

THE STRATEGIC PLAN FOR CONTROL OF TUBERCULOSIS IN AUSTRALIA: 2011–2015

Key challenges, priorities and actions for tuberculosis (TB) control in Australia:

Challenges

- Maintaining the commitment to TB control in the face of low TB incidence in Australia
- Developing new strategies for TB control in a period of high rates of immigration, particularly from countries with high burdens of TB
- Managing increasing drug resistance
- Maintaining a workforce skilled in clinical, laboratory, and public health aspects of TB control
- Maintaining universal access to rapid and reliable diagnosis and treatment for TB

Priorities

- To provide a high standard of diagnosis and treatment of TB
- To enhance surveillance for TB in groups at higher risk
- To reduce the disparities in TB rates among population sub-groups within Australia
- To minimise the development of drug resistance within Australia
- To ensure the continued provision of safe, timely laboratory diagnosis of TB
- To provide regional support and leadership for the elimination of TB

Key actions

- Develop a strategy for awareness campaigns for primary care and organisations representing high risk groups
- Develop a plan for recruitment, training and retention of the TB workforce
- Develop a national strategy for long term assured supply of quality TB diagnostics and medications
- Publish national practice guidelines for TB
- Increase engagement with regional partners in TB control
- Achieve real time national reporting of combined clinical and laboratory data

1. Executive summary

Australia is in an enviable position of having achieved and maintained one of the lowest rates of TB in the world. Despite this, TB continues to pose challenges, reflecting the ongoing global problem. These challenges include an increasing incidence of multi-drug-resistant TB (MDR-TB), the development of extensively drug-resistant TB (XDR-TB), the human immunodeficiency virus (HIV) pandemic, and immigration to Australia. Local challenges include secure supplies of diagnostics and pharmaceuticals and an ageing workforce.

In the Australian-born population the rate of TB is very low and elimination is likely in the next 20 years. However, absolute numbers of TB notifications are increasing with 80%–90% of Australia's new cases occurring in arrivals from high burden countries,¹ including student and healthcare worker arrivals. It is predicted that by 2056 Australia's population will have risen from 22 to 35 million largely due to new

arrivals.² The burden of TB in Australia will depend on future immigration policy, the control of TB in new arrivals, and the detection of TB as migrants age.

In order to maintain TB control in Australia we need to ensure there is a continuing high standard of diagnosis and treatment. This will require the current TB control infrastructure to be continued, including reporting mechanisms, laboratories, workforce and communication.

To further improve local TB control, we need to prioritise higher-risk groups; Aboriginal and Torres Strait Islanders and overseas-born persons. In addition, support for global TB control activities through continued engagement in regional TB control programs and by improving existing and developing new diagnostics, treatments and vaccinations is required.

2. Vision

Our vision is to eliminate TB within Australia.

3. Guiding principles

The guiding principles underpinning Australia's response to TB are:

- strong State and Territory based TB programs, ensuring a close working relationship between public health, laboratory, and clinical services, with strategic advice provided by the National Tuberculosis Advisory Committee (NTAC);
- continued leadership provided by Australian Governments to facilitate national policy formulation, coordination, and implementation;
- early diagnosis and effective programmatic management of TB consistent with the World Health Organization (WHO) Stop TB Strategy;
- active case finding in high risk groups with prompt recognition and facilitation of management of comorbidities (e.g. HIV);
- removing barriers to effective and prompt diagnosis, management and treatment of persons with active TB to ensure efficient passive case finding;

- timely surveillance to monitor and evaluate TB control efforts;
- participation in global and regional TB control; and
- consistency with the Stop TB Strategy.

4. Governance: The NTAC, CDNA and AHPC

In 1999, the Communicable Diseases Network Australia (CDNA), a sub-committee of the Australian Health Protection Committee (AHPC) endorsed the formation of NTAC. NTAC has two terms of reference:

1. To provide strategic, expert advice to CDNA on a coordinated national and international approach to TB control.
2. To develop and review nationally agreed strategic and implementation plans for the control of TB in Australia.

