Title:

Pre-migration tuberculosis screening - do be aware that the first step is always the hardest.

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Running head:

Pre-migration tuberculosis screening scheme

Key words:

pre-entry tuberculosis screening, health information

Word count:

Summary – 151 words

Text – 1961 words

No. references – 16

Tables and figures – None

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Summary

As the proportion of foreign-born persons among tuberculosis (TB) notifications continues to rise, Japan is preparing to introduce pre-migration TB screening for those coming from selected countries, who are intending to stay for more than 90 days. It has announced that the programme will commence in 2020. In this review, the authors examine the experiences from two countries which already have years of experience in operating pre-migration TB screening, namely the United Kingdom and Australia. The authors point out that both countries have developed strong health information system to not only to collect and analyze screening results, but also to use the data to effectively monitor and evaluate the screening program itself. The critical role which health information system plays within pre-migration screening is often overlooked, however that the authors argue that Japan, as with any other countries planning to introduce pre-migration screening for TB, must also plan for data management.

Introduction

It has for some time been recognized that migrants from high tuberculosis (TB) incidence countries are at a higher risk for getting TB. In addition, there is also a risk of TB treatment interruption in some cohorts.[1,2,3] Moreover, changing patterns of migration have resulted in an increasing proportional contribution of TB cases among foreign-born persons in a number of countries, including both low- and middle-TB burden countries[4,5,6]. Pre-entry TB screening has become increasingly popular as one of the strategies to address this, and has been introduced, mainly in high-income countries such as Arab States of the Gulf, Australia, some European states, New Zealand, and North America. As evidence for effectiveness and cost-effectiveness of pre-entry TB screening builds up[7,8,9], more countries are considering pre-entry TB screening programmes as a possible policy option. Japan is one such country, as it prepares to introduce pre-entry TB screening for its incoming foreign-born persons in 2020. In this paper, the authors wish to send out the message that "the first step is always the hardest" – and point to potential pitfalls if the start of such a program is rushed, with a specific emphasis on the importance of an effective health information system to support the program.

Background to Japan's introducing pre-migration TB screening

In Japan, the annual TB notification rate has fallen to 12.3 per 100,000 population in 2018, and is steadily approaching the national target of 10 per 100,000 by 2020[10]. Conversely, both the number and proportion of foreign-born TB patients of all notifications has been increasing for the past decade, from 945 in 2008 to 1,667 in 2018, contributing to 10.7% out of total notifications. Moreover, the proportion is as high as 70.8% among those aged between 15 and 24 years old[2,7]. About 80% of foreign-born TB patients in Japan were born in six countries, the Philippines, China, Vietnam, Indonesia, Nepal, and Myanmar [2,7]. In response to the growing burden of foreign-born TB patients in Japan, the Ministry of Health, Labor, and Welfare (MOHLW) of Japan has announced in February

2018 its decision to introduce a pre-entry TB screening ahead of the Tokyo Olympics Games in 2020. Its programme is targeted towards all visa applicants who wish to stay in Japan for more than 90 days from the above six countries, and aims to screen for active TB. In preparing for the screening programme, it is tempting to focus on perfecting the screening algorithm itself, particularly when the working group consists largely of TB physicians. However, whilst this is important, a pre-entry TB screening programme is more than a practice of screening for an infectious disease. It is a national project crossing multiple sectors and agencies, with different interests and required outcomes in respect of visa grants and border entry that are not necessarily always aligned with the spirit of public health to assist individual and broader community health. It is an ongoing operation that must be justifiable, based on rigorous continuous evaluation mechanism. In order for such evaluation to take place, data must be collected and analyzed. In other word, a strong health information system should be an integral component of the pre-entry TB screening programme. We now turn to the experiences of the United Kingdom (UK) and Australia to highlight our point on accurate and meaningful data capture to allow through analysis of programmes.

UK and the *UKTB*

Based on a successful pilot in eight countries between 2005 and 2011, the UK rolled out pre-entry screening for TB between 2012 and 2014. The programme requires persons who apply for a visa to enter the UK for longer than six months and who come from countries with a TB incidence of 40 per 100,000 or above to be certified free of TB. Screening for TB is carried out through symptom check and chest X-ray (CXR), followed by three sputum smears and cultures, in the event of abnormality of initial screening. Confirmed TB patients are offered treatment in the country of origin, i.e., before re-screening and clearance. Screening is carried out by a panel consisting of locally qualified physicians, radiologists, and TB laboratories designated by the UK authorities and informed by the UK Technical

Instructions[11]. As of November 2019, screening is operational globally in 101 countries with more than 140 panel clinics[12].

