldwide [3], and forecasts predict a further increase in mortality rate by 4-16% in the coming years [21].

Prevalence of Public Stigma towards TB and COVID-19 Cases

Another aspect requiring adequate attention is the societal stigma occasionally associated with tuberculosis and COVID-19. Stigmatization of TB patients has been a historical trend, and COVID-19 patients are met with greater public stigma for fear of contracting the virus, though these trends appear more common among people with lower educational and economic standing [22]. The symptoms of both diseases bear apparent similarity, which include coughing, fever, difficulty breathing, weakness and haemoptysis, thus, the symptom similarity may sometimes lead to the misidentification of TB as a case of COVID-19 and result in delayed suspicion or diagnosis of tuberculosis [22]. The level of suspicion for COVID-19 in recent times has been quite prevalent to the extent that a simple, random cough by an individual in public may arouse suspicion and prompt other individuals in the environment to withdraw for fear of getting infected [23]. These stigma trends serve as major factors that discourage people from getting tested for either of the diseases, which eventually results in low detection and notification rates.

Recommendations for Tackling the TB-COVID-19 Challenges

Diagnostic Strategies

In order to avoid a decline in the level of progress gained over the years in combating tuberculosis, a number of multi-faceted approaches are required, especially in the aspect of improving the delivery of TB diagnostic, healthcare and treatment services amidst the COVID-19 response. The most important action is the timely diagnosis and reporting of TB cases using improved methods, such as the utilisation of rapid molecular techniques like Xpert Ultra [24], which will ensure bidirectional screening for both TB and COVID-19, and avoid diagnostic delays while employing accuracy in detection. The surveillance strategies and infection prevention and control (IPC) measures currently being utilised for the COVID-19 response can be adopted by TB healthcare workers to minimize transmission of the disease and effectively control the population of diagnosed and undiagnosed TB patients.

Treatment and Prevention Strategies

The administration of medications and treatment interventions for TB patients must be upgraded to reduce the risk of emergence of drug resistance, and also ensure quicker recovery of patients, which would further lessen transmission risks. The COVID-19 pandemic has proven the efficacy of telemedicine as a tool for ensuring continuity of essential healthcare services, thus, telemedical approaches can be utilised to sustain the provision of TB healthcare services without the need for physical appointments, as this will benefit patients in terms of treatment and transmission safety [25]. Telemedical services are increasingly being utilized by TB centers, such as the use of telemedicine to improve access to directly observed therapy (DOT) for latent tuberculosis infection (LTBI), and the use of telemedicine to optimize healthcare of patients with cases of multidrug resistant tuberculosis (MDR-TB) [13, 26, 27]. Other methods exist which support COVID-19 distancing measures, such as the establishment of diffuse focal points in local communities for the collection of medications, and also the delivery of medical supplies to homes with the use of personal protective equipment (PPE) to sustain TB service delivery and prevent COVID-19 transmission. Also worthy of note is the observation by Kant and Tyagi (2021) that despite the decline in TB control efforts due to COVID-19 prevention measures, the same measures and heightened hygiene awareness has helped to slightly reduce the spread of the TB bacilli [22]. Thus, consistent adherence to the COVID-19 precautionary measures should be encouraged to help limit localized TB transmission.

Implementing the above strategies requires regular engagement of the government and policy makers to revitalise the administration of TB diagnostic and healthcare services, with the goal of making it one of the IPC priorities amidst the COVID-19 response. The role of public-private partnerships can not be overemphasized, as well as partnerships between governments and national or international tuberculosis organisations, as these will help ensure the productivity of the adopted TB strategies, and will also provide an avenue for adequate training and equipment of more health workers in the battle against tuberculosis. There is also a need for improved public awareness through informative campaigns to reduce stigma, erase any misconceptions associated with both diseases, and also improve the health seeking behaviour of presumptive COVID-19 or TB patients. A strong governmental willpower, meticulous and effective policymaking and implementation, as well as active engagement of non-governmental bodies, remain vital in the global combat against tuberculosis.

