

Annual reports

TUBERCULOSIS NOTIFICATIONS IN AUSTRALIA, 2006

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Abstract

The National Notifiable Disease Surveillance System received 1,201 tuberculosis (TB) notifications in 2006, of which 1,142 were new cases and 59 were relapses. The incidence of TB in Australia was 5.8 cases per 100,000 population in 2006 up from 5.3 per 100,000 in 2005, but still below 6 per 100,000 as it has been since 1985. Eighty-five per cent of TB notifications in 2006 were in people born outside Australia. The incidence in people born overseas and Indigenous Australians were 20.7 and 6.6 cases per 100,000 population, respectively. By contrast, the incidence of TB in the non-Indigenous Australian-born population was 0.9 cases per 100,000 population. Household or other close contact was reported as the most common risk factor for TB infection. The number of cases of TB reported in health care workers increased in 2006; these were mostly in health care workers born in TB-endemic countries and there were no reports of TB transmission in Australian health care settings. Outcome data of the 2005 TB cohort indicates that treatment success was attained in more than 95% of cases. Progress towards TB elimination in Australia will rely on continued TB awareness, maintenance of high standards of TB diagnostic and control practices, and promoting regional and global TB control activities. *Commun Dis Intell* 2008;32:1–11.

Keywords: disease surveillance, tuberculosis

Introduction

In 2007, the World Health Organization (WHO) reported that although tuberculosis (TB) is still a major cause of death worldwide, the global epidemic 'is on the threshold of decline'.¹ In 2005, 8.8 million TB cases and 1.6 million deaths attributable to TB were reported worldwide. However, WHO data show that the TB incidence rates were stable or declining in all regions, even while the total numbers of cases continue to increase slowly due to increased case load in Africa, the Eastern Mediterranean and South East Asia. These findings if confirmed, suggest that the Millennium

Development Goals Target 8: 'to have halted by 2015 and begun to reverse the incidence of major diseases' may have been attained. WHO TB case detection targets (70%) and successful treatment targets (85%) have been met in the WHO Western Pacific Region, which includes Australia and in the neighbouring South East Asian region. This is important for TB control in Australia, since a large proportion of TB cases diagnosed in Australia are people born in these regions.

Approximately 1.7% of all TB cases worldwide have multi-drug-resistant (MDR) disease (i.e. *Mycobacterium tuberculosis* resistant to at least isoniazid and rifampicin).² In 2006, extensively drug-resistant tuberculosis (XDR-TB; defined as MDR-TB plus resistance to any fluoroquinolone and at least one injectable agent: kanamycin, amikacin or capreomycin) emerged. The US Centers for Disease Control and Prevention (CDC) and the WHO reported results of an international survey that found 2% of more than 17,000 isolates collected between 2000 and 2004 were XDR-TB, with cases occurring in 17 countries and the prevalence increasing over the study period.³ In the KwaZulu-Natal region of South Africa, between 2005 and 2006, 53 cases of XDR-TB were detected, of whom 55% had not been previously treated; 44 cases were HIV-infected and 52 died.⁴ The spread of XDR-TB globally has been fuelled by the HIV epidemic, inadequate public health systems, limited access to high-quality laboratory resources, and a neglect of infection control measures.⁵

The South African experience provides lessons for TB control efforts in Australia. Some of these themes will be addressed in this report. For example, while HIV-TB co-infection has not been a major problem in Australia, determining the HIV status of all Australian TB patients has not been achieved.⁶ Notifications of TB in Australian health care workers (HCWs) recruited from countries with a high TB incidence continue to be monitored. Data on MDR-TB in patients from Papua New Guinea accessing Queensland TB services in the Torres Strait are also provided as an example of how TB control in the region can impact public health control of TB in Australia.

Methods

Data collection

TB is a notifiable disease in Australia. Medical practitioners, public health laboratories and other health professionals are legally required to report cases of TB to the state and territory health authorities. Information on notified cases for 2006 was collated by jurisdictions and sent electronically to the National Notifiable Diseases Surveillance System (NNDSS) managed by the Australian Government Department of Health and Ageing. Records were dispatched in a de-identified format to ensure confidentiality. The National Tuberculosis Advisory Committee (NTAC), as a sub-committee of the Communicable Diseases Network Australia, was responsible for determining the dataset collected in 2006 and for data reporting to NNDSS. Key data fields in the TB dataset that are analysed in this report are listed in Table 1, with a brief description of each variable. TB drug susceptibility data on bacteriologically confirmed cases is collected, analysed and reported by the Australian Mycobacterial Reference Laboratory Network in an accompanying report.⁷

Data processing and quality control

Data on all TB notifications reported in 2006 were received by September 2007. Updated information on the outcomes of treatment of patients notified in 2005 was received by December 2007. Data received from the jurisdictions were examined for completeness and accuracy. Any invalid or missing entries were returned to the jurisdictions for review and correction.