5. Goals, Objectives and Indicators

Goal	Objective	Indicator
To ensure sound tuberculosis (TB) control through rapid diagnosis, treatment and notification of TB.	Maintain awareness and education of all stakeholders, including professionals and local communities, of the continuing importance of TB control within Australia. Ensure accurate and timely diagnosis. Ensure timely access to appropriate treatment. Encourage communications amongst and between all stakeholders.	Proportion of cases with a diagnostic delay of greater than 1 month. Complete and current national guidelines. Proportion of TB notifications confirmed by microbiological laboratory diagnosis. Proportion of laboratories meeting recommended turn around time. Proportion of successful treatment of TB. Proportion of cases initially treated in Australia who relapse within 5 years of treatment. Proportion of culture-confirmed cases that undergo drug susceptibility testing.
To improve surveillance and reporting.	Ensure timely and accurate reporting of TB to all levels.	Proportion of TB cases with a recorded HIV status. Completeness of quarterly reporting. Publication of a combined notification and laboratory annual TB report by December of the following year. Annual reporting to WHO.
To eliminate TB in the Australian-born population.	Prevent the transmission of TB within Australia. Ensure prompt and effective contact tracing.	Incidence of TB in: <ul style="list-style-type: none"> Indigenous Australian-born children/adults; Australian-born non-indigenous children/adults. Number of cases of TB acquired within Australian health care institutions/ laboratories.
To reduce difference in the incidence of TB between the overall Australian rate and specific higher risk groups.	Enhance the extent and effectiveness of special TB programs for high risk groups, including: <ul style="list-style-type: none"> Active case finding, particularly in recent migrants; Detection and management of TB infection. Work collaboratively with the Department of Immigration and Citizenship (DIAC).	Incidence of TB in Aboriginal and Torres Strait Islanders. Incidence and characteristics of TB in: <ul style="list-style-type: none"> Overseas born persons; Healthcare workers; Irregular Maritime Arrivals.
To prevent the development and transmission of drug resistant TB in Australia.	Ensure prompt detection of drug resistance. Ensure effective case management of all cases of TB. Ensure good infection control practices in clinical and laboratory settings.	Time to identification of drug resistant TB. Incidence and characteristics of drug resistant TB acquired within Australia. Incidence and characteristics of drug resistant TB in migrants.
To assist global TB control activities.	Advocate and participate in actions towards TB control in the region. Contribute to the Western Pacific Region (WPR) Technical Advisory Group.	Incidence of TB in the region. Report Australia's participation in global control activities, annually.

6. Background

Tuberculosis a major global health problem

WHO estimates that there were 9.4 million incident cases, with 14 million prevalent cases of TB in 2009. There were 1.3 million deaths among HIV-negative people and 0.38 million deaths among HIV-positive people. There were 0.44 million incident cases of MDR-TB globally in 2008 and 0.15 million deaths from MDR-TB. It is estimated in 2009 that MDR-TB accounts for 3.3% of incident cases of TB. XDR-TB has now been confirmed in 58 countries.³ TB is one of the world's most prevalent infectious killers.

TB continues to be a global problem for many reasons including:

- poverty and conflict;
- lack of political commitment;
- health system weaknesses, which affect the programmatic management of TB in both the public and private sectors;
- the lack of suitably trained and qualified human resources;
- the lack of quality assured drugs;
- the lack of standard infection control activities;
- migration (both in-country and between countries);
- the co-existence of TB with HIV;
- the increasing proportion of MDR-TB cases; and
- the recent emergence of XDR-TB.

The changing epidemiology of TB in our region and globally will impact on TB control in Australia in the years to come. In particular, the high prevalence of MDR-TB in some countries including the Asia-Pacific region will be reflected in TB cases in Australia in the future, and TB services need to plan for this development. The improvements in care of MDR-TB have made it possible to control the disease in over 50% of cases but it requires special multidisciplinary care by expert groups.

Tuberculosis in the Western Pacific Region

In October 2010, the Western Pacific Regional Office (WPRO) adopted the *Regional Strategy to Stop Tuberculosis in the Western Pacific (2011–2015)* with the goal of reducing by half the prevalence and mortality from all forms of TB by 2015. According to the latest WHO estimates, the WPR is not likely to achieve its goal. In 2007, there were an estimated 1.9 million incident TB cases and 0.3 million TB deaths in the WPR. China, the Philippines, Viet Nam and Cambodia together account for 93% of incident cases in the WPR.⁴

Particular challenges arise for Australia because of historical relationships with countries within the WPR and the special relationship with Papua New Guinea (PNG) across the Torres Strait. Traditional peoples on both sides of this narrow seaway have family and kinship relationships and are entitled to travel, with comparative ease, across the border.

The failure to control TB within neighbouring countries poses direct public health threats to Australia, as seen 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 PNG. Transmission of MDR-TB has been recognised among PNG nationals accessing health care in the Torres Strait Islands within the treaty zone. From 2004 to 2007, 24 cases of MDR-TB were diagnosed among these visitors representing a substantial demand on human and financial resources.⁵

Tuberculosis in Australia

In the past three decades, Australia has achieved and maintained one of the lowest rates of TB in the world.

