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TB Control in Singapore: the high price of diagnostic delay

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ABSTRACT Singapore has experienced a rise in the tuberculosis (TB) incidence rate among her local population since 2008, which we believe, is contributed in no small part to a recent increase in community transmission due to delayed diagnosis of infectious pulmonary TB cases. Data from the TB notification registry showed an increase from 2004 to 2008 in the number and proportion of sputum acid-fast bacilli smear-positive pulmonary TB cases with prolonged cough. Two surveys at the TB Control Unit showed that healthcare system delays exceeded patient delay in seeking medical consultation. There is thus an urgent need to heighten TB awareness among the public and the medical community in order to reduce the time taken to diagnose infectious TB cases in Singapore.

Keywords: diagnostic delay, healthcare system, infectious, tuberculosis
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The first principle and highest priority in tuberculosis (TB) control is early diagnosis and treatment of infectious (i.e. bacteriologically positive, pulmonary) TB cases. This reduces morbidity and mortality, and interrupts the chain of transmission in the community. The likelihood of transmission depends on the TB case's bacteriological burden, duration of infectiousness (i.e. duration of cough before initiation of appropriate treatment) and the exposure environment. Diagnostic delay has been shown to be independently associated with the transmission of TB infection to contacts.[1]

Following nine years of decline, Singapore's TB rates among the local population (citizens and permanent residents) began to rise in 2008, from an all-time low of 35 per 100,000 population in 2007 to 41 per 100,000 population in 2011.[2] This is likely attributed to multiple factors, including the influx of immigrants from high TB incidence countries since 2005, our rapidly ageing population and the high prevalence of diabetes mellitus, an important risk factor for TB.[3] We believe, however, that a major contributory factor is the recent escalation of TB transmission in our city-state due to diagnostic delay of infectious cases against a backdrop of increasing population density. We had previously reported surveillance data from the National TB registry, which showed an increasing trend in the number and proportion of sputum acid-fast bacilli (AFB) smear-positive pulmonary TB (pTB) cases with cough exceeding eight weeks, from 146 (21.5%) in 2004 to 214 (29%) in 2008.[4] Alarmingly, the number and proportion of sputum AFB smear-positive cases with cough exceeding 24 weeks also rose from 42 (6.2%) to 71 (9.6%) during the same period.[4] Of concern, TB meningitis in two Singapore-born children under five years of age was reported in 2010 for the first time since 2003.[5] This indicates a recent increase in TB transmission in our community.

Ideally, pTB should be diagnosed within one month of symptom onset. International standards state that TB should be suspected in any person with unexplained cough for 2–3 weeks.[6] In the context of Singapore, where diagnostic services are readily available, these persons should be evaluated with a chest radiograph and have at least two sputum specimens examined for AFB smear and TB culture.

Diagnostic delay may occur at the level of the patient or healthcare system. A study of 375 pTB patients treated at the TB Control Unit (TBCU) in 2000 showed that those who presented with cough exceeding four weeks were more likely to be under 65 years old and of Chinese ethnicity.[7] These patients were also more likely to be sputum AFB smear-positive and to experience weight loss. This study did not, however, examine the points of, and reasons for diagnostic delay. Two subsequent surveys at the TBCU showed that healthcare system delays exceeded patient delay in seeking medical consultation. A survey in 2002 found a median patient delay of two weeks vs. healthcare system delays of three weeks. A more recent survey in 2009/2010 reported that among patients with cough exceeding eight weeks, there was a median patient delay of three weeks and healthcare system delay of eight weeks (unpublished data). The 2002 survey found that patients aged 20–29 years had the longest duration (median of six weeks) of patient delay.

Patients may delay seeking medical consultation due to a lack of awareness, poor attitude toward personal health, cultural factors, or inability to access or afford healthcare services.

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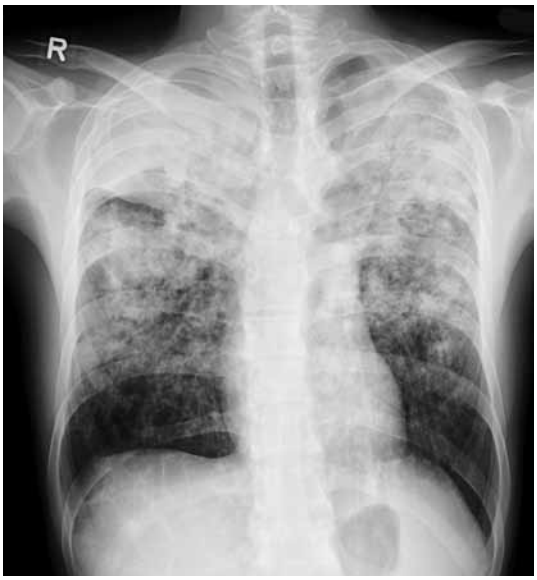


Fig. 1 Chest radiograph shows far advanced pulmonary tuberculosis.