Almost all cases of TB in Australia are reported to the surveillance system. Reasons for the high level of reporting include the presence of effective TB screening programs, a high standard of health care, and specialised and multi-disciplinary TB services in each jurisdiction. The terms 'notification rate' and 'incidence' are therefore used interchangeably in this report.

Additional data were provided from the Queensland Tuberculosis Control centre related to the incidence of tuberculosis among Papua New Guinea (PNG) citizens in the Torres Strait Treaty Zone within which Indigenous people on both sides of the border are allowed free movement for traditional practices. The data for 2007 are incomplete, as full

Table 1. Description of key data fields in the enhanced tuberculosis data set of the National Notifiable Disease Surveillance System used in this report*

Data field	Description
TB outcomes	Options are: <ul style="list-style-type: none"> • Cured (bacteriologically confirmed- pulmonary cases only) • Completed treatment (80% of standard regimen completed) • Interrupted treatment for less than two months (but still completed) • Died of TB during treatment phase • Died of other cause during treatment phase • Defaulter (failed to complete treatment) • Treatment failure (completed treatment but failed to be cured) • Transferred out of Australia during treatment phase
Indigenous status	Whether notified case is Indigenous (Aboriginal and/or Torres Strait Islander) Australian by descent, community acceptance or self-identification
Selected risk factors	Options are: <ul style="list-style-type: none"> • Household member or close contact with a TB patient • Currently/recently residing in a correctional facility within last five years • Currently/recently residing in an aged care facility within last five years • Currently/previously employed in an institution within last five years • Currently/previously employed in the health industry within last five years • HIV status (positive or negative) • Past residence (3 months or more) in a high risk country (as defined by the Australian Government Department of Immigration and Citizenship)

* Other data collected on each case included country of birth, length of residence in Australia (for overseas-born cases), site of tuberculosis disease.

case ascertainment for the year and completion of drug susceptibility testing had not been finalised at the time of retrieval of information.

Case definitions

TB cases were classified as new or relapsed. A new case required a diagnosis accepted by the Director of TB Control (or equivalent) in the relevant jurisdiction, based on laboratory or clinical evidence, and in the absence of any previous treated or untreated TB diagnosis. Laboratory evidence includes either the isolation of *Mycobacterium tuberculosis* complex (*M. tuberculosis*, *M. bovis* or *M. africanum*) from a clinical specimen by culture; or nucleic acid amplification testing indicating *M. tuberculosis* complex, except where it is likely to be due to previously treated or inactive disease. Microscopy and culture remain mainstays of TB laboratory diagnosis and provide the capacity for assessing the level of risk for transmission and drug susceptibility testing. Clinical evidence is a diagnosis made by a clinician experienced in tuberculosis and includes clinical follow-up assessment, with or without supporting radiology.

A relapsed TB case was defined as a case of active TB diagnosed bacteriologically, radiologically or clinically, having been considered inactive or quiescent following previous treatment (as deemed by the state or territory Director of Tuberculosis). Relapses refer to re-treatment cases of which some may be reinfections rather than a true relapse of prior disease. Relapse cases are sub-divided into relapse after full or partial treatment, in Australia or overseas.

National Performance Indicators

The performance criteria for the National Performance Indicators were set by NTAC in 2002 and reviewed in 2003. In TB annual reports before 2005, the performance criteria for incidence in people born overseas applied to people who have been living in Australia for more than five years. In this report the criteria have been applied to all cases regardless of length of residence.

Population estimates for 2006

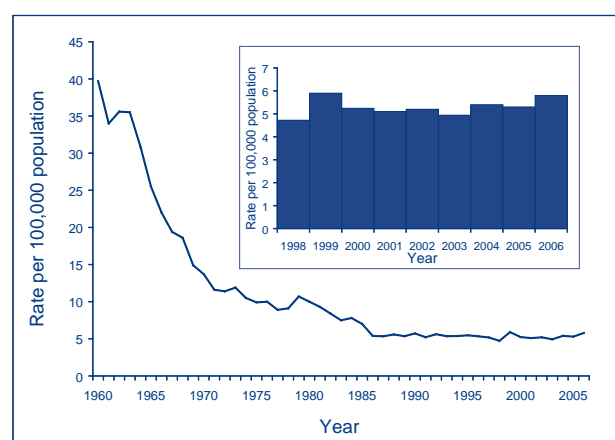
The rates presented in this report were calculated using population data produced by the Australian Bureau of Statistics. The estimated resident population as at 30 June 2006, in each state and territory and in Australia as a whole, was used as the denominator in crude rate calculations. Estimates of the Indigenous Australian population were based on projections from the 2001 census estimate of the Indigenous population in Australia. Data on Migration 2005-6 (ABS Catalogue No: 3412.0) were used to calculate incidence rates of TB in people born overseas.

Results

Tuberculosis notification rates

The total number of cases reported across Australia in 2006 was 1,201 (5.8 cases per 100,000 population). This was 129 (12%) cases more than that reported in 2005 (1,072 and 5.3 cases per 100,000 population, Figure 1). In 2006 there were 1,142 new cases and 59 relapses. Of the 59 relapsed cases, 12 relapsed after full treatment in Australia, two following partial treatment in Australia, 26 following full treatment overseas and 19 following partial treatment overseas.

