

**DISCUSSION PAPER:  
TOWARDS A NATIONAL COMMUNICABLE  
DISEASE CONTROL FRAMEWORK**



**Australian Government**  
**Department of Health**

## Discussion Paper: Towards a National Communicable Disease Control Framework

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# 1. Preface

## Process for development of a Communicable Disease Control Framework

In 2011, the Australian Health Protection Principal Committee (AHPPC) asked the Communicable Disease Network Australia (CDNA) to propose a draft *Communicable Disease Control Framework Australia* (the proposed Framework), for consideration by Australian Health Ministers. AHPPC requested that a system-focused rather than diseases-focused national framework include a comprehensive overview of current communicable disease management in Australia, identification of the essential elements and any capability gaps, and recommendations for priority actions to enhance communicable disease prevention and control to allow Australia to meet current and future threats.

As a Federation, the delivery of health services including communicable disease control is a shared responsibility of the Australian Government and state and territory governments. Developing the Framework will require consideration of a range of issues associated with current governance and delivery of core communicable disease control functions, many of which are split across legislated Australian, state and territory responsibilities.

The CDNA working group formed to support the development of the proposed Framework has membership based on expertise in communicable disease control through state and territory health departments, professional associations and academia. The membership and terms of reference are available in Section 8 of this paper.

Communication with stakeholders about the proposed Framework and consultation on possible areas for action are critical to its success. Initial input on this Discussion Paper is sought from people and organisations within communicable disease control to ensure technical aspects of the paper are sound. Broader consultation with state and territory governments, professional and consumer groups, and interested people or organisations will form part of the proposed Framework development process.

This Discussion Paper, developed by the CDNA Working Group, provides information on key issues impacting our current system of communicable disease control. It defines the essential elements underpinning the Australian system as core functions, special national functions and enablers. Within these elements, the paper proposes seven priority areas to strengthen Australia's future communicable disease control system.

For each priority action area, the paper provides a snapshot of:

- Why is it important?
- What issues are affecting this action area?
- How can we address the issues?

The purpose of the Discussion Paper is to seek input on whether the possible areas for action address the challenges facing national communicable disease control in Australia. The paper poses questions as the basis for consultation.

Feedback from consultation will enable drafting of a proposed *National Framework for Communicable Disease Control* to be considered and agreed by AHPPC in the second half of 2013. Subject to AHPPC's agreement, it is planned that a proposed Framework be considered and agreed by AHMAC by late 2013 and be ready for consideration by the Standing Council on Health (SCoH) in early 2014.

## How to provide input or comment

You are invited to provide written input or comment on this Discussion Paper. Submissions can be sent by email.

## Content of submissions

Your submission should include:

- Name and full contact details including email address, company name and designation of submitter.
- Comments on areas/questions in the Discussion Paper that are of interest to you
- Any other relevant technical information supporting your comments or views
- Identification and discussion of perceived omissions on the Discussion Paper or alternative approaches

## Confidentiality of submissions

Unless otherwise indicated, all submissions may be published on the Department of Health and Ageing website. If you wish any information to be treated as confidential, please explicitly and clearly identify that information and outline the reasons why you consider it confidential. General disclaimers in covering emails will not be interpreted as a specific request or taken as sufficient reason to submissions to be treated confidentially. Submissions including personal information identifying specific individuals will be de-identified prior to publication.

## Email Address for submissions

[Consultation.Communicable.Diseases@health.gov.au](mailto:Consultation.Communicable.Diseases@health.gov.au)

(email address valid only until submission deadline)

## Deadline for submissions

Friday 23 August 2013

\*\*Changes to document since first released for consultation

Minor adjustments have been made to the Discussion Paper based on inaccuracies identified during the consultation period.

# 2. Introduction

## Why Now?

Australia has made considerable progress controlling and preventing communicable diseases over the last century, reducing communicable disease related mortality from 13% of all deaths in 1907 to 1.3% in 2009 (1). Progress can be attributed to improvements in sanitation, the introduction of antibiotics and immunisation programs and ongoing work of health departments responding to outbreaks and monitoring important infections.

However the risk posed from communicable diseases is never static and they remain a prominent public health concern in Australia and many parts of the world. We must constantly look for ways to improve our capacity to coordinate, to respond and control important communicable diseases to protect the health of Australians.

This Discussion Paper sets the strategic context by describing current challenges in communicable disease control and roles and responsibilities in the Australian context. It summarises the key findings of the communicable disease control system overview in 2012 which informed the development of this paper.

The Discussion Paper outlines proposed elements of the Australian communicable disease control system as core functions, special national functions and enablers.

Core functions could include:

- surveillance,
- laboratory services,
- preparedness and acute response,
- policy and programs, and
- public health research.

System enablers underpinning all functions could include:

- governance and leadership,
- workforce and training,
- partnerships,
- communication, and
- funding and infrastructure.

Special national functions could be:

- biosecurity,
- international engagement, and
- priority populations.

Using this system-based approach, the paper identifies capability gaps within the system elements, discusses issues affecting priority areas and poses questions on how to address the issues to enhance communicable disease prevention and control in Australia.

# 3. Strategic context

Communicable diseases present a major threat to health and society in Australia. Recent changes in the landscape of communicable disease control, including new threats, such as emerging infectious diseases, biosecurity issues and climate change, have provided an impetus for Australia to review its current systems for communicable disease management and prevention. Advances in technology and changes in population behaviours present an opportunity to re-examine the most appropriate ways of responding. The mobility of the world's population means that communicable diseases are no longer able to be managed just within nation states nor in jurisdictions within a nation. The modern challenge is to build a robust communicable disease control system able to efficiently detect, prevent and control new and re-emerging infectious disease issues, while maintaining Australia's low levels of more familiar communicable disease issues.

## Challenges for communicable disease control

### Global epidemics can be devastating to national economies

Epidemics can place intense demands on a nation's healthcare system, through widespread illness and mortality, and can cause enormous social and economic disruption. Severe Acute Respiratory Syndrome (SARS) was first reported in Asia in February 2003. The illness spread to more than two dozen countries in North America, South America, Europe, and Asia before the global outbreak was contained. It cost the global economy an estimated US \$40 billion (2) demonstrating that the true cost of global outbreaks is far in excess of the treatment of cases alone.

### Outbreaks can result in unnecessary deaths

Several communicable diseases can kill healthy individuals. For example, the 2011 European outbreak of enterohaemorrhagic *Escherichia coli* affected 3816 people, causing 54 deaths and 845 cases of haemolytic uraemic syndrome (3). Within a relatively short period of time, epidemiological studies and systematic tracing of food products identified sprouts as the vehicle of infection, but not before considerable cost to society and the food industry. Even with excellent food safety systems, contaminated food events can cause serious outbreaks because infectious agents can spread far and wide through domestic and international food supply chains. In the absence of adequate human capacity to detect and investigate outbreaks to determine the source, spread continues and unnecessary and preventable deaths occur.

## 'Old' diseases persist

Successful public health programs, especially vaccination, mean that today's population is largely unfamiliar with 'old' diseases such as measles, polio and tuberculosis. But these diseases still occur and can spread quickly if programs are unable to keep pace with new disease threats or changes in the environment and human behaviour. Tuberculosis (TB), as an example, remains a significant global health threat, with unrecognised infections and drug-resistant strains complicating control efforts. Effective interventions in Australia during the twentieth century have resulted in a low rate of TB in the Australian-born population. But absolute numbers of TB notifications are increasing with 80%–90% of Australia's new cases occurring in arrivals from high burden countries, including student and healthcare worker arrivals (4). Supporting local, regional and international TB control programs is critical to maintain low levels of disease in Australia and prevent the spread of drug-resistant TB.

## Infections impact on health systems

A considerable proportion of health service use is attributed to infectious disease. In 2010, infections accounted for 1 in 6 problems managed by general practitioners. Furthermore, in 2009–10, there were nearly 128,000 hospitalisations with infectious and parasitic diseases as the principal diagnosis, the majority (84%) of which occurred in public hospitals (1). Infections can also be acquired during a stay in hospital, and these are concerning for both patients and the health-care system. Such infections can prolong a patient's stay, aggregate existing conditions or, in some cases, lead to death. Examples include infection of a surgical wound, bloodstream infections from an intravenous catheter, or hospital-acquired pneumonia. In recent years, some bacteria have become resistant to standard antibiotics. The most prominent examples are methicillin resistant *Staphylococcus aureus* (MRSA) and vancomycin resistant *Enterococcus* (VRE).

## Human behaviours still drive disease

Some of the most common and most concerning communicable diseases are driven by seemingly modifiable human behaviours. There are around 200,000 healthcare-associated infections (HAIs) in Australian acute healthcare facilities each year (5). Implementation of infection control programs reduces HAIs. Programs recommend behaviours such as hand hygiene and maintaining a clean environment but time and time again, poor adherence to hand hygiene, in particular, compromises control efforts. Improved healthcare worker hand hygiene is now the highest priority of the Australian Commission on Safety and Quality in Healthcare to combat the rise of HAIs, and the National Health Performance Authority is responsible for the public reporting of the hand hygiene indicator via the *MyHospitals* website. It is critical that prevention programs for all diseases enable individuals to adopt protective behaviours promoted by system wide and environmental changes.

## Traditional treatments losing effect

Antimicrobial agents used to be highly successful in treating infections but their unrestricted use in humans and animals has led to an alarming rise in antimicrobial resistance, especially in the developing world (6). Australia is vulnerable. Antibiotic-resistant bacterial infections occur in hospitals and increasingly in the community rendering first line treatments ineffective. Comprehensive and coordinated government led responses across the world are vital to preserving our ability to treat infectious diseases.

