Executive Summary

Introduction
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: 2013-2023* (the Framework). 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.

The System Overview aims to address AHPPC’s request that a proposed Framework include:
1. a comprehensive overview of current communicable disease control management in Australia, and
2. identification of essential elements and any capability gaps in the system.

Methods
This overview used a systems based approach, proposed by the Discussion Paper *Towards a Communicable Disease Control Framework for Australia*, to examine all components of the current system. The system was defined in terms of core functions of communicable disease control and the enablers that make it happen.

| Core functions | include surveillance, laboratory services, preparedness and acute response, policy and programs, and research. In the Australian context, special national functions for communicable disease control include biosecurity, international engagement and priority populations. Enablers include governance and leadership, workforce and training, communication, infrastructure and funding, and partnerships. |

Literature searches informed the assessment of each function and enabler, including capability gaps and issues affecting successful management of communicable disease in Australia. National workshops of experts, including CDNA members were conducted to identify and discuss aspects of the communicable disease control system that needed strengthening. Priority areas for action were identified and described in Discussion Paper.

Results
Overall, Australia has a solid foundation of medical and scientific expertise in several disease areas, world leading prevention programs such as the immunisation program and sound history 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 good partnerships with each other, professional networks, the healthcare sector and the population.

There remain opportunities to enhance our current system, with some functions and enablers requiring minor to moderate adjustments to current systems, while other areas could benefit from further attention. Descriptions of each function and enabler (Sections 5, 6, 7) contain detailed information on the current status of relevant national activities and identification of capability gaps. These descriptions informed the issues identified in the Discussion Paper.

**Suggested priority areas for action**

The findings from the system overview present multiple opportunities to act and improve Australia’s system of communicable disease control. The CDNA working group responsible for proposing a national framework for communicable disease control have identified capability gaps common to most disease groups that could inform priority areas for action.

Six of the ten core functions and enablers have been identified as priority areas for action:

1. Governance and Leadership,
2. Surveillance,
3. Laboratory services,
4. National policy and programs,
5. Preparedness and acute response, and
6. Workforce and training.

In the Discussion Paper, *Towards a Communicable Disease Control Framework* (Appendix B), the issues affecting these suggested priority areas of action and possible ways to address them are explored.
### Abbreviations/Acronyms

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
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<tbody>
<tr>
<td>ACBPS</td>
<td>Australian Customs and Border Protection Service</td>
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<td>ACIR</td>
<td>Australian Childhood Immunisation Register</td>
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<td>ACSQHC</td>
<td>Australian Commission on Safety and Quality in Healthcare</td>
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<td>AGAR</td>
<td>Australian Group on Antimicrobial Resistance</td>
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<td>AGD</td>
<td>Attorney-General’s Department</td>
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<tr>
<td>Agriculture</td>
<td>Australian Government Department of Agriculture</td>
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<td>AGSP</td>
<td>Australian Gonococcal Surveillance Program</td>
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<td>AHMAC</td>
<td>Australian Health Ministers’ Advisory Conference</td>
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<td>AHMPPI</td>
<td>Australian Health Management Plan for Pandemic Influenza</td>
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<td>AHPPC</td>
<td>Australian Health Protection Principal Committee</td>
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<td>AIDS</td>
<td>Acquired Immunodeficiency Syndrome</td>
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<td>AIHW</td>
<td>Australian Institute of Health and Welfare</td>
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<td>AMR</td>
<td>Antimicrobial Resistance</td>
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<td>AMRSC</td>
<td>Antimicrobial Resistance Standing Committee</td>
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<td>AMSP</td>
<td>Australian Meningococcal Surveillance Program</td>
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<td>ANCJDR</td>
<td>Australian National Creutzfeldt-Jacob Disease Registry</td>
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<td>APSU</td>
<td>Australian Paediatric Surveillance Unit</td>
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<td>ARSP</td>
<td>Australian Rotavirus Surveillance Program</td>
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<tr>
<td>ASPREN</td>
<td>Australian Sentinel Practices Research Network</td>
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<tr>
<td>ATAGI</td>
<td>Australian Technical Advisory Group on Immunisation</td>
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<td>BBV</td>
<td>Blood Borne virus</td>
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<td>BBVSS</td>
<td>Blood Borne virus and Sexually Transmissible Infection Standing Committee</td>
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<tr>
<td>CDNA</td>
<td>Communicable Disease Network Australia</td>
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<tr>
<td>COAG</td>
<td>Council of Australian Governments</td>
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<td>CHQO</td>
<td>Chief Human Quarantine Officers</td>
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<td>CSIRO</td>
<td>Commonwealth Scientific and Industrial Research Organization</td>
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<td>DHQ</td>
<td>Director Human Quarantine</td>
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<tr>
<td>FRSC</td>
<td>Food Regulation Standing Committee</td>
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<tr>
<td>HAI</td>
<td>Healthcare associated infection</td>
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<tr>
<td>Health</td>
<td>Australian Government Department of Health</td>
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<tr>
<td>HIV</td>
<td>Human Immunodeficiency Virus</td>
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HPV    Human Papillomavirus
HQO    Human Quarantine Officer
IAP    Immunise Australia Program
IHR (2005)    International Health Regulations 2005
Kirby    The Kirby Institute for Infection and Immunity in Society
MACBBVS    Ministerial Advisory Committee on Bloodborne viruses and Sexually transmissible infections
NAMAC    National Arbovirus and Malaria Advisory Committee
NAP    National Action Plan for Human Influenza Pandemic
NAUSP    National Antimicrobial Utilisation Surveillance Program
NCHSR    National Centre in HIV Social Research
NCIRS    National Centre for Immunisation, Research and Surveillance
NEPSS    National Enteric Pathogens Surveillance Scheme
NHEMS    National Health Emergency Management Standing Committee
NHMRC    National Health and Medical Research Council
NHPA    National Health Performance Authority
NIP    National Immunisation Program
NIR    National Incident Room
NMS    National Medical Stockpile
NNDSS    National Notifiable Disease Surveillance System
NNN    National Neisseria Network
NRL    National Reference (Serology) Laboratory
NTAC    National Tuberculosis Advisory Committee
NTSRU    National Trachoma Surveillance and Reporting Unit
PHLN    Public Health Laboratory Network
PHOFA    Public Health Outcome Funding Agreement
QMRL    Queensland Mycobacterium Reference Laboratory
SCoH    Standing Council on Health
SoNGs    Series of National Guidelines
STI    Sexually Transmissible Infection
VPD    Vaccine preventable disease
WHO    World Health Organization
1. Introduction

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.

The System Overview aims to address the first two parts of AHPPC's request that a proposed Framework include:

1. a comprehensive overview of current communicable disease control management in Australia, and
2. identification of essential elements and any capability gaps in the system.

To meet these objectives, the communicable disease control system has been defined in terms of core functions and enablers (Figure 1.1). Core functions include surveillance, laboratory services, preparedness and acute response, policy and programs, and research. In the Australian context, special national functions for communicable disease control include biosecurity, international engagement and priority populations.

Enablers include governance and leadership, workforce and training, communication, infrastructure and funding, and partnerships. Enablers define a system's capacity, such as providing a sustainable workforce to support core functions. Enablers also help define priorities for strengthening the system and identifying gaps.

The System Overview includes:

- A background on communicable disease control in Australia (Section 2)
- Review of international models of communicable disease control (Section 3)
- Description of the methods used to develop this overview (Section 4)
- Brief definition and description each function and enabler (Sections 5, 6, 7)
- Suggested priority areas for action (Sections 8)
Figure 1.1 Suggested elements of the communicable disease control system
2. Background

The need for communicable disease control in Australia

A well developed communicable disease control system in Australia provides protection for the community from illness, disability and death due to many infectious diseases. However, this requires ongoing vigilance to maintain the current level of protection against both existing and emerging threats.

Infectious diseases currently cause 1.3% of all deaths in Australia (1) but this has not always been the case. There has been a dramatic reduction in communicable diseases in Australians born after 1850 resulting in increased survival of infants and children and overall, increased life expectancy. This has been due predominantly to the creation of healthy environments with sanitation, clean water and food supplies, and avoidance of overcrowding; and more recently to the availability of vaccines, antimicrobials and control of mosquito and animal vectors of disease.

However, a considerable proportion of health service usage is attributable to infectious diseases. In 2010, infections accounted for 1 in 6 problems by general practitioners (1). Furthermore, the communicable disease burden is not spread evenly throughout the Australian community, and Indigenous Australians continue to suffer higher rates than non-Indigenous Australians of almost all infectious diseases.

In contrast to Australia, developing countries continue to have a high burden of communicable diseases such as tuberculosis, human immunodeficiency virus (HIV) infection, malaria, and childhood infectious respiratory and diarrhoeal disease. With large numbers of people entering Australia every day, some of these communicable diseases can then pose a threat in Australia.

Infectious diseases result from an environment-host-organism interaction. Changes in any one of these axes influence the development and severity of disease in an individual. Microorganisms are continually evolving in unpredictable ways with emerging multi-drug resistance posing a significant threat. An ageing population and a higher proportion of the population who are immunocompromised (cancer and transplant patients) means the population is more susceptible to communicable diseases. And changes in the environment such as climate change and animal habitat destruction that influence patterns of animal-human interaction will continue to affect communicable disease risk in Australia.

Communicable disease control requires surveillance that will both identify communicable disease risks early and monitor the effectiveness of prevention strategies. Systems must also be in place to mitigate risks once they are identified. Interventions range from follow up of
individuals in contact tracing to national approaches such as population immunisation programs or environmental regulation. Rapidly evolving technologies both for diagnosing and treating infections mean provide opportunities to further improve and streamline communicable disease control, but continual review and refinement is required to gain the advantage offered by the new technologies.

Australians generally have a very high expectation that their health will be protected from communicable disease threats. Transmission of communicable diseases is frequently reported in the media and the threat of these diseases causes community concern. Our system must continually evolve in order to produce the high level of protection expected by the community.

The threat of a pandemic or large epidemic poses both the highest level of community anxiety and a significant risk to community health if the threat is poorly managed. Additionally such events have a very large economic impact (Table 2.1).

The next epidemic could be just around the corner. Critically, Australia must continually improve its communicable disease control system to ensure it remains robust, able to respond early and surge rapidly. It is the responsibility of the public health sector in Australia to ensure that communicable disease control resources are organised as efficiently as possible so that capacity is maintained to protect the health of Australians in both epidemic and inter-epidemic periods.

Table 2.1. Economic impact of selected infectious disease events

<table>
<thead>
<tr>
<th>Year</th>
<th>Country/ City</th>
<th>Disease</th>
<th>Cost (USD)</th>
</tr>
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<tbody>
<tr>
<td>1997</td>
<td>Hong Kong</td>
<td>'bird flu'</td>
<td>22 million*</td>
</tr>
<tr>
<td>1994</td>
<td>India</td>
<td>Plague</td>
<td>2 billion</td>
</tr>
<tr>
<td>1990-8</td>
<td>United Kingdom</td>
<td>BSE^+</td>
<td>38 billion</td>
</tr>
<tr>
<td>1999</td>
<td>Malaysia</td>
<td>Nipah virus</td>
<td>540 million*</td>
</tr>
<tr>
<td>1999</td>
<td>New York</td>
<td>West Nile Fever</td>
<td>Almost 100 million</td>
</tr>
<tr>
<td>1979-94</td>
<td>New York city</td>
<td>Tuberculosis</td>
<td>Over 1 billion</td>
</tr>
<tr>
<td>2003</td>
<td>Multi-national</td>
<td>SARS^</td>
<td>40 billion</td>
</tr>
</tbody>
</table>

*Bovine spongiform encephalopathy
^ Severe Acute Respiratory Syndrome
*Conservative estimates
Source: World Health Organization
**Organisation of communicable disease control in Australia**

The organisation of communicable disease control in Australia has been shaped by legislation, politics and significant disease events of the last century.

Prior to Federation, the Australian states and territories had full responsibility for delivery of health services, including public health services. But the need for cooperation and coordination for the control of outbreaks has been clear since the early 1900s. Federation saw the Commonwealth acquire quarantine powers with the passing of the *Quarantine Act (1908)*. Since that time, the Commonwealth Government has expanded its role in communicable disease control from its initial constitutional responsibility for a small number of quarantinable diseases to broader coordination of health emergencies, biosecurity and multijurisdictional outbreaks. Significant events such as the HIV/AIDS pandemic have shaped changes to the organisation of communicable disease control in Australia. As a result, responsibility for national communicable disease control is now shared between the Australian Government and state and territory governments.

**Significant events in Australian communicable disease control**

The emergence of HIV in the early 1980s was seen as a national communicable disease threat and the Australian Government took a major role in the control of the epidemic in partnership with the affected communities and the states and territories. Major Commonwealth investments included the establishment and ongoing funding of the National Centre for HIV Epidemiology and Clinical Research (NCHECR, now the Kirby Institute for infection and immunity in society) and the National Centre in HIV Social Research (NCHSR). A controversial mass media campaign was implemented to raise awareness of protective behaviours. Highly effective needle and syringe programs were funded by the Australian Government and set up by states and territories. States and territories received considerable tied funding for the prevention and management of blood borne viruses and sexually transmissible infections. Since the replacement of the Public Health Outcome Funding Agreements with block funding for public health services including blood borne virus and sexually transmissible infection control under the National Healthcare Agreement, such services have been eroded in some jurisdictions.

Growing recognition of the fact that communicable disease outbreaks do not respect state and territory boundaries revealed a clear need for national surveillance to detect multijurisdictional outbreaks. The National Notifiable Disease Surveillance System was set up in 1990 to receive de-identified data on notifiable diseases collected by states and territories under their notifiable disease legislation. Data are aggregated by the Australian Government Department of Health (Health) and presented fortnightly to the Communicable Disease Network Australia (CDNA).
In order to ratify the World Health Organization’s (WHO) International Health Regulations in 2005 (IHR 2005) Australia had to demonstrate its public health security surveillance and response capacity. The National Health Security Act 2007 was enacted to strengthen response capacity and to allow sharing of surveillance information with the World Health Organization (WHO). It is underpinned by the National Health Security Agreement between the Australian Government and state and territory governments that mandates the jurisdictional reporting to the Australian Government of events of national or international public health importance. The Act authorises the disclosure of personal information when required to support an effective national or international response.

**Current arrangements - in brief**

National communication and coordination of communicable disease information and control interventions occurs via the Australian Health Protection Principal Committee (AHPPC) and one of its subcommittees, the CDNA. CDNA consists of the heads of communicable disease control units in each jurisdiction, representatives from Health, the national centres (National Centre for Immunisation, Research and Surveillance (NCIRS) and The Kirby Institute, and other key stakeholders. CDNA meets by teleconference fortnightly and has face-to-face meetings three or four times a year. Extraordinary meetings are held as required.

As states and territories have historically been responsible for public health services, each jurisdiction has enacted legislation to provide the necessary powers for communicable disease surveillance and prevention of disease transmission. Each state and territory has systems in place for surveillance, public health laboratory services, prevention and control activities. These activities are guided by their specific government priorities and health system organisational arrangements and the particular needs of their population groups.

States and territories vary in the organisation of public health services, with differing numbers of local and regional public health units, variable integration with community health centres and considerable variation in the role of non-governmental organisations (NGOs) or stand-alone foundations. Some jurisdictions have centralised communicable disease control based in health departments, others are decentralised with operational public health units regionally or locally, together with central support.

Local governments play an important role in communicable disease control. There is considerable variation between states and territories in the public health functions undertaken by local governments. Local government functions in some jurisdictions that relate directly to communicable disease control include: immunisation; mosquito and vermin control; ensuring adherence to food safety legislation; regulation of personal appearance 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. Local governments act under their corresponding state public health legislation.
3. International Models for Communicable Disease Control

Internationally, there are various models for organising national efforts aimed at communicable disease control. For comparative purposes, the organisation and governance of public health in the United States of America (USA), Canada, the European Union, the United Kingdom, New Zealand and the Netherlands was reviewed, with an emphasis on the role of central agencies. Most informative were systems in the USA, Canada, the Netherlands and the European Union. These are categorised according to the main model of operation - centralised or decentralised/regional and described in brief below.

**Centralised approach**

**United States of America**

In 1946 the United States (US) established the Communicable Disease Center, now called the Centers for Disease Control and Prevention (CDC), primarily to combat malaria (2). The CDC was built around a strong public health laboratory service and commitment to capacity development, through the Epidemic Intelligence Service (EIS) Program, designed to support state health departments in controlling communicable disease (2). Their role has expanded to include all communicable disease, environmental health and non-communicable disease, and today the CDC is the primary Federal agency for conducting and supporting public health activities in the United States. CDC is technically an operating division of the Department of Health and Human Services. The director of CDC is also the administrator of the Agency for Toxic Substances and Disease Registry (ATSDR). The director is always a public health physician and senior staff are predominantly health professionals and scientists. The director reports to the Secretary for Health and Human Services.

CDC’s seven major funded areas of activity include:

1. Preventing leading causes of disease, disability and death
2. Monitoring health and ensuring laboratory excellence
3. Protecting Americans from infectious diseases
4. Keeping Americans safe from environmental and work-related hazards
5. Ensuring global disease protection
6. Protecting Americans from natural and bioterrorism threats
7. Continuing of operations and business services (3)

In practice, CDC conducts and facilitates fundamental public health activities (e.g. surveillance, laboratory detection, epidemiologic investigation), responds to outbreaks, conducts research and provides information for the public, health professionals, organisations and the government. The CDC’s activities are far-reaching, with staff working in 50 countries and the capacity to respond to infectious disease threats throughout the world (3).
Canada
The Public Health Agency of Canada (PHAC) was established in 2004 as the peak federal government body responsible for public health in Canada, replacing the Population and Public Health Branch of Health Canada (4). The Canadian experience of the 2003 SARS outbreak catalysed a major review of the organisation and governance of communicable disease control and public health, leading to the establishment of a new national public health agency. The vision for the agency was a central body able to provide leadership and action on public health matters, such as national disease outbreaks and emergencies; but also with a broad mandate for public health with linkages to other government departments and agencies in engaged in public health activities.

PHAC’s mandate includes:
1. promoting health,
2. preventing and controlling chronic diseases, infectious diseases, and injuries;
3. preparing for and responding to public health emergencies;
4. serving as a central point for public health expertise, research and program development (4)

PHAC is a Legislated Service Agency, which is led by the Chief Public Health Officer of Canada, who reports directly to the Health Minister (5). Service delivery remains primarily a responsibility of the provinces, with the Public Health Agency taking a national leadership role, through setting standards and guidelines, mobilizing partnerships, coordinating national efforts (including national surveillance activities), providing technical expertise for advice and surge capacity in an emergency and ensuring economies of scale for major investments (such as a specialised facilities) (5).

The Netherlands
The Netherlands’ communicable disease control system has strong central coordination capacity but responsibility for operations is devolved to regional and local authorities. Through legislation, the responsibility of infectious disease control is decentralised to local authorities (the mayors) and activities are carried out by the (regional) municipal health services (6). At a national level, the Ministry of Health, Welfare and Sport oversees compliance with national health policy. It does this with the use of information, support and advice from the National Institute for Public Health and the Environment (Dutch: Rijksinstituut voor Volksgezondheid en Milieu or RIVM), the Netherlands main institute in the field of public health, nutrition, safety and environmental management (7). RIVM is independent from, yet works in partnership with the Dutch government (8). RIVM lists its tasks as:
1. policy support,
2. national coordination,
3. prevention/intervention programmes,
4. provision of information to professionals and the public,
5. knowledge development/research,
6. support for regulatory authorities and
7. crisis management/ response (7).

Within RIVM, the Centre for Infectious Disease Control (Dutch: Centrum voor Infectieziektebestrijding or Clb) has a coordinating national role for controlling infectious disease. The Clb provides support to the local authorities in the form of advice, laboratory diagnostics, epidemiology and surveillance, research and guidelines (6). In practice, in the case of large-scale multi-regional outbreaks, the Clb takes over operational control of the countermeasures. When this occurs, the Clb assembles an Outbreak Management Team (OMT) or a Council of Experts, composed of technical specialists, to provide scientific insight and risk analysis, which is used by the government to formulate appropriate policies for control measures (6). The policies are then entrusted to Clb to operationalize, usually through formulation of guidelines for municipal public health services and other health care professionals. This model of support makes use of existing expertise, such as university research centres, professional and civil society organisations and other government ministries, representatives of which can be called upon to participate in an OMT or Council of Experts, dependent on the nature of the infectious disease threat. Since the first OMT was convened in 1995, there have been 50 OMTs, used to respond to various disease threats within the Netherlands, such as: polio, SARS, methicillin-resistant Staphylococcus aureus, rubella, bird flu, Q fever and pandemic influenza A (H1N1) (6).

**Regional approach**

**European Centre for Disease Prevention and Control (ECDC)**

The European Centre for Disease Prevention and Control (ECDC) was established in 2005 as an independent European Union (EU) agency.

The ECDC’s mission is to:

1. identify, assess and communicate current and emerging threats to human health posed by infectious diseases, and
2. support and help coordinate European Union countries’ preparedness and response capacities (9).

The ECDC has a single Director and reports to a Management Board, which includes representatives from all EU Member States (9). In 2010, the ECDC operated with a budget of €57.8 million, employing a total of 254 staff, all based in the headquarters in Stockholm, Sweden (10).

The organisational structure is based on a matrix system, with four technical units (Preparedness and Response Unit; Surveillance Unit; Scientific Advice Unit; Health
Communication Unit), an administrative unit and six ‘Disease-Specific Programmes (Antimicrobial resistance and healthcare-associated infections; Emerging and vector-borne diseases; Food- and waterborne diseases and zoonoses; Respiratory tract infections; Sexually transmitted diseases, including HIV/AIDS, hepatitis, and other blood borne viruses; Vaccine-preventable diseases).

Main strengths of the ECDC are its capacity to detect and respond quickly to infectious disease threats in Europe. The ECDC uses a web-based communication platform to exchange information and provides an early warning of outbreaks (11). When needed, the ECDC ‘epidemic intelligence officers’ can be dispatched to the field to provide assistance to public health staff within the region. This has been done on many occasions, for example in response to multi-national food-borne disease outbreaks, H5N1 avian influenza in several European countries and Chikungunya virus in Northern Italy. The ECDC has developed a new system for infectious disease indicator-based surveillance at the European level, called ‘The European Surveillance System’ or ‘TESSy’, which currently collects data from 27 EU Member States and 3 European Economic Area countries, for 49 communicable diseases. TESSy also receives and integrates data from a number of European surveillance networks. As a relatively small organisation, the ECDC focuses on regional surveillance, strengthening regional capacity, communicating information and building partnerships (12).

**Benefits of coordinated public health system**

This brief overview of international models of communicable disease control demonstrates the multiple ways national and international systems are coordinated to improve health outcomes and prevent disease. Organisational arrangements such as centralised or decentralised operations suit particular countries and regions and aspects of each could be applied in the Australian context.

Irrespective of specific governance arrangements, there are several benefits of a national comprehensive, centrally supported and integrated public health system:

- Improved delivery of public health services
- More efficient use of funds
- Ability to generate and share knowledge, data and evidence to inform public health decisions and policies
- Increased capacity to mount a quick, decisive and coordinated response during a public health emergency
- Visible national leadership for public health issues
- Ability to develop public health policy agendas and resource allocation in line with the country’s own priorities
- Consistent policies and harmonized procedures
- Linkages among all those working to improve public health in the country
- Central focus for human resources in public health and provision of a career path for public health professionals (13)
4. Methods to develop the System Overview

The System Overview was developed using two main methods:

1. Literature search of peer-reviewed, grey and government literature
2. Workshops with experts of Communicable Disease Network Australia

The literature search and document review informed the description of existing systems, including:
- national surveillance systems, including laboratory systems
- public health laboratory services
- emergency response arrangements
- existing national policies and programs
- status of public health and communicable disease research
- special national functions of biosecurity, international engagement and an approach to priority populations
- governance and leadership
- infrastructure and funding
- public health communication
- workforce, training
- partnerships

The assessment of each function, special national function and enabler considered the overall performance of the system element as well as its performance within specific disease groups. Disease groups included:
- 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

The literature search and expert workshops informed the assessment of each function and enabler, including capability gaps and issues affecting successful management of communicable disease in Australia. The discussion of each function and enabler represents a combination of summative assessment and expert opinion of performance and opportunities for improvement.

The System Overview findings are presented by function and enabler and include:
- Definition of the system function or enabler
- Description of key systems in place and discussion of the issues
For example, the surveillance assessment includes:

- Definition of surveillance
- Description of national surveillance systems and where possible, assessment of their performance

The brief analysis of the Core Functions, Special National Functions and System Enablers provided throughout this document is limited to the findings of formal evaluations, both published and unpublished, and position papers provided by expert groups, as well as feedback from CDNA.
5. Overview of Functions

5.1 Surveillance

5.1.1 Definition
Communicable disease surveillance is the systematic collection of data on the occurrence of communicable diseases with the objectives of monitoring disease trends, detecting outbreaks, assessing the effectiveness of prevention and control measures, identifying disease risk factors and formulating prevention strategies.

5.1.2 Description of surveillance

National Notifiable Disease Surveillance System
The primary system for surveillance of communicable diseases is the National Notifiable Disease Surveillance System (NNDSS). It was established in 1990 and is a passive surveillance system. States and territories collect data on notifiable conditions diagnosed in Australia under their public health legislation and transmit this in a de-identified form daily to the NNDSS. There are nationally agreed case definitions and reporting methods and in general the data are of high quality for most data fields. Data are monitored by the Office of Health Protection (OHP) in the Department of Health (Health). Data on key diseases are presented at CDNA fortnightly teleconferences for review and discussion. Surveillance results are published in quarterly or annual reports in the journal, Communicable Diseases Intelligence however this is not always timely due to competing priorities within OHP.

Most of the diseases on the national notifiable diseases list are notified on the basis of a positive laboratory test. Electronic notification by laboratories is an efficient, timely and accurate method of communicable diseases data collection. For conditions such as haemolytic uraemic syndrome, that can only be diagnosed clinically, notification by clinicians is less complete and less timely than laboratory notification. States and territories differ in the proportion of electronic vs. paper-based notifications and the proportion that are notified clinically, depending on the information system capacity for electronic notification, legislation and local laboratory capacity.

For selected diseases, enhanced data on risk factors, case contacts, and disease outcomes is recorded for each case by contacting the referring doctor for each case of the disease, or the case themselves, to collect additional information. This allows more detailed analysis of disease epidemiology and in some cases, contact tracing interventions. However, collection of enhanced data is resource intensive and it is not feasible to collect enhanced data for all notifications; other surveillance systems are used to collect additional data on some diseases (see below). Data on communicable diseases is available on other routinely collected
datasets, including hospitalisation data, death data, and general practice software, and these
data could be used to better inform communicable disease epidemiology.

A subset of NNDSS data is online (http://www9.health.gov.au/cda/source/cda-index.cfm) and
contains basic epidemiological information on rates of notifiable diseases by state and
territory. Data are aggregated and this limits further analysis. More detailed NNDSS data are
also available to researchers and other interested people on request to OHP. Release of
data requires approval by all states and territories and the processes for preparing the data
for release and for approval can be cumbersome, time-consuming and slow. CDNA have had
recent discussions about regular posting of disaggregated, de-identified nationally notifiable
data onto the Internet to improve access for the public.