Figure 1. Incidence rates for tuberculosis notifications, Australia, 1960 to 2006



Tuberculosis notifications by state or territory

New South Wales reported the largest number of TB cases (464) however the highest rate was recorded in the Northern Territory (15.5 cases per 100,000 population, Table 2).

TB notification rates by jurisdiction are shown in Figure 2. In 2006, rates were the highest for five years in New South Wales, South Australia, and Western Australia. When compared with 2005 totals, increases were seen in Western Australia (91% increase, 54 additional cases), South Australia (56% increase, 26 additional cases), Queensland (27% increase, 30 additional cases), the Northern Territory (18% increase, 5 additional cases) and New South Wales (4.9% increase, 22 additional cases). The number of cases and rates in the other three jurisdictions in 2006 were lower than in 2005.

Tuberculosis in non-Indigenous Australian-born population

Indigenous status was reported for all Australian-born patients. The incidence of TB in non-Indigenous Australians for 2006 was 0.9 cases per

100,000 population (140 cases), which was a small increase on the 122 cases (0.8 per 100,000) reported in 2005 (Figure 3 and Table 3).

Tuberculosis in Indigenous Australians

The TB incidence rate in the Indigenous Australian-born population (6.6 cases per 100,000 population; 33 cases) was an increase of six cases

Figure 2. Tuberculosis notification rates, Australia, 2002 to 2006, by state or territory

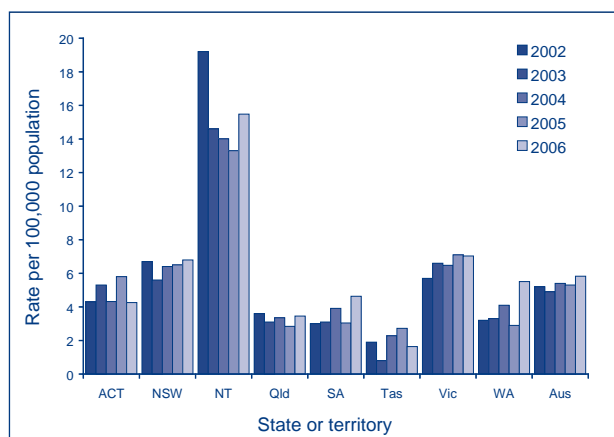


Figure 3. Tuberculosis incidence rates, Australia, 1991 to 2006, by indigenous status and country of birth

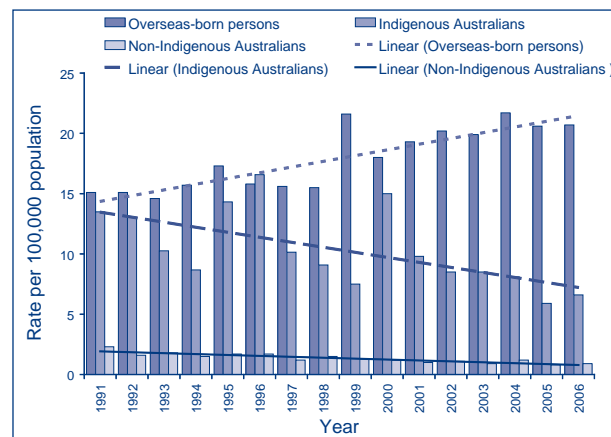


Table 2. New and relapsed cases and rates per 100,000 population, Australia, 2006, by state or territory

	New cases	New cases rate	Relapse cases	Relapse case rate	Total notifications	Total rate
ACT	14	4.3	0	0.0	14	4.3
NSW	437	6.4	27	0.4	464	6.8
NT	29	14.0	3	1.5	32	15.5
Qld	129	3.2	11	0.3	140	3.5
SA	67	4.3	5	0.3	72	4.6
Tas	8	1.6	0	0.0	8	1.6
Vic	349	6.9	9	0.2	358	7.0
WA	109	5.3	4	0.2	113	5.5
Australia	1,142	5.5	59	0.3	1,201	5.8

Table 3. Tuberculosis notifications and incidence rates in all Australian-born, Australia, 2006, by state or territory

	Indigenous	Indigenous rate	Non-Indigenous Australian-born	Non-Indigenous rate	Total Australian-born	Total rate
ACT	0	0.0	2	0.8	2	0.8
NSW	4	2.7	44	0.9	48	0.9
NT	9	14.7	2	2.1	11	7.1
Qld	13	9.3	18	0.6	31	1.0
SA	1	3.6	14	1.2	15	1.3
Tas	1	5.4	4	1.1	5	1.4
Vic	2	6.5	41	1.1	43	1.1
WA	3	4.2	15	1.0	18	1.2
Australia	33	6.6	140	0.9	173	1.1

over the 27 cases reported in 2005 (5.9 per 100,000). The crude TB incidence rate in Indigenous Australians in 2006 was seven times the rate in non-Indigenous Australian-born people.