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References

1. Worldometer. *COVID-19 Coronavirus Pandemic*. https://www.worldometers.info/coronavirus/ (accessed 7th February, 2022).
2. World Health Organization. *Tuberculosis: Key Facts*. https://www.who.int/news-room/fact-sheets/detail/tuberculosis (accessed 7th February, 2022).
3. World Health Organization. Global tuberculosis report 2021. Geneva: World Health Organization; 2021.
4. Visca D, Ong CWM, Tiberi S, Centis R, D'Ambrosio L, Chen B, et al. Tuberculosis and COVID-19 interaction: A review of biological, clinical and public health effects. *Pulmonology*. 2021; 27: 151-165. DOI: https://doi.org/10.1016/j.pulmoe.2020.12.012
5. Migliori GB, Thong PM, Alffenaar JW, Denholm J, Tadolini M, Alyaquobi F, et al. Gauging the impact of the COVID-19 pandemic on tuberculosis services: a global study. *Eur Respir J*. 2021; 58: 2101786. DOI: https://doi.org/10.1183/13993003.01786-2021
6. Fei H, Yinyin X, Hui C, Ni W, Xin D, Wei C, et al. The impact of the COVID-19 epidemic on tuberculosis control in China. *The Lancet Regional Health - Western Pacific*. 2020; 3: 100032. DOI: https://doi.org/10.1016/j.lanwpc.2020.100032
7. Buonsenso D, Iodice F, Biala JS, Goletti D. COVID-19 effects on tuberculosis care in Sierra Leone. *Pulmonology*. 2021; 27(1): 67-83. DOI: https://doi.org/10.1016/j.pulmoe.2020.05.013
8. Bardhan M, Hasan MM, Ray I, Sarkar A, Chahal P, Rackimuthu S, et al. Tuberculosis amidst COVID-19 pandemic in India: unspoken challenges and the way forward. *Trop Med Health*. 2021; 49: 84. DOI: https://doi.org/10.1186/s41182-021-00377-1
9. Chiang CY, Islam T, Xu C, Chinnayah T, Garfin AMC, Rahevar K, et al. The impact of COVID-19 and the restoration of tuberculosis services in the Western Pacific Region. *Eur Respir J*. 2020; 56: 2003054. DOI: https://doi.org/10.1183/13993003.03054-2020
10. Nikolayevskyy V, Holicka Y, van Soolingen D, van der Werf MJ, Ködmön C, Surkova E, et al. Impact of the COVID-19 pandemic on tuberculosis laboratory services in Europe. *Eur Respir J*. 2021; 57: 2003890. DOI: https://doi.org/10.1183/13993003.03890-2020
11. Sarinoglu RC, Sili U, Eryuksel E, Yildizeli SO, Cimsit C, Yagci AK. Tuberculosis and COVID-19: An overlapping situation during pandemic. *J Infect Dev Ctries*. 2020; 14(7): 721-725. DOI: https://doi.org/10.3855/jidc.13152
12. Nkereuwem O, Nkereuwem E, Fiogbe A, Usoroh EE, Sillah AK, Owolabi O, et al. Exploring the perspectives of members of international tuberculosis control and research networks on the impact of COVID-19 on tuberculosis services: a cross sectional survey. *BMC Health Serv Res*. 2021; 21: 798. DOI: https://doi.org/10.1186/s12913-021-06852-z
13. Migliori GB, Thong PM, Akkerman O, Alffenaar JW, Álvarez-Navascués F, Assao-Neino MM, et al. Worldwide effects of coronavirus disease pandemic on tuberculosis services, January-April 2020. *Emerg Infect Dis*. 2020; 26(11): 2709-2712. DOI: https://doi.org/10.3201/eid2611.203163
14. Adewole OO. Impact of COVID-19 on TB care: experiences of a treatment centre in Nigeria. *Int J Tuberc Lung Dis*. 2020; 24(9): 981–982. DOI: https://doi.org/10.5588/ijtld.20.0418
15. de Souza CDF, Coutinho HS, Costa MM, Magalhães MAFM, Carmo RF. Impact of COVID-19 on TB diagnosis in Northeastern Brazil. *Int J Tuberc Lung Dis*. 2020; 24(11): 1220–1222. DOI: https://doi.org/10.5588/ijtld.20.0661
16. Wu Z, Chen J, Xia Z, Pan Q, Yuan Z, Zhang W, et al. Impact of the COVID-19 pandemic on the detection of TB in Shanghai, China. *Int J Tuberc Lung Dis*. 2020; 24(10): 1122-1124. DOI: https://doi.org/10.5588/ijtld.20.0539
17. Meneguim AC, Rebello L, Das M, Ravi S, Mathur T, Mankar S, et al. Adapting TB services during the COVID-19 pandemic in Mumbai, India. *Int J Tuberc Lung Dis*. 2020; 24(10): 1119-1121. DOI: https://doi.org/10.5588/ijtld.20.0537
18. Fekadu G, Bekele F, Tolossa T, Fetensa G, Turi E, Getachew M, et al. Impact of COVID-19 pandemic on chronic diseases care follow-up and current perspectives in low resource settings: a narrative review. *Int J Physiol Pathophysiol Pharmacol*. 2021; 13(3): 86-93. PMID: 34336132; PMCID: PMC8310882
19. Ansumana R, Keitell S, Roberts GM, Ntoumi F, Petersen E, Ippolito G, et al. Impact of infectious disease epidemics on tuberculosis