Each state and territory has developed and maintains their own notifiable disease register;
each is different and there are many idiosyncrasies that affect the transmission of data to the
NNDSS. Significant efficiencies could be gained if there was a single national register, which
could be accessed by each jurisdiction. This would also provide real time information to
jurisdictions about disease notifications to enhance the capacity to detect multi-jurisdictional
clusters and compare changing patterns of disease occurrence.

The major limitation of Australia’s passive communicable disease surveillance system is that
it is a measure, at best, of the amount of communicable disease that is diagnosed, and is not
a measure of disease incidence or prevalence. For laboratory notifiable conditions, in order
for a notifiable disease to be reported to NNDSS, the person with the disease must have
presented to a health care service, the health care provider must have ordered a test, the
person must have had the test, and the test must have returned a positive result. Thus, the
number of notifications is highly dependent on whether or not people with the condition
present to a health care service, whether or not a test is ordered, and on the sensitivity of the
test to detect an infection. For example, the rate of chlamydia notifications in Australia has
almost tripled over the last decade. Recent analysis of chlamydia testing rates shows that
testing has increased markedly related to screening guidelines and ease of testing with the
introduction of highly sensitive PCR urine tests. While increased screening has undoubtedly
contributed to the increase in chlamydia notifications, it is not clear whether the increased
rates are also due to rising infection rates.

There are several ways NNDSS could be improved and enable authorities to separate rising
disease rates from changes in test technologies or reporting practices. More accurate
surveillance data would in turn enable more appropriate responses to reported increases in
disease and improve control program evaluations.
Other communicable disease surveillance systems

A complex web comprising numerous surveillance systems supplements NNDSS data, each established at different times, with unique methods for collection and analysis of data. There are several national surveillance systems, which gather data about multiple diseases/pathogens. Other surveillance systems focus on disease groups of interest, particularly: healthcare associated infections, antimicrobial resistance, foodborne disease and vaccine preventable diseases. In addition, there are several surveillance systems in operation for single diseases/pathogens only (i.e. influenza, HIV, trachoma, Creutzfeldt-Jakob disease). The type of reporting used varies and includes both passive and active reporting.

Many of these surveillance systems have been in place for many years and their current role is largely historical rather than being part of an overall comprehensive system. Generally their on-going development has been ad hoc and the public health benefits are not optimal in some cases.

A list of current national surveillance systems and their characteristics is provided in Table 5.1.2.1 Surveillance systems have been categorised according to the disease or disease groups for which they provide surveillance.
### Table 5.1.2.1 National surveillance systems

<table>
<thead>
<tr>
<th>Topic</th>
<th>Name of Surveillance System</th>
<th>Brief Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Multiple diseases</strong></td>
<td>National Notifiable Disease Surveillance System (NNDSS)</td>
<td>National passive surveillance of 65 communicable diseases, using standard case definitions; notifications are made to DoHA by jurisdictions</td>
</tr>
<tr>
<td></td>
<td>Australian Sentinel Practices Research Network (ASPREN)</td>
<td>National network of approximately 170 general practitioners who report presentations of defined medical conditions (currently: influenza-like illness, gastroenteritis, chickenpox and shingles) each week</td>
</tr>
<tr>
<td></td>
<td>Australian Paediatric Surveillance Unit (APSU)</td>
<td>Active surveillance of uncommon childhood diseases by contacting paediatricians monthly. Communicable diseases currently under surveillance include: acute flaccid paralysis, congenital cytomegalovirus infection, congenital rubella, perinatal exposure to HIV and HIV infection, neonatal herpes simplex virus infection, neonatal varicella, congenital varicella, severe complications of varicella and recurrent respiratory papillomatosis.</td>
</tr>
<tr>
<td><strong>Antimicrobial Resistance</strong></td>
<td>Antimicrobial Resistance Standing Committee (AMRSC) of AHPPC</td>
<td>The Antimicrobial Resistance Standing Committee of the AHPPC has recently been formed to establish systems for comprehensive national surveillance of AMR and monitoring of antibiotic usage in Australia.</td>
</tr>
<tr>
<td></td>
<td>National Antimicrobial Utilisation Surveillance Program (NAUSP)</td>
<td>Data collected centrally on antibiotic use from 35 hospitals around Australia.</td>
</tr>
<tr>
<td></td>
<td>Australian Group on Antimicrobial Resistance (AGAR)</td>
<td>Periodic antimicrobial resistance surveys on key pathogens known to have high rates of antimicrobial resistance. Data provided by 30 laboratories, both private and public.</td>
</tr>
<tr>
<td></td>
<td>Australian Gonococcal Surveillance Programme (AGSP)</td>
<td>Monitors sensitivity to a number of antibiotics resistance in Neisseria gonorrhoeae isolates. Data collected from ten reference laboratories in all states and territories and in New Zealand. Data are analysed quarterly and reported annually in CDI.</td>
</tr>
<tr>
<td><strong>Healthcare Associated Infections</strong></td>
<td>Australian Commission on Safety and Quality in Health Care</td>
<td>ACSQHC has begun work on a National Surveillance Initiative for HAI as part of its Healthcare Associated Infection Prevention program. Guidelines which specify a case definition and reporting methods for Healthcare associated infections are currently in draft form; the HAI’s include: Staphylococcus aureus bacteraemia, Clostridium difficile infection and central line associated blood stream Infection. There is currently, no national surveillance for HAI.</td>
</tr>
<tr>
<td><strong>Foodborne disease</strong></td>
<td>OzFoodNet</td>
<td>A national network of epidemiologists based in each state and territory and DoHA, Undertake enhanced surveillance of foodborne illnesses to detect clusters and investigate outbreaks with the objective of reducing foodborne illness.</td>
</tr>
<tr>
<td></td>
<td>National Enteric Pathogen Surveillance Scheme (NEPSS)</td>
<td>Laboratory based surveillance that monitors trends in the epidemiology of human enteric bacterial infections, identifies potential sources of pathogens causing human disease and monitors antibiotic resistance among bacterial enteric pathogens</td>
</tr>
<tr>
<td>Topic</td>
<td>Name of Surveillance System</td>
<td>Brief Description</td>
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</tbody>
</table>
Multiple diseases

The Australian Sentinel Practices Research Network (ASPREN)

The Royal Australian College of General Practitioners and the Department of General Practice at the University of Adelaide operate the Australian Sentinel Practices Research Network (ASPREN) (14). Established in 1991 as a sentinel surveillance system, ASPREN is a national network of general practitioners (GPs) who report presentations of defined medical conditions or syndromes each week. The main aims of ASPREN are to: provide an indicator of the burden of disease in the primary health care setting; act as an early warning indicator in the event of an influenza pandemic; and collect data for general practice research (14, 15). Participating GPs receive continuing medical education points and some are eligible for financial remuneration. The ASPREN management committee reviews the list of conditions annually and an annual report is published. In 2011, 4 conditions were monitored; all of which are related to communicable diseases. These include: influenza like illness, gastroenteritis, chickenpox and shingles (14). In 2010 ASPREN had 170 participating GPs (9) from across all jurisdictions, an increase from 51 in 2004 (15).

Australian Paediatric Surveillance Unit (APSU)

The Australian Paediatric Surveillance Unit (APSU) was established in 1993 to facilitate active surveillance of uncommon diseases of childhood, complications of common diseases or adverse effects of treatment (16). The APSU is a unit of the Royal Australasian College of Physicians, Paediatrics Division and its activities are overseen by a Scientific Review Panel(10). Surveillance is carried out as part of epidemiologic research; with different research projects using the APSU to collect data. Researchers can apply to the APSU to have a disease of interest included in the APSU’s surveillance system and conditions are usually studied over one to three years. Each month, the APSU contacts over 1300 clinicians on its database and requests they complete a specially designed ‘report card’ (either hard copy or electronic) to document children newly diagnosed with the diseases of interest (16). The report cards are collected centrally and negative and positive responses are logged into a database (17). Participating clinicians are eligible for continuing professional development credits for APSU activities. Communicable diseases currently under surveillance with the APSU are: acute flaccid paralysis, congenital cytomegalovirus infection, congenital rubella, perinatal exposure to HIV and HIV infection, neonatal herpes simplex virus infection, neonatal varicella, congenital varicella, severe complications of varicella and recurrent respiratory papillomatosis (16). APSU intermittently collects data on severe complications of laboratory confirmed influenza in children less than 15 years of age admitted to hospital since 2007, when seasonal influenza activity was unusually high.

The APSU was evaluated in 2009 by staff of the APSU (18) using standard surveillance system evaluation guidelines. Findings were that APSU fulfils its objectives and meets CDC criteria for usefulness, simplicity, acceptability and representativeness, sensitivity and...
timeliness of data quality. It found that the stability of the APSU is threatened by a lack of continued funding (18). Furthermore, it was noted that the system could be improved if it were able to transition to an online reporting mechanism and address gaps in surveillance for populations in rural, remote and disadvantaged communities.

APSU surveillance sits predominantly within the purview of the paediatric community, rather than the communicable disease community. Consequently their communicable disease surveillance activities and reporting tend to be disjointed and not linked into communicable disease monitoring or to CDNA. For example, varicella surveillance done by ASPU does not link in with varicella notifications, or with ASPREN or PAEDS (see below under NCIRS) varicella surveillance.

**Antimicrobial Resistance**

The threat of widespread and multi-drug antimicrobial resistance (AMR) has caused concern in Australia for several decades (19). While both public and private microbiology laboratories generate data on bacterial antibiotic sensitivities, there is no national coordination of these data. Existing national and state-based AMR surveillance activities are often voluntary, and they operate without systematic oversight and leadership at the national level.

The Australian Commission on Safety and Quality in Health Care (ACSQHC) was formed in 2006 to coordinate improvements in safety and quality in health care across Australia in both the public and private sectors (20). ACSQHC is funded by both the Australian Government and state and territory governments, and in 2011 it became an independent statutory authority under the *National Health Reform Act 2011*. As part of its work in improving medication safety, the ACSQHC is developing an antimicrobial stewardship program to optimise antimicrobial use, improve patient outcomes and reduce the incidence of antimicrobial resistance in Australian hospitals. Surveillance of microbial resistance patterns seen in isolates from hospitalised patients is part of this work.

In 2011, the ACSQHC hosted an Antimicrobial Resistance Colloquia of Australian experts on AMR, which analysed existing interventions for monitoring and preventing AMR. It was widely recognised that strategies to address AMR are needed, and that national surveillance is a major gap. Following this a new subcommittee of AHPPC was formed, the Antimicrobial Resistance Standing Committee (AMRSC) whose function is to develop a national strategy to prevent and control AMR. This includes overseeing an integrative approach through coordination of current activities such as; a national AMR surveillance system, national monitoring of antibiotic usage; antibiotic stewardship programs; education; a review of the current regulatory system applying to antibiotics; research into all aspects of AMR and community/consumer campaigns. For the first time in Australia, there is a body, reporting to Health Ministers via AHPPC and AHMAC, tasked with ensuring a comprehensive national approach to AMR with national coordination of activities, comprehensive national reports on
antibiotic use and resistance, and capability to readily link antimicrobial usage and resistance data.

AMRSC has considered ways to enhance and better coordinate existing Australian systems of data gathering and reporting on patterns of AMR and antibiotic use. Possible activities include:

1. Reporting on the number and outcomes of patients infected with resistant bacteria, and establishing an alert system to notify clinicians and policy makers of emerging and re-emerging highly resistant bacteria.

2. Collecting and collating national data on AMR and antimicrobial use in humans from healthcare facilities and the community to provide information on resistant organisms and illness due to these organisms, and the impact of usage patterns on the development of bacterial resistance that would inform national action.

3. Linking together resistance data from humans, animals and agriculture to provide a national picture of AMR to guide action on preserving the effectiveness of antimicrobial agents.

4 Fostering and complementing scientific AMR research in Australia.

5. Providing advice to regulatory authorities (e.g. the Therapeutic Goods Administration, Pharmaceutical Benefits Committee, Australian Pesticides and Veterinary Medicines Authority) when required to facilitate optimum antibiotic availability and accessibility.

The Australian Antimicrobial Resistance Prevention and Containment (AMRPC) Steering Group was established in February 2013. The Secretaries of the Department of Health and the Department of Agriculture jointly chair the Steering Group. The Australian Chief Medical Officer and Chief Veterinary Officer are also members. The Steering Group is providing high level governance and leadership on this important issue, and will oversee the development of a comprehensive National Antimicrobial Resistance (AMR) Prevention and Containment Strategy for Australia.

For Australia, improving national AMR and antimicrobial use surveillance is a critical next step in an expanded strategy for the prevention and containment of AMR. The surveillance will provide ongoing data to give an accurate picture of what is happening across the country, and provide trends about changing patterns of resistance and the impact on patients. National coordination in the context of human health is central to AMR management and, in time, should extend to other organisms and contexts such as veterinary usage and surveillance of bacterial resistance in animals, agriculture and food. Linking data from animals, agriculture and food with that of humans is fundamental to the comprehensive prevention and containment of AMR.
There are two major national surveillance programs currently in place in Australia to collect data on antimicrobial resistance, both are useful and functional but neither is comprehensive. These are the Australian Group on Antimicrobial Resistance (AGAR) and the Australian Gonococcal Surveillance Programme (part of the National Neisseria Network). These surveillance systems are outlined below.

**Australian Group on Antimicrobial Resistance (AGAR)**
The Australian Group on Antimicrobial Resistance (AGAR) was established in 1985, primarily to monitor antimicrobial resistance in *Staphylococcus aureus* (23). The work of AGAR has expanded over the years to incorporate planned surveillance studies on many bacteria for which antibiotic resistance is a clinical concern. The AGAR is a collaboration of clinicians and scientists from major microbiology laboratories comprising 30 institutions across all jurisdictions and including four private laboratories (23). Antimicrobial resistance surveys are conducted periodically, using standardised methods for data collection, isolate collection and laboratory examination, including typing (24). Organisms currently under surveillance include: *S. aureus, E. coli, Klebsiella, Enterobacter, Acinetobacter, S. pneumoniae, Enterococcus spp., H. influenzae* (23). The surveillance work performed by AGAR is reported on their website and published in various journals.

**State and territory AMR and HAI surveillance systems**
Additionally some jurisdictions have AMR and or HAI surveillance programs, but these are not consistent, directly comparable or linked up. Several Australian state and territory government programs have been developed largely in isolation for monitoring AMR or HAI: Healthcare Infection Surveillance Western Australia (HISWA), the Centre for Healthcare Related Infection Surveillance and Prevention (CHRISP; Queensland), the Victorian Nosocomial Infection Surveillance System (VICNISS) and the Tasmanian Infection Prevention and Control Unit (TIPCU). South Australia has had a surveillance program in place since 2001 which is run by the Infection Control Service, it includes monitoring of infections caused by a wider range of multi-resistant organisms, including multi-resistant Gram negative organisms.

Only the Queensland program (CHRISP) has a system for comprehensive monitoring of the *percentage of antimicrobial resistance* in epidemiologically important organisms (Antibiogram). This is quite a different metric to the number (or rate) of *infections* caused by specific multi-resistant pathogens. In fact both types of information are required in order to effectively understand the epidemiology of antimicrobial resistance and antibiotic usage in Australia.
**Surveillance of Pathogenic Neisseria by the National Neisseria Network, Australia**

The National Neisseria Network, Australia (NNN) (25) is a collaborative, laboratory based surveillance programme that is funded by Health. The NNN is a network of ten reference laboratories in all states and territories that provides enhanced surveillance on isolates of the pathogenic Neisseria, *Neisseria gonorrhoeae* and *Neisseria meningitidis* (26).

The Australian Gonococcal Surveillance Programme (AGSP) has been reporting data on the antimicrobial susceptibility of *N. gonorrhoeae* since 1981 to inform gonorrhoea treatment protocols. The NNN laboratories report data on gonococcal susceptibility to an agreed core group of antimicrobial agents on a quarterly basis to the coordinating laboratory, the WHO Collaborating Centre for STD, Sydney, for collation and reporting, and an expanded analysis as an annual report in CDI. The antibiotics that are currently routinely surveyed include azithromycin, ceftriaxone, ciprofloxacin penicillin, and spectinomycin.

Data are used to define standard protocols for antibiotic treatment of gonococcal infection. Additional data are also provided on other antibiotics from time to time. Laboratories also test isolates for the presence of high level plasmid mediated resistance to the tetracyclines. Comparability of data is achieved by means of a standardised system of MIC testing, the use of appropriate quality control gonococci and laboratory participation in a program-specific quality assurance programme provided by the WHO Collaborating Centre for STD, Sydney.

In 2005 the AGSP was formally evaluated (27). The strengths of the AGSP are the use of high quality methods, high acceptability and usefulness of the data to inform patient management and research (27). The major weaknesses were found to be poor accessibility of the outputs to stakeholders and lack of flexibility (34).

Critically there is increasing gonococcal disease rates in Australia and increasing gonococcal antimicrobial resistance reported both nationally and globally. There are widespread concerns for disease control, and the implications of untreated disease include significant morbidity and facilitated HIV transmission. The increasing use of molecular methods for the diagnosis of gonococcal infections has reduced the number of isolates available for testing, and the predominance of isolates are from urban centres and to an extent this threatens the representativeness and sensitivity of the system. However the AGSP is currently monitoring 35% of all gonococcal isolates annually. The development of molecular surveillance strategies for gonococcal antimicrobial resistance by the NNN will enhance but not replace the information provided by the AGSP. The AGSP Annual reports are available online at: [http://www.health.gov.au/internet/main/publishing.nsf/Content/cda-pubs-annlrpt-gonoanrep.htm](http://www.health.gov.au/internet/main/publishing.nsf/Content/cda-pubs-annlrpt-gonoanrep.htm)
National Antimicrobial Utilisation Surveillance Program (NAUSP)

In July 2004, the National Antimicrobial Utilisation Surveillance Program (NAUSP) was commenced to collect national data on antimicrobial use in tertiary hospitals (21). By 2011, 35 hospitals in all jurisdictions contributed data on usage rates for six antimicrobial classes (22). These data are reported bimonthly to the federal health department and compiled into an annual report. The program is funded by Health and is conducted by the Infection Control Service, Communicable Disease Control Branch, Department of Health, South Australia (22). The major limitation of this system is its lack of comprehensiveness.

As at August 2013, there are a total of 79 acute care hospitals that voluntarily contribute data to the NAUSP representing all states and territories. A further 13 hospitals have expressed interest to join the program, and agreement has been reached with the Centre for Healthcare Related Infection Surveillance and Prevention (CHRISP) to supply data from a further 16 Queensland public hospitals. The program currently covers more than 70% of principal referral acute care beds (AIHW peer group A1 hospitals) and approximately 35% of smaller hospitals; therefore, in the past twelve months or so, this program has become much more comprehensive in its coverage.

The National Safety & Quality Health Service Standards mandate that all hospitals should have in place a system of monitoring antimicrobial usage as part of their antimicrobial stewardship program; therefore, the demand for participation in NAUSP is expected to grow substantially. This has implications for the sustainability of the program under the current funding arrangements [personal communication, Irene Wilkinson, NAUSP].

Healthcare Associated Infections

Monitoring for healthcare associated infections (HAIs) in Australia has traditionally been for accreditation or quality control purposes, and coordinated at a facility, state or regional level. There has been no standardised, systematic approach allowing for analysis of national data.

The ACSQHC operates a Healthcare Associated Infection Prevention Program which aims to develop a national approach to reducing HAI through five key areas, including a National Surveillance Initiative (20). In November 2011, the ACSQHC produced three implementation guides for consultation on the national definition and estimation of HAI rates, as follows: *Staphylococcus aureus* bacteraemia, *Clostridium difficile* infection and Central Line Associated Blood Stream Infection. The guides have been developed to support and standardise existing surveillance activities and seek to ensure consistency in reporting of HAI across public and private hospitals (28-30). The ACSQHC has a formal partnership with the Australian Institute of Health and Welfare, which supports HAI surveillance by providing data set specifications, analysis and reporting. To date, the AIHW has produced one report on...
**Staphylococcus aureus** bacteraemia, using data that is nationally consistent (31). The data are produced primarily as an indicator of hospital safety.

The National Health Performance Authority, established in 2011 and operating since 2012, monitors and reports on, the performance of Local Hospital Networks, public and private hospitals, primary health care organisations and other bodies providing health care services. Performance indicators, informed by the COAG endorsed Performance and Accountability Framework, reported to date include: Hospital Performance: Healthcare-associated **Staphylococcus aureus** bloodstream infections in 2011-2012, reported May 2013. An additional indicator, not yet reported, is Healthcare associated **Clostridium difficile** infections.

At the time of writing, comprehensive, standardised surveillance for healthcare associated infection is not carried out in all facilities in all jurisdictions. For surveillance to be comprehensive, resources, technical expertise and additional personnel are required.

**Foodborne diseases**

**OzFoodNet**

OzFoodNet is a national network of epidemiologists funded by Health to work collaboratively to enhance existing surveillance mechanisms to control foodborne disease (32). Each state and territory in Australia employs one or more dedicated epidemiologists, who together with a coordinating epidemiologist located centrally in Canberra, focus on routine surveillance from NNDSS, outbreak investigation and applied research of foodborne illness. OzFoodNet’s strength is its capacity to detect and investigate multi-jurisdictional outbreaks caused by foods distributed in one or more jurisdictions. All known and suspected foodborne outbreak data are collected centrally by OzFoodNet and entered into an ‘Outbreak Register’, which is both an outbreak management system and a prospective record of foodborne disease outbreaks (33). The Outbreak Register provides data that can be used to guide food safety programs and policy development. An example of enhanced surveillance routinely carried out by OzFoodNet staff in collaboration with their laboratory partners is surveillance of **Listeria monocytogenes**. Listeriosis is nationally notifiable through the NNDSS. OzFoodNet collects exposure information on all identified human cases, arranges laboratory typing of isolates and undertakes epidemiological investigation of any clusters. Nationally comparable subtyping is essential for the identification of multijurisdictional clusters because of the generally sporadic nature of Listeria infections. Typing allowed the identification of a nation wide outbreak of Listeria due to a specific cheese brand in 2012-13.

**National Enteric Pathogen Surveillance Scheme**

The National Enteric Pathogens Surveillance System (NEPSS) was established in 1978; it is a laboratory based system and collects, analyses and disseminates data on human enteric bacterial infections including **Salmonella**, **E. coli**, **Vibrio**, **Yersinia**, **Plesiomonas**, **Aeromonas** and **Campylobacter** (34). The NEPSS is maintained by the Microbiological Diagnostic Unit,
Department of Microbiology and Immunology at the University of Melbourne (35). NEPSS monitors trends in the epidemiology of human enteric bacterial infections, identifies outbreaks, identifies potential sources of pathogens causing human disease and monitors antibiotic resistance among bacterial enteric pathogens. It also collects data from non-human sources of enteric pathogens, although the collection of this data has been ad-hoc over the years, dependent on funding and industry cooperation (36).

Vaccine Preventable Disease Surveillance
National Centre for Immunisation Research and Surveillance of Vaccine Preventable Diseases (NCIRS)
The National Centre for Immunisation Research and Surveillance of Vaccine Preventable Diseases (NCIRS) was established by Australian Government in August 1997. Core funding is provided by Health and the NSW Department of Health with infrastructure supported by The Children’s Hospital at Westmead. Its primary function is to perform research aimed at reducing the incidence of vaccine preventable diseases and improving vaccine uptake, in children and adults. Funded communicable disease surveillance activities including:

- publication of regular vaccine preventable disease (VPD) surveillance reports using routinely collected data such as NNDSS data, hospitalisation and mortality data from AIHW;
- publication of regular reports on VPD epidemiology in Aboriginal and Torres Strait Islander people;
- analysis of data from the Australian Childhood Immunisation Register (ACIR) for monitoring of childhood vaccination coverage by the National Immunisation Committee and for publication;
- analysis and annual reporting of data from the Therapeutic Goods Administration (TGA) on adverse events following immunisation.
- collection, analysis and publication of clinical data on adverse events following immunisation reported by special adverse event clinics in children's hospitals in four capital cities;
- implementation of a major nationwide serosurveillance survey approximately every five years whereby 7,000-10,000 serum samples collected for diagnostic purposes across Australia are tested for antibodies to selected VPDs to estimate population immunity to these disease and inform vaccination policy (37). However this survey is burdensome for laboratories and requires additional resourcing if it is to continue (38); and
- coordination of the Paediatric Active Enhanced Disease Surveillance (PAEDS) system, where all admissions to the major children’s hospitals in four capital cities are reviewed to detect cases of selected conditions that either could be adverse events following immunisation or are VPD admissions; data are aggregated and used to monitor trends and identify potential signals.
National HPV Register

Established in 2008, the National Human Papillomavirus (HPV) Vaccination Program Register is operated by the Victorian Cytology Service and fully funded by Health. The Register collects vaccination information on all HPV vaccinations administered in Australia with a focus on vaccinations administered as part of the National HPV Vaccination Program (39). This register is not a population based register but is used to estimate HPV vaccination coverage using ABS population denominator data (39). It is envisaged that in the future register data will be linked to data from the state and territory cervical screening registers in order to evaluate the impact of vaccination on cervical abnormalities.

Australian Rotavirus Surveillance Program (ARSP)

The Australian Rotavirus Surveillance Program (ARSP) is a laboratory based surveillance system that commenced in 1999 to characterise rotavirus strains causing disease in Australia (40). Stool specimens are sent from participating laboratories around Australia to the Murdoch Childrens’ Research Institute (National Rotavirus Reference Centre), Victoria, where they are serotyped and the data analysed and reported (41). The ARSP is supported by grants from Health, GlaxoSmithKline and CSL. A formal evaluation of the ARSP was conducted in 2006 (42). The evaluation found the ARSP to be a timely, flexible and sensitive system that will provide useful information in the post-vaccination era about the impact of vaccination, the rate of vaccination failures, changes in rotavirus epidemiology and the emergence of replacement serotypes. Key challenges for the ARSP were found to be representativeness, as not all states and territories contribute data each year and information about rural locality and Indigenous status is not collected (42).

Polio Surveillance

Polio surveillance covers clinical and laboratory surveillance co-ordinated by VIDRL. Clinical surveillance is performed in collaboration with the APSU and NCIRS (including the PAEDS program) for cases of acute flaccid paralysis (AFP). Laboratory surveillance includes the Enterovirus Reference Laboratory Network, consisting of 11 public sector diagnostic virology laboratories who were involved with the investigation of the enterovirus 71 (EV71) outbreak this year. EV71 may be considered as an emerging pathogen.