## Communicable diseases are linked to chronic diseases

Infectious agents can cause cancer and other long term debilitating illnesses. Chronic viral hepatitis infections cause liver cancer, human papillomavirus infections cause cervical cancer, and *Helicobacter pylori* bacterial infections are linked to gastric cancer. Some gastrointestinal infections caused by microorganisms such as *Salmonella* and *Campylobacter* can cause persistent arthritis. Preventing longer term complications can be difficult. For example, many people with chronic viral hepatitis are unaware they are infected, increasing their risk of chronic liver disease and cancer as well as transmitting the infection. Early identification and treatment of chronic viral hepatitis, and other potentially chronic infections, can prevent long-term complications and costs.

## The environment is changing

Climate change could contribute to the mutation and spread of infectious agents, increase availability of vectors and the risk of animal diseases infecting humans (zoonotic infections) because of sensitivities to climatic conditions (7). Recent reports suggest climate change might be affecting some infectious diseases such as malaria, dengue, and cholera (7). The predicted increase in frequency and severity of extreme weather events such as heatwaves and floods could stress local populations beyond their ability to cope and heighten vulnerability to communicable diseases. The regional impact of climate change may tip the ecological balance in our neighbouring countries and precipitate epidemics (7).

## New diseases continue to emerge

Since the 1980s, new infectious diseases have emerged with greater frequency and infectious agents thought to be under control have re-emerged (8). Newly identified agents, predominantly viruses, include Hendra virus, West Nile virus, Australian bat lyssavirus, Ebola virus, and Nipah virus (9,10). The emergence of highly transmissible novel influenza viruses and of the novel Middle East respiratory syndrome coronavirus (MERS-CoV) remain global concerns. Most of these new diseases emerge from animals (zoonoses), mainly from wildlife. Drivers of disease emergence include changing land use and agricultural practices, changing demographics in society, poor global health, international travel and trade, reduced biodiversity, limited urban planning and changing climate. Within this complex environment, the infectious agents that cause epidemics constantly evolve so predicting future threats is very difficult. Australia must therefore prioritise preparedness and maintain a resilient, flexible system with sufficient skilled human capital to respond to such threats.

## There are new opportunities for control

New technology has led to advances in detection and treatment methods. Rapidly growing trends in utilisation of social media and electronic devices may enhance the ability of health services to update and improve early warning systems and provide more acceptable and successful public education. The evidence-base is expanding with great speed, presenting new opportunities for understanding, preventing and controlling communicable diseases. But being at the cutting edge of knowledge requires the human capacity to regularly synthesise and interpret evidence. Health authorities must prioritise this capacity to ensure their actions maintain best-practice and stay up-to-date.

# 4. Communicable Disease Control in Australia

A modern communicable disease control system needs to be part of the overall Australian health system, which comprises a set of public and private service providers supported by different legislative, regulatory and funding arrangements. The communicable disease control systems are no less complex, with responsibilities being shared between the Commonwealth, State, Territory and Local Governments, each supported by relevant legislative frameworks. Within Australia there is significant variation between jurisdictions in both public health and local government legislations, which creates a complex regulatory framework for public health across the country.

A comprehensive overview of current communicable disease management informed the development of this paper. The purpose of the overview was to identify essential system elements and capability gaps in current management of communicable diseases in Australia. This overview was conducted in 2012 and synthesised information on existing communicable disease control activities. In addition, a national workshop of CDNA members examined Australia's system of communicable disease control using a framework of functions and enablers to document strengths and gaps across the system. A description of current and historical communicable disease control roles and responsibilities across Government and the main findings from the system overview are presented below.

## Historical Roles and Responsibilities

As with the organisation of the Australian health system more broadly, the roles of Australian Government and state and territory governments in communicable disease control reflect past practice and decision making. Australia became a federation of states and territories in 1901 when the Commonwealth of Australia was formed to be responsible for matters concerning the whole nation. At that time, the Commonwealth became responsible for quarantine but had only a limited role in the health system more broadly. After the smallpox outbreak in 1913 and the influenza pandemic in 1919, the Commonwealth concluded that 'there was no way in which to secure effective co-operation between the States during an emergency' and 'a co-ordinating authority in health matters was an urgent necessity'. With approval from the states, the Commonwealth Department of Health was subsequently created in 1921, the Director of Quarantine becoming the Commonwealth Director General of Health. The new Department's limited functions centred on quarantine, industrial hygiene and the conduct of medical research. However there was a desire more broadly to improve cooperation and create uniformity in legislation and administration.

Over time, the Australian Government, which has had the financial power since the 1940s but not the constitutional powers to fully control the health system, has taken responsibility for areas of social welfare including a universal health insurance scheme (Medicare) and the provision of subsidised medicines (Pharmaceutical Benefits Scheme). The Commonwealth has some constitutional powers for legislation in specific areas and is able to provide tied grants to jurisdictions for the implementation of national policy. The states and territories retain their own legislation and remain

responsible for, but do not fully fund, public hospitals, some community services and public health service delivery, including communicable disease control.

Thus there is a system of dual accountability in many areas of health. This is managed by a form of 'cooperative federalism' where the Australian Government and states and territories come together at the Council of Australian Governments (COAG) to agree on major policy issues. For health, the Standing Council on Health (SCoH) consisting of Ministers of Health meets under the auspices of COAG to pursue the major strategic themes of:

1. A better health service and a more sustainable health system for Australia; and
2. Closing the gap for Indigenous Australians.

Supporting the SCoH is the Australian Health Ministers' Advisory Council, consisting of the heads of the departments of health, and its principal committees. The Australian Health Protection Principal Committee (AHPPC), described in further detail under *Joint Australian Government, State and Territory activities*, is responsible for advising the Australian Government on issues related to health protection including communicable disease control, environmental health and health emergency management.

## Current Roles and Responsibilities – in brief

A brief description of government roles and responsibilities is provided to orient the reader to the broad architecture of communicable disease control in Australia.

### **The Australian Government**

The Australian Government Department of Health (Health) works to coordinate communicable disease control activities of national importance and health emergency responses across the country, and provide public health leadership on national issues. Enabling legislation includes the *Quarantine Act 1908* and the *National Health Security Act 2007*. The National Health Security Agreement establishes a framework to support a coordinated national response to public health emergencies between the states and territories and the Australian Government. The Agreement's objective is to strengthen Australia's public health surveillance and reporting system in order to better equip the Australian Government, state and territory health sectors to prevent, protect against, control and respond to a Public Health Event of National Significance or Public Health Emergency of International Concern and to respond to Overseas Mass Casualty events. In addition, the *National Health Act 1953* enables the Australian Government to provide medical and dental services, including vaccination, to Australians. To achieve this, immunisation work areas in Health develop policy, fund and purchase vaccines.

### **State and Territory Governments**

The public health and communicable disease responsibilities for each State and Territory of Australia are enacted by their own pieces of public health legislation. In broad terms, it is the responsibility of each jurisdiction to respond to communicable diseases in their area, and each jurisdiction has systems in place for surveillance, laboratory services, prevention and control activities.

These activities are guided by their specific government priorities and the particular needs of their population groups. Under the National Health Security Agreement, the states and territories have obligations to inform the Australian Government of public health events of national significance and are given permission to send notifiable disease data to a central database. The *National Health Security Act 2007* authorises the disclosure of personal information when required to support an effective national or international response.

### **Local Governments**

There is a wide range of local government functions that relate directly to communicable disease control including: immunisation; mosquito and vermin control; ensuring adherence to food safety legislation; regulation of personal services that can present transmission risk of blood-borne viruses; management of recreational water; regulation of cooling towers; and protecting health during disasters and emergencies. In general, local governments act under their corresponding state public health legislation.

### **Joint Australian Government, State and Territory activities**

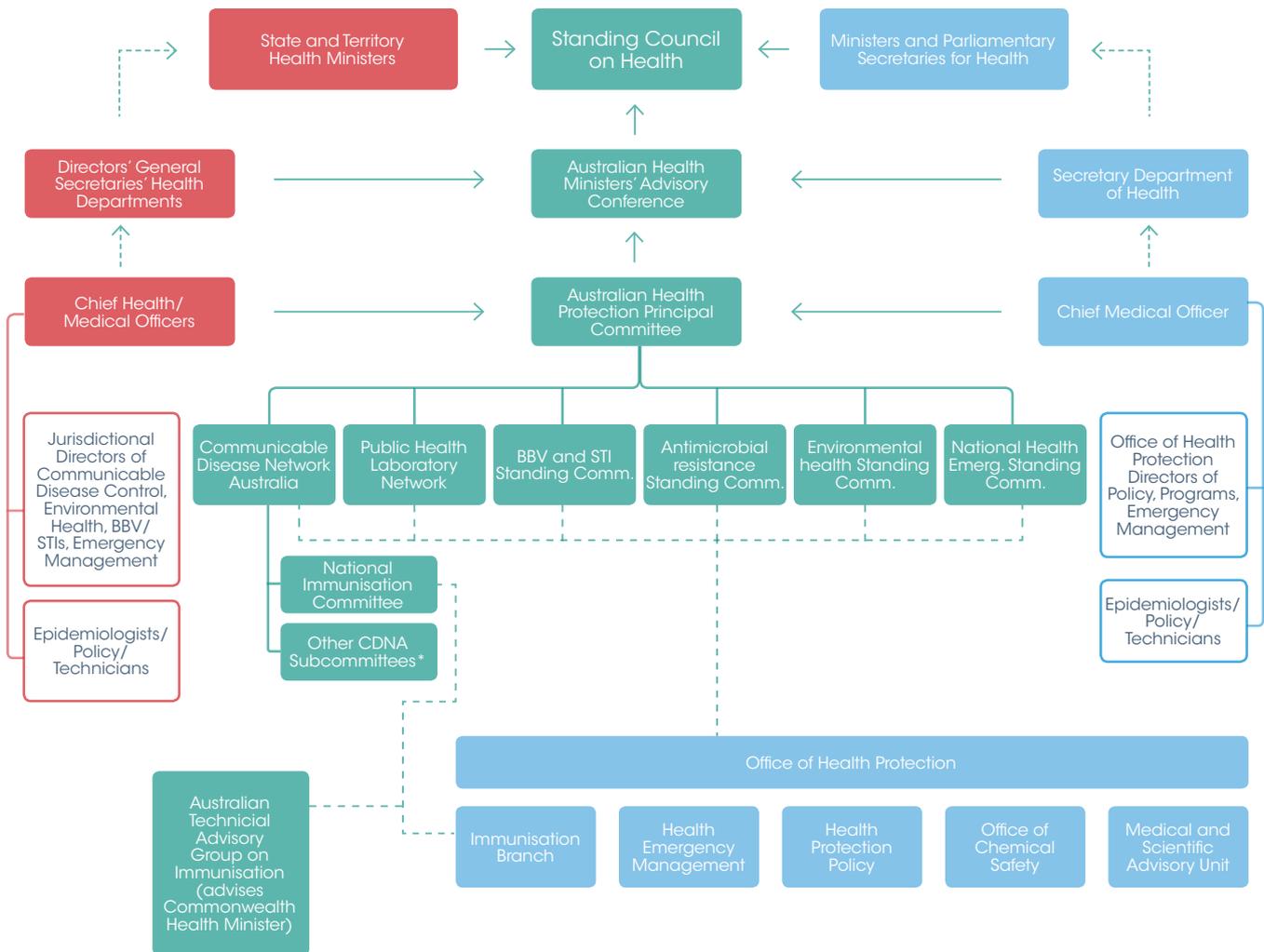
The Australian Health Protection Principal Committee (AHPPC) provides overarching national leadership on emerging health threats related to communicable diseases, the environment, natural disasters and disasters related to human endeavour. It achieves this through cross jurisdictional collaboration with representatives from all states and territories and other health and emergency response experts. The AHPPC reports to the Australian Health Minister's Advisory Council (AHMAC), which reports to the Australian Governments' Standing Council on Health (SCoH) (Figure 1).

