Risk of tuberculosis among contacts in a low-incidence setting

To the Editor:

Contact investigations, which are designed to identify and investigate people who have been exposed to patients with active tuberculosis (TB), are regarded an important component of TB control in low-incidence settings, such as Australia [1], where the incidence of TB is 6.0 per 100 000 and 88% of all cases of TB occur in people born overseas [2].

We aimed to estimate the prevalence of active TB at the time of initial screening and the subsequent incidence of TB among contacts of patients with TB living in Sydney, New South Wales (NSW), Australia.

The study population comprised all persons who were screened as contacts of patients with TB between January 2000 and December 2009, at TB clinics within the Sydney West and Sydney South West Area Health Services. Contact screening and management in this jurisdiction is guided by state policy directives. Cases of active TB among the study population were identified by linking a database containing details for all identified contacts and the NSW notifiable diseases database (which includes the TB registry) using a combination of probabilistic and deterministic linkage methods [3].

TB was defined as any case that was notified as a case of active TB in the NSW notifiable diseases database. TB diagnosis at initial screening (period prevalence of TB) was defined as a TB diagnosis within 90 days of the first healthcare contact for contact screening. Incident cases of TB were ascertained for a period starting 90 days after the first healthcare contact for contact screening and continuing until December 31, 2009 or the date of diagnosis of TB, whichever was the earlier. TB incidence rates were expressed per 100 000 person-years.

In addition, we reviewed the clinical files of 293 randomly selected contacts of patients with pulmonary TB and a tuberculin skin test (TST) $\geqslant$10 mm who did not receive treatment for latent TB infection (LTBI) in order to ascertain whether this was because it was not offered or because it was declined. For the purpose of this study LTBI was defined as a TST $\geqslant$10 mm.

The study cohort comprised 14 371 contacts of patients with TB seen at six Sydney TB clinics. A median of three contacts (interquartile range 2–5) were seen per index case. The mean$\pm$SD age of contacts was 32.9$\pm$19.3 years, 55% were female and 56% were born overseas. The most common countries of origin for contacts born overseas were the Philippines (12.5%), India (11.8%) and Vietnam (10.4%). Characteristics of the study population of contacts are shown in table 1.

Overall, 14% of subjects in the cohort had missing data for TST results. However, 163 (77%) of 212 prevalent cases of TB and 16 (26%) of the 61 incident cases of TB had no record of a TST.

Among the 14 371 contacts, 273 (1.9%) were diagnosed with TB during the study period. Of those contacts who were diagnosed with TB at any time before December 31, 2009, 212 (77.7%) were diagnosed at the time of the initial screening. The period prevalence of TB in contacts at initial screening was 1.48% (95% CI 1.26–3.12%). The mean$\pm$SD follow-up period was 4.6$\pm$2.9 years. The incidence of TB during the period from 90 days to 2 years after initial healthcare contact was 232 per 100 000 person-years (95% CI 174–309), which was 10-times higher than the incidence of TB in the overseas-born population in Australia in 2009 (22.4 per 100 000 per year) [2]. The incidence of TB during the period from 2 years after initial healthcare contact to December 31, 2009 was 27 per 100 000 person-years (95% CI 14–50). Table 1 shows the period prevalence and subsequent incidence of TB stratified by age, sex and country of birth, as well as the incidence of TB stratified by TST size and preventive treatment status.

Of all the contacts with at least one TST result, 35% had a TST $\geqslant$10 mm and were thus assumed to have LTBI. Only 9.5% of all contacts with LTBI received treatment for LTBI. Among the randomly selected sample of the cohort who were contacts of patients with pulmonary TB, had a TST $\geqslant$10 mm and did not receive treatment for LTBI, 95% (95% CI 92–97%) were not offered treatment for LTBI by the treating physician.

The prevalence of active TB among contacts of patients with TB in our study was 1.48%, which is similar to findings in other high income countries, from a recently published meta-analysis of the results of TB contact investigations [4]. Our study has shown that, in the majority of contacts who were ultimately diagnosed with TB, the disease was already present at the time of the screening and hence there was little opportunity to prevent these cases.

A potential limitation of this study is that a large number of subjects, especially contacts who were diagnosed with TB at initial screening (prevalent cases), had missing data for TSTs. The main reason for this is that a TST is not usually performed in patients who present with clinical features of TB. For this reason we did not attempt to assess LTBI as a risk factor for prevalent cases of TB in contacts. A further limitation of this analysis is that we have no direct evidence on outward migration for this cohort. However, these data are available for a cohort of refugees newly arrived in the Australian state of NSW between 1984 and 1994 [5]. Based on data from that cohort, we estimate that a maximum of 15% of the cohort may have left NSW during the follow-up period.

Finally, there is no genotyping data available for the prevalent and incident cases of TB in this cohort. Hence, we cannot directly estimate the proportion of these cases that are likely to have arisen as a result of exposure to the identified index case.