National Influenza Surveillance Scheme

The National Influenza Surveillance Scheme began in 1994, when the previous influenza activity reporting from the Laboratory Virology and Serology reporting scheme was combined with several other national surveillance schemes (43). The objective of the surveillance scheme is to ensure the early detection of influenza epidemics, to trigger public health prevention and control activities; characterisation of the epidemic, especially identification of risk groups and disease severity; and characterisation of the circulating viruses to inform the
following season’s vaccine. Over time, datasets used in reporting for the National Influenza Surveillance Scheme have changed to ensure an accurate understanding of influenza activity and severity in the community. In 2001 laboratory confirmed influenza became nationally notifiable in all jurisdictions, except South Australia where it became notifiable in 2008. Following a particularly significant influenza season in 2007 the Enhanced Influenza Surveillance Framework for Australia was developed and the Influenza Surveillance Strategy Working Group of the CDNA was appointed to oversee the enhancement of influenza surveillance in Australia. Currently, influenza is monitored across the community and health sector using the following surveillance schemes and systems:

- Notifications of laboratory-confirmed influenza are reported from all Australian states and territories and included in the National Notifiable Diseases Surveillance System.
- Community level influenza-like illness (ILI) is monitored through two systems, Flutracking, a weekly online survey integrating syndromic information with participant influenza immunity status; and the National Health Call Centre Network, which currently provides data from all jurisdictions except Victoria and Queensland.
- General practice ILI consultations are provided through the Australian Sentinel Practice Research Network (ASPREN) and the Victorian Sentinel General Practice Scheme. Data on ILI presentations to hospital emergency departments are also collected from sentinel hospitals sites in Western Australia, New South Wales and the Northern Territory.
- Hospitalised cases of laboratory-confirmed influenza are reported through the sentinel Influenza Complications Alert Network (FluCAN); severe complications in children are monitored by the Australian Paediatric Surveillance Unit (APSU). Additionally, Queensland are able to provide data on cases of confirmed influenza admitted to public hospitals through their EpiLog system.
- Information on influenza subtypes and positivity are provided by sentinel laboratories, including the National Influenza Centre laboratories, some state public health laboratories and from ASPREN. Additionally, antigenic characterisation and antiviral resistance data are also provided from the World Health Organization Collaborating Centre for Reference and Research on Influenza.
- Mortality data, represented as influenza and pneumonia related deaths, are available through the Australian Bureau of Statistics. The utility of these data nationally are limited as they are not timely, however some jurisdictions have ‘real-time’ access to their local Births, Deaths and Marriages register to inform mortality trends.

During the influenza season, data from each of these surveillance systems are compiled and published fortnightly in the Australian Influenza Surveillance Report, which is available generally from May to October on the department’s web site. These reports include the above data as well as additional mortality and international surveillance data.
Lack of monitoring of the adult and adolescent vaccination coverage

A major gap in the information available for evaluation of the impact of the National Immunisation Program and for control of VPDs is that there is no accurate method to estimate vaccination coverage data for adults. With the exception of the national HPV register, which includes HPV vaccination data on women (up to 26 years of age), girls and boys vaccinated as part of the school and community based ‘catch up’ program, vaccines administered under the National Immunisation Program to adults and adolescents are not nationally recorded (hepatitis B, varicella, diphtheria-tetanus-pertussis, influenza and pneumococcal vaccinations).

Blood Borne Virus and Sexually Transmissible Infections surveillance

The Kirby Institute

The Kirby Institute for infection and immunity in society began as the National Centre for HIV Epidemiology and Clinical Research (NCHECR) which was established in 1986. It undertakes surveillance and research projects in blood borne viruses, sexually transmissible infections and other areas including trachoma. The Kirby Institute is directly affiliated with the University of New South Wales, and receives funding through Health.

The Kirby Institute’s primary functions relate to the coordination of national surveillance programs, population health and epidemiological research, clinical research and clinical trials. Surveillance activities undertaken in the BBV and STI area by the Kirby Institute, in collaboration with states and territories and other organisations include:

- publication of the annual *HIV/AIDS, viral hepatitis and sexually transmissible infections in Australia Annual Surveillance Report* which reports on NNDSS data, data from the HIV and AIDS registries and other routinely collected data;
- publication of the annual *Bloodborne viral and sexually transmitted infections in Aboriginal and Torres Strait Islander People: Surveillance Report* that uses NNDSS and other data to describe the epidemiology of these infections in Indigenous Australians;
- maintenance of the National HIV Registry and National AIDS Registry, using data collected by states and territories and reported to the Kirby Institute, including data on HIV subtypes and resistance genotypes (44). Data are analysed and reported in the annual surveillance reports (see above).
- maintenance of the National Registry of Perinatal Exposure to HIV, data on perinatal exposure to HIV or paediatric HIV infection are provided by the APSU and follow-up information collected by the Kirby Institute;
- analysis of data on liver transplants, from the Australia and New Zealand Transplant Register to monitor the incidence of advanced liver disease due to chronic viral hepatitis;
• monitoring blood borne virus prevalence in selected populations including HIV prevalence in prison entrants, BBV prevalence in blood donors, HIV prevalence and incidence in people seen at selected sexual health clinics throughout Australia; prevalence of antibodies to hepatitis C and HIV viruses in users of needle and syringe programs, and prevalence of risk behaviours in gay men (44); and

• secretarial and infrastructural support for the National Bloodborne Virus and Sexually Transmissible Infections Surveillance Subcommittee of CDNA.

Additionally, time limited research projects lead by Kirby Institute researchers and typically funded by the NHMRC, provide critical surveillance information and evaluation of control interventions for BBVs and STIs. An example of this is the STRIVE project, which is measuring the prevalence of STIs in remote Indigenous communities in WA, the NT and Qld and impact of annual screening for these infections.

The Australian Collaboration for Chlamydia Enhanced Sentinel Surveillance (ACCESS). The Burnet Institute’s ACCESS system involves six separate chlamydia sentinel surveillance networks that provide important and unique information on testing uptake and prevalence of chlamydia infection in a range of priority populations: young heterosexuals; men who have sex with men (MSM); Indigenous people; pregnant women and sex workers (45).

The six networks are: sexual health clinics (SHCs); Family Planning Clinics (FPCs); Antenatal clinics (ANCs); Aboriginal Health Services (AHSs); General Practitioners (GPs) and Diagnostic Laboratories (Labs). In most networks, routine clinical data is extracted directly from existing Patient Management Systems. No additional testing is required in most networks. Data extracted from sites is encrypted and de-identified to ensure anonymity and confidentiality of individuals accessing the various clinics involved with ACCESS. Line listed consultation data is also provided to ascertain the proportion of individuals attending the clinics who were tested for chlamydia (denominator) calculation.

The main benefits that ACCESS provides are: unique information on testing uptake and positivity rate of chlamydia infection in a range of priority populations; ability to interpret notification trends using appropriate denominator data – the extraction of negative results as well as positive results allows for interpretation of surveillance data resulting from: an increase in testing or an increase in prevalence; and an ability to interpret state-level and national-level health promotion campaigns and interventions (including those funded by Health) to reduce the transmission of chlamydia and other sexually transmitted infections (45).

Other surveillance programs

Australian Meningococcal Surveillance Programme
Established in 1994, the Australian Meningococcal Surveillance Programme (AMSP) is a function of the National Neisseria Network (26). AMSP is a collects data on the phenotypic
(serogroup, serotype and subserotype) strains and antibiotic sensitivity of invasive meningococcal isolates to complement NNDSS data (46). In addition, data from non-culture based laboratory testing, derived from nucleic acid amplification assays and serological examination, are included in the analyses. AMSP links the laboratory information with clinical information (including age and outcome), to provide a comprehensive epidemiological survey. Annual reports summarising data are produced and published in CDI. The increasing use of non-culture based methods for diagnosis of meningococcal infections will result in fewer isolates being available for phenotypic testing including antimicrobial resistance testing. In 2012 there were 222 cases meningococcal disease notified to NNDSS and for 208 laboratory data via the AMSP were available. For the invasive meningococcal disease cases notified in Australia in 2012, 55.5% were diagnosed by culture, and 44.5% cases were confirmed by NAAT testing alone. The AMSP Annual reports are available online at: http://www.health.gov.au/internet/main/publishing.nsf/content/cda-pubs-annlrpt-menganrep.htm

Tuberculosis surveillance - National Tuberculosis Advisory Committee

The National Tuberculosis Advisory Committee (NTAC) is a CDNA subcommittee and membership consists of jurisdictional representatives, a representative from the Australian Government Department of Health, a representative from the Australian Government Department of Immigration and Border Protection and other TB experts. Core data on all notifications of TB are recorded on the NNDSS and jurisdictional NTAC members are responsible for the collection of enhanced data including Indigenous status, country of origin, HIV status and health care work on all cases (47). The enhanced data are published separately to the routine annual NNDSS reporting.

Tuberculosis surveillance - The Australian Mycobacterium Reference Laboratory Network (AMRLN)

The Australian Mycobacterium Reference Laboratory Network (AMRLN) was established in 1986 to collect, analyse and report drug susceptibility data on bacteriologically confirmed cases of TB (48). The AMRLN comprises five State reference laboratories, each of which submit data to the AMRLN coordinator for collation and analysis. The data are analysed and reported with some additional clinical data (such as gender, age, site of disease, association with HIV) (48).

It should be noted that these two datasets, both consisting of information related to every new laboratory diagnosis of TB, are not linked. The two datasets should be integrated to enable the drug susceptibility data to be analysed together with the full set of enhanced data. This should be relatively easy to achieve given small number of TB notifications each year (less than 1400).

Sentinel Chicken Surveillance Programme
The Sentinel Chicken Surveillance Programme is an early warning system aimed at identifying an increase in flavivirus activity in various regions around Australia to inform control interventions (49). Sentinel chicken flocks are located in regional and rural areas and tested regularly for seroconversion to Murray Valley Encephalitis virus and Kunjin virus. Since it was established in 1974, the number and location of chicken flocks has varied, as have the jurisdictions involved (49, 50). In 2010, chicken flocks were maintained in four jurisdictions (Western Australia, New South Wales, Victoria and the Northern Territory) (64). The Programme is funded by individual jurisdictional health departments and in each jurisdiction the program is conducted with some variation as part of a broader arbovirus surveillance program, which may also include mosquito testing. The data are shared informally via the National Arbovirus and Malaria Advisory Committee (NAMAC) of CDNA and is reported in CDI as part of the NAMAC annual report on vector borne diseases.

National Trachoma Surveillance and Reporting Unit (NTSRU)
The National Trachoma Surveillance and Reporting Unit (NTSRU) was established in 2006 to provide a nationally consistent approach to data collection on trachoma (51). Funding comes from the Office of Aboriginal and Torres Strait Islander Health within Health. The NTSRU is responsible for trachoma data collation, analysis and reporting, including reporting related to the ongoing evaluation of trachoma control strategies. Western Australia, South Australia and the Northern Territory, where trachoma is known to be endemic undertake screening or trachoma and results are forwarded to the NTSRU (52). The NTSRU has been based at The Kirby Institute since 2010 following an evaluation of the trachoma surveillance system; before that it was based at the the University of Melbourne (in 2009) and at the Centre for Eye Research Australia (from 2006-2008). An annual report is produced by NTSRU.

Australian National Creutzfeldt-Jakob Disease Registry (ANCJDR)
The Australian National Creutzfeldt-Jakob Disease Registry (ANCJDR) was established by Health in 1993 (53). It is located in the Department of Pathology at the University of Melbourne, Victoria, and serves as a World Health Organization reference centre and laboratory facility for human Transmissible Spongiform Encephalopathies (TSEs) (54). The aim of the Registry is to identify all incident cases of human TSE, obtain detailed clinical information, study possible risk factors for disease and identify any potential situations where disease transmission could have occurred (55). Surveillance is both passive and active. Passive surveillance relies on notification of cases from clinicians, pathologists and family members; to aid this, clinically suspected CJD became a notifiable disease across Australia by June 2006 (56) and CJD became nationally notifiable in 2010 (55). Active and prospective surveillance methods are now geared toward clinical screening of patients and samples referred for testing and later follow-up with clinical services ante- and post-mortem.

In 2002 the ANCJDR was formally evaluated. It was found to be a useful system with a high degree of flexibility and acceptability (55). While it relies on complex reporting and
experienced staff to identify and classify cases, the system itself is simple in design, with high positive predictive value and representativeness. Recommendations were made to improve the sensitivity, although it was noted that ANCJDR was able to detect sporadic cases of CJD at rates comparable to other countries with comprehensive surveillance systems.

National Health Performance Authority
The National Health Performance Authority (NHPA) is an independent body that provides locally relevant and national consistent information on the performance of hospitals and other healthcare organisations. The Authority was set up under the National Health Reform Act in 2011 and commenced operations in 2012. Under the terms of the Act, the Authority monitors and reports on, the performance of Local Hospital Networks, public and private hospitals, primary health care organisations and other bodies that provide health care services. The Authority is also responsible for the MyHospitals website which allows Australians to see how well hospitals perform on waiting times, hand hygiene rates and other measures. The Authority has created and maintains a MyHealthy Communities website that provides information about the health and care provided in local areas.

A key principle of the Authority’s work is the provision of data that not only compares performance but highlights excellence and supports improvements to healthcare in hospitals and the community. Performance indicators relevant to communicable disease reporting are:

- Healthy Communities: Immunisation Rates for children in 2011-2012, NHPA, April 2013

Surveillance reporting
Communicable Diseases Intelligence (CDI) is the primary publication for Australian communicable disease surveillance reports. It is published quarterly on the Internet by Health. CDI publishes quarterly surveillance reports for many of the larger surveillance systems (NNDSS, ASPREN, OzFoodNet) and occasional or annual reporting for others. A few surveillance systems, particularly those related to healthcare associated infections report findings through alternative publications.

Turning surveillance into knowledge to support decision-making
Multiple surveillance systems, many covering similar diseases or disease groups or health events, generate multiple outputs. The “information for action” cycle across multiple systems needs to be addressed. Specifically, this requires developing capability to turn data gained through a variety of systems into knowledge to support decision-making.
A recent review of pandemic preparedness authored by key opinion leaders from the United States and Hong Kong (57) devotes considerable attention to the topic 'Interpreting Surveillance Data for Decision Making'. It considers appropriate interpretive tools that interface between surveillance inputs and evidence, comprising both statistical and transmission dynamic models. The paper further considers the next stage of knowledge synthesis in the process of decision making and makes practical suggestions for development of decision support tools (57), an area of applied informatics research that would be a valuable capability more appropriately included within a suite of core functions.
5.2 Laboratory Services

5.2.1 Definition
Public health microbiology is a cross-cutting area that spans the fields of human, animal, food, water, and environmental microbiology, with a focus on human health and disease. It requires laboratory scientists with the ability to work effectively across disciplines, particularly with epidemiologists and clinicians. Public health microbiology laboratories or laboratories with these functions play a central role in detection, monitoring, outbreak response, and providing scientific evidence to prevent and control infectious diseases (9).

5.2.2 Description of laboratory services
Public health laboratory services are a critical component of communicable disease control being vital for effective surveillance, outbreak investigation, detection of emerging infections and emergency preparedness and response. In Australia public health microbiology services are currently provided by a variety of laboratories, both public and private, with a range of expertise and specialised facilities. Laboratory services in Australia are of extremely high quality, as demonstrated by their ability to contribute data and research findings internationally, with many laboratories in Australia having WHO reference laboratory designations. A great strength of the laboratory services in Australia is their capacity to work with state and territory public health units to meet public health needs. At a national level, leadership and consultation in all aspects of public health microbiology comes from the Public Health Laboratory Network (PHLN).

Australian laboratories perform a variety of public health functions including:

- routine diagnostic testing, analysis and reporting of notifiable or other infectious diseases, including confirmatory and sensitivity testing
- additional specialised testing on routine specimens, for example by larger laboratories to detect clusters or outbreaks, or emergence of new strains
- special epidemiological surveys to determine prevalence and incidence of infection or immunity or antibiotic susceptibility;
- control of communicable disease outbreaks by interpreting and performing additional testing or population or environmental sampling or use of more specific testing procedures;
- development, validation and introduction of new procedures required for effective public health management (58)

An example of specialised testing that is growing in its importance for public health is epidemiological typing. Epidemiological typing is important for determining transmission pathways and defining clusters. It is also essential for the timely detection of emerging strains (eg pandemic H1N1 2009 influenza virus) and virulent strains (eg Clostridium difficile). It
provides valuable information for tailoring prevention techniques (eg influenza vaccine composition) and tailoring therapy for infections (eg 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.

The functions, organisation and financing of laboratory services for public health purposes vary throughout Australia. Broadly speaking, private and public diagnostic laboratories report on notifiable diseases (and other conditions) 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.

Specialist public health microbiology laboratories include:

- designated state based public health laboratories – stand alone or co-located with large public hospital laboratories – and usually block funded by state/territory health authorities
- public health laboratories that provide reference services for specific health areas, funded through hospital departmental budgets or special grants
- specialist research or reference laboratories (59)

The public health laboratory task is to provide, analyse and disseminate epidemiological, microbiological and virological information additional to that required for the immediate treatment of patients. The distinction between activities that are primarily diagnostic or primarily public health in nature is generally understood, however the precise separation in their practice is difficult to achieve, and depends on the way health services are organised and resourced.

Most of these public health laboratory functions are financed, and hence organised, at the state and territory level, although some national reference laboratories receive Australian Government grants for highly specialised services where a defined national gap has been identified. Inevitably, because state/territory based laboratories aim to serve their own individual jurisdiction, public health laboratories across Australia have developed in an uncoordinated manner, resulting in a lack of harmonisation of specialised laboratory testing methodologies and of information systems. Inconsistencies and inefficiencies therefore exist. For example, the use of different molecular typing methodologies for some important
organisms in different jurisdictions reduces Australia’s capacity to detect and investigate national outbreaks. Additionally, there is unequal provision of public health laboratory services across jurisdictions.

Most state based public health laboratories are also key microbiology service providers for public hospitals in their jurisdiction. Budgetary constraints on health services, including pathology services, mean that public health laboratory testing is competing for resources with testing for acute clinical care of sick patients. This has constrained public health testing and risks creating further barriers to communicable disease control, just at the time when technological advances can improve detection and investigation of communicable disease outbreaks. That is, financial pressures, combined with increasingly specialised tests and technologies, means that financing public health testing is becoming unsustainable. In order to maintain the services required for optimal communicable disease control in the future enhancements must be identified and realised and a new model of public health laboratory funding developed.

Public Health Laboratory Network
The Public Health Laboratory Network (PHLN) is a collaborative group of laboratories, which have expertise and provide services in public health microbiology (60). The PHLN was first established as part of the National Communicable Diseases Surveillance Strategy to CDNA (61) and is a standing committee of the Australian Health Protection Principal Committee (AHPPC). The central purpose and role of PHLN is defined as the provision of leadership and consultation in all aspects of public health microbiology and communicable disease control; achieved through the continued development of a proactive network of public health laboratories (60). As well as a forum for national discussion on public health laboratory issues, the committee undertakes critical surveillance work by developing and maintaining a comprehensive and up to date set of laboratory case definitions for key notifiable diseases. These case definitions inform the national case definitions for reporting to the NNDSS.

Membership of the PHLN subcommittee comprises representatives from public health laboratories in each state and territory, the Australian Animal Health Laboratory (AAHL), CDNA, and the World Health Organization (WHO) Collaborating Centre for Reference and Research on Influenza. Observer members include representatives from private pathology, the Australian Chemical, Biological, Radiological and Nuclear (CBRN) Data Centre and New Zealand (Table 5.2.1.1).

PHLN members are active on a broad range of public health microbiology committees where they can raise the profile of, and provide expert advice on behalf of the PHLN. Examples include: CDNA, enHealth, OzFoodNet, the Subcommittee on Animal Health Laboratory Standards (SCAHLS), and National Tuberculosis Advisory Committee (NTAC) (62). Health provides the secretariat support to PHLN.
PHLN functions well as a network but it is reliant on the goodwill of its members, who are essentially “volunteer” committee members who give up their time to do the work of PHLN. They do not receive sitting fees or other financial remuneration. Additionally, membership does not include all laboratories with public health functions, which limits PHLN’s scope to influence policy in public health microbiology and communicable disease control surveillance.

While PHLN functions well as a network of public health laboratories for discussion on issues related to national public health microbiology, the subcommittee has documented that there is no single information technology platform that links laboratories. Hence, there is no mechanism to enable information flow and data sharing.
### Table 5.2.2.1 - PHLN Members 2013

<table>
<thead>
<tr>
<th>Jurisdictional members</th>
<th>Name of laboratory / organisation</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Australian Government</strong></td>
<td>Health Emergency Management Branch, Office of Health Protection, Department of Health</td>
</tr>
<tr>
<td><strong>Australian Capital Territory</strong></td>
<td>Microbiology and Infectious Diseases Department, ACT Pathology, Canberra Hospital</td>
</tr>
<tr>
<td><strong>New South Wales</strong></td>
<td>CIDM Laboratory Services, ICPMR Westmead Hospital</td>
</tr>
<tr>
<td></td>
<td>Department of Microbiology, SEALs, Prince of Wales Hospital, Sydney</td>
</tr>
<tr>
<td><strong>Queensland</strong></td>
<td>Public Health Microbiology, Forensic &amp; Scientific Services</td>
</tr>
<tr>
<td></td>
<td>QPHS Central, Royal Brisbane Hospital</td>
</tr>
<tr>
<td><strong>Northern Territory</strong></td>
<td>Royal Darwin Hospital Laboratory</td>
</tr>
<tr>
<td><strong>Western Australia</strong></td>
<td>Division of Microbiology and Infectious Diseases, PathWest</td>
</tr>
<tr>
<td><strong>South Australia</strong></td>
<td>Infectious Diseases Laboratories, Institute of Medical and Veterinary Science</td>
</tr>
<tr>
<td></td>
<td>SA Pathology Women’s and Children’s Hospital</td>
</tr>
<tr>
<td><strong>Victoria</strong></td>
<td>Microbiological Diagnostic Unit (MDU), Public Health Laboratory, Department of Microbiology and Immunology, University of Melbourne.</td>
</tr>
<tr>
<td></td>
<td>Victorian Infectious Diseases Reference Laboratory</td>
</tr>
<tr>
<td><strong>Tasmania</strong></td>
<td>Department of Microbiology and Infectious Diseases, Royal Hobart Hospital</td>
</tr>
<tr>
<td><strong>National members</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Australian Animal Health Laboratory</strong></td>
<td>Australian Animal Health Laboratory, CSIRO Livestock Industries</td>
</tr>
<tr>
<td><strong>Communicable Disease Network Australia</strong></td>
<td>Rotating member on PHLN</td>
</tr>
<tr>
<td><strong>Expert members</strong></td>
<td></td>
</tr>
<tr>
<td><strong>WHO Collaborating Centre for Influenza</strong></td>
<td>WHO Collaborating Centre for Reference and Research on Influenza, North Melbourne</td>
</tr>
<tr>
<td><strong>Observer members</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Private Pathology Representative</strong></td>
<td>Sullivan Nicolaides Pathology, Queensland</td>
</tr>
<tr>
<td><strong>Chemical, Biological, Radiological and Nuclear (CBRN) Data Centre</strong></td>
<td>Biological Intelligence – Australian CBRN, Data Centre, Forensic and Data Centres</td>
</tr>
<tr>
<td><strong>New Zealand</strong></td>
<td>Canterbury Health Laboratories, Christchurch New Zealand</td>
</tr>
<tr>
<td><strong>Secretariat</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Health Emergency Response Coordination Section</strong></td>
<td>Health Emergency Management Branch, Office of Health Protection, Department of Health</td>
</tr>
</tbody>
</table>
National reference laboratories

There is no single national reference laboratory for communicable diseases in Australia. Several state-based laboratories act as national reference laboratories for particular organisms or groups of organisms. Some laboratories are WHO Collaborating Centres and perform an international reference laboratory function for particular organisms. Some national and international Australian disease specific reference laboratories are described below.

Vaccine-preventable diseases including influenza

National Poliovirus Reference Laboratory and WHO Regional Poliovirus Reference Laboratory

The Poliovirus Reference Laboratory is part of the Victorian Infectious Diseases Reference Laboratory (VIDRL) and was established in 1994. It is a member of the global poliovirus laboratory network, and functions as the national laboratory for Australia, Pacific Island countries, Brunei and is one of two regional reference laboratories for the Western Pacific region (63, 64). The National Poliovirus Reference Laboratory was renamed the National Enterovirus Reference Laboratory from July 2011, reflecting the broader focus of the laboratory’s activities in support of polio surveillance. The designation as a WHO Polio Regional Reference Laboratory is retained. The laboratory is also the National Polio Reference Laboratory for Papua New Guinea.

National Measles Reference Laboratory and WHO Regional Measles Reference Laboratory

The National Measles Reference Laboratory designation was assigned to VIDRL in 1999. In 2000, it became the first WHO measles regional reference laboratory for the Western Pacific Region (65). In its dual role as national and regional reference laboratory, VIDRL aims to provide a timely diagnostic service for measles surveillance and outbreak investigation, provide a reference service and laboratory support for measles diagnosis for laboratories around Australia and within the WHO Western Pacific region and to develop alternative laboratory methods for measles diagnosis and surveillance that may be appropriate for resource poor countries.

National Rotavirus Reference Centre

The National Rotavirus Reference Centre is based at the Murdoch Childrens Research Institute, Victoria (41). The Centre undertakes surveillance and characterisation of rotavirus strains causing annual epidemics of severe diarrhoea in young children throughout Australia, reporting the changing annual pattern of dominant genotypes since 1999. The Centre manages the Australian Rotavirus Surveillance Program described in the Surveillance Section 5.2.
WHO Collaborating Centre for Reference and Research on Influenza and WHO National Influenza Centres

The WHO Centre for Influenza was established at the then government body, Commonwealth Serum Laboratories (CSL) in 1951, not long after the formation of WHO and the WHO World Influenza Centre at the National Institute for Medical Research (NIMR) in London in 1948. In 1992, the Centre received designation as a WHO Collaborating Centre for Research and Reference on Influenza, the third globally and the first in the southern hemisphere. CSL continued to host the Centre after it was privatised as CSL Limited in 1994. In December 2006, with additional Australian Government investment of $23.2 million over four years, the Centre was transferred to VIDRL.

The Centre is one of five WHO Collaborating Centres for Reference and Research on Influenza that analyse influenza virus isolates from around the globe to document epidemiological, antigenic and genetic characteristics of the viruses. Data from all five Collaborating Centres are reviewed to determine which circulating influenza strains are predominantly circulating and therefore would be appropriate components for the next seasonal vaccines. Twice a year WHO makes a recommendation based on these data on which influenza strains should be included in the vaccine for the coming influenza season, for either the northern hemisphere or the southern hemisphere. The final decision on the composition of vaccines in each country is the responsibility of relevant national authorities. In addition to surveillance, the Centre engages in influenza research, training and education activities.

There are three laboratories in Australia which are designated WHO National Influenza Centres. These are: VIDRL, Pathwest and the Institute of Clinical Pathology and Medical Research (ICPMR).