Tuberculosis notifications in the overseas-born population

In 2006, country of birth was reported for 1,200 of the 1,201 cases. One thousand and twenty-seven (85.5%) cases were overseas-born. The rate of notification, 20.7 cases per 100,000, was similar to rates in this population in the previous two years (20.6 and 21.7 per 100,000 population in 2005 and 2004 respectively, Figure 3). Rates of TB in the overseas born have shown an increase since 1991. Table 4 shows the cases and rates ranked by estimated rate in the Australian resident population for country of birth. While the

highest rates were among those born in Somalia, Bangladesh and Ethiopia, these represent a relatively small number of cases in a small resident population. The largest numbers of TB cases were in those born in India, Vietnam, Indonesia, the Philippines and China as in previous years (Table 4).

Data on the year of arrival was available for 938 of the 1,027 overseas-born cases in 2006. Four hundred and sixteen (44%) of the 2006 cases presented within two years of arrival in Australia and 794 (85%) within 20 years of arrival (Figure 4).

The Australian immigration status was available on overseas-born cases of TB from all states and territories excluding New South Wales and the Australian Capital Territory. The majority of the 477 (59%) cases were permanent residents, 14% were refugees

Table 4. Notification of tuberculosis and estimated rate per 100,000 population for selected countries of birth, Australia, 2006

Country of birth	New	Relapse	Total cases	Estimated resident population 2006*	Estimated Rate per 100,000 population in Australia 2006	WHO incidence rate per 100,000 2005†
Somalia	20	2	22	5,431	405	224
Bangladesh	20	2	22	13,751	160	227
Ethiopia	12	0	12	7,516	160	344
Papua New Guinea	34	3	37	26,302	141	250
Sudan	34	6	40	29,282	137	228
Indonesia	68	3	71	67,952	104	239
India	148	5	153	153,579	100	168
Vietnam	120	3	123	180,352	68	175
Pakistan	11	2	13	19,768	66	181
Cambodia	18	0	18	28,175	64	506
Afghanistan	11	1	12	21,140	57	168
Zimbabwe	11	0	11	21,142	52	601
Philippines	65	3	68	135,619	50	291
Thailand	14	1	15	32,747	46	142
China‡	60	8	68	203,143	33	100
Sri Lanka	22	0	22	70,908	31	60
South Korea	12	2	14	49,141	28	96
Egypt	10	0	10	38,782	26	25
Hong Kong	14	2	16	76,303	21	75
United Kingdom	27	1	28	1,153,264	2	14
Other overseas born	242	10	252	2,622,566	10	
Total overseas born	973	54	1,027	4,956,863	20.7	
Australia	168	5	173	15,648,625	1.1	
Total§	1,141	59	1,201	20,605,488	5.8	

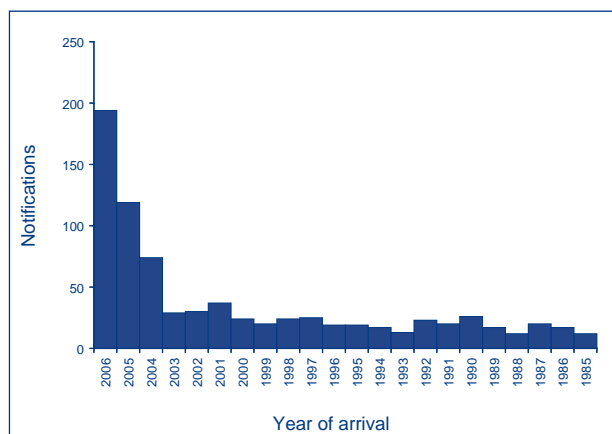
* The estimated resident population (ERP) at June 2006 (ABS 3412) except for Somalia ERP 2005.

† Rates from the World Health Organization 2007 Global Tuberculosis Report.

‡ China excludes Hong Kong SAR and Taiwan.

§ Country of birth unknown in one case.

Figure 4. Notifications of tuberculosis in the overseas-born population, Australia, 2006, by year of arrival in Australia



or humanitarian entrants and 10% were overseas students. Unauthorised entrants, made up only 6% nationally but 85% of cases (n=17) reported in the Northern Territory. These were illegal fishermen detained by Australian Customs diagnosed with TB and commenced on TB treatment. The majority of refugees (56/68, 82%), overseas visitors (20/31, 96%), and overseas-born students (47/51, 92%) diagnosed with TB arrived in Australia between 2002 and 2006. All unauthorised entrants diagnosed with TB in 2006 had arrived within the past 12 months. By contrast, overseas-born permanent residents diagnosed with TB in 2006 had arrived in Australia between 1940 and 2006.

