

# TB control in Singapore: where do we go from here?

Cynthia Bin-Eng Chee<sup>1</sup>, MBBS, FRCP, Yee Tang Wang<sup>1</sup>, MBBS, FRCP

Singapore's population increased from 4.17 million in 2004 to 5.08 million in 2010 following a liberalised immigration policy and rapid economic growth after 2005.<sup>(1)</sup> During this period, there was a 46% rise in the total number of new tuberculosis (TB) cases notified in the country, from 1,916 cases in 2004 to 2,791 cases in 2010, with the proportion of foreigners increasing from 29% to 47% of the total case burden (Fig. 1).<sup>(2)</sup> In 2008, the TB incidence rate among Singapore citizens and permanent residents (PRs) increased, for the first time in ten years, to 39 per 100,000 population from a historical low of 35 per 100,000 population in the previous year (Fig. 2).<sup>(2)</sup> This trend reversal occurred despite the efforts of the Singapore TB Elimination Programme in implementing Directly Observed Therapy (DOT), in which a public health nurse supervises the taking of each dose of TB medication, for approximately 60% of Singapore's TB cases; a computerised surveillance module to track the treatment progress and outcome of all cases treated in the country; and a national policy of preventive treatment for latently infected close contacts.<sup>(3-5)</sup> It is clear that TB control in Singapore is now at a crossroad, and that additional measures and resources are critically needed in our battle against this disease of global public health importance. Pivotal to this is to acknowledge and address TB in foreigners and its impact on the local population. In today's highly interconnected world, it must be recognised that "TB anywhere is TB everywhere", and that policies that ignore this reality are self-defeating in the long-run.

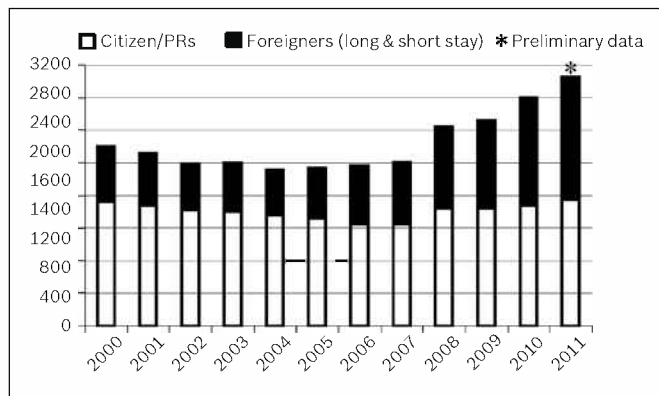
Foreigners with TB in Singapore are categorised under two broad groups from the view of their potential to transmit the disease to the local population: (1) long-term pass holders, i.e. those who are issued work permits, employment, student or visit passes for longer than six months; and (2) short-term visitors comprising mainly pass applicants and medical tourists. Over the last five years, short-term pass holders have constituted approximately 40%–50% of the total burden of foreigners notified with TB. Although it is assumed that these persons do not stay for long in the country, their potential to spread TB to the community should not be underestimated. An analysis of TB among the foreign-born in Singapore showed that, while cases from Malaysia, China and India accounted for the highest numbers over the last decade, the last five years saw a marked increase in the number of TB cases among unskilled workers from Indonesia, the Philippines and Myanmar.<sup>(6)</sup>

Foreigners applying to work, study or live in Singapore for more than six months and those applying for Permanent Residency are required to undergo chest radiograph screening for "active TB". Persons reported to have "scarring" on their screening chest radiograph have been granted long-term passes without further investigation or follow-up on the presumption that "scarring" equates to disease inactivity. Disease inactivity cannot, however, be accurately ascertained by radiographic appearances alone, even in the absence of symptoms and signs. For this reason, it is crucial to perform sputum smear and culture for TB in these cases to at least detect the bacteriologically positive cases while recognising that with this approach, some active but bacteriologically negative cases may be missed. Given the rising number of foreigners developing TB after being granted long-term stay, it may be time for Singapore to consider the merits of performing sputum acid-fast bacillus (AFB) smear and TB cultures for those with radiologically deemed "inactive TB" at the point of screening. Rapid genotypic drug resistance testing of sputum for persons with abnormal chest radiographs from countries with high rates of multidrug-resistant TB may also be prudent. For active TB cases that are bacteriologically negative, it remains for the diligent physician to detect them for treatment. In our view, foreigners with TB who live and work in Singapore should be treated under DOT by Singapore's National TB Programme (NTP) in order to accord them the best chance of cure. A repatriation policy has not only potentially devastating consequences for the patient, but would also not serve the greater good of the global community, including our own.