From an international perspective, Australia is unusually well placed in influenza surveillance, research and control through the WHO Collaborating Centre for Influenza, three WHO National Influenza Centres, AAHL, CSL Limited, Biota, regulatory expertise in influenza vaccines at the TGA, and a number of strong academic research groups. The activities of the public health laboratories and influenza surveillance systems are linked through PHLN and CDNA (including the Influenza Surveillance Strategy Working Group of CDNA). However, there is room for greater national communication, particularly between public health and research activities and between human and animal influenza surveillance/reference laboratories.
Emerging infectious diseases, arboviruses and zoonoses
Australian Animal Health Laboratory
The Australian Animal Health Laboratory (AAHL) is a facility of the Commonwealth Scientific and Industrial Research Organisation (CSIRO), funded by CSIRO and DAFF. AAHL is the national centre for diagnosis, research and policy advice in animal health. Its diagnostic capacity includes the rapid diagnosis of exotic (foreign) and emerging animal diseases. The laboratory is a World Organisation for Animal Health (Office Internationale des Epizooties – OIE) reference laboratory for avian influenza, Hendra and Nipah virus disease, and other animal diseases (66). AAHL is the National Reference Laboratory for Rabies and the National Reference Laboratory for Brucellosis.

WHO Collaborating Centre for Reference and Research in Arbovirus Infections
The arbovirus laboratory at the Queensland University of Technology (QUT) is designated as a WHO CC for Reference and Research in arbovirus infections. In addition to research, it provides advice and assistance in the event of outbreaks of arbovirus infection, provides reference stocks of virus and antisera to other national and international laboratories and trains arbovirologists (67).

University of Sydney Medical Entomology Department
The Sydney University Medical Entomology Department serves as the de facto National Reference Laboratory for insects and other arthropods of medical and public health importance (68). The diagnostic laboratory provides an identification facility for all arthropods associated with human health, and the detection of arthropod-borne pathogens in likely vectors. Their research focuses on the biology, ecology and disease involvement of insects, particularly mosquitoes and mosquito-borne pathogens such as the arboviruses.

WHO/FAO/OIE Collaborating Centre for Reference and Research on Leptospirosis for Australia and the Western Pacific Region
This centre is part of Queensland Health Forensic and Scientific Services. The laboratory undertakes testing to determine leptospira serovars causing human disease, and prevalence in animal species. It is involved in research, surveillance and training in Australia and internationally (69).

WHO Collaborating Centre for Mycobacterium ulcerans
This Centre is based at VIDRL. Its role is to collect and manage information on the incidence, epidemiology and control of Mycobacterium ulcerans infections in the Western Pacific Region, and to perform and coordinate appropriate research projects with the aim of determining the ecology and mode(s) of transmission of M. ulcerans to humans and animals.
Enterovirus Reference Laboratory Network,

The Enterovirus Reference Laboratory Network consists of 11 public sector diagnostic virology laboratories who were involved with the investigation of the enterovirus 71 (EV71) outbreak this year. EV71 may be considered as an emerging pathogen.

Australia established an Enterovirus Reference Laboratory Network – primarily for poliovirus surveillance but also to detect other enteroviruses of public health significance, such as enterovirus 71 (EV71), through the sharing of enterovirus sequence data. EV71 infection often manifests benignly as hand, foot and mouth disease in infants but has been associated with fatal neurological disease, particularly in the Asia-Pacific region (70). The network consists of 11 public sector diagnostic virology laboratories.

Respiratory infections including tuberculosis

WHO Collaborating Centre in Tuberculosis Bacteriology

The Queensland Mycobacterium Reference Laboratory (QMRL) was designated a World Health Organisation Collaborating Centre in Tuberculosis Bacteriology in 1998. On request from WHO, QMRL provides reference services in identification & susceptibility testing of Mycobacterium tuberculosis to national laboratories; training in laboratory diagnosis for tuberculosis; and collaborates in the organisation and implementation of relevant national quality control programmes. The laboratory is part of a global network of supranational reference laboratories and participates in the surveillance of drug resistance in Mycobacterium tuberculosis. The laboratory is also member of the Australian Mycobacterium Reference Laboratory network, along with the IMVS in South Australia, VIDRL, PathWest Laboratory Medicine in Perth Western Australia, and the ICPMR in New South Wales (71).

WHO Collaborating Centre for Severe Acute Respiratory Syndrome (SARS) is based at AAHL in Geelong.

Sexually transmissible infections and bloodborne viruses

National (Serology) Reference Laboratory and WHO Collaborating Centre for Diagnostics and Laboratory Support for HIV and AIDS and Other Blood-borne Infections

The National Reference Laboratory (NRL) was established in 1985 as part of the Australian Government's HIV/AIDS Strategy, to evaluate HIV tests and adjudicate on the interpretation of HIV test results. Today, NRL remains a not-for-profit scientific organisation with the overall goal to support laboratories, in Australia and internationally, that perform testing for the diagnosis and management of human infectious disease, with specific focus on HIV and other bloodborne viruses such as hepatitis C. NRL is designated a WHO Collaborating Centre for Diagnostics and Laboratory Support for HIV and AIDS and Other Blood-borne Infections (72).
The Neisseria Reference Laboratory and WHO Collaborating Centre for Sexually Transmissible Disease (STD), Sydney

This laboratory, based at the Department of Microbiology, The Prince of Wales Hospital, is the coordinating centre for the National Neisseria Network (NNN), Australia, the Australian Meningococcal Surveillance Programme (AMSP) and the Australian Gonococcal Surveillance Programme (AGSP). In addition this Centre coordinates the Regional WHO Gonococcal Antimicrobial Surveillance Programme (GASP) for the Western Pacific Region and the WHO South East Asian Region. The WHO Collaborating Centre for STD, Sydney provides quality assurance programmes for the AGSP, the AMSP and the GASP for the Asia Pacific.

WHO Regional Reference Laboratory for Hepatitis B Virus

VIDRL was designated as Western Pacific Region hepatitis B reference laboratory in 2010. This laboratory provides technical support and confirmatory testing for serosurveys, epidemiologic modelling and molecular epidemiologic support as required, and technical advice and training.

Foodborne and enteric infections

Australian Salmonella Reference Centre

The Australian Salmonella Reference Centre, based at the IMVS in South Australia, is the national reference laboratory for Salmonella in Australia (73). The laboratory has an international reputation for its reference function and also provides a high quality serotyping and phage typing service for Salmonella. The laboratory holds data on Australian Salmonella isolates dating back to the 1940s and is an important source of information on Salmonella in Australia. Data are published in monthly and annual reports.

Laboratories specialising in multiple organisms

National High Security Quarantine Laboratory

The National High Security Quarantine Laboratory (NHSQL) is based at VIDRL and is a physical containment (PC) level 4 facility, funded through a service agreement with Health. It provides laboratory testing facilities for the diagnosis of the quarantineable viral haemorrhagic fevers Lassa, Ebola, Marburg and Crimean Congo haemorrhagic fever and smallpox (74).

TGA licensed facilities for testing organ and tissue donors (OTDS), SEALS Virology, NSW Sydney

Organ transplantation is associated with risk of transmission of infectious diseases, particularly donor-derived blood borne viruses or BBV (HIV, HBV, HCV), opportunistic infections, and highly resistant organisms infecting immunosuppressed individuals. Specific, TGA-licensed laboratory facilities at SEALS Virology, Prince of Wales Hospital, NSW were established to reduce the risk of transmission of these infections through increased use of nucleic acid testing (NAT) of donors. This facility provides statewide and national testing 24/7,
supporting the clinical response to the need to increase donation rates to support increased organ and tissue transplantation.

**WHO Collaborating Centre in Virus Reference and Research**

The WHO Collaborating Centre in Virus Reference and Research is based at VIDRL is a designated centre of excellence in virology and encompasses much of the virological activities of VIDRL. The Centre is responsible for: detection and characterisation of viruses in clinical material; maintenance virus reference collections; training and consultancy in virology; provision of infectious disease surveillance information; and research and development in areas such as antiviral therapy, mechanisms of antiviral drug resistance and new technology for detection of viruses.

**WHO Collaborating Centre in Biosafety in Microbiology**

The WHO Collaborating Centre in Biosafety in Microbiology is based at VIDRL and provides: training in biosafety; and biosafety related advice and support to institutions and participates in the work of the WHO Biosafety Advisory Group.

**Laboratory information sharing**

**Australian Biosecurity Intelligence Network**

The Australian Biosecurity Intelligence Network (ABIN) was established with Commonwealth National Collaborative Research Infrastructure Strategy funding, following the identification of a National Biosecurity Framework as a top priority for government funding in 2008 (75). Run by CSIRO, ABIN is an information sharing network developed to strengthen Australia’s biosecurity research, surveillance, diagnostic and response capability, by enabling researchers, industry and governments, to collaborate, use expertise, share data, information, and generate intelligence using leading edge tools and technologies made available through ABIN’s secure online workspace. Examples of proof of concept projects include

- Pathogen Profiling Intelligence Network for Human Health
- Animal Health Laboratory Sample Tracking
- Aquatic Animal Health (75)

The ABIN concept of a multi-user information platform with varying levels of data access permissions has possible applications in communicable disease control, especially for laboratory information sharing.
5.3 Preparedness and Acute Response

5.3.1 Definition
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.

5.3.2 Description of preparedness and acute response
Day to day operations in communicable disease control units are the foundation for responding to large outbreaks. It is almost impossible to be adequately prepared for communicable disease emergencies without the daily activities of responding to notifiable diseases, suspected and confirmed outbreaks, delivery of routine immunisation services and preventive health interventions such as post-exposure prophylaxis, contact tracing and risk communication. Outbreak of national importance will almost always involve scaling up existing activities and require surge capacity in skilled workforce and resources.

This section describes some of the legislative and governance arrangements for national health emergencies and current mechanisms of national outbreak preparedness and response.

Legislative frameworks for national outbreaks
The Australian federal system creates a particularly complicated legislative infrastructure for the management of the outbreak of communicable disease of national or international significance in this country. Within the structure, Commonwealth quarantine legislation (Quarantine Act (1908)) is intended to exclude the entry of infectious and communicable disease or minimise the effects of introduced disease. Eight separate and sometimes quite different State and Territory acts are intended to cover notification of disease including different lists of notifiable diseases, confidentiality, coercive powers, health emergency powers and broad emergency powers which may include public health emergencies (76).

A 2006 report prepared for the National Public Health Partnership by the Centre for Public Health Law examined emergency powers and cross-jurisdictional issues regarding outbreaks of communicable disease. It concluded that the legislation within each State and Territory delivers acceptable legal readiness for an outbreak of communicable disease of local or regional significance. When contemplating the ability of the current legislative infrastructure to support a response to the outbreak of a communicable disease of national or international significance, a number of issues were identified. These include:
the breadth of quarantine powers and their interaction with State and Territory powers;

● the notification of disease and the diseases which are notified which are not uniform across the jurisdictions;

● the collection of data to support management of a communicable disease across Australia;

● the free flow of information between jurisdictions to support management of an outbreak of communicable disease of national or international significance;

● the different kinds of public health orders between jurisdictions and the problems this creates for the possibility of recognition from another jurisdiction;

● the inability of orders to have extraterritorial effect or recognition outside the State or Territory in which they were made; and

● emergency powers cover different areas and are differently declared (76).

Since that time, the National Health Security Act 2007 and National Health Security Agreement have established a framework to support a coordinated national response to public health emergencies between the Australian Government and state and territory governments. The Agreement’s objective is to strengthen Australia's public health surveillance and reporting system in order to better equip the Commonwealth, 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. However issues of free flow of information across jurisdictions, differing public health orders and emergency powers remain.

**Australian Government responsibilities**

The Health Emergency Management Branch, in the Office of Health Protection, Department of Health, is responsible for effective risk assessment and coordination of national health responses to naturally occurring or deliberately introduced biological and emerging threats to the population. It serves as the primary coordination point for consideration of health protection policy and operational matters with states and territories.

Activities of the Health Emergency Management Branch include:

- ensuring Australia’s health system has integrated and coordinated arrangements in place to respond to national health emergencies and protect the community including working closely with states and territories through the Australian Health Protection Principal Committee (AHPCC);
- building Australia’s capability to respond to national health emergencies including working closely with states and territories through the National Health Emergency Management Subcommittee (NHEMS);
- coordinating national responses to health emergencies;
• managing the National Incident Room (NIR), including its infrastructure, its workforce recruitment and training and its role as National Focal Point for WHO International Health Regulations 2005;
• supporting the operations of AHPPC and its standing committees: the Public Health Laboratory Network (PHLN), NHEMS, CDNA, and the Environmental Health Committee (enHealth);
• managing the National Medical Stockpile, including inventory management, stock procurement, budgeting and managing stockpile deployment arrangements with states and territories as required;
• providing national leadership on strategies to support the health sector and the whole of government to effectively respond to an influenza pandemic (the Australian Health Management Plan for Pandemic Influenza (AHMPPI));
• managing pandemic vaccine development contracts;
• overseeing the establishment, development and maintenance of the National Critical Care and Trauma Response Centre at the Royal Darwin Hospital;
• administering the Security Sensitive Biological Agents Regulatory Scheme;
• building laboratory capacity to detect, identify and respond to existing and emerging communicable diseases and security sensitive biological agents including working closely with states and territories through the PHLN and the Australian (counter-) Bioterrorism Laboratory Network;
• liaising with Australian Radiation Protection and Nuclear Safety Agency (ARPANSA) on radiological hazards;
• liaising with the national security community on matters relating to all-hazards threatening Australia and Australians;
• provide an environmental health policy coordination role across the portfolio and the Australian Government and working closely with states and territories through enHealth; and;
• policy development and stakeholder liaison associated with the Health Protection Fund

National Health Emergency Responses
The Attorney-General's Department (AGD), through Emergency Management Australia (EMA), is responsible for emergency management at a Commonwealth level, including developing policy and plans to respond to and minimise the effects of all natural disasters or crises. Circumstances which might require a national emergency management response are broad, and could include a pandemic event. This is discussed further in Section 7.4 Partnerships, Emergency Preparedness.

Within the health sector, the National Health Emergency Response Arrangements (NatHealth Arrangements) govern cooperation between the Australian and states and territories governments for national health emergencies including communicable diseases
such as pandemic influenza, and bioterrorism emergencies, such as smallpox or anthrax outbreaks. Specific emergency response plans outline the governance of national responses to emergent communicable disease threats, including anthrax, smallpox and pandemic influenza.

Supporting coordination of national health emergencies are:

- the National Incident Room and National Emergency Response Plans
- Health Infrastructure Assurance Advisory Group

Supporting policies and protocols include:

- Australian Emergency Manual Series: Health Aspects of Chemical, Biological and Radiological (CBR) Hazards
- Overview of biological agents that could be used in a Terrorist Act
- Australian Clinical Guidelines for Acute Exposures to Chemical Agents of Health Concern: A guide for emergency department staff
- Guidelines for Smallpox Outbreak, Preparedness, Response and Management
- Guidelines for Anthrax Outbreak, Preparedness, Response and Management

National Incident Room
The National Incident Room was established to ensure a nationally consistent and coordinated response to a national health emergency (77). In communicable disease, such an emergency would include a significant outbreak, such as an influenza pandemic. Since its establishment in 2001, the communicable disease emergencies that have activated the National Incident Room include the SARS outbreak (2003) and Pandemic influenza (H1N1)(2009)(86). In situations such as these, the main activities conducted in the National Incident Room include: gathering information to assist the response; provision of technical advice to committees and government; coordination of the deployment of the National Medical Stockpile if required; implementing health aspects of the Commonwealth disaster plans; coordination of a medical response; conducting meetings of the AHPPC and other expert committees; communication and liaison with all parties, including other sectors, and the community (77). The Incident Room also provides secure communications links to state and territory governments, WHO, and other federal government authorities such as Defence and security agencies.

Health Infrastructure Assurance Advisory Group
The Attorney-General's Department (AGD) provides strategic leadership on critical infrastructure matters and works closely with other Australian Government agencies, states and territories and the business sector to ensure that Australia’s critical infrastructure is better protected and more resilient in the event of a disaster or emergency. The Australian Government's Critical Infrastructure Resilience Strategy aims to achieve the continued provision of essential services that support Australia’s national security, economic prosperity, and social and community wellbeing in the face of all hazards. The concept of Critical Infrastructure Resilience broadens the concept of critical infrastructure issues to include non-
traditional threats such as organised crime, natural disasters and pandemics. While these threats have previously been addressed through other government mechanisms, they have only recently been brought under the national security umbrella. This reflects a broadening of the concept of national security to include threats from all hazards.

**Multijurisdictional outbreaks and significant health events**

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.

In Australia, the majority of outbreaks are confined to small geographical areas, and as such, managed at a jurisdictional level, led by regional public health units or state or territory health departments. At a national level, CDNA provides guidance on responding to communicable disease outbreaks of national importance. OzFoodNet, often in conjunction with CDNA, provides national coordination for multijurisdictional outbreaks of suspected foodborne disease. There is a scaled response to acute outbreaks, culminating in the activation of the National Incident Room, to achieve a nationally consistent and coordinated response in the event of a national emergency. Within Health, management of national health emergencies is coordinated and supported by the AHPPC.

Australia’s system of a scaled response to national emergencies has served to control many communicable disease outbreaks. The CDNA group can be mobilised to meet very quickly, providing expert advice at short notice. In general, national consistency of responses within jurisdictions is achieved. This is particularly the case when multi-jurisdictional outbreak response guidelines are available, as they are for some diseases (eg norovirus, influenza). The coordinated response provided by OzFoodNet during many foodborne disease outbreaks over the past 12 years has demonstrated an excellent model of national management, with the use of standard methodology and provision of, albeit limited, surge capacity staffing in the case of large outbreaks. 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.

Responses to large, multijurisdictional outbreaks require excellent lines of communication between jurisdictions, standard methods for data collection and laboratory detection, a competent workforce and a focal point of outbreak control. Australia can improve in several areas, particularly by implementing a mechanism of sharing data between jurisdictions in a timely manner. Furthermore, during a large outbreak, surge capacity staff may be required at the jurisdictional level and there is no identified workforce to fill this need. Finally, although,
there is good will and strong relationships between individuals at a national and jurisdictional level, during an outbreak of national significance, there is no focal point of expertise and ownership of advice. This lack of accountability can leave those with operational responsibility in a vulnerable situation.

**Threat assessment and decision support**
Threat assessment dictates public health responses to real or potential communicable disease events. 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.

The same principle applies to potential or real international health events. Currently international health surveillance is reactive and relies on information from international health organisations such as WHO. It could be enhanced by a more systematic and planned approach to international health risk assessment, conducted nationally and distributed to all jurisdictions. Australia has an important role to develop health risk assessment capacity in the region, supporting the work of WHO and the Asia-Pacific Strategy for Emerging Diseases.
5.4 Policy and Program Response

5.4.1 Definition
The WHO defines health policy as: "....decisions, plans, and actions that are undertaken to achieve specific health care goals within a society. An explicit health policy can achieve several things: it defines a vision for the future which in turn helps to establish targets and points of reference for the short and medium term. It outlines priorities and the expected roles of different groups; and it builds consensus and informs people (78)."

A health program is a plan of action for an event or sequence of actions to achieve a specific health outcome.

5.4.2 Description of policies and programs
Australia does not have an explicit overarching communicable disease policy; however policy is implicit in the Australian Government investment at the national level and in state/territory public health legislation and disease control workforce and infrastructure. Additionally, there are a number of communicable diseases for which there is specific strategy that defines objectives and contains performance measures and targets.

Investment in communicable disease control by the Australian Government is considerable and broad in scope and reflects a policy position on the need for central coordination in the national interest. For example, the National Notifiable Diseases Surveillance System was established over 20 years ago, in response to the recognition that Australia needs to measure and report on communicable diseases at the national level. This has been further strengthened by the requirements of the International Health Regulations 2005, to which Australia is a signatory. Health has created the Office of Health Protection to fulfil the policy requirement for central coordination of public health events of national significance.

The multitude of communicable disease control players in Australia, including the Australian Government, jurisdictional and local governments, national centres, universities and other non-governmental organisations each have their own communicable disease control policies and programs relevant to their own work. There is no explicit national policy or other framework to guide or bind the various components together under a common vision.

Australia has invested in a number of communicable disease program areas nationally and instigated a variety of policy responses. In 1996, the Chief Health Officers of Australia developed the National Communicable Disease Surveillance Strategy, which aimed to reduce the social and economic impact of communicable diseases on the Australian population through the provision of a national framework to monitor communicable diseases and plan and prioritise interventions (61). Although focusing on surveillance, the Strategy outlined
recommendations that would affect other functions, including policy development, laboratory services and research. The main theme of the recommendations was the importance of strong coordination and planning for communicable disease control at a national level. The ensuing years saw several changes to communicable disease control in keeping with this theme, including strengthening of NNDSS and in 2000, the establishment of OzFoodNet to enhance surveillance of foodborne disease.

In addition to the 1996 overarching surveillance strategy, Australia has developed national strategic plans for the control of some disease groups. These are in the areas of sexually transmitted infections (STIs), blood-borne viruses (BBVs), vaccine preventable diseases and pandemic influenza.

CDNA has recognised the importance of national consistency in the response to cases of communicable disease and the efficiency gain if such one response protocol is developed nationally rather than a separate protocol being developed and reviewed independently in each of the eight states and territories. Similarly, there is recognition of the need for national consistency in surveillance and control of healthcare associated infections, and the Australian Commission on Safety and Quality in Health Care (ACSQHC) has been tasked to put in place national programs for the prevention of these infections.

Finally, Australia also has national frameworks which outline preparedness and response activities for pandemic influenza in the form of the National Action Plan for Human Influenza Pandemic (2011) (79) and the Australian Health Management Plan for Pandemic Influenza (2009) (80).

However, while there are areas in communicable disease control where Australia has successful coordinated national policy and programs, there are other significant areas where there is no national approach, or this is in its infancy. For example, although the threat of widespread antimicrobial resistance has been known for decades, it was in 2012 that the Antimicrobial Resistance Standing Committee of AHPPC has been endorsed by AHMAC to advise on antimicrobial resistance surveillance, reporting, research and prevention. Similarly, only a small proportion of communicable diseases have a national response guideline (SoNG see below).

**Vaccine preventable diseases**

The Immunise Australia Program (IAP) is a joint Australian and State/Territory Government initiative which aims to increase vaccination coverage rates for vaccines on the National Immunisation Program Schedule. It has been extremely successful in reducing the incidence of many once common diseases that are now rare in Australia. Implementation of the program is administered via the National Partnership Agreement on Essential Vaccines, which provides for the free supply of vaccines to states/territories. States/territories distribute
vaccines to vaccination service providers in their jurisdiction and are responsible for achieving national benchmarks on childhood immunisation coverage and vaccine wastage.

The Australian Government administers the Australian Childhood Immunisation Register (ACIR), a population based register of all children under seven years of age who are registered with Medicare that records vaccination details. This enables accurate estimation of immunisation coverage rates as well as providing individual immunisation histories for children up to seven years of age. Vaccination service providers are paid a fee of $6.00 ($3.00 in Queensland) for each completed vaccination encounter they report to the ACIR (81).

Vaccination is encouraged by the linking of Centrelink parent payments to their child’s immunisation status with the payment paid only if the child’s immunisations are up to date for age or the child has an exemption. Over the years benefits, child care rebate and the maternity allowance have been linked to immunisation status; currently the payment of Family Tax Benefit A is dependent on immunisation status as recorded on the ACIR.

The General Practice Immunisation Incentive (GPII) Scheme provided GPs with financial incentives to achieve high immunisation coverage for children attending their practice. Service Incentive Payments (SIP) were made for each completed immunisation encounter and an outcome payment if a threshold immunisation coverage was achieved. The SIP payment was ceased in October 2008 and the Outcome Payment ceased in May 2013.

Adolescent vaccinations are delivered via school based vaccination programs by all states/territories, with some variation in the school years in which the vaccinations are offered. Human papillomavirus (HPV) vaccinations are recorded on the National HPV Vaccination Register, held by the Victorian Cytology Service in Melbourne.

Thus the control of vaccine preventable diseases in Australia occurs via a comprehensive and mature system with multiple levers to achieve high vaccination coverage for childhood immunisations and a sound method of measuring childhood vaccination coverage. The approach to adult vaccination is more haphazard however, and adolescent vaccination sits in between.

The history of immunisation in Australia demonstrates the benefits of national policy and resourcing to achieve significant health benefit across the country. Australia has a long history targeted and mass vaccination programs for communicable disease control. Routine infant vaccination was established by 1953, but different schedules were used across jurisdictions. Oral polio vaccine was introduced in 1966 and measles vaccine in 1969. A national schedule for infant vaccination with whole cell diphtheria-tetanus-pertussis vaccine was achieved in 1975.
Prior to 1993, immunisation implementation was considered the responsibility of the states/territories and individual jurisdictions provided their own programs or delegated the role to local governments, although general practitioners also provided immunisation services. The funding arrangements were complex and included a mix of federal funding to states/territories for vaccines provided in public programs and PBS funding for a few vaccines prescribed by general practitioners. The federal funding was based on historical usage, not on population, and had been incorporated into the general state/territory revenue assistance in 1988, making it difficult for jurisdictions to access funds to increase immunisation coverage. State/territory funded vaccines were not generally provided to private practitioners, especially live virus vaccines, due to cold chain concerns. There was a lack of clearly defined roles and responsibilities. As a result, vaccination service delivery was fragmented and was difficult to monitor.

Consequently, Australia had low immunisation coverage with a national survey of childhood immunisation in 1989/90 showing that only 53% of children aged up to 6 years were fully immunised. Those most at risk of incomplete immunisation were low socioeconomic and minority groups. This was a lower rate than in some developing countries. Thus, while there had been success in controlling some diseases (eg polio, diphtheria etc), many vaccine preventable diseases including measles were continuing to occur with attendant mortality and morbidity.

In response, the first National Immunisation Strategy was endorsed by AHMAC in June 1993. The strategy established national immunisation coverage targets and made a range of recommendations to improve efficiency, quality, coverage and accountability of immunisation services. Also in 1993, Haemophilus influenzae type b (Hib) vaccination was introduced as a national program with a subsequent rapid and significant reduction in invasive Hib disease in young children. This demonstrated the value of a coordinated, national approach to the introduction of a new vaccine and set the stage for later initiatives.

Implementation of the 1993 National Immunisation Strategy occurred quickly. Operation of the Australian Childhood Immunisation Register commenced on 1 January 1996. The National Immunisation Committee was established as a continuation of the National Hib committee of Commonwealth and state/territory health department representatives but with the addition of, general practitioners and other key stakeholders. Contractual arrangements between Commonwealth and jurisdictions were put in place for vaccine funding; funding was population-based, with a requirement that funded vaccine be provided free to both public and private providers and that vaccine use and wastage be monitored. Nationally agreed vaccine pricing was negotiated with the pharmaceutical companies by Health, so that small and large jurisdictions all had access to vaccine at the same price based on national purchasing volumes. The National Immunisation Committee was working collaboratively to action the...
National Immunisation Strategy recommendations, including implementing cold chain standards, on-the-spot immunisation, simultaneous immunisation, recalls and reminders, and professional education.

The second landmark document was the Immunise Australia: Seven Point Plan released in 1997. This saw the establishment of the General Practice Immunisation Incentives (GPII) Scheme, the linking of immunisation status to the payment of parent benefits, an expansion of role and uses of the ACIR, the establishment of the National Centre for Immunisation Research and Surveillance (NCIRS), the one-off Measles Control Campaign, which offered measles vaccine to all primary school students in 1998, national immunisation days, and the development of requirements for immunisation certification at school entry.