The majority (75%) of the Australian resident population are born in Australia.⁶ This includes those born of immigrant parents. In this group, the rate of TB disease is very low, with new disease cases coming largely from the previously infected elderly population.

The present low rate of TB in Australia can be attributed to improved socioeconomic circumstances in the 20th century and the vision and sound public health programs of policy makers, clinicians and the political commitment of all Australian governments. They laid the framework for the very successful National TB Campaign following World War II.

The low rate of TB has been maintained despite large-scale immigration from countries, all with considerably higher TB rates than Australia. This is largely the result of effective pre-migration screening and the activities of specialised, multidisciplinary TB services in the States and Territories.

Prior to 1950, the incidence of active TB in Australia was over 45 per 100,000. During the 1950 to 1976 National Tuberculosis Campaign, there was a rapid and sustained decline in the notification rate of new cases.⁷

Since 1986, there has been a further decline in the rate of notified cases to a plateau of 4.8–5.9 per 100,000. In 2008, there were 1,210 cases (5.5 per 100,000) of TB reported in Australia. These rates

are considerably lower than the global incidence of 137 per 100,000 in 2009 and continue to compare favourably with other developed countries.⁸

Mortality rates from TB have also declined substantially from 10 per 100,000 in 1954 to less than 1 per 100,000 in 2008.

Although rates of TB in Australia have remained low, the absolute numbers of TB cases have increased by 33% between 1998 and 2008, corresponding with Australia's migration policy and increasing population. Additionally, specific subgroups, such as Indigenous people and persons born overseas, still have rates many times those of non-Indigenous Australian-born persons.

Recently, the emergence of drug resistance has translated into a marked increase in cost per case managed. Despite this, TB services have not grown to meet changes in demand.

MDR and XDR-TB

The emergence worldwide of MDR-TB, and more recently XDR-TB,⁹ has highlighted the importance of sustained TB control programs and systems of care to avoid the development of resistant strains, and to appropriately diagnose and manage cases that arise.

In 2008, an estimated 440,000 cases of MDR-TB emerged globally. India and China carry the greatest estimated burden of MDR-TB, together accounting for almost 50% of the world's total cases. More than three quarters of the estimated cases of MDR-TB occur in previously untreated patients. The proportion of MDR-TB cases among new cases and previously treated cases of TB reported globally from 1994 through 2009 ranged from 0% to 28.3% and from 0% to 61.6%, respectively. The highest proportions of MDR-TB cases, and the most severe drug-resistance patterns, appear in the countries of the former Soviet Union.

In 2009, there were 31 cases (2.9%) of MDR-TB identified in Australia from all isolates tested. This proportion was higher than in previous years, which has been around 1.5% of isolates tested. This highlights an increasing trend in MDR-TB case identification since drug susceptibility data collection began in 1986.

NTAC has identified that a large proportion of these cases of MDR-TB since 2006 occur in PNG nationals who are provided with humanitarian treatment by and within Australia.

Recent documented difficulties in TB control in other high income nations with a low TB burden,

and the concerns regarding TB control in countries in our region highlight the need for continued vigilance.^{10,11}

The US Centers for Disease Control and Prevention (CDC) and WHO reported results of an international survey that found 2% of more than 17,000 MDR-TB isolates collected between 2000 and 2004 were XDR-TB.¹² By the end of 2008, 58 countries had reported at least 1 case of XDR-TB. In Australia there has been one confirmed case of XDR-TB identified from retrospective analysis of laboratory records since 2004 against the WHO case definition (2006). The financial and human resource cost of the management of this one case has been substantial.

7. Australia's Priority Populations

NTAC has identified the following groups as being at higher risk of TB than most of the population. These populations have rates of TB disease much greater than 6 per 100,000.

Persons in close contact with active disease

Special attention is paid to those in recent contact with infectious TB throughout Australia. Australia's excellent TB control activities identify transmission of TB early and treat latent infection to prevent ongoing transmission, but occasionally a large cluster of infected cases is found. Contact tracing requires extensive and prolonged public health action.

Indigenous Australians

The rate of TB in the population of Indigenous Australians has decreased over the past 10 years but still remains approximately 7 times the non-Indigenous rate. Rates increase with age and transmission of TB to infants and children still occurs. Indigenous Australians have higher rates of infections, disease, hospitalisation and mortality from TB than non-Indigenous Australians.¹³ Observations from contact tracing and via molecular testing have shown clustering of cases in households, remote and town-camp communities and in regional areas. From 2000 to 2010 there have been 24 cluster-linked cases identified in a network of Indigenous people from coastal northern New South Wales to southern Queensland.