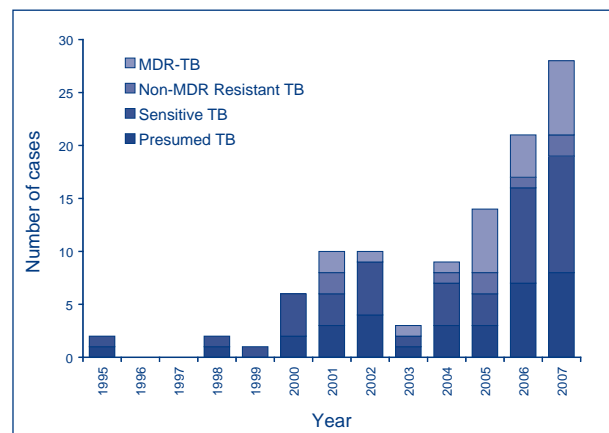
There was an increased number of notifications of TB in Queensland in 2006 among Papua New Guinea nationals accessing health care in the Torres Strait Islands treaty zone. Twenty-one cases, four with MDR-TB, were diagnosed in 2006. The number of cases (including MDR-TB cases) continued to increase in 2007 (Figure 5).

Tuberculosis notifications by age and sex

Information on the sex of TB cases was available for all cases and age was identified in all but two cases (1 non-Indigenous Australian-born and 1 overseas-born case). The male to female ratio in TB notifications was 1.5:1 in non-Indigenous Australian-born TB cases, 1:1 in Indigenous cases and 1.2:1 in overseas-born cases.

One of the most important measures of TB control is the incidence in children aged less than 15 years because these cases represent recent TB infection. TB was notified in 62 children aged less than 15 years in 2006, slightly lower than the number

Figure 5. Number of tuberculosis cases and susceptibilities among Papua New Guinea nationals accessing Queensland health facilities in the Torres Strait Treaty Zone, 1995 to 2007*



* Data provided by A Konstantinos, Director, Queensland TB Control Centre.

(65) reported in 2005. These were 21 Australian-born children and 41 children born overseas. Of the 21 Australian-born children, three were identified as Indigenous.

The NTAC target performance indicator for rates of TB in children aged less than 15 years is less than 0.1 cases per 100,000 population for all groups. The overall notification rate for the less than 15 years age group in 2006 was 1.6 cases per 100,000 population. The rate was highest in overseas-born children (19.8 cases per 100,000 population) and remained low in the non-Indigenous (0.5 cases per 100,000 population) and Indigenous Australian-born children (1.7 cases per 100,000 population, Table 5).

The age group incidence rates for TB in overseas-born, Indigenous Australian-born and non-Indigenous Australian-born populations are shown in Figure 6 and Table 5. TB incidence in the overseas-born population showed three peaks: one among infants aged less than five years; a second among young adults (15–34 years) and a third peak in the over 65 year age group. TB rates among Indigenous and non-Indigenous Australians showed increasing rates throughout adult life with the highest TB rates in those aged 65 years or more.

The age adjusted rate for Indigenous people was 18.1 per 100,000 (crude 6.6 per 100,000); 28.5 per 100,000 (crude 20.7 per 100,000) for overseas-born; and 0.9 per 100,000 (crude 0.9 per 100,000) in the non-Indigenous Australian-born.

Table 5. Tuberculosis notifications and estimated incidence rate, Australia, 2006,* by age group, indigenous status and country of birth

Age group	Indigenous Australian-born		Non-Indigenous Australian-born		Overseas-born	
	n	Rate	n	Rate	n	Rate
0-4	1	1.7	9	0.8	13	60.8
5-14	2	1.8	9	0.4	28	13.9
Subtotal < 15 years	3	1.7	18	0.5	44	19.8
15-24	6	6.4	8	0.3	139	30.5
25-34	3	4.5	21	1.0	254	35.6
35-44	5	10.6	7	0.3	180	20.1
45-54	7	25.6	9	0.5	138	15.3
55-64	5	41.0	14	1.0	78	9.6
65+	4	60.4	62	3.5	197	65.7

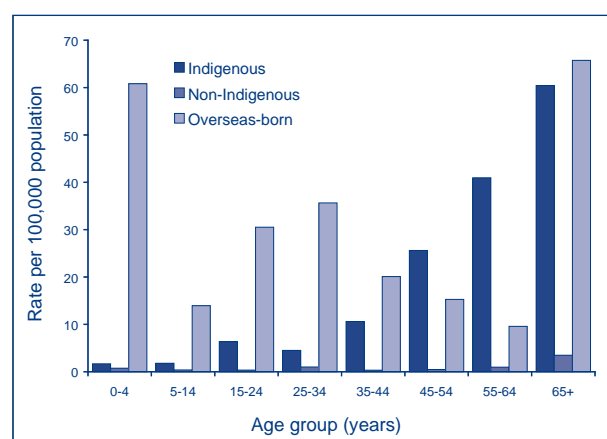
* One non-Indigenous Australian-born and one overseas-born case had no age information.

Tuberculosis and selected risk factors

Information on risk factors for TB disease, excluding HIV, were reported in 301 cases (Table 6).

Household or other close contact with a TB patient was the most common risk factor in all three patient groups. Sixty-five cases of TB were reported in people who had previously worked or were currently working in a health care setting; 54 of these were overseas-born. Past residence of three months or longer in duration in a TB high risk country (defined as more than 12.5 cases per 100,000) was reported in 29 cases, including 18 Australian-born cases.