The use of immunisation registers for the estimation of vaccination coverage is a strength of Australia’s immunisation program. However, disease surveillance is also a critical component of immunisation program evaluation. The NNDSS is an excellent system for the surveillance of many vaccine preventable diseases, but not all. For example, trends in pertussis notifications are difficult to interpret in the context of vastly increased rates of pertussis testing and the introduction of highly sensitive PCR tests. Additionally, not all vaccine preventable diseases are notifiable, such as HPV. Monitoring of organism subtypes is critical for on-going surveillance of some vaccine preventable diseases, but sustainable representative systems for these are inadequate or non-existent (eg HPV, rotavirus).

The National Immunisation Strategy and the Seven Point Plan underpin the Immunise Australia Program to this day. However, with the addition of new and expensive vaccines onto the schedule, additional community expectations about vaccine safety and the quality of vaccination service delivery, the need for greater transparency and accountability in governance, greater emphasis on adolescent and adult vaccination, greater understanding of under-vaccinated population groups, and the inclusion of new vaccines for diseases for which surveillance is more complex, these policy documents require revision and renewal. A new National Immunisation Strategy is currently under development.

**Blood borne viruses and sexually transmissible infections**

There is currently a suite of five national strategies in the area of blood borne virus (BBV) and sexually transmissible infection (STI) control. These cover the period 2010-2013 and were endorsed by Health Ministers in April 2010. These are the:

- Sixth National HIV Strategy 2010 – 2013;
- Third National Hepatitis C Strategy 2010 – 2013;
- National Hepatitis B Strategy 2010 – 2013; and

For each of these strategies, Health, through the Australian Health Ministers’ Conference and its subcommittees, primarily the Blood Borne Virus and Sexually Transmissible Infection Subcommittee (BBVSS) of AHPPC provides leadership for the coordination of the national response. Together, these five strategies aim to reduce the transmission of STIs and BBVs in Australia, and the morbidity, mortality and personal and social impacts they cause (ref: current STI/BBV strategies). For the first time, each of the strategies contains performance indicators and a National Blood-borne virus and Sexually Transmissible Infection Surveillance and Monitoring Plan (82) has been developed to collect data for the indicators and publish these in an annual report. However, the some of the indicators do not well reflect intended health outcomes, and data is not available for many of the indicators. Further work to improve the indicators and to develop new systems for collection of data measures for the indicators is required.

**Human immunodeficiency virus (HIV)**

The first of the national BBV and STI strategies to be developed was the first National HIV/AIDS strategy, released in 1989. It followed on from The National Health Strategy on AIDS Control which was endorsed by the Commonwealth Government in 1985. Australia’s success in limiting its HIV epidemic has resulted from the coordinated national approach undertaken since the beginning of the epidemic in the early 1980s.

The National Health Strategy on AIDS Control provided national leadership and a framework for action. Funds were provided for AIDS-specific services and to the state/territory AIDS Councils to support their education and health care programs. The national centres for HIV research were established, including the National Centre for HIV Epidemiology and Clinical Research (NCHECR, now the Kirby Institute) in 1986 and the National Centre for HIV Social Research (NCHSR) in 1990.

In 1989, the first National HIV/AIDS Strategy was released, stressing a partnership between government, doctors and the affected communities. Central to the policy is the belief that people with HIV/AIDS have the right to participate in the community without discrimination. This partnership approach is recognised internationally as one of the cornerstones of Australia’s success.

Successive national HIV/AIDS strategies have followed, with the most recent, the Sixth National HIV Strategy 2010-2013, endorsed by Australian Health Ministers in April 2010. The emphasis on a partnership approach with affected communities, non-government organisations, clinicians, researchers and governments working together has been a central
The theme of all the strategies. The goal of each strategy has remained generally to reduce HIV transmission and reduce the personal and social impacts of HIV/AIDS.

The third, fourth and fifth national HIV strategies clearly define roles and responsibilities for the strategy partners. The need for strong central leadership by the Australian Government is emphasised, and Health is tasked with primary carriage of each of the strategies. In particular, Health’s defined responsibilities are to facilitate national policy formulation and coordination, commission research, monitor and evaluate the strategy and administer funding to states and territories, national community-based organisations and the National Centres. Of note however, the sixth national strategy articulates that leadership is provided by the Australian Government working via the AHMAC subcommittees and with additional advice from the Ministerial Advisory Committee on Blood Borne Viruses and Sexually Transmissible Infections (MACBBVS), working within the context of funding arrangements for the health system. Specific responsibilities are not defined for the Australian Government.

Similarly, specific responsibilities for other HIV strategy partners are defined in previous national HIV strategies, but not the sixth national strategy. Under the third, fourth and fifth national strategies states and territories have the role of providing leadership within their jurisdiction with responsibility for: HIV data collection and analysis; developing, funding, delivering and evaluating a range of services (such as health promotion and treatment and care services provided by community-based organisations); establishing advisory committees with representation from all members of the partnership; establishing public policy and legislative frameworks and strategies consistent with the national strategy; ensuring that resources are allocated in accordance with the strategy’s guiding principles; measuring and reporting on the Strategy’s implementation; and participating in relevant national forums. No specific responsibilities for states/territories are defined in the sixth strategy.

The lack of defined responsibilities in the sixth strategy is a reflection of the change in Commonwealth and state/territory funding arrangements. At the time of the third national strategy, HIV funding was provided by the Commonwealth to the jurisdictions via Special Purpose Payments (SPPs) that had defined process/output measures that had to be achieved for continuation of funding. By the time of the fourth National HIV/AIDS Strategy 1999/2000 - 2003/2004, the HIV Matched Funding Program had been "broadbanded" with other public health programs under the Public Health Outcome Funding Agreement (PHOFA). Output measures were replaced with outcome measures and states/territories were provided with flexibility to expend the funding in any way appropriate to achieve the outcomes. By the time of the sixth national strategy, funding was even more loosely linked to specific outputs. Under the COAG reforms, the HIV funding provided under the PHOFA was transferred to the National Healthcare Agreement, where HIV funding was provided as block funding combined with Commonwealth funding for hospital and other services. The sole indicator for HIV in the
National Healthcare Agreements to 2011 was the population rate of new HIV diagnoses. By the 2012 Agreement, it had been realised that the population rate of new HIV diagnoses is not a measure of annual HIV transmission, and all blood borne virus and sexually transmissible infection performance indicators were dropped. Funds which historically were earmarked for the national benefit of minimising HIV transmission are now mixed with other Commonwealth health funding with no onus on states/territories to achieve outcomes or outputs in HIV control. With the current financial constraints on healthcare funding in all jurisdictions, there is a significant risk that efforts in HIV prevention and control will be reduced and infections will increase. It is not inconceivable that should, for example, current needle and syringe programs be compromised in one jurisdiction, HIV rates in people who inject drugs in that jurisdiction would start to rise. This would lead to infections in this population in other jurisdictions. Similarly, a failure in one jurisdiction to contain HIV transmission in gay men has impacts in other jurisdictions. There is a strong requirement for national consistency to achieve national benefit.

Thus, while a strong national strategy is required to provide a common vision and framework within which partners can work together collaboratively and efficiently, the strategic direction must be reflected in funding policy and program structural arrangements.

**Pandemic influenza**

Like the WHO and many countries, Australia has recognised that future influenza pandemics are inevitable and that an influenza pandemic has the potential to have major social and community impacts. The health system could be devastated so it is critical that the health sector is equipped to respond to minimise the impact on the health of all Australians and on the health system itself. A national approach to national wide pandemics/outbreaks and other emergencies is critical and the Australian Government is continuing to invest in the maintenance of the National Medical Stockpile and on-going pandemic planning and emergency planning.

The National Action Plan (NAP) for Human Influenza Pandemic outlines how Commonwealth, state/territory and local governments will work together to protect Australia against the threat of an influenza pandemic and support the Australian community. The health sector response is detailed in the Australian Health Management Plan for Pandemic Influenza (AHMPPI) 2009. The first AHMPPI was released in 2006 and revised in 2008 to take account of new evidence on the control of influenza including modelling data on the widespread use of antivirals. The AHMPPI was revised in December 2009 to recognise that the severity of a pandemic must be taken into account when mounting a response. A new pandemic response phase, PROTECT, was added in the 2009 revision of the AHMPPI, to guide the health sector response to a mild or moderately severe pandemic virus where the objective is to protect those most at risk of severe infection.
The NAP and the AHMPPI are complemented by state/territory whole of government and health sector planning as well as by the pandemic plans of other health service providers, businesses and industry.

The AHMPPI is currently under revision to incorporate the lessons from Australia’s experience during the 2009 H1N1 influenza pandemic. The Review of Australia’s Health Sector Response to Pandemic (H1N1) 2009: Lessons Identified (83) focuses on what was planned, what happened during the response, and identifies key issues and lessons to inform future pandemic planning in Australia. The Report makes twenty-five recommendations that encompass the range of public health policies and actions relevant to a national health sector response to an influenza pandemic.

**Foodborne disease - OzFoodNet**

OzFoodNet was established and funded by the Australian Government in 2000 as a national system to enhance foodborne illness surveillance. This was in recognition that many foods are distributed across Australia and therefore contaminated food could produce an outbreak that spans more than one jurisdiction. Detection of such outbreaks requires states/territories to share data, and further investigate and analyse this at the national level. OzFoodNet is a national network of epidemiologists, based in Health and in each state/territory to work collaboratively on the surveillance of foodborne disease OzFoodNet conducts enhanced surveillance using standardised hypothesis-generating questionnaires and protocols for follow-up of outbreaks and sporadic cases of foodborne disease (84). In addition to performing a surveillance function, OzFoodNet aims to influence longer term public health responses by formation of national standards, policy development, burden of disease research and capacity building.

The OzFoodNet program has been independently reviewed and found to be a successful program on a number of levels. OzFoodNet has improved Australia’s capacity to control foodborne illness through strengthened surveillance practices and outbreak management (85). In addition, the program has been found to be cost effective. Key to the success of the program has been regular and timely communication between jurisdictional staff (84) and the ability to provide a surge capacity of staff when required. The activities of OzFoodNet and its ability to reduce the burden of foodborne disease could be enhanced by improved coordination between animal and human based surveillance, with provision of data about the whole food chain, allowing for targeted and timely public health action.

**Series of National Guidelines (SoNGs)**

The purpose of the Series of National Guidelines (SoNGs) is to provide nationally consistent guidance to public health units in responding to a specific communicable disease or outbreak event. The guidelines capture the most recent international and national evidence and
knowledge of experienced professionals to provide advice on best practice communicable disease control. The SoNGs are developed by CDNA, and endorsed by the AHPPC. Since the first SoNG was developed in 2008, fewer than ten SoNGs have been developed for use by jurisdictional public health units. The content and legal ramifications of SoNGs means the process of developing them is arduous and presents an intensive time commitment. Development of a SoNG for each of the nationally notifiable diseases requires dedicated funding and resourcing. However, efficiencies are gained as the endorsement of a national guideline by AHPPC means that each jurisdiction does not have to develop its own state-wide guideline for that disease. Additionally, the endorsement of a SoNG at the national level provides public and political assurance that each state/territory is providing a best practice communicable disease control service for that disease.

Healthcare Associated Infections
The Australian Commission on Safety and Quality in Health Care (ACSQHC) was created by Health Ministers in 2006, and funded by all Australian governments on a cost sharing basis, to lead and coordinate health care safety and quality improvements in Australia. The ACSQHC reports to Health Ministers and works with the Inter-Jurisdictional Committee, which is made up of senior safety and quality managers from Health, and each state/territory department of health.

The ACSQHC implements 17 national safety and quality programs, one of which is the Healthcare Associated Infection (HAI) Prevention Program. This program aims to develop a national approach to reducing HAI by identifying and addressing systemic problems and gaps, and ensuring comprehensive actions are undertaken in a nationally coordinated way by leaders and decision makers in both public and private healthcare sectors. Five initiatives support the HAI Prevention Program. These are:

- the National Hand Hygiene Initiative has been set up to develop a national hand hygiene culture-change program to standardise hand hygiene practice and placement of alcohol-based hand rub in every Australian hospital and measure and report on healthcare worker compliance with hand hygiene;
- the National Surveillance Initiative seeks to explore options for a national surveillance system to monitor HAI and provide timely feedback to jurisdictions and clinicians in order to inform public health action; facility level surveillance for *Staphylococcus aureus* bacteraemia, *Clostridium difficile* infection and central line associated bloodstream is being implemented;
- the Building Clinical Capacity initiative aims to address skill or knowledge-based gaps in infection control professionals across healthcare settings; and
- the National Antimicrobial Stewardship Initiative supports activities that optimise antimicrobial use, improve patient outcomes and reduce the incidence of antimicrobial resistance in Australian hospitals
National Guidelines for key stakeholders

Responsibility for carrying out communicable disease control activities does not only lie with governments and public health units, but with the directors of healthcare facilities and residential care facilities, childcare centres, schools, other organisations (eg petting zoos, providers of personal appearance services) and individual members of the community. CDNA has developed guidelines for some other partners including:

- management of influenza and gastroenteritis outbreaks in residential aged care facilities;
- management of healthcare workers known to be infected with BBVs;
- investigation of food handlers during on-typhoidal Salmonella outbreaks; and
- infection control guidelines for healthcare facilities.

However, these guidelines tend to be developed in an ad-hoc fashion and in response to external requests, rather than via a systematic priority-driven process. Development and on-going review of such guidelines requires additional and efficient resourcing.
5.5 Research

5.5.1 Definition
Public health research is research which contributes to the understanding of how population health is influenced by risk factors or to the identification of effective interventions for improving health and reducing health inequalities. Public health research differs from public health practice (which also uses scientific methods), as it is designed to obtain generalisable knowledge rather than to address specific programs for service delivery (86).

5.5.2 Description of research

Funding bodies and mechanisms
The National Health and Medical Research Council (NHMRC) is Australia’s leading expert body promoting the development of public and individual health. It achieves this through providing support to research and fostering the development of consistent health guidelines between Australia’s states and territories (website NHMRC’s role). The NHMRC is the peak funding body in Australia for investigator initiated peer-reviewed health research.

Research in Australia is funded by various mechanisms, including federal/state/territory governments, universities, non-government organisations, charities, the private sector and industry. Research is conducted by a similarly diverse collection of institutions and organisations, including state/territory government departments, Australian Government departments, universities, non-government agencies, private organisations and industry. Communicable disease research is funded and delivered by these diverse groups, which have only limited coordination of their activities. Significant contributions are made in the area of STIs and BBVs by the Kirby Institute and for vaccine preventable diseases by the National Centre for Immunisation Research and Surveillance (NCIRS).

Review of public health research
There have been multiple reviews of health and medical research in Australia over the last 15 years, and the recommendations of these are used to inform NHMRC funding and organisational policy.

A major review of NHMRC in 1998 called for “priority driven research that contributes directly to population health and evidence based health care”.

In December 2008 the NHMRC published Report of the Review of Public Health Research Funding in Australia (87) undertaken by the NHMRC Public Health Research Committee chaired by Professor Don Nutbeam. The Report noted positive feedback on the NHMRC’s role in funding research, but also received robust feedback that NHMRC had not responded adequately to recommendations from the 1998 review to increase priority driven and strategic research with the greatest potential to improve population health. Key findings were that:
there had been no proportionately increased investment in public health funding by NHMRC;

there is no overarching Australian public health research strategy to ensure Australian health priorities are considered through all types of research;

the impact of public health research is limited by funding systems and academic incentives which encourage descriptive research rather than intervention research;

current systems provide inadequate support for policy and practice focused research, and the translation of research into policy and practice; and

funding for public health research in Australia is currently dispersed across several funding agencies with the result that there is little co-ordination of research funding or project outcomes.

The Report made several key recommendations, with the purpose of expanding the volume and range of opportunities for public health research in Australia. Recommendations for better strategic leadership and coordination were:

- establishment of a National Public Health Research Forum;
- development of a national public health research strategy to identify priority research streams and emphasise intervention research;
- collaboration with Health in the future development of the Public Health Education and Research Program (PHeRP) to support the development of national centres of excellence in key public health priority areas;
- greater engagement by the NHMRC in its role as a source of evidence-based guidelines on key public health issues; and
- the establishment and maintenance of a National Register of Public Health Research (87).

To address Australia’s public health needs, four key recommendations advocated for changes to funding strategies and mechanisms including: that the NHMRC facilitate the development of large scale, long term, and nationally-relevant public health research infrastructure; and, that the NHMRC initiate a review of the likely workforce needs in public health research over the coming decades. The report also made recommendations for continuous improvements to the NHMRC application and assessment processes to promote public health research funding.

**Progress since the review of public health research**

Following the Nutbeam Review the NHMRC implemented some of the Review’s recommendations. It established a new Prevention and Community Health Principal Committee to advise on public health matters, including on the prevention of transmission of infection. It supported the recommendation to develop a national public health research strategy by identifying public health research within its strategic plan. Additionally the NHMRC worked with the new Australian National Preventive Health Agency to produce an interim
Strategy for Preventive Health Research, focusing on the issues of obesity, tobacco and alcohol. The NHMRC established a National Register of Public Health Research, however the register remains a pilot register, is not comprehensive and most of the data fields are not routinely collected information and so do not contain any data. The NHMRC introduced a program of Centres of Research Excellence in Population Health Research; five were funded $2.5 million each from 2011 and another five from 2012. Of these, there were one in each year on communicable disease control issues. From 2011, the Centre for Research Excellence in Immunisation titled Immunisation in Under Studied and Special Risk Populations: Closing the Gap in Knowledge through a Multidisciplinary Approach was funded at the University of New South Wales. The Immunisation CRE has a Scientific Advisory Committee which meets annually and includes the Chair of the Australian Technical Advisory Group on Immunisation. It has conducted a number of workshops with national representation such as a recent one on “Immunisation for Refugees and Migrants”. From 2012, the Centre of Research Excellence for Tuberculosis Control: From Discovery to Public Health Practice and Policy was funded at the University of Sydney.

Of note, a national public health research forum was not established. And while centres of research excellence in population have been established and funded, which was not done in collaboration with the Public Health Education and Research Program, which was discontinued in 2009

Recent NHMRC strategic plans do include areas of public health in the listed priorities and this reflects significant developments in support. In their 2010-2012 Strategic Plan, the NHMRC identified emerging infectious disease threats as a major health issue, as well as other focus areas which have elements of communicable disease control (global health, Indigenous health, ageing and health, health consequences of climate change). The NHMRC has also established a fund for urgent research where required for emergent health issues. These funds were used to fund research on the H1N1 influenza pandemic in 2009 and on Hendra virus in 2011.

**Strategic Review of Health and Medical Research 2013**

In February 2013, the Department of Health released the *Strategic Review of Health and Medical Research Final Report* that was developed by a review panel chaired by Mr Simon McKeon AO. The Review recommends a 10 year strategy that aims to maximise health outcomes from investments in health and medical research. The review recommends embedding research in the health system as an overarching strategy in order to overcome long standing barriers for research translation into better healthcare through evidence-based interventions and also to enable an integrated approach to research and healthcare delivery (88).
The Review addresses public health research acknowledging that preventive measures often are the most cost effective ways to improve health outcomes and that public health programs often have positive health impacts in a broad cross section of the population. It indicates that Australia has a very good track record in public health, including in “....control of hydatid disease, malaria, dengue and tuberculosis; vaccination for prevention of epidemic childhood infections,... and safe-sex campaigns”. It is worth noting however, that while safe sex campaigns were successful in limiting the HIV epidemic in men who have sex with men in the late 1980s and early 1990’s, the rate of new HIV diagnoses has been increasing since then with some evidence that the use of condoms has decreased, although alternative methods of reducing the risk of HIV transmission have emerged in the gay community. The rate of other STIs, including chlamydia, gonorrhea and syphilis has increased significantly.

The Review identifies that despite growth in public health research over the last decade, further capacity building is required: “While NHMRC funding of public health research has grown at 16% per annum since 2002 compared to 13% across the total portfolio, public health research comprises less than 15% of total NHMRC expenditure. Given the potential for such research to reduce health expenditure and improve quality of life, there remains work to be done in expanding the public health workforce and increasing the proportion of expenditure on this type of research.” (88). It goes on to recommend that the NHMRC build capacity in public health research by investigating ways to build a larger pool of public health researchers and to explore how current funding schemes can be further leveraged.

The Review acknowledges that effective public health interventions are often context specific, and require assessment locally to ensure effectiveness in the Australian population and health system. Additionally, such studies may require pilot data before larger-scale investments are made, and the larger study itself may require more than five years data for completion. Therefore, public health intervention studies may not fit well into the current NHMRC model for funding, and furthermore they may be disadvantaged when assessed on the current NHMRC Project Grant criteria. Therefore the Review recommends that public health intervention studies need a streamlined approach for competitive grant assessment and this should be investigated by the NHMRC.

The McKeon Review discusses health research infrastructure issues, including health datasets: “......proliferation of technologies and instruments capable of producing unprecedented volumes of data for analysis, plus new statistical techniques for data linking, data mining and meta-surveys. Throughout the research spectrum, from nanotechnology to population health, the ability to generate, store, manage, aggregate, analyse, share, make sense of, and disseminate reports from large volumes of data is rapidly growing in importance.”. It recommends that the NHMRC should:

- accelerate efforts to build and support national patient databases;
● facilitate and ensure researchers have access to de-identified patient data;
● establish a national clinical registry program; and
● develop a national biobank strategy and platform.

Each of these recommendations for improving access to health information would facilitate communicable disease surveillance and research.

That research translation into policy is not ideal has been recognised by the NHMRC for many years, and there have been various funding mechanisms implemented in an attempt to encourage collaboration between governments, industry and researchers. The McKeon review found that the link between health and medical research evidence and policy remains weak. It indicates that there is a need to:

● enhance the capability of NHMRC and researchers to support policy makers;
● encourage the embedding of researchers within government policy departments; and
● conduct research on gaps between health policy and practice, and the evidence base.

A dearth of health economists in Australia is acknowledged by the McKeon Review, so that there is insufficient capacity to adequately assess policy and health management guidelines. This finding is applicable to communicable disease control in Australia, where apart from data on the cost effectiveness of vaccination programs assessed by the Pharmaceutical Benefits Advisory Committee, there is little analysis of disease prevention or control interventions.

All of the above findings and recommendations of the McKeon Review have relevance for communicable disease control in Australia. Better linking and coordination of the communicable disease research community with CDNA and its subcommittees, BBVSS and AHPPC is required in order to ensure that policy relevant research is done and used to inform policy decisions.

The McKeon Review makes a recommendation that researchers should be embedded within government policy departments in order to facilitate development of evidence based policy. In fact, the original ANU Masters of Applied Epidemiology Program funded by the Australian Government and state and territory governments facilitated MAE students working within communicable disease units in every jurisdiction, using the international field epidemiology training program model. A large body of research and policy analysis work was undertaken by these students, with assistance from their ANU and placement supervisors. This was a key mechanism to integrate health protection research and policy in Australia. Unfortunately, the MAE funding was lost along with the PHeRP funding. While the MAE has been replaced with a similar program, the lack of funding has reduced the number of students and not all jurisdictions are able to support students.
Communicable disease research in the areas of BBVs and STIs, and in immunisation is strong in Australia, primarily because of the National Centres established for the prevention and management of HIV, and the National Centre for Immunisation Research and Surveillance. However, research in other areas of communicable disease control is more ad hoc, disjointed, fragmented and not well linked to CDNA or to state/territory communicable disease control units. Even in the area of BBVs and STIs, BBVSS has recognised the gap between prevention program implementers and researchers and held a special meeting of BBVSS and key Australian research institutions in this area, with the objectives of raising awareness of BBVSS members of: current research being undertaken in Australia; and research institution organisational structure, funding and priorities, and of relationship building to inform research questions.

The CDNA SoNGs are referenced and evidence based where evidence exists. However, many gaps exist where the guidelines are based on “common sense”, historical practice or on international guidelines. There is often no data on which to assess the cost effectiveness of communicable disease control interventions. Improved links between CDNA and researchers could address this gap.

Funding for communicable disease control research in Australia is currently dispersed across several funding agencies with the result that there is little co-ordination of research funding or project outcomes. Formal sustainable mechanisms for coordination, better dissemination of research findings and better collaboration between policy makers in government and researchers are required.

Rethinking research in communicable disease control
The differentiation of research from other core functions of communicable disease control, such as surveillance, has at times presented a barrier to efficient funding and action. The greyness of the boundary between surveillance and research is a recurring challenge. Considering research as a system enabler, rather than a core function, could promote improvements across the spectrum of public health activities. For example, surveillance practice could be improved through direct research support for the development and implementation of interpretative tools for multiple surveillance systems, that generate knowledge for decision making. This could be more effective than the development of such tools being seen as a purely research activity, without direct links or requirements to improve public health practice.
6. Overview of Special national functions

Special national functions include biosecurity, international engagement and in part, the approach to priority populations. There are particular areas in which a national approach is either a legislated requirement or represents a more efficient way to address specific health threats.

6.1 Biosecurity

6.1.1 Definition

‘Biosecurity’ can be defined as ‘actions involved in protecting the economy, environment and people’s health from pests and diseases’. Biosecurity is a fundamental public health issue and includes protection from a range of potential threats, including the accidental or deliberate release of harmful biological agents such as viruses, bacteria, fungi, parasites, prions and toxins, with the potential to cause significant damage to human health, the environment and the Australian economy. Biosecurity encompasses off-shore, border and on-shore components.

6.1.2 Description of biosecurity

Health aspects of biosecurity

Currently the Director of Human Quarantine is the Australian Government’s Chief Medical Officer. Under the Quarantine Act 1908, the federal Health Minister appoints the Chief Human Quarantine Officers (CHQOs). Human Quarantine Officers (HQOs) are appointed by the Director of Quarantine in each jurisdiction to act for the Australian Government as required for human health biosecurity. A number of communicable diseases are listed as quarantinable diseases under the Act. The Director of Human Quarantine, CQOs and HQOs all have specific powers under the Quarantine Act 1908 to detain a person or person where there is a risk of transmission of a quarantinable disease. These powers also include the ability to mandate that a person undergoes a medical examination or a medical test. These powers usually apply at Australia’s international borders but may be applied post border. The CQO in each jurisdiction is usually the head of the state/territory communicable disease unit, and HQOs are public health physicians located close to Australian ports of entry.

For practical purposes, an ill traveller entering Australia is first assessed by a Quarantine Officer (QO) from the Department of Agriculture (Agriculture) for symptoms of a quarantinable disease. CQOs have agreed on a Traveller with illness checklist, which assists DAFF QOs in excluding a quarantinable disease. If a quarantinable disease cannot be excluded using the checklist, or where there is uncertainty, the QO contacts the HQO on call for that jurisdiction.

The Department of Health (Health) is working in consultation with Agriculture to develop and implement proposed new legislation to replace the Quarantine Act 1908. The new legislation
(the Biosecurity Bill) is designed to provide a modern, flexible and adaptive approach to managing the risk of serious communicable diseases entering Australia, or emerging, establishing or spreading in Australia. The responsibility for human health policy remains with Health, and requires the provision of human health risk assessment advice for import risk analyses. The Biosecurity Bill 2012 and the Inspector-General of Biosecurity Bill were introduced into Parliament on 28 November 2012.