Reporting to AHPPC are six Standing Committees with a key role in national health protection issues: Communicable Disease Network Australia (CDNA); Public Health Laboratory Network (PHLN); Environmental Health Standing Committee (enHealth); National Health Emergency Management Standing Committee (NHEMS); Antimicrobial Resistance Standing Committee (AMRSC); and Blood Borne Virus and Sexually Transmitted Infections Standing Committee (BBVSS). AHPPC Standing Committees are usually composed of representatives from health departments of the Australian Government and state and territory governments, and external experts from relevant organisations. Figure 1 provides a broad outline of hierarchies and committees in communicable disease control.

The two networks with the broadest scope to oversight communicable disease control are CDNA and PHLN. Established in 1989, CDNA provides national public health coordination on communicable disease surveillance, prevention, control and offers strategic advice to governments and other key bodies on public health actions to minimise the impact of communicable diseases in Australia. CDNA is composed of representatives from the Commonwealth, State and Territory governments, and key organisations in the communicable disease field. PHLN is a collaborative group of laboratories, which have expertise and provide services in public health microbiology. The central purpose and role of PHLN is the provision of leadership and consultation in all aspects of public health microbiology and communicable disease control through the continued development of a proactive network of public health laboratories. Membership of the PHLN standing committee is composed of state and territory, expert, national and observer members.



A broad outline of relationships between the Australian Government and state and territory governments, joint committees and their secretariats is presented in Figure 1.



- \*CDNA Subcommittees
- Case Definitions Working Group
  - Invasive Pneumococcal Disease Surveillance Working Group
  - National Arbovirus and Malaria Advisory Committee
  - National Surveillance Committee
  - National Tuberculosis Advisory Committee
  - Influenza Surveillance Strategy Working Group
  - Polio Expert Panel
  - The Creutzfeldt Jakob Disease Incidents Panel

— Solid lines indicates membership or representation on committee/council/conference  
 - - - Dotted lines indicate a working relationship or provision of secretariat to subcommittees

**Figure 1. Key government and committee components of communicable disease control in Australia**

## Assessment of existing system

Australia has a solid foundation of technical expertise in several disease areas, world leading prevention programs such as the immunisation program and generally a sound model of cooperation between the Australian Government and state and territory governments. State and territory governments respond effectively to disease threats in their jurisdictions, enabled by legislation, and generally good partnerships with each other, professional networks, the healthcare sector and the population.

National capability gaps were identified by CDNA in key functions of communicable disease control such as surveillance, laboratory services and formulation of evidence-based policy, as well as in enabling areas such as governance, leadership and workforce. These are summarised below and are described in detail in the System Overview of Communicable Disease Control in Australia 2012.

- **Overall** system performs well but needs a “**re-boot**” for the 21st century
- **Governance** of communicable disease control is **disparate** and disease-specific
- National **coordination** is over-reliant on committees that are not optimally structured for responsive decision making
- Communicable disease control **needs more comprehensive** and **modern surveillance** systems
- Public health **laboratory** testing is becoming financially **unsustainable** despite its **increasing importance** in communicable disease surveillance and control
- Attempts to develop **consistent** national disease control **policy** are well-received but the process is **inadequately resourced**
- Allocation of **resources** to national disease control programs is **not always efficient** or according to disease **burden**
- Prevention program goals are not always **linked** to **surveillance indicators** hindering accurate **evaluations** of program effectiveness
- Public health **research** needs to be more closely matched to policy-relevant questions
- More collaborative **leadership** could enhance coordination of **multijurisdictional** outbreaks
- There is not a strategic approach to sustaining a skilled **workforce** for all functions of communicable disease control

### Question

Are there strengths or weaknesses of the existing communicable disease control system that are not included?

# 5. Essential Elements

## Essential elements: a framework of functions and enablers

The communicable disease control system has been defined in terms of core functions and enablers. Core functions include **surveillance, laboratory services, preparedness and acute response, policy and programs**, and **research**. Enablers include **governance and leadership, workforce and training, communication, infrastructure** and **funding**, and partnerships [Figure 2]. Enablers define a system's capacity, for example providing a sustainable workforce to support core functions. Enablers also help define priorities for strengthening the system and identifying gaps.

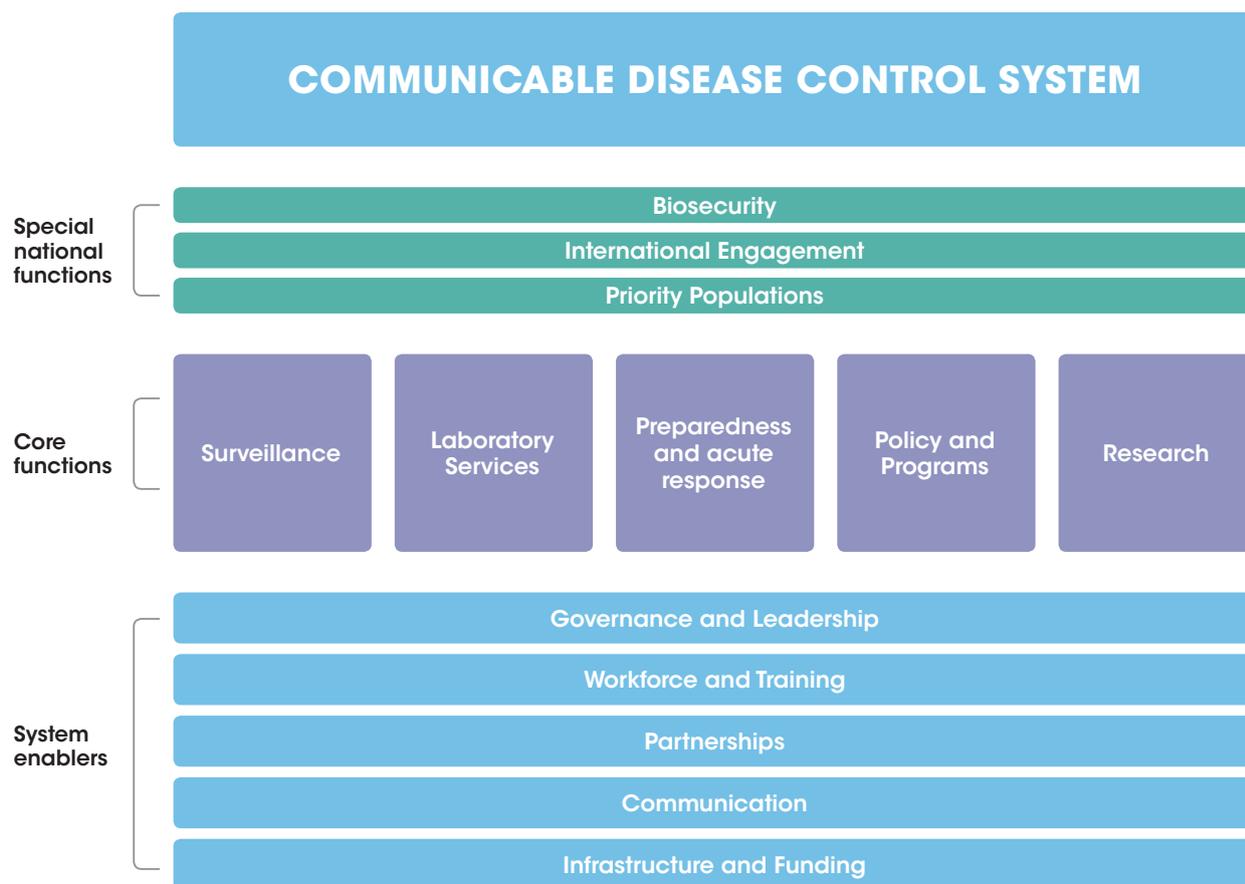
Addressing core functions across multiple programs is intended to show the benefits of an integrated system. It aims to ensure components work together so the whole communicable disease control system is greater than the sum of its individual functions. This approach aims to align the complex and occasionally duplicated activities across government and allows a focus on policy priorities and optimal use of resources. A systems approach suits communicable diseases because, although diseases differ, there are common principles of detection, response, prevention and control.