Screening data is collected by the panel clinics and collated and analyzed by the Public Health England (PHE). Whilst most providers utilize a structured data submission template designed by the PHE, about 40% of panel clinics, which are managed by the International Organization for Migration (IOM) utilize a bespoke IOM global clinical management system called the UKTB, which feeds into the PHE monitoring and surveillance system. UKTB consolidates data from all IOM locations in a central online database and provides information for monitoring of trends and epidemiological situation in the processing locations. It has been reported that while IOM data is of good quality, non-IOM data can often contain missing variables and discrepant dates[13]. Whenever possible, missing values are deduced from other variables. Both structured data submissions from non-IOM clinics and IOM data from UKTB are then consolidated in the PHE into a common dataset, which is reported on and used for surveillance, monitoring and quality assurance, as well as to inform about effectiveness and cost-effectiveness of the screening. According to the latest PHE annual report[12], 304,234 applicants were screened in 2018. A total of 318 TB cases were detected, giving an overall TB yield of 104.5 per 100,000 applicants.

Australia and the *eMedical*

Australia has had a pre-entry health screening programme (initially undertaken on ships before arrival) since the introduction of the *Immigration (Restriction) Act* at the time of federation in 1901[14]. Today, all visa applicants must be free from TB, mostly through self-declaration although under the current health assessment programme, Australia physically screens over 750,000 migrants annually for TB, including all permanent migrants and humanitarian entrants, and all visa applicants intending to stay

121 in Australia[15] for a period of longer than 6 months where they come from a country with TB incidence
122 of greater than 40 per 100,000 or are health care workers. TB screening similarly consists of a
123 comprehensive physical examination for all, including CXR for those 11 years and older. For children
124 aged 2–10 years, to minimise the number of x-ray exposures in this age group, they are primarily
125 screened with a latent TB infection (LTBI) test (either Interferon Gamma Release Assay, IGRA or
126 Tuberculin Skin Test, TST). Those suspected of TB follow a similar algorithm to the UK. Health
127 assessment and screening for TB is conducted by panels according to Australian -specified guidelines[16].
128 Such panels currently operate in 167 countries through approximately 600 clinics including over 40
129 designated TB centres. While newer molecular technologies such as XpertMTB/RIF have been
130 considered and are used in positive smears for earlier treatment decisions, the use of culture is still felt
131 to provide higher yield and assurance and hence are still seen as essential in this process.
132
133 Panel physicians for Australia must use an electronic medical system, eMedical, to enter the health
134 assessment and subsequent results and management of TB. It is a web-based, user-friendly application
135 that is directly linked to the visa application process, and as with UKTB, plays an integral part in
136 producing data with which to evaluate Australia's screening program. Furthermore, aside from
137 managing clinical information for pre-entry TB screening, one distinct feature of eMedical is that it is
138 also available through a password protected process for TB specialists within Australia. Australia
139 requires applicants with previously treated TB[17], or LTBI (abnormal CXR finding consistent with
140 previous TB or positive LTBI test) to attend within 28 days of arrival – through eMedical, TB
141 physicians who can access information on such applicants, and conduct the necessary follow-up. Their
142 visa status is dependent on attending for this further TB follow-up, which might require 2 to 3 years
143 monitoring in some cases. This system is used to analyse the data from all countries to compare to
144 WHO incident rates as well as the post-arrival notifications from the same countries. This allows

identification of potential areas of under-diagnosis premigration and specific actions that can then be used to address any shortcomings as identified in the pooled data example in the next paragraph.

A second distinct feature of eMedical is that it is shared by Canada, New Zealand, and US. Through such a system there is much data and information that can be gained through sharing and building on a common database. This includes testing and comparing screening algorithms and diagnostic tests, comparing migrant cohorts at greater risk, the quality of the reporting and performance and panel physicians. One such project that was looked at collectively by these countries was the very low yield rates in the premigration health assessment phase that all were receiving from one large and significant sending country with very high incidence of TB and high rates of TB post arrival in migrants from this country. The yield rates were less than 90% of the reported incidence in the country, atypical of active screening seen for other countries who usually have the same or higher incidence in many circumstances. By pooling data, the five countries were able to target specific initiatives to further clarify weaknesses in the programme and address improved screening practice such as TB laboratory processes, analysis of cohort of migrants, review of integrity measures and the role of migration agents and 'pre-treatment' for TB.

Concluding remarks: so, what are the lessons for Japan?

Surprisingly most countries do not have in place health information systems to assist in the tracking and monitoring of TB outcomes from their premigration screening programmes and as such require significant handling of at times, inaccurate manual data collection systems. The experiences from the two countries clearly highlight the importance of establishing a good health information system at the outset of any screening programme through which data can be collected, collated, analyzed, and reported. Such information is necessary not only to produce indicators with which to evaluate the

programme, but can also assist to identify quality issues, point out to specific groups who may require particular attention and – as in the case of Australia, link pre-migration screening electronically to post-entry health care. The pattern of migration, and with it the priorities for pre-migration screening, are constantly in a flux and the health information is critical in allowing the program to be responsive and fine-tune itself.