The same system will be in place if the new Biosecurity Bill is enacted. The powers of the Director of Human Quarantine, CQOs and HQOs have been modernised in the new legislation, but continue to serve the purpose of preventing the entry of serious communicable diseases into Australia. Updated functional titles are the Director of Human Biosecurity (currently Director of Human Quarantine); Chief Human Biosecurity Officers (currently CHQOs) and Human Biosecurity Offices (currently Human Quarantine Officers).

While Health is responsible for human health biosecurity policy, Agriculture is primarily responsible for implementing policy and managing biosecurity systems. Their role includes coordinating a national response in the event of an emergency, including the emergency management of an animal disease that may have an impact on human health.

To better address future biosecurity demands, Agriculture has brought together its biosecurity research, policy and program areas for animal, plant, food and quarantine operations. Agriculture will continue to conduct its biosecurity business in line with its legislative responsibilities, conduct risk analyses, including import risk analyses, and develop recommendations for biosecurity policy as well as providing biosecurity policy advice.

There are several sector specific response plans for managing biosecurity threats, such as the Australian Health Management Plan for Pandemic Influenza (AHMPPI), the FluBorderPlan and the Australian Veterinary Emergency Plan (AusVetPlan). The Ausvetplan outlines responses to ‘Emergency Animal Diseases’, which include communicable diseases that potentially impact on human health such as: Australian lyssaviruses (including bat lyssavirus), Equine encephalomyelitis (western, eastern and Venezuelan), Japanese encephalitis, Nipah virus and Rabies. The Ausvetplan provides a coordinated national response plan for the management of incursions and outbreaks of these, and other, diseases.

**Biological agents of security concern**

On 13 April 2007, the Council of Australian Governments’ (COAG) agreed to the establishment of a national regulatory scheme for biological agents of security concern and endorsed a report that recognised that the most effective and efficient means of minimising security risks posed by security sensitive biological agents (SSBAs) was to establish a national regulatory scheme.
The Security Sensitive Biological Agents (SSBA) Regulatory Scheme is the mechanism the department uses regulates access to biological agents of security concern. Access to certain biological agents that have the potential to be used for terrorist purposes is restricted to registered laboratory facilities. Registration requires compliance with mandatory standards for the handling of these agents, the training and vetting of staff, and for reporting to Health. In this way the risk of such agents being used for bioterrorism is significantly reduced.

In 2010-11, Health supported activities to enhance national laboratory capacity and preparedness, and increase its capacity to detect and identify biological agents of security concern to Australia. This included the provision of laboratory equipment and reagents to key national public health laboratories, and continued support of the Royal College of Pathologists of Australasia Quality Assurance Program for biological agents of security concern. The program provides laboratories with the opportunity to gain experience in identifying security sensitive biological agents. The department also supported activities to ensure appropriate high level physical containment laboratories are accessible in the event of an act of bioterrorism.

**International biosecurity - human health**

WHO's global alert and response activities and the Outbreak Alert and Response Network represent a major pillar of global health security aimed at the detection, verification and containment of epidemics. In the event of the intentional release of a biological agent these activities would be vital to effective international containment efforts. The Australian Government works closely with Emergency Management Australia and other government agencies to develop measures to reduce risk risks from biological agents and will advise medical practitioners if an increased threat develops. Health provides fact sheets and clinical guidelines on specific biological threats, including:

- Australian Emergency Manual Series: Health Aspects of Chemical, Biological and Radiological (CBR) Hazards
- Overview of biological agents that could be used in a Terrorist Act
- Australian Clinical Guidelines for Acute Exposures to Chemical Agents of Health Concern: A guide for emergency department staff
- Guidelines for Smallpox Outbreak, Preparedness, Response and Management
- Guidelines for Anthrax Outbreak, Preparedness, Response and Management
6.2 International engagement

6.2.1 Definition
Includes a wide range of activities, from upholding the WHO’s International Health Regulations, to providing medical care, advice or support to regional neighbours for health issues. It incorporates all links Australia has with agencies and governments for the purpose of communicable disease control issues.

6.2.2 Description
Australian health policy and communicable disease experts engage with the international health community through several mechanisms. There are formal relationships between the Department of Health (Health) and international organisations and individual countries. Australia also has a number of international health obligations via treaties and regulations including the International Health Regulations (2005). Health supports the Australian Aid Program by working with DFAT on technical matters.

Beyond government, individual experts and research institutions engage with the international community through research and capacity building partnerships.

International Health Policy at Department of Health
The International Health Policy Section coordinates with international health bodies and organisations and contributes to whole-of-government approaches to overseas health development and trade discussions. Key points of international engagement include World Health Organization (WHO), the Organisation for Economic Co-operation and Development (OECD) and the Asia-Pacific Economic Cooperation (APEC).

In addition, the Asia Pacific Section manages bilateral health relationships with health ministries in the Asia Pacific Region, in particular China and Indonesia. This section manages the Pacific Senior Health Officials Network, including the Policy Partnerships Initiative.

International Health Regulations 2005
Australia is a signatory to the International Health Regulations 2005. The IHRs are a code of practices and procedures to prevent the international spread of disease. The fundamental principle of IHR is to provide security against international spread of disease while avoiding unnecessary interference with international traffic. The IHR (2005), which entered into force on 15 June 2007, require the 194 signatory countries across the globe, including all the Member States of WHO countries to report certain disease outbreaks and public health events to the WHO. In addition, the IHR (2005) define the rights and obligations of countries to report public health events, and establish a number of procedures that the WHO must follow in its work to uphold global public health security. The IHRs obligations and action are
under constant review and improvement as the WHO provides recommendations to support the goal of assisting countries to respond to acute public health risks.

**WHO Membership**

Australia is a Member State of the World Health Organisation (WHO) and due to its location in the Asia Pacific region engages with both the Western Pacific Regional Office (WPRO) and the South East Asian Regional Office (SEARO). Australia actively participates in discussions of the World Health Assembly and in the Western Pacific Regional Committee on the development and agreement of resolutions on global and regional health issues. These have included such resolutions as the

- Polio eradication
- Measles eradication
- Avian influenza

The WHO Asia Pacific Strategy for Emerging Diseases (APSED) is a bi-regional strategy (WPRO and SEARO) for strengthening capacity for communicable disease surveillance and reports. It provides a framework for the development of stronger collaboration with neighbouring countries to build regional partnerships against EIDs, including regional implementation of the IHR (2005). Australia is actively involved in the development of this strategy and the engagement with Australia’s near neighbours has provided an important opportunity to share information and strategies, which can be used to combat the spread of communicable diseases both within Australia and the Western Pacific Region.

WHO has developed a comprehensive “event management system” to manage critical information about outbreaks and ensure accurate and timely communications between key international public health professionals, including WHO Regional Offices, Country Offices, collaborating centres and partners in the Global Outbreak Alert and Response Network (GOARN).

WHO has a network of Collaborating Centres around the world that focus on mobilising expertise to support the WHO. Collaborating Centres are institutions such as research institutes, parts of universities or academies, which are designated by WHO to carry out activities in support of the Organization’s programmes. Currently there are over 800 WHO collaborating centres in over 80 Member States working with WHO on a wide range of areas.

**Whole of Government**

Australia’s international health engagement involves whole of government collaboration in particular with Australia’s Aid Program to ensure that assistance is on common areas of interest are complementary and targeted to health priorities.
In addition to engagement with the WHO globally and in our region Australia engages with key broad multilateral organisations including, the World Bank, the ADB, the East Asian Summit and Association of Southeast Asian Nations (ASEAN); key specific multilateral organisations including the APEC Health Taskforce (HTF), the ASEAN\(^1\) Health Secretariat, the Pacific Islands Forum Secretariat, and the Secretariat of the Pacific Community (SPC) Pacific Public Health Surveillance Network (PPHSN); and the Governments of the United States, Canada, the United Kingdom and New Zealand, which also have substantial engagement on health issues in the region, by focusing on opportunities to align donor programs in mutual and complementary areas of interest.

**Specific purpose international engagement**

The Public Health Laboratory Network (PHLN) laboratories have been engaged in the regional biopreparedness and capacity building through Australian Aid Program supported projects and WHO laboratory twinning initiatives. For example, they host clinicians and scientists from countries in South East Asia and Pacific coming to the country on Australian Leadership Awards – Fellowship (ALAF) grants and upskill them in biothreat detection and surveillance. The Australian Government and state and territory governments continue to support regional public health training programs and postgraduate education for students in countries with high incidence of communicable diseases. Significant efforts have been made in providing access for our regional partners to quality assurance schemes in laboratory testing developed and maintained in Australia.

The Asia-Pacific Economic Cooperation (APEC) Food Safety Cooperation Forum (FSCF), co-chaired by Australia and China, comprises food safety regulators from APEC member economies. Sharing information on emerging food issues and during food safety emergencies has been a priority area, resulting in the establishment in 2013 of the APEC Food Safety Incidence Network (FSIN). Australia (FSANZ) is FSIN Secretariat for its first year of operation.

**Technical experts from universities and research institutes**

Beyond government, individual experts and research institutions engage with the international community through research and capacity building partnerships. Anecdotal reports suggest that individual experts can be asked repeatedly by a range of countries and institutions to conduct technical missions or consultations, and that this type of international engagement is largely unrecognised and lacks oversight or coordination. Improving communication between universities focussed on the topic of international engagement for public health could enable better collaboration, sharing of learning and expertise and where possible reduce duplications. An annual workshop or forum could be one way to improve communication.

\(^1\) The Association of Southeast Asian Nations (ASEAN) comprises: Brunei, Myanmar, Cambodia, Indonesia, Laos, Malaysia, Philippines, Singapore, Thailand, and Viet Nam. ASEAN+3 adds Japan, China and South Korea
Inviting selected representatives from government agencies, especially DFAT and the Australian Aid Program, could further improve relationships in the sector.
6.3 Priority populations

6.3.1 Definition
Priority populations are groups within the Australian population who are at special risk of communicable disease and/or suffer disproportionately high burdens of infectious diseases. These populations include Aboriginal and Torres Strait Islander people, the elderly, immunocompromised, refugees and some migrants, prisoners and socially and economically disadvantaged groups.

6.3.2 Description
There are several groups in Australia with worse health than the general population due to a range of environmental and socio-economic factors. For instance, people living in rural and remote areas may experience difficulties accessing health services and this could have a direct impact on their health. Priority population groups for health interventions include the following:

- Aboriginal and Torres Strait Islander people
- People in rural and remote areas
- Socioeconomically disadvantaged people
- Veterans
- Prisoners
- Overseas born people
- Immunocompromised people

Communicable disease control is particularly relevant to Aboriginal and Torres Strait Islander people, prisoners, overseas-born people and socioeconomically disadvantaged. Furthermore, special settings such as the justice system and aged care facilities often deal with specific communicable disease issues including influenza and gastrointestinal disease outbreaks, and harm reduction requiring needle and syringe exchange programs. Targeted interventions and policies can address setting-specific issues and deliver better health outcomes.

Indigenous populations
The health disadvantage of Aboriginal and Torres Strait Islander populations is well documented (89). Despite incomplete identification of Indigenous status resulting in an overall underestimate of disease burden, it is recognised that Indigenous Australian's suffer a higher incidence of most notifiable infectious diseases including: tuberculosis, Haemophilus influenzae type b, meningococcal infection, invasive pneumococcal diseases, gonococcal infection, syphilis, chlamydial infection and salmonella (89). Of great concern is the persistence of diseases in Australia's Indigenous population that have largely vanished from the non-Indigenous populations, such as scabies, trachoma and acute rheumatic fever.
Aboriginal and Torres Strait Islander Health programs in the Australian Government Departments’ of Prime Minister and Cabinet, and Health aim to raise the health status of Aboriginal and Torres Strait Islander peoples by addressing existing inequities in the health system through working in partnership with communities. This requires improving access by Aboriginal and Torres Strait Islander peoples to effective primary health care and substance use services and population health programs, improving the responsiveness of the health system, providing complementary action through Indigenous-specific health programs; and working collaboratively across governments and the health sector to improve service delivery and outcomes.

The Australian Government and state and territory governments have committed to working together on improving the health of Aboriginal and Torres Strait Islander people, through their collective endorsement of the National Strategic Framework for Aboriginal and Torres Strait Islander Health: Framework for action 2003-2013. Although strategies for reducing the burden of specific infectious diseases are not discussed, the document endorses a whole-of-government approach, supporting the formation of partnerships between Aboriginal and Torres Strait Islander organisations, individuals and communities, and a number of government agencies across all levels of government, to ensure action occurs both within and outside the health sector to address the complex and inter-related factors that contribute the causes and persistence of health problems (90).

Reducing the burden of communicable diseases in Aboriginal and Torres Strait Islander populations requires a population and public health approach that empowers communities and leaders to understand and respond to endemic and epidemic diseases, with support of health professionals. More work is required nationally to achieve better Indigenous identification on notifiable disease data, for example the Australian Government could require Medicare Benefits Schedule funding for pathology testing be dependent on having the field complete on request forms. However, new administrative requirements can lead to workarounds such as systems automatically defaulting to “Not Aboriginal” or “Not Torres Strait Islander” if the field is blank. So this type of intervention needs to be part of a broader cultural shift in the health profession that supports open disclosure of Indigenous status without discrimination and supports the individual’s decision to keep their status private.

**Overseas born populations**

In general migrants to Australia enjoy health that is equivalent to or better than the health of the Australian-born population, owing to the phenomenon of the “healthy migrant effect”, explained by the selection of migrants based on their health and in some cases, their relatively high socioeconomic status (1). However, there are some vulnerable migrant groups, specifically refugees, whose health is poor, with a high prevalence of infectious diseases such as: hepatitis B, tuberculosis, malaria, syphilis and intestinal parasites (91).
Owing to reduced public health services in their country of origin, many refugees and temporary visa holders have an incomplete or inadequate vaccination status. Although predeparture medical screening is in place in some countries, not all refugees are given the opportunity to be screened and infectious disease testing is not comprehensive. Compounding the poor health status of some refugee people on arrival is the unfamiliarity of many Australian health care professionals with some of the infectious disease conditions, resulting in delayed diagnosis and intervention. In addition, many mainstream health services are ill-equipped to provide sensitive and culturally appropriate care and language appropriate preventative health information.

To overcome some of these barriers, in late 2005, CDNA asked the Australasian Society of Infectious Diseases (ASID) to develop screening and treatment recommendations for infections in recently arrived African refugees to Australia, with the aim of providing practical assistance to general practitioners and others who provide healthcare services to these individuals. The key issues identified were tuberculosis, malaria, blood-borne viruses (Human Immunodeficiency Virus, Hepatitis B virus and Hepatitis C virus), schistosomiasis, intestinal helminths, sexually transmissible infections (STIs), *Helicobacter pylori* infection and immunisation. The Guidelines, up to date in 2008, included links to key refugee health resources in each state and territory.

In the context of massive global migration, the Department of Immigration and Border Protection (DIBP) is a key partner in minimising risk of imported diseases to Australia, through early detection and prevention of certain infections. High priority areas include tuberculosis, and the international intergovernmental approach to aligned and enhanced migration screening processes. Other areas include hepatitis B and potentially other vaccine preventable diseases in higher risk migrant groups, in particular refugees.

With four to five million visitors from overseas arriving in Australia each year, DIBP acknowledges that they cannot screen all people. Over 90 per cent of cross border arrivals are Australian residents returning after a short absence overseas or short-term visitors to Australia. The remainder are permanent or long-term arrivals (92) .

The following factors are used to determine which visitors are screened and what examinations they might undergo:

- the risk of tuberculosis (or multi-drug resistant tuberculosis) in the person's country of origin;
- what people are coming for, how long they are coming for and whether there is any special significance around that particular visit;
- if the person is arriving as part of a special humanitarian refugee; and
• if the person is an irregular maritime arrival (ie a person without a valid visa arriving in Australia by boat) (92).

Applicants for Australian visas have to meet health requirements set out in migration law, the objective of the health requirement is to protect the Australian community from public health and safety risk and to contain public expenditure. Under the Migration Act 1958(Cth), there are two specific public health criteria:

• the applicant must be free from tuberculosis; and
• the applicant must not be a public health threat or danger to the Australian community

Upstream of premigration screening, equally important is health system strengthening in regional countries through support of immunisation and disease control programs. However the variable the pace at such programs achieve national coverage in developing countries means that Australia needs to maintain ongoing direct preventative strategies for potential migrants.

Older Australians
Health of the elderly population is a major concern to the federal government and a national approach to optimising the health of Australia’s ageing population is needed. Growing numbers of older people, many of whom have multiple chronic disease conditions, increases the proportion of the population with lowered immune systems, who are therefore, at risk of infectious disease. Of particular concern is the incidence of HAI and AMR infection, with frequency of hospital stay and multiple chronic conditions being risk factors also. It can be expected that this population, due in large part to their increasing numbers will present a major source of communicable disease in the future.

In particular, transmission of infection between hospitals and residential aged care facilities when patients move between these facilities is increasingly being recognised. Preventing some transmission requires greater collaboration between communicable disease control units and agencies responsible hospital infection control, at national, jurisdictional and local levels.

The population sub-groups who experience negative health effects from communicable diseases do not recognise state and territory borders. Fostering a national approach to dealing with relevant health issues, including communicable disease control, would guide collective efforts to improve health service access and health outcomes for these groups.

Immunocompromised people
There is an increasing recognition of the role of immunosuppressed patients as reservoirs and sources of important communicable diseases, such as vaccine-derived polioviruses and antimicrobial resistant viruses. Specifically, organ transplantation is associated with risk of
transmission of infectious diseases, particularly donor-derived blood borne viruses or BBV (HIV, HBV, HCV), opportunistic infections, and highly resistant organisms infecting immunosuppressed individuals. Transplantation is a core function of health facilities in Australia, and infection is the single most common cause of disease immediately post transplantation. Long term, infection (with viruses such as EBV, BBV such as HBV, HCV) is the single most commonly identified aetiology of cancer in this population.
7.0 Overview of Enablers

7.1 Governance and leadership

7.1.1 Definition
In the Australian context these include the provision of a vision and drive for development and implementation of new activities, as well as authority to support decision making processes and actions. It incorporates the administrative operations of planning, coordinating and controlling activities, as well as ensuring outcomes are achieved and standards upheld.

7.1.2 Description
The Australian health system comprises a set of public and private service providers supported by different legislative, regulatory and funding arrangements, with responsibilities distributed across the three levels of government, non-government organisations and individuals (1). Under Section 51 of the Australian Constitution, the provision of health services, including communicable disease prevention and control, is a shared responsibility of the Australian government and the state and territory governments. The communicable disease control responsibilities of federal, state, territory and local governments are 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 (93).

Communicable disease control in Australia has traditionally been the domain of the jurisdictions, with each state and territory having a Constitutional responsibility for communicable disease surveillance and control, and Commonwealth responsibilities largely limited to quarantine issues. Over time, the Commonwealth has assumed more responsibility for communicable disease governance and leadership, particularly in the areas of multijurisdictional outbreaks, national emergencies, biosecurity threats and international issues. There are several systems in place for governance and leadership on national communicable disease issues and roles are shared between several Commonwealth Government departments and expert advisory committees.

Australian Government Roles and Responsibilities
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 Commonwealth. The Agreement’s objective is to strengthen Australia’s public health surveillance and reporting system in order to better equip the Commonwealth, 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.

The Office of Health Protection in the Department of Health is responsible for the majority of Commonwealth responsibility for communicable disease control and achieves this through three main areas

- Health Protection Policy including bloodborne viruses and sexually transmissible infection policy, border health and quarantine functions and general health protection policy (antimicrobial resistance)
- Health Emergency Management including preparedness and response, countermeasures, vaccine preventable disease surveillance, zoonoses, foodborne and emerging infectious diseases
- Immunisation including policy, procurement and program delivery for the national immunisation program and associated surveillance.

Committees, Sub-committees and Expert Advisory Groups to Government

Joint Australian Government, state and territory government 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 Ministers’ Advisory Council (AHMAC), which reports to the Australian Governments’ Standing Council on Health (SCoH). 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 Bloodborne Virus and Sexually Transmitted Infections Standing Committee (BBVSS).
Communicable Disease Network Australia (CDNA)

Established in 1989, the Communicable Disease Network Australia (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 and the region.

CDNA produces guidelines, protocols, strategic plans and other documentation to assist in the national coordination of communicable disease control. CDNA membership includes representatives from the Australian Commonwealth, State and Territory governments, and key organisations in the communicable disease field. CDNA maintains close communication and cooperation with New Zealand, which has observer membership status.

CDNA holds fortnightly teleconferences to share and evaluate the latest data and developments in communicable disease surveillance and management, and additional teleconferences are held as required in response to outbreaks or significant communicable disease issues. The Network receives financial support and secretariat support from Health.

CDNA oversee the activities of other subcommittees, which report to them, including:

- The CJD Incidents Panel
- Case Definitions Working Group
- Invasive Pneumococcal Disease Surveillance Working Group
- National Arbovirus and Malaria Advisory Committee
- National Immunisation Committee
- National Surveillance Committee
- National Tuberculosis Advisory Committee
- Influenza Surveillance Strategy Working Group
- National Bloodborne Virus and Sexually Transmissible Surveillance and Monitoring Subcommittee
- Polio Expert Panel.
Box 7.2.1.1: CDNA Subcommittee—National Tuberculosis Advisory Committee

The National Tuberculosis Advisory Committee (NTAC) was established in 1999 to provide expert advice to the Communicable Diseases Network Australia (CDNA), the Australian Government Department of Health and the states and territories, on the prevention and control of tuberculosis (TB). The NTAC consolidates current TB related activities occurring at the jurisdictional level. NTAC members contribute to enhanced national surveillance of important epidemiological control indices for TB including disease incidence, drug resistance and treatment outcomes.

The current membership of NTAC includes representation from people responsible for the TB programs in their respective jurisdictions; namely nurse managers with TB expertise, public health physicians, clinicians practicing in TB clinics, thoracic physicians, infectious disease physicians and microbiologists. Membership also includes a representative from the Department of Immigration and Border Control (DIBP). Secretariat to NTAC is provided by the Department of Health.

The activities of NTAC assist in maintaining a high level of knowledge and expertise in Australia with regard to TB, and ensure that there is continued vigilance and action. The work of the committee is vital to minimise the national burden and human impact of TB. The role of the NTAC committee has become increasingly important over recent years as issues relating to the prevention and control of TB have emerged.

Box 7.2.1.2: CDNA Subcommittee - National Immunisation Committee

The National Immunisation Committee is the peak group responsible for overseeing the development, implementation and delivery of the Immunise Australia Program and reports to the AHPPC through CDNA.

NIC’s terms of reference include:
- Lead policy development and evaluation with respect to implementation of the National Immunisation Program and provide advice on strategic directions. Although NIP vaccines are the main focus and priority of NIC, this does not preclude consideration of implementation issues for other vaccines.
- Consult and collaborate with stakeholders and other peak immunisation related committees including ATAGI and CDNA on the development of national immunisation priorities, strategies and service delivery.
- Provide advice on communication strategies and materials for informing providers and the community about immunisation policy and programs.
- Establish task-oriented and/or time-limited working groups as required
Public Health Laboratory Network

The Public Health Laboratory Network (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 subcommittee is comprised of state and territory, expert, national and observer members (see earlier section 2.2.2 Description of laboratory services). The subcommittee meets monthly via teleconference, annually at a face to face meeting and communicates more frequently by email as required (60).

Environmental Health Committee (enHealth)

The Environmental Health (standing) Committee (enHealth) has responsibility for providing agreed health policy advice, implementation of the National Environmental Health Strategy 2007-2012, consultation with key players and the development and coordination of research, information and practical resources on environmental health matters at a national level. The enHealth membership includes representatives from Commonwealth, State and Territory health departments, related Commonwealth Government Departments and other government and non-government key stakeholders. Although enHealth are concerned with all physical, chemical and biological factors in the environment that may impact on health, many of these issues relate to communicable disease, such as sanitation, drinking water quality, food safety, pest/vermin control and housing conditions (94).

National Health Emergency Management Standing Committee

The National Health Emergency Response Arrangements govern cooperation between the Commonwealth and States and Territories for national health emergencies including communicable diseases such as pandemic influenza, and bioterrorism emergencies, such as smallpox or anthrax outbreaks. Specific emergency response plans outline the governance of national responses to emergent communicable disease threats. These responses are enabled by Committees, primarily the AHPPC, and by Groups, Networks, and Centres including:

- National Health Emergency Management Standing Committee
- Australian Medical Assistance Teams
- Disaster Mental Health Working Group
- Public Health Laboratory Network
- Australian Bioterrorism Laboratory Network
- Communicable Disease Network Australia
- Environmental Health Committee
- National Medical Stockpile
- National Incident Room
- National Critical Care Trauma Response Centre
- Australian Emergency Hospital Response

**Antimicrobial Resistance Standing Committee (AMRSC)**

The Antimicrobial Resistance Standing Committee (AMRSC) was established as a standing committee of the AHPPC in April 2012. The role of the AMRSC is to advise the AHPPC on matters relating to AMR; provide expert advice and assistance on issues relating to AMR; and recommend national priorities relating to AMR for action.

The Committee's is responsible for the development of a national strategy to minimise AMR. This includes supporting an integrated approach to the national strategy through coordination of national activities such as:

- a comprehensive national antimicrobial resistance and usage surveillance system
- education and stewardship programs
- infection prevention and control guidelines
- research into antimicrobial resistance and its prevention
- a review of the current regulatory system applying to antimicrobials, and
- community and consumer campaigns.

**Blood Borne Virus and Sexually Transmitted Infections Standing Committee (BBVSS)**

The BBVSS is a key advisory body reporting to Australian Health Ministers' Conference (AHMC) through the Australian Population Health Development Principal Committee (APHDPC) on strategic policy, programs, social issues and activities related to HIV, viral hepatitis and STIs. The BBVSS forms part of a coordinated response across Australian government, state and territory government, key organisations, peak bodies and national research centres for hepatitis B, hepatitis C, HIV, STIs and Aboriginal and Torres Strait Islander blood borne viruses and sexually transmissible infections.

The Australian Government further seeks advice through the **Ministerial Advisory Committee on Blood Borne Viruses and Sexually Transmissible Infections (MACBBVS)**. The MACBBVS is the Australian Government’s key advisory body on the national response and management of blood borne viruses and sexually transmissible infections. It is responsible for providing independent and expert advice to the Minister for Health on BBVs and STIs. MACBBVS works as an advisory structure and its key role is to provide specialist advice to inform the Australian government's response to BBVs and STIs, identify emerging issues and ways these may be addressed.