While effective disease control is the responsibility of all levels of government in Australia, taking a national approach in certain areas could be a more effective and efficient use of national resources. This paper represents the first time all functions of communicable disease control have been considered at a national level and considers areas that would benefit most from greater national coordination. In doing so, it builds on existing jurisdictional, national and international arrangements as well as previous national strategies.

Developing a Framework marks a change from previous communicable disease strategies. In the past, the focus has been on improving core functions and enablers within disease groups, rather than across disease groups. Potential efficiencies and synergies across content areas in the communicable disease control system may not have been recognised. Using a framework of functions and enablers has identified system improvements that can be applied to all disease groups and communicable disease challenges.

Broad content areas of disease groups, listed in alphabetical order, include:

- Antimicrobial resistance
- Emerging, zoonotic and vector-borne diseases
- Foodborne and enteric infections
- Healthcare associated infections
- Influenza and other respiratory viruses
- Sexually transmissible and bloodborne virus infections
- Vaccine-preventable diseases
- Miscellaneous infectious diseases of national significance



**Figure 2: Suggested elements of a communicable disease control system**

**Question**

Are there elements of a future communicable disease control system that are not included?

# 6. Priority areas

National workshops of experts, including CDNA members, identified capability gaps in functions and enablers across all disease groups. Capability gaps common to most disease groups were identified in six of the ten core functions and enablers: governance and leadership, surveillance, laboratory services, national policy and programs, preparedness and acute response, and workforce and training.

## 6.1: Leadership and Governance

### 6.1.1 Why is leadership and governance important?

Leadership is important to ensure that communicable disease control is coordinated and prioritised across the whole country to realise full efficiency and effectiveness of response and prevention activities. It incorporates the administrative operations of planning, coordinating and controlling activities, as well as ensuring outcomes are achieved and standards upheld. The responsibility for communicable disease control in Australia is split between the Australian Government and state and territory governments. For governance to work well there needs to be a clear articulation of roles and responsibilities and agreed clear leadership.

### 6.1.2 What issues are affecting leadership and governance?

#### Coordination by committee

The Australian Government currently meets many of its disease control responsibilities through national committees, subcommittees, expert advisory panels and provision of funding. This approach has enabled significant communicable disease control achievements including the internationally recognised National Immunisation Program (NIP) and a world best practice national HIV/AIDS response. Although the committees and panels provide high quality technical advice to government, current arrangements do not facilitate the responsive decision making so often required in communicable disease control, especially for acute or emerging threats. Growing pressures such as the continued emergence of new diseases, an expanding evidence-base and development of new technologies are driving a need for more comprehensive technical coordination and national oversight.

#### National centres and networks

Existing national centres, funded in the main by the Commonwealth, for vaccine-preventable disease (National Centre for Immunisation, Research and Surveillance (NCIRS)), food borne disease (OzFoodNet) and HIV/STI control (Kirby Institute) demonstrate the benefits of a national approach. The centres have different operating models: OzFoodNet sits within government and investigates potential national outbreaks of foodborne disease; NCIRS and Kirby are external organisations that receive part but not all funding from government. Improving the ability of these organisations to

support national communicable disease control requires management of the relationship between centre experts and their counterparts in government policy, programs and surveillance work areas. It also requires consideration of capacity for further supporting policy development, participation in multi-jurisdictional outbreak investigations, design or implementation of control programs, or setting and evaluating disease control targets.

### **Building on areas of expertise**

The Australian Commission for Safety and Quality in Healthcare (ACSQHC), and the more recently established Australian Antimicrobial Resistance Prevention and Containment (AMPRC) Steering Group (comprising Secretaries of Health and the Department of Agriculture (Agriculture); the Chief Medical Officer and Chief Veterinary Officer), and the Antimicrobial Resistance Standing Committee (AMRSC) of AHPPC are steps towards harmonising national efforts against HAI and AMR.

The contribution of established centres of expertise like NCIRS to immunisation and ACSQHC to healthcare associated infections has raised the possibility of developing further expert centres especially in the area of vector-borne disease, zoonoses, emerging infections and respiratory infections. For zoonoses and vector-borne diseases in particular, an expert centre could facilitate greater linkages with animal and environmental health committees and experts. Sub-committees of CDNA provide expert technical advice at a national level for some of these threats, for example the National Arbovirus and Malaria Advisory Committee, Seasonal Influenza Surveillance Strategy Working Group, and the National Tuberculosis Advisory Committee. Supporting an expanded role for these committees, beyond provision of expert advice, to coordinate national efforts is a potential first step towards centres of expertise for priority disease groups.

### **A nationally networked system**

The key advantage of national centres is that technical expertise for most or all of the core functions, surveillance, laboratory services, outbreak investigation, policy and program response and research, can be integrated to support control of specific diseases. This leads to high quality and evidence-based advice, promotes consistency and fosters excellence in a national resource. These centres or networks can succeed in and out of government.

Working towards a nationally networked system, the strengths and specific expertise of each jurisdiction could support a decentralised model of national centres, with national oversight and coordination. This could lead to efficiency gains by minimising duplication of guidelines, policies, strategies and resources. Future national centres could be designed according to a standard operating model and governance structure that defined their disease control responsibilities and involved government in executive decision-making.

### **National leadership, international leadership**

Improving leadership and governance of national communicable disease control is an opportunity to improve the organisation of Australia's international health activities, relationships and programs.

The principal risks of epidemic disease to Australia derive from three sources: entry through the northern borders, through seaports and airports, and within Australia from wildlife or livestock (11). The Australian Government Department of Health leads the human health components of biosecurity, supporting the biosecurity lead agency, the Department of Agriculture (Agriculture).



Together with the Department of Immigration and Border Protection, the Attorney-General's Department and Emergency Management Australia, Agriculture and Health work collaboratively to measure and reduce risks, resolve issues and prepare for threats to maintain the national biosecurity system. The national regulatory scheme for pathogen security further strengthens the biosecurity system by restricting access to security sensitive biological agents, and monitors compliance with mandatory standards. Maintaining Australia's biosecurity system fulfils, in part, our obligations under WHO International Health Regulations including improving surveillance and response capacity and increasing public health security at our borders.

The Asia Pacific region has been identified as an epicentre for emerging diseases, resulting in significant impacts on health, social and economic development (12). Proactive regional engagement to mitigate potential epidemics is in Australia's national interest. Regional engagement requires Australia to commit more human and other resources to support surveillance, preparedness, prevention and control activities in countries in the Asia-Pacific region. This could include assisting regional countries to meet their obligations under the WHO International Health Regulations and the World Organisation for Animal Health requirements through supporting collaborative surveillance and developing regional expertise through training and education (11).

Mechanisms for regional engagement are in place. Australia is an active member of the WHO's West Pacific Regional Office (WPRO) and supports key multilateral agencies, such as the World Bank, East Asian Summit, Secretariat of the Pacific Community and other governments. The Australian Agency for International Development (AusAID) is the lead agency for international health issues and their Pandemic and Emerging Infectious Diseases Framework 2010-2015 supports the implementation of the WHO Asia-Pacific Strategy for Emerging Diseases (12). But the technical expertise on emerging infections is concentrated in Australian Government and state and territory health departments, research institutes and academic centres and is not coordinated to support international health activities.

### 6.1.3 How can we address the issues?

#### Questions

- Within existing legislative arrangements, how can we achieve comprehensive and coordinated central technical expertise across all content areas of communicable disease control?
- How can we improve the accessibility and outputs of existing national centres to align with communicable disease priorities?
- Would developing new centres of expertise such as centres for emerging, zoonotic and vector-borne infections, and influenza and other respiratory infections address gaps in national technical expertise?
- How could domestic communicable disease control authorities support the development of a proactive regional engagement strategy for surveillance, preparedness, prevention and control activities in the Asia-Pacific region to mitigate potential epidemics?

## 6.2: Surveillance

### 6.2.1 Why is surveillance important?

Surveillance data are critical for detecting and managing outbreaks, monitoring the impact of interventions and reducing disease. The collection and interpretation of infectious disease data supports the identification of individual and population risk factors, the prioritisation of disease burdens, and the monitoring and evaluation of prevention and control activities. Surveillance systems should be routinely evaluated and subject to continuous improvement.

Surveillance systems help ensure urgent questions (is this an outbreak? how big is the outbreak? what is the normal incidence of disease?) can be answered quickly and accurately. The systems also help explain complex questions (how many people in total have chronic hepatitis and what is likely to happen in the future? is the pattern of HIV spread changing?) to inform disease control policy and program targets. Surveillance that provides the best possible information and analysis is a priority of communicable disease control.

### 6.2.2 What issues are affecting surveillance?

#### National notifiable disease surveillance

The principal national system is the National Notifiable Disease Surveillance System (NNDSS). NNDSS monitors key communicable diseases notified under state and territory public health legislation. Diagnosed cases of notifiable diseases are reported to authorities who act to reduce further spread, ensure adequate treatment, monitor disease trends and the age, sex and geographic pattern of cases. However NNDSS cannot currently provide information on risk factors, transmission and severity markers needed for effective disease control programs and, to this end, is supplemented by several other systems in Australia. To support NNDSS each state and territory maintains its own database so there are nine separate notifiable disease surveillance systems in Australia.

#### An expanding surveillance landscape

The number and types of surveillance systems have grown over the last twenty years. There are more than 30 communicable disease surveillance systems in Australia, covering multiple diseases, single diseases, behaviours and outcomes which are administered by a range of public health agencies. The expansion of surveillance practice is because no single system provides the full picture for a disease and its determinants. Surveillance systems now gather data from a variety of settings, notably hospitals, communities, laboratories and primary care. Many different types of health events are monitored ranging from severe cases of illness using hospital data, to number of people absent from work using employer data, to patient-reported potential adverse events following immunisation. Collection methods range from sentinel site reporting, syndromic data collected continuously from hospital emergency departments, to intermittent prevalence surveys and applied research studies. Surveillance has also extended to upstream determinants such as risk and protective behaviours.