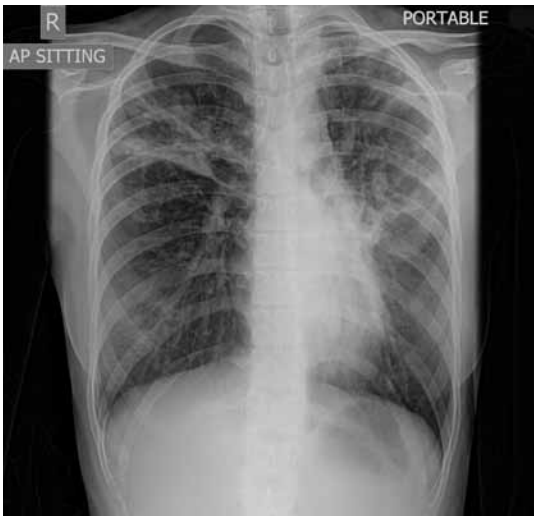
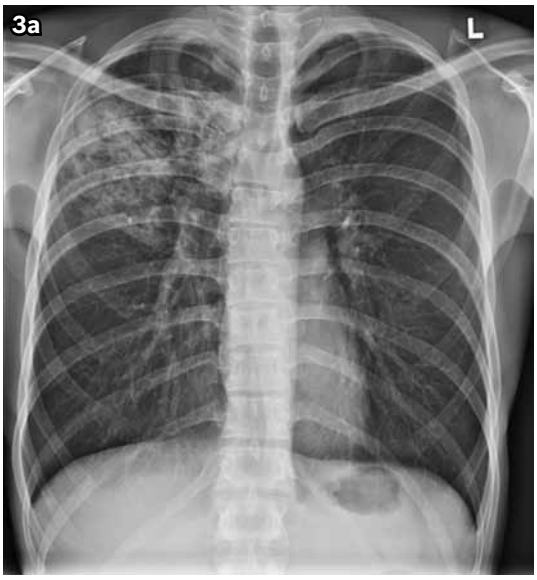


Fig. 2 Chest radiograph shows bilateral cavitary disease.



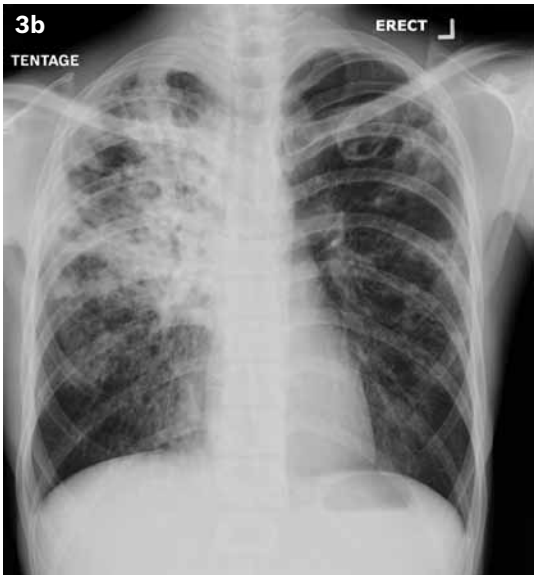


Fig. 3 Chest radiographs show (a) right upper and mid-zone consolidation; and (b) interval worsening of right-sided consolidation and the development of bilateral cavitary disease (taken 11 weeks after the radiograph in Fig. 3a).

Fig. 1 shows the chest radiograph, taken at the Emergency Department (ED), of a young working Singaporean who did not seek medical consultation despite having cough for one year. Sputum AFB smear was positive (2+). Active TB was detected in four out of 21 close contacts screened. Of the remaining contacts, 75% were deemed to have latent TB infection.

Diagnostic delay at the level of the healthcare system may be due to a lack of availability of services or low awareness of TB among healthcare workers. The decline in TB rates among the local population following tightened TB control measures implemented since 1997[8] may have created an impression among our medical community and the public that TB is no longer a health threat in Singapore. Thus, this diagnosis has not been considered often enough, especially among younger patients. Fig. 2 shows the chest radiograph of a Singapore-born teenager taken at the ED of a public hospital, where she had presented for cough and fever of three months' duration. Her sputum AFB smear was strongly positive (4+). She had previously consulted the primary health clinic three times and had been prescribed two courses of antibiotics in the preceding six weeks. No chest radiograph was performed. Her father had pTB several years ago; unfortunately, his household members did not turn up for contact screening. Cough is, admittedly, a very common, nonspecific symptom encountered in primary health care. However, a chest radiograph should be strongly considered if symptoms persist despite symptomatic treatment and antibiotics. A history of TB exposure in such patients should also lead one to suspect and investigate for TB.

Fig. 3a shows the chest radiograph of a 27-year-old Singaporean who consulted the primary health clinic for persistent cough. A chest radiograph repeated three weeks later, after a course of antibiotics, showed a worsening of the right-sided infiltrates, and another course of antibiotics was prescribed. TB was apparently not suspected. This patient self-presented two months later to the ED of a public hospital, by which time cough had been present for at least four months and there

was a weight loss of 12 kg. The chest radiograph at this time showed further worsening, with the development of bilateral cavitary disease (Fig. 3b). Sputum AFB smear was strongly positive (3+).

Despite having a well-developed healthcare system, Singapore's TB rates are still much higher than those of developed countries in the West. There is an urgent need to decrease the time taken to diagnose infectious TB cases that present to our healthcare facilities. Fundamental to this is the heightening of TB awareness and the fostering of continued vigilance among our public and the medical community. This ancient scourge of man may have been forgotten, but it has certainly not gone away.

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