The number of TB cases reported in health care workers has risen from 34 in 2001 to 65 in 2006. More importantly, among health care workers notified with TB, the proportion born overseas has increased from 47% (16 of 34 cases) in 2001 to 83% (54 of 65 cases) in 2006 (Figure 7). At diagnosis, most health care workers were or had been working in the previous 12 months in an Australian health care setting. None of

Figure 6. Tuberculosis incidence in Australian-born and overseas-born population, 2006, by age group

the cases were deemed to have acquired TB in an Australian health care setting, nor were there any reports of TB transmission to patients from health care workers in Australia in 2006.

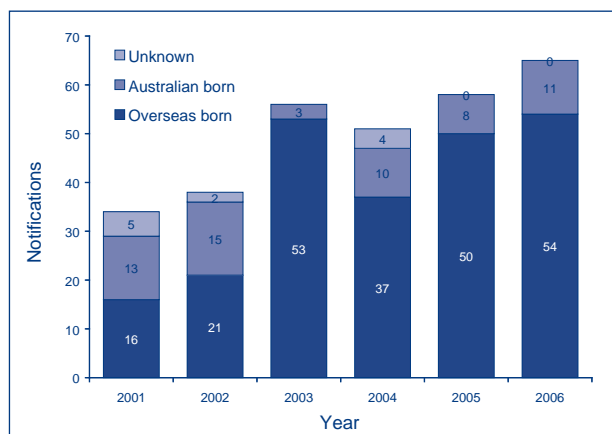
Table 6. Selected risk factors* in tuberculosis notifications, Australia, 2006, by indigenous status and country of birth

Risk factor	Indigenous	Non-Indigenous	Overseas-born	Total
Household or other close contact with TB	5	33	139	177
Currently or recently resident in correctional facility	1	1	3	5
Currently or recently residing in aged care facility	—	3	2	5
Currently or recently employed in an institution	—	3	17	20
Currently or previously employed in health industry	1	10	54	65
Past residence in high risk country	—	18	11 [†]	29

* Excludes HIV status (see below); includes multiple risk factors.

† Excludes overseas born in tuberculosis high risk countries (incidence > 12.5 cases/100,000).

Figure 7. Trends in cases of tuberculosis reported in health care workers, Australia, 2001 to 2006, by country of birth



Tuberculosis and HIV status

Information on HIV status was reported in 423 of the 1,201 cases (35.2%). Eleven people were identified with HIV infection at the time of diagnosis. All were overseas-born. In 2006, the proportion of cases with HIV status reported was similar to that in 2005.

Anatomical site of disease

The anatomical site of TB infection was recorded in 1,168 (97.2%) cases. Of these, 591 (50.6%) cases of notified cases had pulmonary disease only, a further 113 (9.7%) cases had pulmonary disease and disease at an extrapulmonary site. Pulmonary TB was reported in 78% of the Australian-born cases and 55% of the overseas-born cases. 464 (39.7%) cases had extrapulmonary disease only. The sites of disease in new and relapse cases are shown in Table 7.

Treatment outcomes of 2005 tuberculosis patient cohort

Treatment outcome data for all TB cases reported in 2005 were received by December 2007 (Table 8). Treatment success, including those with bacteriologically confirmed cure and those who completed treatment, was reported in more than 95% of non-Indigenous Australian born and overseas-born cases with assessable outcomes. In contrast, treatment success was reported in only 81% (17 of 21 with assessable outcomes, $p < 0.05$) of Indigenous TB patients. This lower treatment success rate was due to a small number of cases ($n=4$) with poor outcomes (Table 8). There were no treatment failures.

National Performance Indicators

Performance criteria for incidence (less than 1 per 100,000) were met only for the crude incidence rates in non-Indigenous Australian-born cases (Table 9). Incidence rates in under 15 year age groups exceeded the performance criteria (less than 1 case per million) in all groups. The completeness of HIV data collection remains well below the goal of 100%. Outcome reporting met the target of 100% for the 2005 patient cohort and while overall treatment success rate was met in the non-Indigenous and overseas-born, the treatment success rate in Indigenous cases (81.1%) was below the goal of >95%.