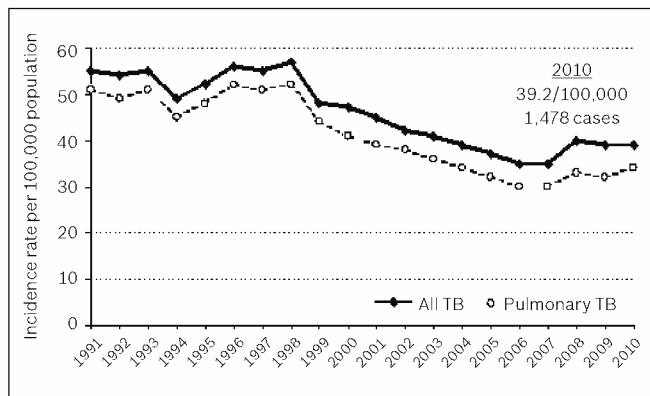
It is vital to facilitate, as much as possible, the early diagnosis and treatment of TB for the sake of public health. The cost to a non-subsidised patient in the Singapore public healthcare system for medical consultation, two sets of sputum AFB smears and TB cultures, chest radiograph and baseline blood investigations is in the region of approximately S\$300.00. Persons who are ineligible for subsidised healthcare (i.e. non-citizens and non-PRs) and who are of low income may delay or avoid seeking medical consultation and treatment, with the obvious consequence of continued disease transmission to the community. In the interest of public safety, medical evaluation of this airborne infectious disease should be made as affordable as possible (or ideally at no cost) to all, regardless of residency status. This matter could perhaps be addressed by mandating outpatient insurance coverage for TB for all foreigners residing in Singapore, and allowing

<sup>1</sup>TB Control Unit, Dept of Respiratory and Critical Care Medicine, Tan Tock Seng Hospital, Singapore

**Correspondence:** Dr Cynthia B E Chee, Senior Consultant, TB Control Unit, Dept of Respiratory and Critical Care Medicine, Tan Tock Seng Hospital, 144 Moulmein Road, Singapore 308089. [cynthia\\_chee@ttsh.com.sg](mailto:cynthia_chee@ttsh.com.sg)



**Fig. 1** Graph shows the number of new TB cases notified in Singapore for the period 2000–2011 and stratified according to citizens, permanent residents and foreigners. The latter category comprises long- and short-term pass holders.



**Fig. 2** Graph shows the annual incidence rate of all new TB and new pulmonary TB cases notified among citizens and permanent residents for the period 1991–2010. Following the launch of STEP in 1997, the incidence rate declined from 58 per 100,000 in 1998 to 35 per 100,000 in 2006/07. The incidence rate rose to 39 per 100,000 in 2008, where it has remained in 2009/10.

Medisave funds to be used to cover outpatient expenses for this condition.

TB treatment requires the patient to ingest multiple medications for at least six months, an undertaking which can defeat even the best of us. It has been reported that about a third of patients do not take medications as prescribed and that it is not possible to accurately predict which of them would be non-adherent.<sup>(7)</sup> DOT is the best way to ensure treatment adherence to achieve cure, and it has been shown to prevent the emergence of drug resistance and reduce the risk of relapse.<sup>(8)</sup> DOT also enables close monitoring of patients for side-effects and a rapid response should patients interrupt treatment. DOT is regarded by international authorities as the standard of care and is the pillar of any well-functioning TB programme.<sup>(9)</sup> The International Standards for TB Care emphasises the overarching principle that healthcare providers caring for the individual with TB are also assuming an important public health responsibility and must have the means to assure treatment adherence in their patients.<sup>(10)</sup> The American Thoracic Society/Centres for Disease Control and Prevention/Infectious Disease Society of America state that the responsibility for successful treatment is clearly assigned to the public health programme and not to the patient.<sup>(11)</sup> In Singapore, DOT is administered at the polyclinics and TB Control Unit by trained nurses who are fully apprised of its vital importance and who are accountable to the NTP. Currently, about 60% of TB cases are treated under DOT in Singapore. This proportion can be improved. For frail and elderly patients, a system of outreach DOT delivered to the patient at home should be implemented under the NTP. For those physically able to receive DOT at their nearest polyclinic, DOT has unfortunately been viewed by some as an unnecessary inconvenience and interference with the patient's life and work, and sometimes even as an infringement of the patient's rights. It is our hope that society will realise that DOT is not only for patients' benefit, but is ultimately for their protection, and that there will be a mindset change such that patients' employers and the community will fully support this public health manoeuvre.

The political will to address the rising number of foreign and local TB cases in Singapore must translate into action and increased resources to remove barriers to early diagnosis, to enable all patients to undergo DOT, and to ensure that all healthcare providers who manage TB patients are responsible and accountable to the public health system. The time to act is now. Otherwise, future generations will pay the price.

**ENDNOTE**

Preliminary data for 2011 indicates that 3,049 new TB cases were reported, with foreigners accounting for 49% of the total case burden (Fig. 1).

**DISCLOSURES**

This commentary reflects the authors' personal views. The statements pertaining to DOT represent the standpoint of the Singapore TB Elimination Programme.

**ABSTRACT** The total number of new tuberculosis (TB) cases notified in Singapore among citizens, permanent residents and foreigners rose by 46% from 2004 to 2010. During this period, the proportion of foreigners increased from 29% to 47% of the total case burden. In 2008, the TB incidence rate among Singapore citizens and permanent residents increased for the first time in ten years, despite the on-going efforts of the Singapore TB Elimination Programme. Additional measures and resources are clearly needed to curb this rising trend. Pivotal to this is to address TB among foreigners. The political will to battle TB in Singapore must result in action to remove barriers to diagnosis, to enable all TB patients to undergo treatment under directly observed therapy (DOT), and to ensure that all healthcare providers who manage TB patients are responsible and accountable to the public health system.

Keywords: foreigners, Singapore, TB control programme, tuberculosis  
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