Lastly, pre-migration screening is not simply about detecting TB among migrants who are intending to travel – it is about improving and sustaining the welfare and health of migrant population, and pre-migration screening must be able to contribute to that ultimate objective. Without the health information system, there will be no data. And without data, it will be impossible to assess whether or not the screening programme is achieving what is it supposed to achieve.

Japan now stands at a crossroads between initiating its pre-entry TB screening quickly and with minimum investment into health information system, and spending some considerable time and effort in preparing for electronic data collection and analysis. The experiences from the two countries, UK and Australia, however clearly seem to indicate that while it is undoubtedly true that the start is always the hardest, a good and right beginning almost always assures success. Let us hope that Japan is convinced that this is so, and makes that start.

Funding support

This research is partly supported by the Welfare labour administration promotion survey project subsidy, the Ministry of Health, Labour, and Welfare, Japan, “A study to contribute to developing a guideline on quality assurance mechanism of the Japan pre-entry tuberculosis screening” (19HA2001), and the double-barred cross seal donation fund by the Japan Anti-Tuberculosis Association (JATA),

193 Japan.

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195 ## References

1 Abubakar I, Stagg HR, Cohen T, et al. Controversies and unresolved issues in tuberculosis prevention and control: a low-burden-country perspective. J Infect Dis. 2012;205:S293–300.
2 Wörmann T, Krämer A. Communicable diseases. In: Rechel B, Mladovsky P, Devillé W, Rijks B, Petrova-Benedict R, McKee M, editors. Migration and Health in the European Union. Maidenhead: Open University Press; 2011
3 European Centre for Disease Prevention and Control. Migrant Health: Background Note to the 'ECDC Report on Migration and Infectious Diseases in the EU'. Stockholm: ECDC; 2009.
4 World Health Organization. Systematic screening for active tuberculosis: principles and recommendations. WHO/HTM/TB/2013.04. Geneva, Switzerland: WHO. 2013.
5 Pareek M, Greenaway C, Noori T, et al. The impact of migration on tuberculosis epidemiology and control in high-income countries: a review. BMC Medicine 201614:48 https://doi.org/10.1186/s12916-016-0595-5
6 Kawatsu L, Uchimura K, Izumi K, et al. Profile of tuberculosis among the foreign-born population in Japan, 2007–2014. Western Pacific Surveillance and Response Journal, 2016, 7(2):7–16. doi:10.5365/wpsar.2016.7.1.008
7 Klinkenberg E, Manissero D, Semenza JC et al. Migrant tuberculosis screening in the EU/EEA: yield, coverage and limitations. Eur Respir J. 2009 Nov;34(5):1180-9. doi: 10.1183/09031936.00038009.
8 Aldridge RW, Yates TA, Zenner D, et al. Pre-entry screening programmes for tuberculosis in migrants to low-incidence countries: a systematic review and meta-analysis. Lancet Infect Dis. 2014 Dec;14(12):1240-9. doi: 10.1016/S1473-3099(14)70966-1
9 Kunst H, Burman M, Arnesen TM, et al. Tuberculosis and latent tuberculous infection screening of migrants in Europe: comparative analysis of policies, surveillance systems and results. Int J Tuberc Lung Dis. 2017 21(8):840-851. doi: 10.5588/ijtld.17.0036.
10 RIT/JATA. TB in Japan 2019. RIT/JATA;Kiyose, 2019.
11 Public Health England, UK Visas and Immigration. UK Tuberculosis Technical Instructions (UKTBTI). March 2019, version 7. [Internet]. Available from: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/800099/UK_tuberculosis_technical_instructions_version_7.pdf
12 Public Health England. UK pre-entry tuberculosis screening report 2013 [Internet]. Available from: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/821336/UK_pre-entry_tuberculosis_screening_report_2018.pdf
13 Public Health England. UK pre-entry tuberculosis screening report 2013 [Internet]. Available from: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/328468/TB_preentry_screening_brief_report_2013.pdf
14 Douglas P, Posey DL, Zenner D, Robson J, Abubakar I, Giovinazzo G. Capacity strengthening through pre-migration tuberculosis screening programmes: IRHWG experiences. Int J Tuberc Lung Dis Off J Int Union Tuberc Lung Dis. 2017 Jul 1;21(7):737–45.
15 Dept of Home Affairs. The Health Requirement. 2018. www.homeaffairs.gov.au/about/corporate/information/fact-sheets/22health
16 Martin B, Douglas P, Intergovernmental collaboration for the health and wellbeing of refugees settling in Australia, PRHP March 2018; Vol. 28(1):e2811807
17 Kaushik N, Lowbridge C, Scandurra G, et al. Post-migration follow-up programme for migrants

at increased risk
of developing tuberculosis: an Australian cohort study. ERJ Open Res 2018; 4: 00008-2018