**Australian Technical Advisory Group on Immunisation (ATAGI)**

The Australian Technical Advisory Group on Immunisation (ATAGI) provides independent, expert advice to the Australian Government Minister for Health on the Immunise Australia
Program, the administration of vaccines and other related issues. ATAGI is responsible for
development of the Australian Immunisation Handbook and provides technical advice on the
introduction of new vaccines to the national schedule. Also central to this latter process, the
Australian Government Therapeutic Goods Administration (TGA) considers applications from
manufacturers for the registration of new vaccines. The Commonwealth Government
Pharmaceutical Benefits Advisory Committee (PBAC) determines whether the vaccine fulfils
the cost effectiveness criteria for either the National Immunisation Program (NIP) or the
Pharmaceutical Benefits Scheme (PBS). The Pharmaceutical Benefits Branch’s
Pharmaceutical Benefits Pricing Authority then determines a nationally negotiated price for
every new vaccine, and a recommendation is made to the Minister who may approve funding.
ATAGI provides advice to the PBAC to assist in their determination.

**Food Regulation Standing Committee (FRSC)**
The peak inter-governmental committee overseeing food safety is the Food Regulation
Standing Committee (FRSC), which is the sub-committee of the Legislative and Governance
Forum on Food Regulation (the Forum). FRSC is responsible for coordinating policy advice to
the Forum and ensuring a nationally consistent approach to the implementation and
enforcement of food standards. It also advises the Forum on the initiation, review and
development of FRSC activities.

The bi-national (Australia and New Zealand) food regulation system is responsible for
overseeing the safety of the food supply including communicable disease control of foodborne
infection. Activities include:
- evidence-based policy development
- development and implementation of pro-active prevention programs (including law)
- pro-active monitoring, surveillance and enforcement
- development and implementation of reactive responses,
- response to food safety issues (e.g. response to multi-jurisdictional outbreaks of food-
  borne disease)

To identify potential foodborne disease outbreaks, CDNA gathers primary foodborne disease
intelligence through OzFoodNet, a nationally funded network of epidemiologists working with
laboratory partners. OzFoodNet coordinate investigations into nationally-important outbreaks
of foodborne illness. Where a contaminated food is identified and specific action is required,
food regulators may trigger the National Food Incident Response Protocol in circumstances
where a national response is required.

**Other Australian Government departments and agencies**
- There are a number of Australian Government departments and agencies with a role
  in communicable disease control. The Prime Minister, supported by the *Department*
of Prime Minister and Cabinet (PM&C) and First Ministers leads the response to an influenza pandemic (95). PM&C had responsibility to support the Prime Minister where a national response was required for an influenza pandemic. In this capacity, PM&C produced the National Action Plan for Human Influenza Pandemic (NAP). In the event of a crisis requiring national coordination, PM&C can convene the Australian Government Crisis Committee (AGCC) to coordinate a whole-of-government response. The AGCC has broad membership including representatives from key Commonwealth departments and agencies with responsibility for emergency management. There is also capacity for PM&C to convene a National Crisis Committee which would supplement the AGCC with representatives of the states and territories.

- The Attorney-General’s Department (AGD) maintains response plans to assist the states and territories respond to an emergency, including national health emergencies. AGD operates the Crisis Coordination Centre (CCC), which is a dedicated all-hazards monitoring facility that operates 24 hours a day, seven days a week. The centre provides whole-of-government situational awareness to inform national decision-making during a crisis.

- The Department of Agriculture (Agriculture)), supported by the Department of Immigration and Border Control, manages quarantine controls at the border to minimise the risk of exotic pests and diseases entering the country. Agriculture is responsible for controlling and monitoring animal and plant health, and for assessing the risks of transmission of disease between animals and humans in conjunction with the Department of Health. Collaborative mechanisms are described in Box 7.2.1.3

- The Department of Immigration and Border Protection (DIBP) is a key partner in minimising risk of imported diseases to Australia, through early detection and prevention of certain infections, DIBP is also responsible for ensuring migrants meet health requirements set out in migration law, the objectives of which are to protect the Australian community from public health and safety risk and to contain public expenditure

- The Department of the Environment deals with many aspects of environmental health such as air quality, water quality and biodiversity, all of which can affect the environment that facilitate emergence and spread of infectious diseases.

- The Department of Foreign Affairs and Trade (DFAT) works to advance the interests of Australia and Australians internationally. This involves working to strengthen Australia’s security; enhancing Australia’s prosperity; and helping Australian travellers and Australians overseas. DFAT issues travel advisories which often contain information about communicable disease risks in other countries. DFAT is also responsible for Australia’s Aid Program. For health matters, the Aid Program supports large-scale disease prevention, including vaccination, and treatment.
Box 7.2.1.3 Collaborative mechanisms between the Departments’ of Health (Health) and Agriculture (Agriculture)

**The Agriculture-Health Memorandum of Understanding** – a high level memorandum covering biosecurity, antimicrobial resistance, emerging and zoonotic disease management, food safety, regulation of agriculture and veterinary chemicals, and regulation of genetically modified organisms;

**Zoonoses surveillance and policy/programmes** – Agriculture is a member of CDNA, which includes the human health aspects of zoonotic diseases

**Zoonoses emergency response** – Within the agricultural (or animal health) portfolio, if there is an outbreak of an emergency animal disease that may cause zoonotic disease in humans, the Australian Chief Medical Officer is invited to participate in the deliberations of the Consultative Committee on Emergency Animal Diseases (CCEAD).

**Food-borne disease** – Agriculture’s Food and Agricultural Productivity Divisions are closely engaged in maintaining the safety of food in Australia through collaborative activities in food regulation with partner agencies such as Health, Food Standards Australia New Zealand and Codex Alimentarius. Agriculture has specific responsibilities relating to the safety of imported foods.

**Antimicrobial Resistance** – Agriculture and the Australian Pesticides and Veterinary Medicines Authority (APVMA) are active members of the Antimicrobial Resistance Standing Committee. In addition, the AMR Prevention and Containment Steering Group is developing a national strategy to minimise AMR in Australia. This includes consideration of the contribution to AMR of antimicrobial use in animals, including livestock and companion animal use.

**Wildlife Health** – Wildlife are an important source of emerging infectious diseases. The Australian Wildlife Health Network (AWHN), managed from Taronga Zoo and supported by Agriculture’s Animal Division, oversees Australian wildlife health issues covering surveillance and reporting, research activity and policy/program inputs.

**Human Health Aspects of Border Biosecurity** – Agriculture Biosecurity has an established collaborative arrangement with Health with respect to protecting our borders from exotic infectious diseases affecting humans. Agriculture’s border operational staff implement human health quarantine services and Health undertakes risk assessments and provides policy guidance and advice. Collaborative governance, policy and implementation are provided through the respective relationship managers and a joint Agriculture-Health Human Biosecurity Forum

Several federal agencies have responsibility for aspects of communicable disease control. National and state entities such as the National Health and Medical Research Council

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2 The Codex Alimentarius Commission develops harmonised international food standards, guidelines and codes of practice to protect the health of consumers and ensure fair practices in the food trade
The National Health and Medical Research Council (NHMRC) is Australia’s leading expert body promoting the development and maintenance of public and individual health standards. NHMRC brings together within a single national organisation the functions of research funding and development of advice.

Food Standards Australia and New Zealand (FSANZ) develops and administers the Australia New Zealand Food Standards Code, which lists requirements for foods such as additives, food safety, labelling and GM foods. Enforcement and interpretation of the Code is the responsibility of state and territory departments and food agencies within Australia and New Zealand. The Australian Institute of Health and Welfare (AIHW) is the major national agency responsible for providing reliable, regular and relevant information and statistics on Australia’s health and welfare. AIHW is an independent statutory authority accountable to the Australian Parliament through the Health portfolio.

The Australian Commission on Safety and Quality in Health Care (ACSQHC) is a government agency which was established by the Commonwealth, with the support of State and Territory governments to coordinate national improvements in safety and quality in health care across Australia. The Commonwealth Scientific and Industrial Research Organisation (CSIRO), is Australia’s national science agency. CSIRO’s 12 National Research Flagships aim to improve lives, through partnerships focused on Australia’s most significant challenges and opportunities. For example, CSIRO’s Biosecurity Flagship is focused on helping to protect Australia from biological threats and risks posed by serious exotic and endemic pests and diseases. Across multiple disciplines, CSIRO works with leading scientific organisations around the world.

The National Health Performance Authority

The National Health Performance Authority (NHPA) is an independent body that provides locally relevant and national consistent information on the performance of hospitals and other healthcare organisations. The Authority was set up under the National Health Reform Act in 2011 and commenced operations in 2012. Under the terms of the Act, the Authority monitors and reports on, the performance of Local Hospital Networks, public and private hospitals, primary health care organisations and other bodies that provide health care services. The Authority's activities are guided by a document called the “Performance and Accountability Framework” agreed by the Council of Australian Governments (COAG). The framework contains 48 indicators that form the basis for the Authority’s reports. There are two report streams – Hospital Performance and Healthy Communities.

National Centres
In the area of bloodborne viruses and sexually transmissible infections, there are four national centres:

1. The Kirby Institute for infection and immunity in society (Kirby Institute)
2. National Centre for HIV Social Research (NCHSR)
3. Australian Research Centre in Sex, Health and Society (ARCSHS)
4. Australian Centre for HIV and Hepatitis Virology Research (ACH2)

The national centre for vaccine preventable diseases is the National Centre for Immunisation, Research and Surveillance (NCIRS).

The two national centres specifically relevant to communicable disease control surveillance are the Kirby Institute and NCIRS. Both demonstrate the benefits of a national approach: collating surveillance and laboratory data, and research to provide evidence-based advice to government.

**The Kirby Institute**
The Kirby Institute for infection and immunity in society (Kirby Institute) was established in 1986 as the National Centre in HIV Epidemiology and Clinical Research by the Australian Government to fulfil a number of key roles in Australia’s fight against HIV/AIDS (96). Since 1986, the Centre’s scope of work has broadened to include surveillance and research in a range of other infectious diseases, notably viral hepatitis and sexually transmissible infections and in 2011 the name of the Centre was changed to the Kirby Institute for infection and immunity in society (97). The Kirby Institute receives funding from Health, State health departments, non-Government organisations and numerous research grants. The Kirby Institute’s core communicable disease prevention functions and enablers are summarised in Box 7.2.2.3.

**National Centre for Immunisation Research and Surveillance (NCIRS)**
The National Centre for Immunisation Research and Surveillance of Vaccine Preventable Diseases (NCIRS) was established by the Australian Department of Health in 1997 (98). Core funding for NCIRS is provided by Health and the NSW Department of Health, with infrastructure support from Children’s Hospital at Westmead and the University of Sydney (98). The purpose of NCIRS is to promote the optimum control of vaccine preventable diseases in Australia through research, surveillance and evaluation of scientific evidence. NCIRS’ core communicable disease activities are summarised in Box 7.2.2.4.

The funding of NCIRS has grown from $500,000 provided under the initial successful tender to the Commonwealth in 1997, to more than $3M in 2012/13. The justification for this funding has been the increasing scope and complexity of vaccines and vaccine programs in the intervening 16 years and recognition that high level, flexible and readily available technical support was essential for the effective running of the Australian
Technical Advisory Group on Immunisation (ATAGI). When ATAGI was established in 1999, the role of NCIRS in supporting ATAGI was not initially in place. The need to support production of the Australian Immunisation Handbook prompted the first steps in this development. This was rapidly followed by the adoption by ATAGI of the US model for their Technical Advisory Committee (ACIP) of setting up expert working parties to review evidence and provide detailed recommendations for review. This led to further significant expansion of the workload of ATAGI and NCIRS was charged with acting as the technical secretariat for working parties as well as for the Handbook. There was further significant amplification of the requirements for technical advice when the PBAC was given the role of judging submissions for funding of vaccines under the National Immunisation Program, with detailed ATAGI advice an important component of this process.
Box 7.1.2.3 Kirby Institute: A summary of major communicable disease control functions and enablers

| Kirby Institute  |
| (formerly National Centre in HIV Epidemiology and Clinical Research) |
| Established 1986 |

**SURVEILLANCE:** Surveillance studies are conducted to monitor the pattern of HIV, viral hepatitis and specific sexually transmissible infections and evaluate the impact and cost-effectiveness of intervention strategies. Kirby has responsibility for national trachoma surveillance and reporting.

**LABORATORY DETECTION:** Significant laboratory expertise in the area of HIV. Provide support for clinical trials, epidemiological studies and research conducted at Kirby Institute.

**POLICY AND PROGRAMS:** Involved in public health program evaluation and contribute to policy development. Senior staff contribute to national and international committees, external boards and advisory groups.

**RESEARCH:** The Kirby Institute has an extensive research agenda, through several scientific programs and groups, which operate to fulfil the research areas outlined in the National Strategies for HIV, blood-borne viruses and sexually transmitted infections.

**GOVERNANCE/LEADERSHIP:** Provides national leadership in the area of HIV, viral hepatitis and sexually transmissible infections; independent advice is backed by a strong evidence base.

**FUNDING/INFRASTRUCTURE:** Core activities that correspond to initiatives outlined in the National Strategies are funded by Health. Kirby Institute is the recipient of funding from variety of other sources. The Kirby Institute is affiliated with the Faculty of Medicine, University of New South Wales and receives infrastructure funding from the NSW Government.

**WORKFORCE/TRAINING:** The Kirby Institute is an important source of information to all Australian health professionals working in the area of HIV, blood-borne viruses and sexually transmitted infections. Senior staff provide supervision to postgraduate students. Staff are involved in a variety of training conducted as part of continuing professional development, clinical and public health professional training.

**PARTNERSHIPS:** The staff of the Kirby Institute are members of many external boards, committees and advisory groups. Kirby has more than 500 collaborating organisations, including organisations from all States and Territories in Australia, National bodies, and numerous International organisations.

**COMMUNICATION:** The Kirby Institute produces a comprehensive Annual Report detailing their activities, funding and partnerships. Dissemination of research output is undertaken through publication in scientific journals and a range of surveillance reports. Annual Surveillance Reports are produced for HIV, blood-borne viruses and sexually transmitted infections.

Box 7.1.2.4 National Centre for Immunisation Research and Surveillance (NCIRS): A summary of major communicable disease control functions and enablers

**NATIONAL CENTRE FOR IMMUNISATION RESEARCH AND SURVEILLANCE (NCIRS)**

**Est 1997**

**SURVEILLANCE:** NCIRS has a major role in the analysis and reporting of surveillance data collected by various sources on Vaccine Preventable Diseases (VPDs) and immunisation in Australia. They produce regular reports on: the epidemiology of VPDs; on trends in immunisation coverage for children under seven and for older age groups; and on Adverse Events Following Immunisation (AEFI). They manage the National Serosurveillance Program, and the Paediatric Active Enhanced Disease Surveillance project.

**POLICY AND PROGRAMS:** NCIRS plays a key role in the development of immunisation policy in Australia, through the coordination and conduct of research and technical support provided to peak bodies. NCIRS produces The Australian Immunisation Handbook, which provides the definitive clinical vaccination guidelines for health professionals in Australia. NCIRS also provides technical support to ATAGI’s working parties, considering policy recommendations for specific vaccines and for AEFI investigations. Collaborative projects with CDNA include surveillance recommendations and case definitions for a wide range of VPDs and the series of national guidelines pertaining to VPDs. NCIRS is responsible for coordinating the evaluation of vaccines introduced into the National Immunisation Program.

**RESEARCH:** NCIRS is the major centre for policy-related vaccine research in Australia, and also conducts clinical trials. The scope of its research activity includes epidemiologic studies, disease modelling, social research and research relevant to use of vaccines by Aboriginal and Torres Strait Islander people.

**GOVERNANCE/LEADERSHIP:** NCIRS provides an independent expert voice in the field of immunisation and VPDs.

**FUNDING/INFRASTRUCTURE:** Core funding is provided by Health, supplemented by NSW Health. Infrastructure support is from The Children’s Hospital at Westmead and the Centre is affiliated with the Discipline of Paediatrics and Child Health and the School of Public Health of the University of Sydney. Clinical research is supported through various non-government sources.

**WORKFORCE/TRAINING:** NCIRS is an important source of support to all Australian health professionals working in the area of immunisation. Specific training or supervision is provided to professional trainees and post-graduate students and NCIRS contributes to or conducts educational activities for researchers, immunisation providers and other professionals.

**PARTNERSHIPS:** Engaged in multiple collaborative projects, with partners in all States and Territories of Australia. Staff are members of a number of national and international peak committees and advisory groups.

**COMMUNICATION:** Major role in provision of information to health professionals through relevant resources and to the public via the media. Surveillance data, program evaluations, clinical trials and other research findings are regularly published in relevant national and international journals. Support to health professionals is provided through workshops and resources on the NCIRS website and a national email discussion group.

7.2 Infrastructure and funding

7.2.1 Definition
Public health infrastructure comprises organisational capacity, business processes, and information and knowledge systems. Health funding is reported in terms of who provides the funds used to pay for health expenditure. Health expenditure is reported in terms of who incurs the expenditure, rather than who ultimately provides the funding for that expenditure.

7.2.2 Description
Public health funding and expenditure
The Australian Institute of Health and Welfare (AIHW) produced a series of reports on national public health expenditure from 1999-2000 until the most recent report for 2008-2009. The reports estimated recurrent expenditure on public health activities funded by the Australian Government and state and territory health departments (99).

The delivery of communicable disease control and other public health activities rests largely with states and territories, accounting for about three-quarters of the total public health expenditure. However states and territories provide less than half the overall funding from their own revenue from fiscal and other sources (99). Until 2009, the Australian Government, as well as expenditures incurred through its own programs, provided Specific Purpose Payments (SPPs) to states and territories mostly through Public Health Outcome Funding Agreements (PHOFAs) and the Australian Immunisation Agreements, to help fund public health activities of each state and territory government.

Since 2009, all financial relations between the Commonwealth and the States are governed by the provisions of the Intergovernmental Agreement, which establishes a foundation for the Commonwealth and the States to collaborate on policy development and service delivery, and facilitate the implementation of economic and social reforms in areas of national importance.

Under the Federal Financial Relations Framework, the Commonwealth provides financial support for the States’ service delivery efforts through:

- National Specific Purpose Payments (National SPPs) and National Health Reform funding to be spend in key service delivery sectors
- Three types of National Partnership payments – project payments, facilitation payments and reward payments; and
- General revenue assistance consisting of GST Payments to be used by the States for any purpose, and other general revenue assistance

Since 1 July 2012, healthcare SPPs have been replaced by National Health Reform Funding under the National Health Reform arrangements and is paid into a national funding pool to
support public hospital and public health services. Within the National Health Reform Funding, 2.3% ($314.2 million of $13,518.2 million) is for public health and states and territories have full discretion over the application of public health funding to the outcomes set out in the National Healthcare Agreement. This $314.2 million is Australian Government support for public health and does not represent total state and territory expenditures. For example, some states spend similar amounts ($200-$300 million) on public health from their own budgets (100).

The Australian Immunisation Agreements have been replaced by the National Partnership on Essential Vaccines to improve the health and wellbeing of Australians through the cost-effective delivery of immunisation programs under the National Immunisation Program. This National Partnership provides funding to the states/territories for the purchase of vaccines on the National Immunisation Program schedule, which have not yet transitioned to centralised purchasing arrangements. Facilitation and reward payments are also made to the states/territories; the reward payments are an increasing proportion of the support funds available and are dependent on the achievement of national benchmarks by individual jurisdictions.

In addition to the block public health funding provided under the National HealthCare Agreement, the Australian Government provides relatively small amounts of funding for specific communicable disease control activities as Implementation Plans under the Agreement. These include funds for vaccine preventable disease surveillance, OzFoodNet and for the provision of human quarantine services.

As discussed in the Policy and Program section, the impact of the change in funding arrangements is observed in a lack of defined responsibilities in the sixth national HIV/AIDS strategy. Funds which historically were earmarked for the national benefit of minimising HIV transmission are now mixed with other national health funding with no onus on states/territories to achieve outcomes or outputs in HIV control. Current financial constraints on healthcare funding in all jurisdictions may risk that efforts in HIV prevention and control and infections will increase. It is not inconceivable that should, for example, current needle and syringe programs be compromised in one jurisdiction, HIV rates in people who inject drugs in that jurisdiction would start to rise. This inevitably would lead to infections in this population in other jurisdictions. Similarly, a failure in one jurisdiction to contain HIV transmission in gay men has impacts in other jurisdictions. There is a strong requirement for national consistency to achieve national benefit.

**Public health expenditure 2008-2009**

The 2008-2009 figures are the most recent estimates of public health and communicable disease control expenditure in Australia. The figures demonstrate that communicable disease
control represents a small proportion of public health expenditure, which is an even smaller proportion of overall health expenditure.

In 2008-2009, total expenditure on public health activities was $2,300.2 million or $106 per person on average, and represented 2.1% of overall health expenditure (99). Public health activities included communicable disease control, selected health promotion, organised immunisation, environmental health, food standards and hygiene, screening programs, prevention of hazardous and harmful drug use and public health research.

**Public health funding**

The Australian Government contributed an estimated $1,297.7 million or 56.4% of the total public health funding in 2008-2009. Of this amount, $633.7 million was directly spent on its own public health programs (Table 7.2.2.1). Funding by state and territory governments from their own sources was estimated at $1,002.4 million (99). The largest contributions came from New South Wales, Victoria and Queensland, representing 77% of Australia’s population.

**Public health expenditure**

A breakdown of the total estimated expenditure on public health activities by Australian and state/territory governments shows that $1,666.4 million (72.4% of total expenditure) was spent by the state and territory governments. The balance of $633.7 million related to programs and activities for which the Australian Government was directly responsible (Table 7.2.2.1).

Overall government expenditure was highest for organised immunisation, selected health promotion and screening programs (Table 7.2.2.1). The highest amount of direct Australian Government expenditure was in public health research while state and territory governments directed $574.7 million (34.5%) of their expenditure to organised immunisation activities.

**Communicable disease control**

Communicable disease control expenditure of $284.9 million represented 12.4% of total government expenditure on public health in 2008-2009 (Table 7.2.2.2).
Table 7.2.2.1: Total government expenditure on public health activities, current prices, by activity, 2008–09 ($ million)

<table>
<thead>
<tr>
<th>Activity</th>
<th>Australian Government</th>
<th>State and territory governments</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Communicable disease control</td>
<td>25.1</td>
<td>259.8</td>
<td>284.9</td>
</tr>
<tr>
<td>Selected health promotion</td>
<td>132.9</td>
<td>305.4</td>
<td>438.3</td>
</tr>
<tr>
<td>Organised immunisation</td>
<td>64.7</td>
<td>574.7</td>
<td>639.4</td>
</tr>
<tr>
<td>Environmental health</td>
<td>20.3</td>
<td>79.6</td>
<td>99.9</td>
</tr>
<tr>
<td>Food standards and hygiene</td>
<td>19.0</td>
<td>19.0</td>
<td>38.0</td>
</tr>
<tr>
<td>Screening programs</td>
<td>110.5</td>
<td>225.8</td>
<td>336.3</td>
</tr>
<tr>
<td>Prevention of hazardous and harmful drug use</td>
<td>122.6</td>
<td>172.4</td>
<td>295.0</td>
</tr>
<tr>
<td>Public health research</td>
<td>138.6</td>
<td>29.7</td>
<td>168.3</td>
</tr>
<tr>
<td>Total expenditure</td>
<td>633.7</td>
<td>1,666.4</td>
<td>2,300.2</td>
</tr>
</tbody>
</table>

Source: AIHW health expenditure database (99).

Public health expenditure data
The AIHW’s Public Health Expenditure Project published 2000–01 to 2008–09 data in the National public health expenditure reports and Public health expenditure in Australia reports. The data collected for these reports only included expenditure by key health departments and agencies of the Australian Government and states and territories. Prior to June 2009, these data were provided under the auspices of the PHOFAs. The PHOFAs ceased on 30 June 2009 and since then Australian Government funding for public health programs has been included within National healthcare SPPs and NP payments under the Intergovernmental Agreement on Federal Financial Relations.

In 2011, the Public Health Expenditure Project was halted pending a review of the scope and content of the collection. This was partly due to the above changes in Australian Government funding arrangements with the states and territories that commenced in 2009, and also to address a number of data quality concerns relating to the scope of the collection and consistency of reporting across states and territories. As a result, public health expenditure data for 2010–11 are only reported as total public health expenditure, nationally and for each state and territory. In 2010-2011, total government public health expenditure was $1,901 million including $1,061 million by the Commonwealth and $840 million by states and territories (101). Non-government public health expenditure was $46 million.
Public Health Infrastructure
Public health infrastructure comprises organisational capacity, business processes, information and knowledge systems, and workforce (102). Workforce is discussed in the next section. As demonstrated in earlier sections of the system overview (surveillance, laboratory services etc), the national communicable disease control infrastructure is made up of multiple organisations, committees, systems, networks and resources. These include the state and territory health departments and associated public health units or communicable disease control units. It is beyond the scope of this document to detail the capacity, business processes and knowledge systems of each organisation. Instead, a brief description of the national infrastructure represented by the Department of Health is provided. This is followed by a generic explanation of what constitutes adequate organisational capacity, business processes and information and knowledge systems, as defined by CDC USA and the Public Health Agency of Canada (102).

Department of Health The Department of Health (Health) is responsible for achieving the Australian Government’s priorities (outcomes) for population health, pharmaceutical services, medical services, aged care and population ageing, primary care, rural health, hearing services, Indigenous health, private health, health system capacity and quality, mental health, health workforce capacity, acute care, and biosecurity and emergency response. The outcomes relevant to communicable disease control are population health, and biosecurity and emergency response. At the national level, the Office of Health Protection (OHP) within Health is primarily responsible for communicable disease control. Of approximately 5,500 staff in Health, the Office of Health Protection employs 160 staff. The Office of Health Protection includes four branches (Health Protection Policy Branch, Health Emergency Management Branch, an Immunisation Branch and the Office of Chemical Safety), supported by a Medical and Scientific Advisory Unit.

The Department of Health as a whole defines OHP’s business processes, information and knowledge systems and workforce. Health’s governance framework includes an Executive Committee and Audit Committee and these are supported by committees for: policy development and implementation; finance, risk and security; people; information knowledge and technology; and clinical, scientific and medical issues.

The Office of Health Protection administers components of three important flexible funds: the Health Surveillance Fund, Health Protection Fund and Communicable Disease Control Prevention Service Improvement Grants Fund.
Box 7.2.1 Flexible Funds

The Health Surveillance Fund supports a quality health system through effective implementation and management of the government’s key surveillance and monitoring priorities. It is designed to improve detection, prevention and awareness of communicable and chronic diseases, and provide information and analysis to assess the efficacy of population health programs and to support evidence-based preventive health policy in Australia.

The Health Protection Fund provides a flexible funding pool to support activities to prepare for and respond to changing health protection priorities such as national health emergencies, communicable disease outbreaks, natural disasters and terrorist attacks. The Health Protection Fund supports activities, projects and purchase of goods that contribute to, and build capacity and capability, in national preparedness to respond to health emergencies and risks that may arise through communicable disease outbreaks, natural disasters, environmental and chemical threats and acts of terrorism.

The Communicable Disease Prevention and Service Improvements Grants Fund provides a flexible funding pool for provision of grants aimed at preventing blood borne viruses and sexually transmissible infections and promoting appropriate treatment and management. The grants support broad based health promotion activities as well as activities targeted at the specific population groups most affected by these diseases.