## Comprehensive surveillance for some disease groups

The expansion has improved our understanding of the impact of some diseases and the effectiveness of interventions. Some disease groups have benefited more than others. For vaccine-preventable disease (VPD), the National Centre for Immunisation, Research and Surveillance (NCIRS) collates surveillance data from multiple sources including routine disease notifications, immunisation coverage, adverse events following immunisation (AEFI) and seroepidemiology. This relies on the Therapeutic Goods Administration (TGA) AEFI data and the Department of Human Services Australian Childhood Immunisation Register (ACIR). The breadth of activity, supported by expert analysis, has improved our understanding of VPDs and informed the continued development and evaluation of the National Immunisation Program.

For HIV/AIDs, bloodborne viruses (BBVs) and sexually transmissible infections (STIs), the Kirby Institute collates national surveillance data, maintains disease registers, implements recurrent serosurveys and risk factor surveys, and participates in intervention and treatment trials. As a result, it provides comprehensive annual epidemiology reports and supports the development of specific surveillance strategies for these infections in Australia.

OzFoodNet, a network of epidemiologists working within Australian, state and territory governments, exemplifies a coordinated approach for detecting and responding to foodborne diseases in Australia. OzFoodNet enhances existing surveillance and outbreak mechanisms through timely communication and cooperation among network members. OzFoodNet's mission is to apply concentrated effort at a national level to investigate and understand foodborne disease, to describe more effectively its epidemiology and to identify ways to minimise foodborne illness in Australia.

## The beginnings of national surveillance for AMR and HAI

ACSQHC and the newly formed National Health Performance Authority have started collecting and collating national data on AMR and HAIs. To date, AMR surveillance has been restricted to planned surveillance studies of limited organisms, and monitoring for HAIs has been for accreditation or quality control purposes, coordinated at a state or regional level with no standardised analysis of national data. Coordinated national data collection is a crucial first step, but needs considerable resources to achieve national coverage quickly and to ensure data are linked to public health action from the start.

## National gaps remain

Zoonoses and vector-borne disease are less coordinated in their surveillance activities, increasing the risk of undetected disease and hampering prevention and control. The majority of emerging diseases are zoonotic (13) so ensuring adequate national surveillance coverage is vital for timely detection. National surveillance could be in multiple sectors. Foodborne, zoonotic, vector-borne diseases and AMR could be integrated with other sectors such as animal health, environmental health and agriculture. This integration requires person-to-person partnerships, shared data sources, and virtual networks and could help in the identification of outbreak sources and improved understanding about pathways of disease transmission between animals and humans.

## A cycle of improvement and innovation

Surveillance systems must remain flexible and be able to adapt, especially to advances in laboratory diagnostics and health system information technology. The advent of specialised laboratory testing has led to a reduction in other types of testing, primarily the culture-based techniques to isolate organisms. This is a problem when national surveillance case definitions are based on culture results and systems are dependent on these data. Solutions are needed because specialised testing presents opportunities to combine traditional surveillance methods with analysis of the changing genetic patterns of pathogens over time, place and person (14). This approach, termed molecular epidemiology, allows for greater understanding of how pathogens are transmitted, which is vital information to halt transmission and prevent disease.

Periodically evaluating each existing surveillance system using standard guidelines and implementing practicable findings would enable a cycle of continuous quality improvement and identification of opportunities to integrate networks in the surveillance sector. A standardised evaluation process should require that each system's surveillance goals support disease control program goals for meaningful evaluations of program effectiveness. A cycle of improvement would enable the Australian surveillance sector to keep pace with changing technology.

## Making the most of data collected for other purposes

Communicable disease surveillance systems represent a tiny fraction of data collected in Australia. Several population or event based administrative datasets could be used for surveillance and research, despite being collected for other purposes. Examples include hospital admission data, laboratory testing data, birth and death registers, and immunisation registers such as ACIR and the National Human Papilloma Virus Vaccination Program Register (NHPVPR). These can be used to describe disease burden, trends and contextualise communicable disease surveillance data. Currently access to these data is not systematised or coordinated and tends to be on a project-by-project basis, organised by individual researchers or institutions. Identifying the most useful administrative datasets and removing barriers to access them could significantly improve surveillance efforts in Australia. Similarly, communicable disease control authorities could take advantage of the current transition to patient-controlled electronic health records, an emerging administrative data source cataloguing individual interactions with health services. Analysing patients' journeys through the health system from clinician, to laboratory testing, treatment or hospitalisation could provide powerful information with multiple public health applications.

A key benefit of access to administrative or population-based datasets is enabling linkage with communicable disease data. Data linkage connects different pieces of information thought to belong to the same person, place or event. Connecting all available health and related information can improve the quality, depth and robustness of data analyses and provide more accurate answers to surveillance or research questions. Information sharing policies that uphold privacy principles and ensure data are de-identified are essential. In addition, using information from multiple sources can reveal things that individual surveillance systems might not be able to, and can be more efficient than developing a new specific system.

### Access to timely communicable disease data

Multiple surveillance systems exist because no single system provides the full picture for a disease and its determinants. However accessing relevant information from multiple sources is time consuming and requires significant effort on the part of individual researchers or institutions, largely taken up by submitting several separate requests for data to different government departments and organisations.

The challenges are to maximise data access and improve timeliness, quantity and quality of analyses conducted by interested parties, and make the best available synthesis of surveillance data available to policy makers. For example, a virtual hub of communicable disease surveillance data where de-identified health information is collated, standardised and accessible, with variable levels of permissions depending on who is accessing the data, could address such challenges. Available data could incorporate the multiple separate systems currently operating in Australia as well as administrative data sets such as hospital discharge and primary care data. This could allow comprehensive analysis of conventional data sources and provide the context necessary to interpret less conventional communicable disease data such as internet-based influenza trends or reports of vaccine associated adverse events. More comprehensive use of existing information would build the evidence base from existing practice and ensure that it informed national policy.

Over the longer term, virtual data networks or health information grids allowing real-time exchange of health data by multiple parties could transform the surveillance landscape – highlighting the need for a system prepared for change. Partnering with health informatics specialists to improve current systems and support design of new systems is essential. Information technology specialists who understand public health processes and requirements could identify ways to, for example: share data across different platforms; link new datasets to existing systems; generate algorithms to detect unusual patterns in health events; and display analysed data in an accessible and understandable format. Communicable disease surveillance must keep pace with changes to the way the world captures, stores, transfers, uses and disseminates information.

### 6.2.3 How can we address the issues?

#### Questions:

- Are there important diseases and threats not currently under national surveillance and what type of surveillance might be most suitable for the disease/threat?
- What are the possible ways to integrating new and existing systems to develop the best possible information for public health action?
- Within existing legislative frameworks, how could we establish a cycle of continuous quality improvement of standardised periodic evaluation of existing systems?
- How can we ensure surveillance indicators can be linked to disease control goals so that program evaluation and effectiveness can be accurately assessed?
- What are possible ways to introduce innovative methods to modernise surveillance?

## 6.3: Laboratory services for surveillance, prevention and control

### 6.3.1 Why are laboratory services important?

Laboratory-based diagnosis and characterisation of infectious agents support all other core functions in communicable disease control. Surveillance depends on accurate diagnoses, and outbreak management depends on quick identification of the causative agent. This is especially true in relation to deliberate and accidental releases of pathogens. Strategic decisions about potentially dangerous outbreaks, which may lead to use of considerable resources, rely on laboratory test results. Specialised testing such as molecular typing is becoming important in determining transmission pathways; defining outbreak clusters; and identifying emerging (e.g. Pandemic H1N1 2009) and virulent strains (e.g. *C. difficile*). Specialised testing helps tailor prevention techniques (e.g. influenza vaccine composition) and therapy for infections (e.g. in the case of antimicrobial resistance).

Laboratory services go beyond provision of testing, and also include participation in activities such as: advisory groups, applied research, policy development, professional organisations, national and international engagement, and professional and public education and information.

### 6.3.2 What issues are affecting delivery of public health laboratory services?

High quality laboratory services are integral to Australia's communicable disease control efforts but systemic challenges risk their continued success. Financing public health testing is becoming unsustainable, especially with increasingly specialised tests and technologies. Mechanisms for information and data sharing between laboratories have been proposed but not realised. Existing national networks have developed in an *ad hoc* manner and depend largely on the goodwill participation of laboratories whose primary relationships are with states and territories. Leadership is required to coordinate a strategic approach to public health laboratory services and investment to sustain these services into the future.

#### Existing national laboratory networks

Currently, Australian public health laboratories work through the Public Health Laboratory Network (PHLN), or independently as nationally designated reference laboratories. The Public Health Laboratory Network (PHLN) includes 12 public health and tertiary referral hospital laboratories and is a subset of the public health pathology community. Activities of PHLN members include surveillance of certain organisms (including multiple-antibiotic resistant organisms (MROs)); specialised testing; supporting outbreak investigation through additional testing, and, applied research such as epidemiological surveys and development of new diagnostic tests.

Independent laboratories, some of which act as nationally designated or reference laboratories for particular organisms but are not PHLN members, also provide important public health services. National designations include acting as collaborating centres for the World Health Organization, for example the WHO Collaborating Centre for Reference and Research on Influenza. Dangerous pathogens are handled through a network laboratories, that handle security sensitive biological agents and investigate emerging infectious diseases. These laboratories span human and animal health.

### Financing arrangements

Broadly speaking, private and public diagnostic laboratories report on notifiable diseases detected by testing patient specimens, to state health departments and other surveillance programmes. Initial testing is funded from Medicare rebates or hospital budgets but no additional funding is provided for collecting and transmitting data for surveillance purposes. Reference, public health and specialist laboratories generally receive specimens from smaller laboratories for specialised or supplementary testing, storage of reference isolates and sera. An example of a specialised public health test is genotyping the measles virus to identify linked cases in an outbreak compared to the diagnostic test of isolating or measuring antibody response to the measles virus.