Overseas-born persons

Immigrants from high burden countries have contributed to more than 80% of TB cases in Australia since 2000. The rates in middle income and less well resourced countries vary between 20 and 400 cases per 100,000 population. Most notified cases in Australia have places of birth in the WPR and the

South East Asia Region (SEAR). The rates of TB in overseas-born people have risen steadily over the past 10 years from 14.1 to 20.4 cases per 100,000. The age incidence rate in the overseas-born tends to show three peaks: one among children aged less than 5 years; a second among young adults (15–34 years); and a third peak in the over 65 year age group.

Secondary and tertiary students

Over 200,000 student visas were granted in 2009–10.¹⁴ A majority of these students were from countries in the WPR and SEAR with a high burden of TB. Whilst students are screened for active TB prior to entry to Australia, after arrival they have a predictably higher rate of TB. When active disease develops in this group it can have a serious social and economic impact disrupting their education and contributing to great stress in the family offshore. Additionally, the community and media take a special interest in such incidents.

Strengthened relationships with educational institutions are required to promote screening for TB infection and to detect active TB earlier.

Health care workers

Health care workers (HCW) have been identified recently as an important population sub-group amongst the overseas-born in Australia. In 2001, there were 17 cases of TB in overseas-born HCWs, rising to 83 cases in 2008. The rise is attributable to the increasing recruitment of HCWs from high burden countries. While there have been no recent reports of TB transmission to patients from notified TB cases in HCWs the possibility of this occurring when there are high rates of TB infection in the workforce needs to be recognised. HCWs serve in a variety of health care settings in the community e.g. hospitals, community clinics and aged care facilities and provision of appropriate TB screening and follow up services for HCWs are essential.

Other potential risk groups

Elderly and immunosuppressed persons

The aging population (those born before 1950) have a higher rate of TB infection and are at an increased risk of progressing to active disease by therapeutic interventions or comorbidities that cause immunosuppression.

Likewise, people of any age referred for immunosuppressive treatments or for solid organ transplants are at an increased risk of acquisition of TB or progression to disease from TB infection. Therefore, those on high dose corticosteroid treatment or tumour necrosis factor (TNF) inhibitors, now used

widely for the management of rheumatoid arthritis, ankylosing spondylitis, psoriasis and inflammatory bowel disease and prospective transplant recipients, require appropriate screening and treatment for TB infection prior to commencing immunosuppression.

Tuberculosis and HIV co-infection

HIV infection has been globally recognised as an important risk factor for increased susceptibility to TB infection and the risk of developing active TB. Globally, TB is one of the major causes of death amongst people with HIV. HIV positive cases are also more likely to have extra-pulmonary disease than non-HIV infected cases.

To date, there has been a limited overlap between those with HIV infection and those with TB in Australia. HIV-TB co-infection is mainly found in overseas-born persons. In 2008, information on HIV testing status at the time of TB diagnosis was reported in only 83% of TB notifications nationally and of these people, less than 1% (11 cases) were identified as being HIV positive. The results of HIV testing of all TB cases are still not available in Australia. This needs to be addressed.

Other risk groups

In contrast to previous and current overseas experience, the risk of TB disease in some groups in Australia, such as the homeless, prison residents and nursing home residents, is very low. The background TB infection rate in the first two groups is likely to be low, while the rate in the last group is likely to be higher. Regardless, all these settings have the potential for isolated outbreaks of TB to occur.

8. Surveillance and laboratory services

Surveillance

The Commonwealth, together with NTAC, monitors the incidence of TB on a national basis using agreed enhanced data provided by State and Territory health authorities and laboratories, in conjunction with the National Notifiable Diseases Surveillance System (NNDSS).

The key elements of TB surveillance include:

- maintenance of the NNDSS and enhanced data systems; and
- reporting to WHO.

The Governments of Australia need to continue to maintain national TB surveillance in order to inform TB policy. This requires close working relationships with the States and Territories and national bodies,

including NTAC, the Department of Immigration and Citizenship, and the Public Health Laboratory Network (PHLN).

Laboratory services

State TB reference laboratories have responsibility for TB testing and antibiotic susceptibility testing. There are two Supranational TB Reference Laboratories in Australia.

The five state mycobacterium reference laboratories (MRLs) undertake the following functions:

- provision of basic TB diagnostic services in cooperation with other public and private laboratories;
- provision of specialised TB diagnostic services, such as mycobacterial identification, drug susceptibility testing, and rapid molecular detection of drug resistance;
- provision of molecular epidemiological typing by a nationally-approved method;
- provision of specialised diagnostic services for the investigation of clinically-significant non-tuberculous mycobacteria (NTM) infections;
- delivery of national quality assurance programs; and
- training of clinical, public health and laboratory personnel to maintain expertise in mycobacterial diagnostics in both the public and private sectors.