This study reveals that a low proportion of contacts with LTBI who attended the participating TB clinics received preventive

TABLE 1 Tuberculosis (TB) cases among contacts by risk factor status and period of follow-up

Characteristic	Population at risk at start of contact nvestigation n	Total TB cases n (%)	Prevalence of TB at time of initial contact screening[#]		Risk for incidence of TB 3 months to 2 years after initial screening[¶]		Incidence of TB 3 months to 2 years after initial screening[¶]		Risk for incidence of TB ⩾2 years after initial screening[+]		Incidence of TB ⩾2 years after initial screening[+]	
			n	% (95% CI)	Person-years at risk n	Persons at risk n	n	per 100 000 (95% CI)	Person-years at risk n	Persons at risk n	n	per 100 000 (95% CI)
All contacts	14 371	273 (1.9)	212	1.48 (1.26–3.12)	21 518	14 159	50	232 (174–309)	40 318	14 109	11	27 (14–50)
Age years[§]												
0–14	2369	6 (1.9)	38	1.60 (1.15–2.22)	3629	2331	6	165 (67–379)	6232	2325	2	32 (6–129)
15–34	5335	128 (2.4)	98	1.84 (1.50–2.24)	7698	5237	26	338 (225–502)	15 008	5211	4	27 (9–73)
⩾35	5740	99 (1.7)	76	1.32 (1.05–1.66)	8830	5664	18	204 (125–329)	17 362	5646	5	29 (11–71)
Sex[ƒ,##]												
Male	6125	123 (2.0)	102	1.67 (1.37–2.03)	9131	6023	19	208 (129–331)	17 260	6004	2	12 (2–47)
Female	7475	149 (2.0)	109	1.46 (1.20–1.76)	11 205	7366	31	277 (191–398)	21 677	7335	9	42 (20–82)
TB incidence (per 100 000) in country of birth[¶¶]												
Australian-born <10 per 100 000	5357	46 (0.9)	39	0.73 (0.53–1.00)	8033	5318	6	75 (30–171)	16 287	5312	1	6 (0.3–40)
Overseas-born <10 per 100 000	641	15 (2.3)	11	1.72 (0.90–3.15)	969	630	3	310 (80–982)	1979	627	1	51 (3–327)
Overseas-born 10–99 per 100 000	2800	74 (2.6)	59	2.11 (1.62–2.73)	4240	2741	14	330 (188–568)	8005	2727	1	12 (1–81)
Overseas-born >100 per 100 000	3245	138 (4.3)	103	3.17 (2.61–3.85)	4763	3142	27	567 (381–836)	8488	3115	8	94 (44–194)
TST size[++,§§]												
TST ⩾10 mm (including results prior to contact investigation)	4307	N/A	N/A		6635	4307	32	482 (336–689)	12 679	4275	9	71 (35–140)
TST <10 mm	8073	N/A	N/A		12 247	8073	4	33 (10–90)	23 269	8069	0	
TST result unknown or not done	1779	N/A	N/A		2636	1779	14	531 (302–913)	3757	1765	2	53 (9–214)
Preventive treatment[§§,ƒƒ]												
All preventive treatment received	548	N/A	N/A		858	548	2	233 (40–936)	1653	546	1	60 (3–392)
TST ⩾10 mm, preventive treatment received	409	N/A	N/A		633	409	2	316 (55–1266)	1313	407	1	76 (4–493)
TST ⩾10 mm, no preventive treatment received	3942	N/A	N/A		6002	3942	30	500 (343–722)	11 365	3912	8	70 (33–145)

TST: tuberculin skin test; N/A: not available. [#]: Includes all TB cases among contacts diagnosed within 90 days of the first healthcare contact for screening; [¶]: the denominator is person-years at risk, the 212 contacts who were diagnosed with TB at the time of the initial screening are excluded; [+]: the denominator is person-years at risk, the 262 contacts who were diagnosed with TB at the initial screening or within the first 2 years of follow-up are excluded; [§]: data available for n=13 444; [ƒ]: one contact with TB was classified as "transgender", thus female and male cases total 272 instead of 273 cases; [##]: data available for 13 600; [¶¶]: data available for 12 043; [++]: data available for 12 417; [§§]: only includes contacts during follow-up period (without the 212 contacts who were diagnosed with TB at the time of the initial screening); [ƒƒ]: data available for 14 159.

therapy. This low proportion (9.5%) is in stark contrast to the USA where, mainly as a result of policy directives in line with the goal of TB elimination in the USA [6], 74–79% of patients diagnosed with LTBI commence treatment [7, 8]. In our cohort of contacts, low treatment rates for LTBI appeared to be mainly a consequence of physicians' reluctance to offer LTBI treatment rather than low patient uptake of treatment.

In conclusion, in a setting where more than half of all screened contacts were born overseas and the background incidence of TB is low, contacts of patients with TB have a significantly increased risk for TB compared to the general overseas-born population of Australia. Most contacts who develop active TB are diagnosed with TB at the time of the initial screening, thus efforts should be made to ensure at least one screening visit for every identified contact at risk. Few contacts received treatment for LTBI in this study setting, due to physicians' reluctance to prescribe preventive treatment.

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Using the Chartis system to selectively target a lung segment with a persistent air leak

To the Editor:

Persistent air leak (PAL) is an important complication of pneumothorax, especially of secondary pneumothorax. PAL increases not only the morbidity and mortality of patients, but also the length of hospital stay and costs. When a chest drain and suction fail to stop the PAL, surgical intervention is recommended according to the British Thoracic Society guidelines on pneumothorax treatment [1]. Pleurodesis is considered as an alternative treatment when surgical repair is impossible due to an underlying comorbidity. Diverse chemical and biological substances, including autologous blood [2], talc [3, 4], fibrin [5] and antibiotics [6], have demonstrated various efficiencies to treat PAL. Recently, an endobronchial valve (EBV) was successfully utilised to treat PAL [7–9]. Targeting the lung lobe or segment with an air leak is a prerequisite for stopping PAL using EBV. In the present study, we report a novel way of identifying the precise location of an air leak with a catheter-based device (Chartis system; Pulmonx Inc., Redwood City, CA, USA), which can measure airway pressure and flow.

A 49-year-old male presented to the emergency department with dyspnoea. His medical history included recurrent right-sided pneumothorax, for which he had received a video-assisted