Public health laboratories fund surveillance and specialised testing through individual funding agreements with state and territory governments. However, growing demand and cost for pathology services, including public health testing, means these core public health activities are constrained by competing resource priorities. The current system does not represent the best use of laboratory services for public health in Australia and is in urgent need of a sustainable financing model. A critical component is estimating the true cost of adequate public health laboratory testing in Australia. Previous attempts to identify financial mechanisms to improve accessibility of laboratory services and information for public health purposes (15) could be revisited so that Australia's public health laboratory capacity is maintained and improved.

### A molecular age: the implications of specialised testing

Reference public health laboratories routinely conduct specialised testing on isolates referred from clinical laboratories. Specialised tests such as molecular typing and DNA analysis deliver detailed information about infectious agents. The detail allows greater understanding of how pathogens are transmitted which is vital information to prevent disease. In the past, for example, isolation of *Listeria monocytogenes* was sufficient to establish the cause of an outbreak. Molecular typing of *L.monocytogenes* has revealed there is not one but many different strains of *L.monocytogenes* and to establish the cause of an outbreak it is now necessary to identify the same strains in humans and in foods.

The system of referring isolates to reference laboratories evolved when the testing technology was available only in larger reference laboratories. But testing technologies such as real-time polymerase chain reaction (PCR) DNA analysis and sequence-based detection and typing techniques are increasingly being used in clinical laboratories for diagnosis, guiding treatment and hospital infection control (14). This trend is making the distinction between reference laboratories and other laboratories less clear in terms of who can test for what. There are two important implications: Firstly, reference laboratories will depend on clinical laboratories submitting data rather than isolates to coordinate national laboratory-based surveillance of certain organisms; Secondly, clinical laboratories will

only conduct specialised testing for individual clinical need when funded by Medicare, and this represents only a subset of organisms for which specialised testing is important for public health surveillance and action. Reference laboratories are therefore still needed to perform specialised testing on some organisms, coordinate national surveillance for most organisms, develop techniques to assess antimicrobial resistance, identify influenza strain changes that affect vaccine effectiveness, characterise new viruses, and develop new tests.

### **A networked future: harmonised testing and information sharing**

The advantage of the diffusion in technology is that there are more potential public health laboratory partners able to provide more comprehensive information on communicable diseases in Australia. The use of this information to public health relies on integrated laboratory quality assurance mechanisms and consistency in methods and approaches. The accessibility of this information depends on sustainable financing, participation incentives and comprehensive information sharing agreements with and between laboratories. Addressing this trend now is important given next generation sequencing techniques likely to be in diagnostic settings in the next five years (14).

Developments in laboratory testing require innovative ways of networking and sharing laboratory data. New ways of sharing data will likely use secure 'cloud' computing where databases exist on a common network, typically the internet, and laboratories both contribute to and access these data. This model would need to be underpinned by privacy principles and mechanisms for national oversight and accountability. Networked databases would collect only summarised laboratory data and limit data to the minimum needed to answer questions. It would minimise transfer of raw data by syndicating queries using shared standards rather than copying data to multiple remote repositories (16). Control of data and personal identifiers would remain with their original source and agreed information policies and data protection practices would enable trust in the network (16).

Jointly owned networked databases could maximise use of data generated in clinical and public health laboratories by ensuring equal and full access by participating laboratories, supporting the twin aims of timely information sharing for public health benefit and publication-related research funding. An ideal proof-of-concept project could be establishing and resourcing molecular surveillance networks for priority public health organisms with harmonised testing methods and information sharing platforms.

### **National responsibilities and reference laboratories**

National leadership and oversight are critical to supporting integrated laboratory networks for communicable disease control. One option could be a hub and spoke model with designated national reference laboratories for specific technologies, tests or organisms so that comprehensive reference testing is a national resource and laboratory-based surveillance is nationally coordinated. National reference laboratories would have defined accountabilities that could include national reporting; applied research; linking with private pathology, animal health, academia, and other health sector laboratories; and promoting participation in shared information platforms. A hub and spoke model for information sharing would need nationally agreed information sharing policies that upheld privacy principles and defined acceptable minimum datasets for common databases.



## Advancing public health laboratory capacity

The future success of public health laboratory services in Australia depends on three elements: central leadership to establish integrated public health laboratory networks; a sustainable financing mechanism for public health tests; and new ways to share information between laboratories and between health authorities and laboratories. Addressing these elements on a national level will take advantage of the diffusion of specialised testing technology and improve the efficiency and effectiveness of information sharing for public health good.

### 6.3.3 How can we address the issues?

#### Questions:

- How could a nationally integrated laboratory system be organized?
- What is required to develop a molecular surveillance network and harmonised testing methods for diseases of public health importance?
- What type of financial mechanisms might support public health laboratory testing, especially specialized testing?
- How can we develop innovative ways to network and share laboratory data to support disease surveillance, prevention and control goals?

## 6.4. Evidence-based national policy

### 6.4.1 Why is evidence-based policy important?

Evidence-based public health policies enable interventions such as immunisation, harm-reduction (needle exchange), food safety and infection control programs. Successful programs are informed by surveillance, supported by laboratory services, have outbreak response capacity and continually evaluate and research health outcomes. Evidence-based policies can reduce health inequities by targeting resources where the need is greatest, while helping ensure that majority of the population benefits from proven interventions.

Communicable disease leaders from government and the broader network of expert committees recognise the importance of consistent national policy and have supported its development for a limited selection of disease areas. But to achieve comprehensive national communicable disease control policies, a more systematic approach to their production, implementation and evaluation is needed.

## 6.4.2 What issues are affecting national communicable disease policy?

States and territories maintain separate and occasionally different policies, guidelines, and strategies for many of the same diseases and priority populations. CDNA, in line with its role to develop policy and advice on control of communicable disease, has commenced the Series of National Guidelines (SoNG) to address disparities in public health management guidelines. The guidelines are for public health units responding to notifiable diseases and now exist for avian influenza, Hendra virus, dengue, hepatitis A, influenza, legionellosis, measles, pertussis and rabies and Australian Bat Lyssavirus. The SoNG project is a small component of disease control policy but requires further resourcing to continue and to build in a review process to regularly update guidelines with the latest evidence.

National public health management guidelines have been developed for audiences other than public health units. CDNA has developed guidance for other partners including: guidelines for management of gastroenteritis and influenza outbreaks in aged care facilities; management of healthcare workers known to be infected with blood-borne viruses; health advice for members of Australian Medical Assistance Teams going to and returning from overseas missions; and guidelines for the investigation of food handlers during non-typhoidal Salmonella outbreaks. Despite being well received, these guidelines tend to be developed in an ad-hoc fashion and in response to external requests, without prioritisation of disease or topics. Similar to the SoNG project, development of such guidelines requires additional and efficient resourcing to support a more systematic, efficient approach.

There are precedents of comprehensive standard national guidelines, for example the Australian Immunisation Handbook (the Handbook) which provides clinical advice for health professionals on the safest and most effective use of vaccines in their practice. Although primarily an evidence-based technical guide for immunisation providers, it also summarises key aspects of policy and programs, for example in standards for childhood vaccination. The recommendations are made by the Australian Technical Advisory Group on Immunisation (ATAGI) and approved by the National Health and Medical Research Council (NHMRC). The information is reviewed and updated every three to four years, however consideration is currently being given to how the process could be improved with more flexibility to update the recommendations and content as required.

### A systematic approach to developing policy

A systematic approach would require formalising a process and structure for policy development that covers all diseases and depends on leadership to focus national technical resources. At the Australian Government level, recognition of the work and responsibilities of other departments and agencies in communicable disease control is important to ensure consistency and enable collaboration.

Engaging a wide range of partners in policy development, such as research institutes, the clinical workforce, healthcare administrators and other government agencies, would support policy implementation. A structured and collaborative policy development process would complement efforts to improve the consistency of national strategies for communicable disease control.

## Expanding the evidence-base

Policy development must include synthesis and interpretation of relevant evidence. Examples of activities that support evidence-based policy include: applied research into foodborne illness to inform food safety policy and regulatory action; evaluating the effectiveness of interventions to reduce individual risk of sexually transmitted diseases through targeted surveillance systems; assessment of vaccine coverage through registers and seroepidemiology; and formal evaluations of systems and interventions. Resourcing national activities that use existing public health data means that results can be quickly translated into policy and practice.

Where evidence is needed to influence or develop policy, it could be commissioned to match policy-relevant questions. Research activities that lead to strategies that minimise the impact of infections are policy relevant and examples include: establishing pathogenesis of infections; developing diagnostic tests; understanding the epidemiology of infectious disease, developing safe and effective vaccines, finding new treatments, discovering new agents and using existing knowledge to ensure strategies are up to date and evidence based (17).

Communicable disease control leaders could identify policy-relevant research questions and foster working partnerships with research institutes or universities. Policy directed research needs to be flexible, timely and cost-effective, making the most of existing data and partnerships in the communicable disease control community. And in order to inform national policy, evidence and research should be on a national scale and represent all jurisdictions where feasible.

## A strategy for strategies

Currently the development of national strategies in aspects of communicable diseases control varies by content area, with little attention to the common objectives of a communicable disease control system or realisation of synergies with other disease areas. Systematising national strategy formulation by developing a “strategy for strategies” could ensure that a similar if not the same process is applied to all diseases or programs. A framework of core functions and enablers could be applied to disease-specific strategies, and the principles of core functions and enablers applied to intervention-specific strategies such as immunisation or infection control strategies. Achieving consistency in strategy development would build relationships across content areas in communicable diseases and align activities with a common vision.

### 6.4.3 How can we address the issues?

#### Questions:

- How could current communicable disease policy development be improved?
- Would a “strategy for strategies” that defines core components of communicable disease control improve national communicable disease policy?
- What are the best ways to engage with researchers and commission policy relevant research?
- How can we develop critical appraisal capacity within policy-making bodies to keep pace with and synthesise the expanding evidence?