Discussion

In 2006, notification rates of TB in Australia remained low despite increases in some jurisdictions associated with more reports of TB in those born overseas. Increased notifications of TB were reported in unauthorised entrants such as Indonesian fishermen who were detained, diagnosed and started

Table 7. New and relapsed tuberculosis cases, Australia, 2006, by site of disease

Site	New	Relapse	Total	Per cent of cases
Total pulmonary disease	658	46	704	60.3
Pulmonary only	551	40	591	50.6
Pulmonary plus other sites	107	6	113	9.7
Extrapulmonary only	455	9	464	39.7
Pleural	67	0	67	5.7
Lymph nodes	165	6	171	14.6
Bone/joint	35	3	38	3.3
Genito/urinary	29	0	29	2.5
Milliary	16	1	17	1.5
Meningeal	24	0	24	2.1
Peritoneal	12	0	12	1.0
Other	59	2	61	5.2

Table 8. Tuberculosis treatment outcomes, Australia, 2005, by population group

Outcomes	Indigenous		Non-Indigenous Australian-born		Overseas-born		Total cases	
	n	% assessable	n	% assessable	n	% assessable	n	% assessable
Assessable outcomes								
Treatment success	17	81.0	108	95.6	795	95.7	920	95.3
Cured (bacteriologically confirmed)*	5	23.8	6	5.3	41	4.9	52	5.4
Completed treatment	12	57.1	102	90.3	754	90.7	868	89.9
Interrupted treatment†	1	4.8	0	0.0	5	0.6	6	0.6
Died of tuberculosis	1	4.8	3	2.7	9	1.1	13	1.3
Defaulted‡	2	9.5	2	1.8	9	1.1	13	1.3
Failure§	0	0.0	0	0.0	0	0.0	0	0.0
Not followed up, outcome unknown	0	0.0	0	0.0	13	1.6	13	1.3
Total assessable	21	100.0	113	100.0	831	100.0	965	100.0
Non-assessable outcomes	n	% total	n	% total	n	% total	n	% total
Transferred out of Australia	0	0.0	1	0.8	44	4.8	45	4.2
Died of other causes	3	12.5	14	10.9	35	3.8	52	4.8
Still under treatment	0	0.0	1	0.8	10	1.1	11	1.0
Total	24		129		920		1,073	

* Cured is defined as the bacteriologically confirmed cure of smear or culture positive pulmonary cases.

† Interrupted treatment means treatment interrupted for two months or more but completed.

‡ Defaulted means failed to complete treatment.

§ Failed means treatment completed but failed to be cured.

Table 9. National tuberculosis performance indicators, performance criteria and the current status of tuberculosis in Australia, 2005 and 2006

National tuberculosis Performance Indicator	Performance criteria	2005	2006
Annual incidence of TB (per 100,000 population)			
Crude incidence			
Indigenous Australians	<1	5.9	6.6
Non-Indigenous Australian-born persons	<1	0.8	0.8
Overseas-born persons	*	20.8	20.7
Relapse cases initially treated in Australia	<2% treated cases	1.4	0.9
Incidence in children <15 years, by risk group (per 100,000 population)			
Indigenous Australian children	<0.1	0.6	1.7
Non-Indigenous Australian-born children	<0.1	0.7	0.5
Overseas-born children	*	18	19.8
Collection of HIV status in tuberculosis cases (% of cases with data collected)	100% over next 3 years	37	35
Treatment outcome measures (%)			
Cases evaluated for outcomes†	100	100	TBA
Cases that have treatment completed and are cured	>90	95.3	TBA
Cases recorded as treatment failures‡	<2	0	TBA

* Performance criteria currently under review.

† Evaluation of outcomes of 2005 patient cohort re-assessed in October 2007.

TBA To be assessed: 2006 patient cohort outcomes to be reported in 2007 annual report.

on treatment for TB before deportation from Western Australia and the Northern Territory. In Queensland, Papua New Guinean nationals accessing health care in the Torres Strait Islands Treaty Zone contributed to an increase in that jurisdiction. In South Australia, several factors contributed to the increase in TB notifications, including 10 TB notifications in health care workers. These three groups are the focus of increased surveillance by tuberculosis services. Australian TB services continue to provide high quality services as evidenced by very high treatment success rates, low rates of relapse, the complete absence of treatment failure and low case fatality rate.

The number of TB notifications in health care workers has increased since 2001 and the proportion of these cases who were born overseas has also increased. These increases are linked to increasing recruitment of HCWs from countries with a high TB incidence in recent years. Ninety-five per cent of overseas-born HCWs diagnosed with TB in Australia since 2001 come from TB 'high risk' countries as defined by the Australian Government Department of Immigration and Citizenship (TB incidence > 12.5 per 100,000). In 2006, there were no reports of HCWs infecting patients, nor any proven cases of health care workers acquiring TB in an Australian health care setting. NTAC is developing a set of recommendations for screening and assessment of HCWs for TB prevention and control.

It is well recognised that those with HIV are more likely to become infected with *M. tuberculosis*, more likely to progress to active TB if *M. tuberculosis* infected, and more likely to have extrapulmonary disease than non-HIV infected. While the overlap of TB and HIV infection is still considered low in the Australian population, knowing the TB patient's HIV status allows for a best standard of care. In 2006, however the HIV status was reported for only 35.2% of Australia's TB cases, similar to the 37% reported for the 2005 TB cases. Emerson and Post observed that in the seven years, 1999 to 2005, only 21% of Australian notified TB cases had reported HIV status. They advocate an HIV test be offered, despite a low perceived risk for HIV infection, to all people with TB, with appropriate pretest discussion.⁸ In the United States of America it took 10 years (1993 to 2003) to increase the HIV testing of TB patients from 35% to 68%.⁹ It is hoped that those managing TB cases in Australia will heed the recommendation for HIV testing in a timely manner.