diagnostic, management, and prevention services: experiences and lessons from the 2014-2015 Ebola virus disease outbreak in West Africa. *Int J Infect Dis*. 2017; 56: 101-104. DOI: https://doi.org/10.1016/j.ijid.2016.10.010

20. McQuaid CF, Vassall A, Cohen T, Fiekert K, White RG. The impact of COVID-19 on TB: a review of the data. *Int J Tuberc Lung Dis*. 2021; 25(6): 436-446. DOI: http://dx.doi.org/10.5588/ijtld.21.0148
21. Cilloni L, Fu H, Vesga JF, Dowdy D, Pretorius C, Ahmedov S, et al. The potential impact of the COVID-19 pandemic on the tuberculosis epidemic: a modelling analysis. *Lancet*. 2020; 28: 100603. DOI: https://doi.org/10.1016/j.eclinm.2020.100603
22. Kant S, Tyagi R. The impact of COVID-19 on tuberculosis: challenges and opportunities. *Ther Adv Infectious Dis*. 2021; 8: 1-7. DOI: https://doi.org/10.1177/2049936
23. Roberts M. *Covid symptoms: Is it a cold or coronavirus?* https://www.bbc.com/news/health-54145299 (accessed 14th December, 2021).
24. World Health Organization. *Meeting report of a technical expert consultation: Non-inferiority analysis of Xpert MTB/RIF Ultra compared to Xpert MTB/RIF*. https://www.who.int/tb/publications/2017/XpertUltra/en/ (accessed 14th December, 2021).
25. Effiong FB, Elebesunu EE, Madu GO. Applications of Telemedicine in Tackling Infectious Disease Outbreaks: The Nigerian Perspective. *Mod Care J*. 2021; 18(4):e118414. https://dx.doi.org/10.5812/modernc.118414
26. Donahue ML, Eberly MD, Rajnik M. Tele-TB: Using TeleMedicine to Increase Access to Directly Observed Therapy for Latent Tuberculosis Infection. *Mil Med*. 2021; 186(Suppl 1): 25-31. DOI: https://doi.org/10.1093/milmed/usaa300
27. Huang GKL, Pawape G, Taune M, Hiasihri S, Ustero P, O'Brien DP, et al. Telemedicine in Resource-Limited Settings to Optimize Care for Multidrug-Resistant Tuberculosis. *Front Public Health*. 2019; 7: 222. https://doi.org/10.3389/fpubh.2019.00222

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