## 6.5. Best-practice prevention programs

### 6.5.1 Why are prevention programs important?

Specific disease prevention programs are critical to achieve communicable disease control policy goals and incorporate a wide range of targeted efforts, including disease management guidelines, health promotion programs, incentive schemes and vaccination programs.

### 6.5.2 What issues are affecting disease prevention programs?

#### A good track record in prevention

Australia’s national response to HIV/AIDS is recognised as world best practice (18). A multi-pronged approach allowed: the mobilisation of affected communities; rapid establishment of needle and syringe exchange programs to prevent the spread amongst injecting drug users; engagement with sex-work industry; peer-education and prevention linked with nondiscriminatory HIV/AIDS testing, treatment and care (18). National leadership, collaborative partnerships and consistent national policy development were critical. However past achievements do not guarantee future success. In recent years HIV/AIDS transmission dynamics have changed again, with increasing numbers of new HIV infections in different sub-groups such as young heterosexual individuals. To address changing risks, well-established national HIV/AIDS programs need to be evaluated and modified.

Australia's National Immunisation Program (NIP), a collaborative program involving the Australian and state and territory governments and immunisation providers, is also internationally recognised. The NIP now achieves over 90% coverage for childhood vaccines. Historically, states and territories were responsible for immunisation. But in the late 1990s there were growing disparities in funding and access to vaccines between jurisdictions, new vaccines were increasing the complexity of schedules and the estimated national childhood vaccine coverage was 53%. The Immunise Australia Program was established in 1997 to enhance coordination between all levels of government and ensure consistent funding for vaccines. In addition to high immunisation coverage, the program now enables good control of vaccine-preventable diseases, access to all required vaccines for eligible cohorts, a contemporary national schedule, and national registers of childhood and some adolescent vaccinations.

### **Enablers of successful national programs**

National leadership and coordination have been critical to the success of immunisation and HIV prevention programs. State and territory support has also been critical to the implementation of national programs. Implementation of specific national strategies directs these programs and investment in surveillance and applied research has enabled the continued development of evidence-based policies. Leveraging the cost advantage of purchasing on a national scale has led to more efficient and stable procurement for these programs, especially the immunisation program.

### **Priority areas for disease control**

The key challenge is focussing national efforts on prevention priorities. Ideally priority areas would see well-performing programs improved and development of programs where little or nothing exists. Actions should address high-burden diseases and diseases for which control programs are known to reduce disease. Systematic risk appraisals could also support planning by assessing current disease trends and future predictions in the context of social, economic, political and environmental factors driving communicable disease.

High priority areas also include populations that suffer a disproportionately high burden of communicable diseases including: Aboriginal and Torres Strait Islander people, the elderly, immunocompromised, new arrivals to the country, such as refugees and immigrants, and people of lower socioeconomic means.

While a Framework could focus on functions that support all disease areas, disease-specific strategies and programs are equally important for prevention and control. Australia has a good track record in prevention for HIV/AIDS and immunisation, but a more systematic approach is needed to ensure we have the best mix of national and jurisdictional programs for existing and new threats. A systematic approach could harness the strengths of states and territories and only invest national resources for a significant additional benefit.

### **Identifying priority areas**

High quality communicable disease control departments in states and territories have led the majority of disease control in Australia. But there could be cost and resource savings from better national coordination. The task is identifying disease areas for which a national program will be more cost-effective and efficient than separate state and territory programs and targeting investment into these areas.

Investments could be national strategies to implement effective interventions, for example a national foodborne disease prevention strategy, or specific interventions such as standardising infection control programs across the country. For example, healthcare associated infections (HCAI) are a priority area of the ACSQHC and the National Hand Hygiene Initiative (NHHI) is an associated program. The purpose of the NHHI is to develop a national approach to improving HH and monitor its effectiveness. The NHHI includes development of guidelines, an education strategy and program, establishment of outcome measures for auditing health care settings; and development of a national electronic surveillance system. The National Health Performance Authority is responsible for the public reporting of the hand hygiene indicator via the *MyHospitals* website. A national approach uses resources effectively to develop consistent policy, education, surveillance and monitoring in tackling a truly national issue.

Just as the disparities in immunisation programs reduced national vaccine coverage, differences in the implementation of some programs heighten vulnerability to disease resurgence. National investment could also support parts of state and territory disease control programs. For example, strong state and territory based tuberculosis (TB) programs work to reduce the burden of TB in their jurisdictions. The National Tuberculosis Advisory Committee (NTAC) provides strategic direction, but there are challenges that could be effectively met if addressed centrally. These challenges include securing supply of diagnostics and pharmaceuticals, responding to drug-resistant TB and associated treatment costs, and maintaining international engagement for regional TB control. In the case of securing supplies, the purchasing power of the Australian Government could be more cost effective and provide greater stability in access to diagnostics and pharmaceuticals.

### **Developing new ways to prevent disease**

Continued investment in research and innovation is especially important because communicable disease control relies on a limited number of prevention options. Antimicrobial resistance is threatening traditional treatments, and rates of endemic diseases such as salmonellosis and campylobacteriosis and sexually transmissible infections continue to rise despite the existence of effective prevention and treatment options.

Trialling innovative ways to control disease, such as diagnostics, treatments or behavioural interventions that could be rolled out across the country if successful, could be an effective use of national resources in disease control. A recent example is Australian-led research investigating whether *Wolbachia*, a bacterium that occurs naturally in up to 70% of all insect species - but not the dengue carrying mosquito *Aedes aegypti* - can be used as an effective biocontrol strategy to disrupt dengue transmission between people. The researchers have demonstrated that when *Wolbachia* is present in *Aedes aegypti*, it acts like a 'vaccine' for the mosquito by blocking dengue virus transmission by mosquitoes and thereby preventing human infection and dengue disease (19). If successful, this innovative disease prevention method could protect Australia against rise and spread of dengue and contribute to addressing the global burden of the disease.

### 6.5.3 How can we address the issues?

#### Questions:

- What do you consider to be communicable disease control priorities in Australia and why?
- Are there specific disease control programs for which a national approach will improve delivery and cost-effectiveness and health outcomes?
- How can we ensure known effective prevention programs are nationally consistent and implemented?
- What are the best ways to encourage research of innovative ways to prevent disease?

## 6.6: Preparedness, assessment and response to biothreats and emergencies

### 6.6.1 Why is preparedness and response important?

Responding to communicable disease emergencies saves lives and minimises health impacts. A timely and effective response depends on preparedness: an ability to detect, assess and respond to acute events. Communicable disease preparedness is required for unpredictable events such as pandemic influenza, bioterrorism and emerging infectious diseases. Effective response requires a cooperative multi-stakeholder approach, effective communications, robust science-based decision making and a flexible public health system.

### 6.6.2 What issues are affecting preparedness and response?

#### **Managing multijurisdictional outbreaks that are not “national health emergencies”**

National health emergency preparedness and response is a whole-of-government responsibility. AHPPC, supported by CDNA, advises AHMAC on national approaches to communicable disease threats, and coordinates the response from the health department’s National Incident Room (NIR). The only communicable disease threats to date that have activated the NIR since it was established in 2001 are SARS (2003) and pandemic H1N1 (2009).

For other multijurisdictional threats that do not qualify as national health emergencies, CDNA is mobilised to provide expert advice and promote consistent national responses. But emergency coordination by committee, in the absence of infrastructure and resources of the NIR, does not facilitate responsive and coordinated decision-making. Jurisdictional CDNA members have dual roles, leading the outbreak response in their own state or territory as well as enabling CDNA to operate. Furthermore, rapid threat assessments need to be conducted as a threat emerges and revised as new evidence is generated. Committee meetings, even if frequent, do not suit this acute but ongoing technical work. Developing a central technical capacity for threat assessment and decision support could significantly improve CDNA's emergency response capability.

### **Outbreak investigation and management guidelines**

A good example of where states and territories work together is for epidemiological investigations of potential foodborne disease outbreaks, coordinated by OzFoodNet. The OzFoodNet model incorporates pre-agreed epidemiological investigation guidelines and provision of limited surge capacity to staff large outbreak responses. In contrast, national outbreak guidelines exist for only a few other communicable diseases including influenza and gastrointestinal outbreaks in aged care facilities. Ensuring standardised outbreak guidelines are part of national policy could streamline national responses.

Similarly, ensuring there is up-to-date policy on the use of all components of the National Medical Stockpile (NMS), the strategic reserve of essential vaccines, antibiotics and antiviral drugs, chemical and radiological antidotes, and personal protective equipment, is critical to achieve streamlined deployment in the event of a national health emergency.

### **Researching to plan and planning to research**

Planning assumptions for threat-specific preparedness should be updated regularly to reflect the latest scientific evidence. For example, the Australian Health Management Plan for Pandemic Influenza (AHMPPI) includes evidence-based assumptions about a pandemic virus (i.e. clinical attack rate) and its impact (i.e. hospitalisations and deaths). Mathematical modelling of some of these assumptions provides policy makers with a range of scenarios to support flexible, adaptable public health responses. The AHMPPI is regularly updated.

Faced with an unknown threat, understanding the epidemiological characteristics, such as who is most at risk of infection or severe outcomes, is vital to inform targeted responses. Pre-agreed emergency response plans should identify the types of research and epidemiological investigations required at the early stages of an epidemic, and establish the necessary partnerships to undertake the research when needed.

### **National health communications**

The evaluation of Australia's response to pandemic (H1N1) influenza emphasised the need to ensure communication with clinical and primary care sectors before and during a pandemic (20). More recent multijurisdictional events, including Murray Valley Encephalitis and Hendra virus outbreaks, and a national listeriosis outbreak, revealed the need for clearer articulation of accountabilities, especially when communicating with the clinical sector and the public. For some events, the lack of nationally consistent health and risk information has left jurisdictions to issue their own occasionally conflicting advice. A generic outbreak communication plan with Commonwealth and jurisdictional functions



and responsibilities, as well as objectives, actions and target audiences for different stages of a national outbreak, would overcome existing problems. This plan would require a national technical focal point to lead health communication during national events, supporting CDNA's emergency response capability.