Since 1986, the Australian Mycobacterium Reference Laboratory Network (AMRLN) have collected data on bacteriologically confirmed TB cases, including drug susceptibility testing (DST)

results, and have published annual reports which complement the data in this report. The NNDSS and AMRLN datasets will be combined during the next 12 months. By combining the demographic and clinical information in the NNDSS dataset with the DST results provided by the AMRLN more detailed analyses will be possible. For example, future reports will provide drug resistance rates among new and re-treatment cases (rather than a single combined resistance rate). Drug resistance rates will also be computed for migrants and refugees from particular high-incidence countries (e.g. Indonesia, Somalia, Sudan), where MDR-TB rates are currently unknown. This information may assist Australian doctors to recognise patients at increased risk of drug-resistant disease and will be informative for international TB control organisations, such as the WHO. Of note regarding MDR-TB in Australia, a recent publication from NTAC, *The NTAC Multi-drug Resistant Tuberculosis (MDR-TB) Information Paper (October 2007)*, provides background information and advice on avoiding the production of MDR-TB, on the detection of MDR-TB, and approaches to treatment and management of cases and contacts on MDR-TB.¹⁰

Increased notifications of TB noted in some jurisdictions in 2006 were attributed to increased notification of TB in overseas-born residents. The failure to control TB within neighbouring nation states can pose direct public health threats to Australia as exemplified in the Treaty Zone between the outer Torres Strait Islands of Queensland and the various villages of the South Fly District of the Western Province of Papua New Guinea. Multi-drug-resistant tuberculosis has been detected among Papua New Guinean nationals accessing health care in the Torres Strait Islands within the treaty zone.¹¹ In 2006, 21 cases of TB (4 with MDR-TB) were diagnosed among these visitors; a significant contribution to the 129 new cases notified in Queensland that year. This has increased from the 14 (6 MDR) TB cases in 2005 and 9 (1 MDR) in 2004, and 2007 data show the number continues to increase among these visitors (A Konstantinos, personal communication).

Clearly, supporting effective TB control in this region would significantly decrease the risk of transmission of TB (including MDR-TB) across this border. With the high proportion of MDR-TB (10 of 35 cases diagnosed in 2005 and 2006), it is also important that the public health principles of TB management are maintained as failure to do so could bring not only MDR-TB but XDR-TB directly to Australia's doorstep. Therefore it is in Australia's interest to have regional and global involvement in TB control.

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References

1. World Health Organization. Global Tuberculosis Control: surveillance, planning, financing. Geneva: World Health Organization; 2007. Report No. WHO/HTM/TB/2007.376.
2. WHO/IUATLD global project on anti-tuberculosis drug resistance surveillance. Anti-tuberculosis drug resistance in the world: third global report 1999–2002. Geneva: World Health Organization; 2004. Report No. WHO/HTM/TB/2004.343.
3. Wright A, Bai G, Barrera L, Boulahbal F, Martin-Casabona N, Gilpin C, et al. Emergence of *Mycobacterium tuberculosis* with extensive resistance to second-line drugs – world wide, 2000 – 2004. *MMWR Morb Mortal Wkly Rep* 2006;55:301–305.
4. Gandhi NR, Moll A, Sturm AW, Pawinski R, Govender T, Lalloo U, et al. Extensively drug-resistant tuberculosis as a cause of death in patients co-infected with tuberculosis and HIV in a rural area of South Africa. *Lancet* 2006;368:1575–1580.
5. Raviglione MC, Smith IM. XDR tuberculosis—implications for global public health. *N Engl J Med* 2007;356:656–659.
6. Roche PW, Bastian I, Krause V, National Tuberculosis Advisory Committee. Tuberculosis notifications in Australia, 2005. *Commun Dis Intell* 2007;31:71–80.
7. Lumb R, Bastian I, Gilpin C, Jelfs P, Keehner T, Sievers A. Tuberculosis in Australia: bacteriologically confirmed cases and drug resistance, 2006. A report of the Australian *Mycobacterium* Reference Laboratory Network. *Commun Dis Intell* 2008;32:12–17.
8. Emerson CR, Post JJ. To routinely offer testing for HIV infection in all cases of tuberculosis: a rational clinical approach? *Med J Aust* 2008;188:162–163.
9. Marks S, Magee E, Robison V. Reported HIV status of tuberculosis patients—United States, 1993–2005. *MMWR Morb Mortal Wkly Rep* 2007;56:1103–1106.
10. National Tuberculosis Advisory Committee. Multi-drug-resistant tuberculosis. *Commun Dis Intell* 2007;31:406–409.
11. Gilpin CM, Simpson G, Vincent S, O'Brien TP, Knight TA, Globan M, et al. Evidence of primary transmission of multi-drug-resistant tuberculosis in the Western Province of Papua New Guinea. *Med J Aust* 2008;188:148–152.