Like the TB services in general, the reference laboratories face the challenges of a workforce with diminishing expertise and a predicted increase in workload. Laboratory-specific challenges include the rising costs of providing a range of rapid molecular diagnostic tests. Compliance with progressively more stringent biosafety standards presents an additional challenge.

Expertise within the MRLs could be enhanced by the establishment of a mentoring scheme within Australia and by encouraging MRLs to support national TB laboratory services in neighbouring higher burden TB countries. Finally, the TB laboratories must remain an integral part of the national and state TB control programs, and must be integrated into the programs' computerised data management systems. Finally, to meet the challenges listed above, the MRLs will require the continued support of federal and state governments so that the laboratories can remain an integral part of the nation's TB control program.

9. Workforce

TB care and control is an essential element of a health system, and like other parts of the health

system is increasingly vulnerable to constraints upon human resources. In Australia, as in all low burden well resourced countries, the TB workforce is ageing, the distribution is uneven, the capacity diminishing and the knowledge and skills lost are not being replaced. Although TB prevalence continues to decrease, absolute numbers are increasing, and cases are becoming increasingly more complex, demanding more time and increasingly highly skilled health workers. In line with the increasing sub-specialisation of health care, TB care and control is becoming a sub-specialty and TB disease is becoming an unfamiliar issue in an overcrowded undergraduate health curriculum.

Replacement, education and training of the workforce needs to be planned to enable continuing control of TB.

Strengthening the capacity of health and community services to respond effectively to TB will reduce the burden of this infection on Australia.

It is essential to:

- ensure that there is a sufficient pool of expertise in the future to maintain the necessary clinical, laboratory and public health activities for TB control in Australia; and
- maintain awareness in the general health workforce.

10. Abbreviations

AHPC	Australian Health Protection Committee
CDC	Centers for Disease Control and Prevention
CDNA	Communicable Diseases Network Australia
DIAC	Department of Immigration and Citizenship
HCW	health care workers
HIV	human immunodeficiency virus
LTBI	latent tuberculosis infection
MDR-TB	multi-drug-resistant tuberculosis
MRL	mycobacterium reference laboratories
NNDSS	National Notifiable Diseases Surveillance System
NTAC	National Tuberculosis Advisory Committee
NTM	non-tuberculous mycobacteria
PHLN	Public Health Laboratory Network
PNG	Papua New Guinea
SEAR	South East Asia Region
TB	tuberculosis
TNF	tumour necrosis factor
WHO	World Health Organization
WPR	Western Pacific Region
WPRO	Western Pacific Regional Office
XDR-TB	extensively drug-resistant tuberculosis

11. Definitions

In this plan the following definitions apply:

Active case finding is the deliberate search for TB disease or infection by means of clinical and radiographical examination, supplemented by tuberculin skin testing.

Case management is a system of healthcare delivery in which an individualised treatment plan for the patient is developed by a multidisciplinary team to achieve established patient care outcomes.

Contact refers to a person who has shared air with a person who has been notified with active disease.

Elimination of TB refers to less than one infectious (sputum smear positive) case per million in the general population.

Extensively drug-resistant tuberculosis is defined as MDR-TB plus resistance to any fluoroquinolone and at least one second-line injectable (amikacin, kanamycin or capreomycin).

Health care workers refer to all health care professionals, including trainees, students, and employees of health care establishments who have contact with patients.

Health undertaking is a medical service required for visa applicants who, through their medical examination for an Australian visa, are found to have evidence of exposure to TB or other diseases that may be of concern (such as hepatitis B).¹⁵

High risk groups refer to population segments with increased risk of exposure to TB

Immunosuppressed are persons whose immune response is inadequate and consequently their ability to fight infections is impaired.

Multi-drug-resistant tuberculosis is defined as TB caused by strains of *Mycobacterium tuberculosis* resistant to at least isoniazid and rifampicin.

Passive case finding involves detecting active TB disease among patients who present to medical services for diagnosis of symptoms.

Tuberculosis disease refers to an infectious disease caused by the *Mycobacterium tuberculosis* complex.

Tuberculosis (latent) infection refers to a subclinical infection with the tubercle bacilli without clinical, bacteriological or radiological features of disease.

Surveillance refers to the ongoing, systematic collection, analysis, interpretation, and dissemination of data regarding a health-related event for use in public health action.

12. Acknowledgment

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