### 6.6.3 How can we address the issues?

#### Questions:

- How could we best develop a national threat assessment and decision-support function for new threats and multijurisdictional events?
- How can we ensure threat-specific planning incorporates the latest evidence and where appropriate, applied research, such as mathematical modeling, informs planning?
- How can we improve health communications during multijurisdictional outbreaks?

## 6.7. Workforce and training

### 6.7.1 Why is workforce and training important?

The best defence against future epidemics and current challenges in communicable disease control is possessing broad human capacity with a wide range of skills such as epidemiology, biostatistics, literature review and critical appraisal, clinical microbiology, entomology, health information technology, policy and program development and evaluation, and health risk communications. Australia needs expertise at the highest international levels to foster a knowledge base that allows access to overseas expertise as well as allows the sharing of expertise with developing countries (11).

### 6.7.2 What issues are affecting workforce and training in communicable disease control?

The breadth of required skills presents complex challenges for workforce planning, mainly because of separate professional training schemes and a lack of recent assessment of current and future workforce needs. Based on general public health workforce analyses, areas of skills shortages are likely to include: epidemiology and biostatistics, pathologists, laboratory scientists, information technology, program evaluation, and leadership.

Communicable disease workforce planning requires determining competencies and skills needed to deliver the Framework recommendations and translating this into labour demand. This demand could be matched to actual positions to identify gaps, allowing training and education policies to address supply issues.

## Workplace training for communicable disease control

Communicable disease control brings together a range of professionals, most of whom achieve professional qualifications within their own discipline. The skills and knowledge required by communicable disease control professionals may or may not be acquired from a previous professional training or general public health degree.

To this end, specialised training programs are needed to support the development of communicable disease control skills. One example is the Master of Philosophy (Applied Epidemiology) (MAE), a two year research degree that emphasizes learning-by-doing. The program teaches scholars epidemiology in the field, through coursework and learning in a field placement, such as a health department. The MAE program has contributed to building capacity in Australia's communicable disease control workforce, with many graduates now leaders in public health. Scholars serve as a 'standing national response team', providing a much needed, yet informal, surge capacity in the advent of major national disease outbreaks.

Workplace based learning, as modelled by the MAE program, provides a critical link between academia and the public sector and benefits both. The beneficiaries of workplace-based learning include colleagues and supervisors of the students. Via their student, academic supervisors have access to the real-life experience needed to keep academic research practical and relevant.

Workplace training is needed for other skills needed in communicable disease control such as policy and program evaluation. One example of existing training is the New South Wales Public Health Officer Training Program, a three year workplace based training program offering a supervised learning experience in one of three streams: policy; general public health; and epidemiology, research and evaluation.

Opportunities to expand vocational training include developing public health laboratory research and epidemiology fellowships for laboratory scientists, or public health policy and program fellowships for clinicians and public servants. Public health internships for recent health graduates, to expose them to the daily operations in health departments, would provide some momentum to ongoing recruitment.

### 6.7.3 How can we address the issues?

#### Questions:

- What improvements are needed to communicable disease control education and training?
- What could be the scope of national workforce planning for communicable disease control and who would be best placed to undertake this work?
- Is there a greater role for workplace training? If so, which skills in communicable disease control would you prioritise for work-placed based training?

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# 8. Communicable Disease Network Australia Working Group

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## Terms of reference

- The Working Group is a steering committee that will guide the process of development of a national framework for surveillance, investigation and control of communicable diseases.
- The focus will be on the role of national approaches and structures.
- Membership will include members of CDNA and other representatives at the discretion of the Chair. CDNA will have oversight of the Working Group.
- A consultation draft will be completed by June 2013 with final draft to be completed by November 2013

# 9. Consultation Participants

The following stakeholders provided submissions in response to the Discussion Paper in the period between 23 July and 23 August 2013.

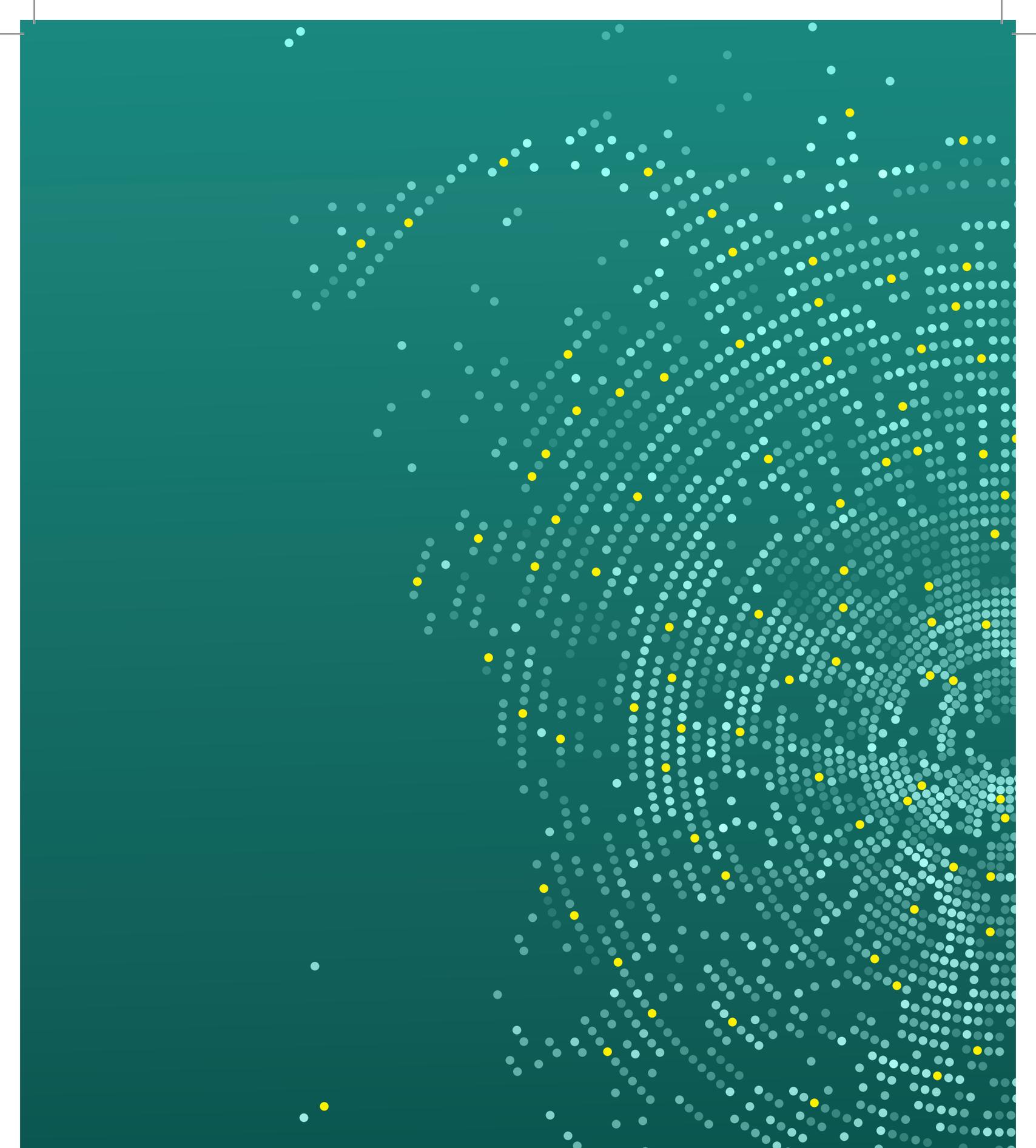
## Organisations

Australasian Society for HIV Medicine  
Australasian Society for Infectious Diseases  
Australian Association of Pathology Practices  
Australian Commission for Safety and Quality in Healthcare  
Australian Creutzfeldt-Jacob Disease Registry  
Australian Epidemiological Association  
Australian Federation of AIDS Organisations  
Australian Government Department of Agriculture  
Australian Government Attorney-General's Department  
Australian Government Department of Immigration and Border Protection  
Australian Government Department of Prime Minister and Cabinet  
Australian National University, Research School of Population Health  
Australian Rotavirus Surveillance Program/WHO Collaborating Centre Enteric Viruses  
Australian Society for Antimicrobials  
Australian Society for Microbiology  
Australian Technical Advisory Group on Immunisation  
Australian Veterinary Association  
Australian Wildlife Health Network  
Burnet Institute  
Communicable Disease Network Australia  
CSIRO Biosecurity Flagship  
Environmental Health Standing Committee (enHealth)  
Food Regulation Standing Committee  
Food Standards Australia New Zealand  
Influenza Surveillance Strategy Working Group  
Marie Bashir Institute for Infectious Diseases and Biosecurity  
Menzies School of Health Research  
Microbiological Diagnostic Unit, University of Melbourne  
Ministerial Advisory Committee on Bloodborne Viruses and Sexually transmissible infections  
Modelling & Simulation Group, Centre for Epidemiology and Biostatistics, Melbourne School of Population and Global Health  
National Antimicrobial Utilisation Surveillance Program

National Arbovirus and Malaria Advisory Committee  
National Centre for Immunisation, Research and Surveillance  
National Coalition of Public Pathology  
National Health and Medical Research Council  
National Health Emergency Standing Committee  
National Health Performance Authority  
National Immunisation Committee  
National Neisseria Network and Australian Gonococcal Surveillance Program  
National Reference Laboratory  
National Surveillance Committee  
National Tuberculosis Advisory Committee  
New South Wales CDNA representative  
Office of Health Protection  
Organ and Tissue Donation Services, SEALS Virology  
OzFoodNet  
Pathology Australia  
Public Health Association of Australia  
Public Health Laboratory Network  
Queensland Mycobacterium Reference Laboratory  
Royal College of Pathologists of Australia  
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Tasmania CDNA representative  
Victorian Cytology Service  
Victorian Infectious Diseases Reference Laboratory  
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All information in this publication is correct as at April 2014