The placement of public health functions within a government department puts public health professionals inside a very large organisation and process-oriented culture that attends to the political issues of the day and the implementation of government priorities and policies (102). The same issue applies to state and territory health departments. It also affects workforce development. Although embedding public health functions inside the usual bureaucracy promotes linkages with other relevant activities it also blurs the professional career path for those with specialist training in relevant disciplines, impedes agility of responses to public health emergencies, and occasionally allow politics to interfere with inter-jurisdictional and evidence-based public health activities (102).
Towards a robust public health infrastructure
The components of public health infrastructure outlined by CDC USA and adopted by the Public Health Agency of Canada, provides a useful checklist to assess aspects of the Australian communicable disease control infrastructure across regions and jurisdictions. It complements the proposed Framework’s system approach of functions and enablers. This checklist included the consideration of harmonized legislation, and a central resource for knowledge translation and evidence-based decision making, areas not explicitly addressed by the Framework’s functions and enablers classification.

<table>
<thead>
<tr>
<th>Organisational capacity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Agreed strategies to maintain public health system, to effect improvement in major health issues, set priorities and make strategic investments.</td>
</tr>
<tr>
<td>3. Defined essential functions, programs and services.</td>
</tr>
<tr>
<td>4. Effective governance structure to ensure clear decision making authority and public accountability, that ensures clarity of roles and responsibilities within a system-wide perspective</td>
</tr>
<tr>
<td>5. Visibility for and leadership of the public health community and communication with the public</td>
</tr>
<tr>
<td>6. Mechanisms to consult and undertake collaborative planning to develop national strategies for important public health issues</td>
</tr>
<tr>
<td>7. Mechanisms to support non-governmental organisations and to consult with them.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Business processes and information and knowledge systems</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Defined and agreed programs and business processes, including capacity to assist with outbreak management, with linkages to clinical systems.</td>
</tr>
<tr>
<td>2. Standards and best practices,</td>
</tr>
<tr>
<td>3. Research related to population and public health.</td>
</tr>
<tr>
<td>4. A central resource for knowledge translation and evidence-based decision making, including identification of research needs, evaluation of population and public health programs, information infrastructure including information architecture, models and standards, technology transfer, privacy and information management, development of data sources and system development.</td>
</tr>
</tbody>
</table>

**BOX 7.2.2.2 Components of Public Health Infrastructure**
7.3 Workforce and Training

7.3.1 Definition

The communicable disease control workforce requires broad human capacity with a wide range of skills such as epidemiology, biostatistics, literature review and critical appraisal, pathology, microbiology, virology, entomology, environmental health, health information technology, policy and program development and evaluation, and health risk communications. Training includes all activities which increase workforce capacity, by either increasing the number of skilled people available to take up positions, or increasing the capability of existing staff. Training is related to standards for qualification and competencies, lifelong learning and career development opportunities and requires accessible and effective training programs.

7.3.2 Description

Workforce

Health workforce issues are on the agenda of the Council of Australian Governments (COAG) through the Australian Health Workforce Ministerial Council and the Health Workforce Principal Committee. Health Workforce Australia (HWA) is a Commonwealth statutory authority that reports to the Standing Council on Health. HWA’s goal is to build a sustainable health workforce for Australia with responsibilities for strategic planning to address workforce shortages and capacity development within health. To date, HWA has focussed on front-line health workers as doctors, nurses, midwives, and dentists. The public health workforce is a small part of the overall health workforce picture and is usually considered separately to the typical health workforce due to the range of professionals and competencies required. Further work is required to better define the communicable disease control workforce and identify their specific supply and demand issues.

The most recent reviews of the public health workforce in Australia were conducted as part of the National Public Health Partnership (NPHP) in 1998 and 2002 (103). At that time, the challenges identified including: difficulty defining the public health workforce; high staff turnover; lack of career prospects; absence of professional credentialing requirements; and many workers lacking formal public health training.

Models have been proposed for workforce planning in public health, although challenges still exist around defining the scope of public health and the competencies required by the workforce. Qualitative research has identified specific public health workforce skills shortages as: program evaluation, information and knowledge management, epidemiology, capacity building, submission writing, leadership and biostatistics (104). Although these gaps were identified from general public health settings, all of the skills identified are necessary in communicable disease control. A survey of the pathology workforce conducted in 2011 identified workforce shortages specifically for qualified pathologists and scientists, with particular difficulty attracting pathologists to regional and rural areas (105). Further workforce...
issues identified in the laboratory service sector included: lack of career pathways for scientists; shortage of health information technology staff; high staff turnover.

**Surge capacity**

The idea of having a skilled workforce ready to respond with an emergency is commonplace in other fields of emergency management such as disaster response, army reserves and even the fire brigade. The same principle should apply to communicable disease control and health emergency planning. Planning to have skilled people is as important as planning for logistics, supplies, and critical infrastructure.

Communicable disease control needs an identified surge capacity of skilled people, who may be required in the event of a sudden outbreak or emergency. The review of Australia's response to pandemic(H1N1) 2009 recommended that the government develop a health sector surge capacity strategy to address the anticipated increase in demand for health services during a pandemic and the need to sustain provision for long periods of time (83). The most important skills likely to be in epidemiology, biostatistics, laboratory testing, and health risk communications. Similarly, in a severe influenza pandemic or equally serious communicable disease emergency such as a bioterrorism incident, public health doctors and nurses and officers would be required to staff emergency clinics, undertake contact tracing and contact management, or support front line delivery of health services. Currently there is no identified workforce to meet such a need, although students of the Master of Applied Epidemiology program (described below in Training), serve as a ‘standing national response team’, to provide an informal surge capacity in epidemiology in the advent of major national disease outbreaks. Currently the maximum number of students at any one time is likely between 10 and 20.

**Accreditation, competencies and career progression**

There are limited processes of professional credentialing and competency identification for the general public health workforce, including standardisation of public health training for both tertiary and vocational programs. And the public health workforce in Australia remains one of the only parts of the health workforce that lacks formal regulation, with the exception of the Australasian Faculty of Public Health Medicine. The role of Public Health Physician is well defined by a recently developed set of competencies. Specific public health training programs means that the role of Public Health Officer exists in New South Wales. Other workers such as environmental health officers, laboratory scientists, require some specialist skills, but communicable disease control usually forms only a part of their work. With few exceptions, there are generally no ongoing accreditation processes that require public health or communicable disease control professionals to maintain specific skills or competencies. One impact of this is poorly defined professional career paths within communicable disease control, especially when limited to the workings of government bureaucracies.
The critical finding is that no workforce planning for communicable disease control has taken place in over a decade. This is despite major global public health events, increasing expectations of maintaining our comparatively low burdens of infectious diseases and a recent recommendation to develop a health sector surge capacity strategy. Training, building and sustaining a skilled workforce is vital to improve Australia's communicable disease control system.

Training
Public health training in Australia has been fundamentally shaped by the findings of the “Kerr White Report”, an independent review of the research and education requirements for public health in Australia conducted in 1985 (106). The White Report formed the basis for the establishment of the Public Health Education and Research Program (PHERP) which provided substantial assistance to the tertiary sector to increase public health education and research (107). Between 1987 and 2010 PHERP funded a variety of public health training and research initiatives including: Masters of Public Health (MPH) programs; specialist research and training programs; state-based consortia of universities delivering postgraduate education and research training; four national and special focus centres; several national workforce development projects and many ‘innovation projects’ to develop and pilot new courses and new approaches to public health training and capacity building. These developments were found to be highly successful in terms of increasing public health workforce capacity and fostering leadership in key areas of public health. In 2005, the Australian Network of Public Health Institutions (ANAPHI) described a baseline set of competencies for Master of Public Health Program graduates to achieve which many universities have adopted.

The growth in public health education did address some of the skills shortages in public health and epidemiology. Despite this period of development in the area of public health training and research, issues that threaten public health training and as a result, workforce development remain.

The generalist nature of many other tertiary and vocational qualifications means on the job training in communicable disease control is usually required, although the capacity to provide this is often limited by an already thinly spread workforce.

Specifically identified problems within public health training include: a lack of national standardisation for many tertiary public health courses; variable and often ‘ad hoc’ on the job training; lack of continuing professional development opportunities; and vulnerability of even highly successful public health programs, such as the Master of Philosophy, Applied Epidemiology (MAE) program, due to inconsistent and insecure funding arrangements.

There is also a lack of academic training with a focus on communicable diseases in areas related to epidemiology such as mathematical modelling and biostatistics. While programs
such as the Biostatistics Collaboration of Australia are developing capacity in biostatistics in Australia, there is a lack of programs that teach biostatistical and modelling skills with a specific focus on issues relating to communicable diseases.

**Workplace-based training and career development**

Specialised skills and knowledge useful to new employees in the field of communicable disease may or may not be obtained through enrolling in a general public health degree, although the majority of the workforce would have such a background. The absence of a clearly recognisable professional identity for many public health professionals presents a major barrier to identifying the training needs and national competencies.

For example, while epidemiology taught at Masters of Public Health level (MPH) provides a good foundation, graduates are not sufficiently skilled or experienced to manage current and future communicable disease challenges. A MPH degree with a specialisation in Infectious Diseases Epidemiology and Control is offered by the University of New South Wales, but is not offered by all university MPH programs. There is a greater need for advanced training that includes hands-on experience.

One of few degrees in Australia to specifically train students to work across many of the communicable disease control core functions is the Master of Philosophy (Applied Epidemiology) program at the Australian National University, known colloquially as the ‘MAE program’. Based on the world-renowned Epidemic Intelligence Service training from the United States’ Centers for Disease Control and Prevention, the MAE is Australia’s only field epidemiology training program and is part of TEPHINET—the international network of Field Training Programs in Epidemiology and Public Health Interventions Network. A review of the MAE program in 2010 found the program is highly successful, having contributed to building capacity in Australia’s communicable disease control workforce, with many graduates having become leaders in public health. Students of this program, serve as a ‘standing national response team’, providing a much needed, yet informal, epidemiological surge capacity in the event of major national disease outbreaks. The program emphasises learning-by-doing and students work in field placements, usually federal, state or territory health departments and national communicable disease centres. This workplace-based learning provides a critical link between the public sector and academia and benefits both. Despite the obvious role the MAE has played in ensuring Australia has the capacity to meet the future needs of communicable disease control, the course has suffered from a lack of consistent funding, requiring a major restructure in 2011.

Workplace-based training is needed for other skills in communicable disease control such as policy and program evaluation. An example is the New South Wales Public Health Officer Training Program is a three year workplace based training offering three streams - general public health, policy, epidemiology, research and evaluation. Trainees are staff of NSW
Health, working in a supported learning environment to achieve a tertiary qualification based on real life experiences.

Victoria, until recently, also had a public health training program, the Victorian Public Health Training Scheme (VPHTS). Established in 1990, initially as three medical officer positions, the program broadened to include people with an undergraduate or postgraduate degree in health, science or a human services discipline and relevant professional public health field experience. The VPHTS aimed to build the capacity and skills of the public health workforce through advanced academic training and supervised work in a series of public health field placements. For many years the Victorian Department of Human Services funded five students each year for a two year period to undertake the program. From 2010 the program became a professional doctorate program undertaken through Monash University. A limited number of scholarships were funded by the Victorian Government; however scholarship funding has now ceased and it is much less likely that the training will be accessed by health graduates.

One recent initiative developed by the School of Public Health and Community Medicine at the University of New South Wales (UNSW), and not mentioned in the discussion paper, is the Future Health Leaders Program, which commenced in 2013. This program is delivered in partnership with suitable health workplaces and leads to the qualification of a Professional Doctorate in Applied Public Health (DrPH), however there are no graduates or evaluation at this early stage.

The Marie Bashir Institute for Infectious Diseases and Biosecurity at the University of Sydney (previously known as the Sydney Emerging Infections and Biosecurity Institute) is developing a Master’s program in Health Security. The proposed Master’s program will accommodate students from disparate disciplinary backgrounds while at the same time providing them with credentials for a career in public health (human/veterinary), health and security policy and government, international programs such as WHO, OIE and the non-government sector. The Marie Bashir Institute has multi-disciplinary representation across the areas of human, animal and environmental health and the social sciences.

**Bringing multiple disciplines together**

Communicable disease control brings together a range of professionals, most of whom achieve professional qualifications in their own disciplines, for example, infectious disease physicians, nurse immunisers, epidemiologists, virologists, administrators and many others. While specific workplace-based training programs are essential to develop the core communicable disease control workforce, there are opportunities to build a rotating or temporary workforce whereby professionals spend periods of their training time within communicable disease control units or health departments. An example would be infectious disease physician trainees rotating through health departments, ensuring the latest clinical
knowledge is available to government and that partnerships are built with the clinical sector. Such models would be considered under a broader communicable disease workforce strategy.
7.4 Partnerships

7.4.1 Definition
Partnerships are defined by common interest, roles or responsibilities in disease control. Partnerships harness the diverse skills and resources needed to improve and expand the scope and quality of services in communicable disease control. Partnerships include formal and informal relationships between organisations or associations and occasionally formed to achieve common goals.

7.4.2 Description
All levels of government, non-government agencies, professional organisations, the private sector and the community play a role. Strategic partnerships can improve collaboration and service delivery, across clinical response, surveillance, laboratory detection, research, policy, or governance. Health emergency planning recognises that partnerships need to be established well in advance of such events. The prioritisation of partnerships allows for clearer hierarchies during times of crisis and greater flexibility when diseases, health systems, workforces and public opinions change. Successful partnerships are usually based on shared accountabilities but can be built from common interest or shared goals.

National partnerships
Communicable disease control in Australia is a vast network of partnerships – via committees, networks and advisory groups – the members of which represent government, NGOs, professional bodies and occasionally the community. Partnerships are more developed in some disease groups. Australia’s HIV/AIDS epidemic response involved close collaborations between all levels of government, affected communities, service providers, professional groups and researchers (108). These partnerships fostered consistent policy and program responses to the epidemic. The model has been extended to bloodborne viruses and other sexually transmissible infections where common behaviours affect transmission and some diseases affect the same high risk groups.

Across federal government
Intersectoral collaboration between federal government agencies occurs for communicable disease control areas such as biosecurity. Biosecurity requires partnerships between the Department of Agriculture, the Department of Immigration and Border Protection and the Department of Health (Health). Other topic-based partnerships exist such as the Zoonoses Working Group of Agriculture and Health, and the Agriculture, Environment and Health Tripartite Forum on Communicable Diseases between Health, Agriculture and the Department of the Environment (Environment). The 2013 establishment of the Antimicrobial Resistance Prevention and Containment Steering Committee has seen a high-level partnership formed between the Secretaries of Agriculture and Health and Australia’s Chief Veterinary Officer and Chief Medical Officer as a steering group for government action on this issue.
A broad ‘health protection’ partnership with relevant agencies could support all common threat-specific interests in food safety, emerging infections, zoonoses, vector-borne disease and anti-microbial resistance. Defining the parameters of such partnerships such as information exchange, joint risk assessments, and shared research priorities, could sustain them. A “One Health” model to improve communication and integrate response between the fields of human health, animal health and agriculture would help to define such a partnership.

National and state entities such as the National Health and Medical Research Council (NHMRC), Australian Research Council (ARC), the Australian Bureau of Statistics (ABS), the Australian Institute of Health and Welfare (AIHW), Commonwealth Scientific and Industrial Research Organisation (CSIRO), are providers of research and practice expertise, advice, funding capacity and policy direction.

Emergency preparedness

Whole-of-government partnerships support response to national emergencies. National Security has historically incorporated traditional defence and intelligence themes. The Australian Government has broadened the concept of National Security to include non-conventional threats such as climate change, biosecurity, natural disasters and the economy to facilitate a whole-of-nation approach to National Security. Most, if not all, large scale emergencies or disasters have the potential to cause adverse impacts on the health of affected communities and populations. Emergent and re-emergent disease; health impacts of natural disasters and acts of terrorism (including mass casualties, Chemical, Biological, Radiological and Nuclear (CBRN) threats and acts) can develop very rapidly – so emergency preparedness and planning are essential components in minimising the impacts of these threats on the public.

The Attorney-General’s Department (AGD), through Emergency Management Australia (EMA), is responsible for emergency management at a Commonwealth level, including developing policy and plans to respond to and minimise the effects of all natural disasters or crises. Circumstances which might require a national emergency management response are broad, and could include a pandemic event (92). EMA maintains a number of Australian Government emergency management plans, including the Australian Emergency Management Arrangements (AEMA), which provides an overview of how Federal, state, territory and local governments collectively approach emergency management, including catastrophic disaster events (109). The AGD oversees the Commonwealth response to any national emergency through the emergency management framework (if a Commonwealth response is required). Where the emergency is health related, Health coordinates with AGD and other agencies to implement a whole-of-government response.
In recognition of the need for a whole of nation approach to health protection, the National Health Emergency Response Arrangements (NatHealth Arrangements) are produced under the authority of the Australian Health Minister’s Advisory Council (AHMAC). The NatHealth Arrangements direct how the Australian health sector (incorporating state and territory health authorities and relevant Commonwealth Agencies) would work cooperatively and collaboratively to contribute to the response to, and recovery from, emergencies of national consequence. Emergencies of national consequence are defined in the Model Arrangements for Leadership During Emergencies of National Consequence as emergencies that require consideration of national level policy, strategy and public messaging or inter-jurisdictional assistance, where such assistance is not covered by existing arrangements. The NatHealth Arrangements operate within the context of Australian Government National Security framework including the provisions of National Emergency Coordination Framework, the Commonwealth Disaster Plan (COMDISPLAN), the National Counter-Terrorism Plan (NCT-P) the National Counter-Terrorism Handbook (NCT-H) and the Council of Australian Governments (COAG) endorsed Model Arrangements for Leadership during Emergencies of National Consequence.

Clinical partnerships
Communicable disease control bodies work with health professionals in many healthcare settings, including infectious disease specialists, infection control practitioners, microbiologists, nurses and nurse immunisers, hospital administrators and general practitioners. Healthcare settings include general practice and aged care facilities, hospitals, and community health centres. Communicable disease control bodies also partner with environmental health officers, food safety inspectors and childcare providers in local governments. These partnerships are the foundation of health sector’s capacity to respond to large-scale outbreaks.

At the national level, the Commonwealth Government and Office of Health Protection have partnerships with professional organisations representing healthcare professionals including the Australian Medical Association (AMA), the General Practice Roundtable (GPRT), and Australasian Society for Infectious Diseases (ASID) . The establishment of the GPRT during the 2009 influenza H1N1 pandemic improved communication with the primary health care sector and enabled collaboration between the government and representatives of the front-line clinicians (83). An evaluation of Australia’s pandemic response emphasized the importance of communication with clinical and primary care sectors before and during a pandemic.

Technical advisory groups, such as the Australian Technical Advisory Group on Immunisation, support government policy and programs through provision of independent, scientific advice and usually include clinicians representing the hospital and primary care sectors.
The vast array of professional associations means that there are potentially multiple partnerships with government. Associations such as ASID, the AMA, the Australian Nursing Federation (ANF), and medical specialist colleges including the Royal Australasian College of General Practitioners (RACGP) and Australasian Faculty of Public Health Medicine (AFPHM) are all important clinical partners. Membership of ASID, for example, includes infectious diseases physicians, clinical microbiologists, scientists, infection control practitioners, public health physicians, sexual health physicians, veterinarians and others eminent in the field of infectious diseases. Ideally a two way partnership between OHP and ASID would see the latest evidence and technical knowledge filter into government policy, and if required, government able to communicate with membership of ASID through a central representative. It is critical that government understands professional associations and the best ways to link to their membership in order to develop, advance or implement policy.

For the more general professional associations, such as RACGP or AMA, communicable disease control is only a small component of the work. It is therefore important for communicable disease control authorities to define, establish and support partnerships that have clear purposes, terms of reference and operational guidelines, if necessary.

Organising multiple professional partners into a forum to facilitate regular exchange of information and exploration of ideas might improve the overall effectiveness of partnership system, rather than a series of two way partnerships.

**Partnerships with the non-government organisations, universities and the private sector**

Partnerships with the non-government sector, private sector and professional groups including clinical partnerships have developed in an ad-hoc fashion in Australia. Non-government organisations play an important role at the national and state levels as providers of research and development, advocacy, social marketing and primary care. Some disease or topic groups have more robust partnerships than other areas, as demonstrated by the HIV/BBV/STI sector. Other groups or partnerships have developed in response to big events, such as GP Roundtable and Pandemic Review Implementation Advisory Committee (PRIAC) overseeing the government response to lessons identified during the 2009 influenza pandemic.

The purpose of some partnerships is to exchange information. Organisations such as the Public Health Association of Australia (PHAA) link to a large membership of public health professionals. Other partnerships exist on technical grounds, such as the Australian Technical Advisory Group on Immunisation or university-based research groups with expertise in policy areas of government. Expertise in immunisation - as provided by the
Vaccine and Immunisation Research Group (VIRGo) at University of Melbourne/Murdoch Childrens Research Institute - is relevant to immunisation policy. Similarly, the Marie Bashir Institute for Infectious Diseases and Biosecurity (formerly the Sydney Emerging Infections and Biosecurity Institute) conducts cross-disciplinary research into emerging and re-emerging infectious disease; and aims to inform the development of policies and strategies to prevent, contain and control emerging and re-emerging infectious diseases. Modelling work by the Modelling & Simulation Group, Centre for Epidemiology and Biostatistics, Melbourne School of Population and Global Health has informed pandemic planning. Such work is relevant to the Australian Government’s responsibility for national health security, detection and response to emerging infectious diseases, yet formal linkages to support policy development are lacking.

Current governance of communicable disease control means that some individuals and organisations are represented on multiple committees and working groups of government, while others are not represented at all. Government funded institutions sometimes need to deal with several different groups within government, to address different policy, research, technical and funding issues. Therefore there are duplications and gaps, largely attributable to a lack of overarching organisation and leadership of communicable disease control priorities.

**International partnerships**

Australia maintains several international partnerships for communicable disease control mostly administered by the International Division of Health. Australia has ratified the International Health Regulations (2005) and is a member state of the World Health Organization in the Western Pacific Regional Office. Health has a formal partnership with the Department Foreign Affairs and Trade (DFAT) to provide technical support to DFAT’s health-related overseas aid programs.

Australia is a Member State of the World Health Organisation (WHO) and due to its location in the Asia Pacific region engages with both the Western Pacific Regional Office (WPRO) and the South East Asian Regional Office (SEARO). Australia actively participates in discussions of the World Health Assembly and in the Western Pacific Regional Committee on the development and agreement of resolutions on global and regional health issues. These have included such resolutions as polio eradication, measles eradication and avian influenza.

Australia’s regional engagement is directed towards providing and brokering technical assistance, advocacy, coordination and facilitation. This is coordinated both through the Department of Health and also by direct engagement of health experts with WHO. These discussions and assistance would benefit from improved coordination to ensure that key outcomes and priorities are shared.
In addition to engagement with the WHO globally and in our region Australia engages with key broad multilateral organisations including, the World Bank, the ADB, the East Asian Summit and ASEAN; key specific multilateral organisations including the APEC Health Taskforce (HTF), the ASEAN\(^3\) Health Secretariat, the Pacific Islands Forum Secretariat, and the Secretariat of the Pacific Community (SPC) Pacific Public Health Surveillance Network (PPHSN); and the Governments of the United States, Canada, the United Kingdom and New Zealand, which also have substantial engagement on health issues in the region, by focusing on opportunities to align donor programs in mutual and complementary areas of interest.

The public as partner

The Australian public plays a key role in communicable disease control. Individuals can reduce their likelihood of contracting many infectious diseases by receiving free vaccinations from the National Immunisation Program, adopting protective behaviours and observing safe work practices. Engaging the public and influencing behaviour change is paramount to communicable disease control. While communication is key, the public should be seen as a partner that can help improve the development and successful implementation of disease control policies.

\(^3\) The Association of Southeast Asian Nations (ASEAN) comprises: Brunei, Myanmar, Cambodia, Indonesia, Laos, Malaysia, Philippines, Singapore, Thailand, and Viet Nam. ASEAN+3 adds Japan, China and South Korea
7.5 Communication

7.5.1 Definition
Communication is the exchange of information between people or between organisations. Important categories include outbreak and risk communication, scientific communication and health education and literacy.

7.5.2 Description
Health communication is especially important in communicable diseases. The surfacing of new infectious organisms, microbial resistance to therapeutic drugs, and the new emerging diseases represent public health threats that can spread quickly and unexpectedly. These trends have expanded the role of health communication as a vital component of public health practice.

Communication in communicable disease control is important between those responsible for protecting the public, their partner organisations, other service providers and the community, to ensure consistency of information, as well as to inform, advise, educate and prepare them for disease threats.

Health communication programs need to consider specific groups representing different sets of beliefs, values, attitudes, social and cultural norms and perceptions. Therefore, only the use of specific health communication strategies and techniques can tailor messages to maximize public attention, raise awareness of health risks, contribute to improve health literacy levels, promote solutions and increase the likelihood of adoption of health behaviours and practice.

Outbreak and risk communication
Briefly, outbreak and risk communication is developed by communicable disease control authorities for diverse audiences about significant public health events, the likely outcomes of a health event and required actions by people and health practitioners. Communication products include situation reports or updates, clinical or public advice fact sheets made available on websites, supported by use of media agencies for press releases and interviews with key personnel. Public health advice information lines provide additional mechanism for the public to contact authorities and social marketing applications are web-based tools that can support delivery of important public health messages.

Lessons from large scale communicable disease events
The review of Australia's response to pandemic (H1N1) identified important lessons for outbreak communication. The national public information campaign was important, complemented by jurisdictional public communications activities, for the community to
develop an understanding of the importance of hygiene in reducing transmission of influenza (83). But communication resources were stretched in ensuring that current information was available to government, the media and the public. And despite clear messages about which groups were at high risk of severe outcomes and about the promotion of self-identification, there was a need for more targeted communication with vulnerable groups. The 24-hour news cycle emphasised the importance of shared and coordinated messaging across jurisdictions.

To enhance national coordination and timeliness of operational communications, an appropriate process to enable early sharing of materials across jurisdictions is needed. During the 2009 influenza pandemic, the intense media demand was difficult to manage when the spokespeople on health issues at both the national and jurisdictional levels were also involved with managing the pandemic response at the most senior levels. The review called for clear guidelines identifying federal and jurisdictional functions and responsibilities, including agreed spokespeople and the objectives, actions and target audiences for various stages of an influenza pandemic, should be developed for the health sector. The pandemic lessons are applicable to almost all recent national communicable disease events including Murray Valley encephalitis activity in 2011 and the national listeriosis outbreak in 2012/2013. Similarly, high profile events in one jurisdiction - such as the detection of Australian bat lyssavirus in a horse in Queensland in 2013 require operational and public communication responses for all jurisdictions.

The pandemic review also recommended optimal communication between national, state and territory governments, peak bodies, local bodies and primary health care professionals needs to be further addressed in future planning. It is important to enhance communication with the clinical and primary care sectors in planning and during significant national communicable disease events, in particular to communicate the role of AHPPC and public health objectives of a government response. Addressing these linkages could include formalising networks and considering ways of enhancing the intersection and integration between the Commonwealth, jurisdictional governments and local networks of peak bodies.

Event-specific communication guidelines would ideally build on existing mechanisms. For example, CDNA maintain excellent lines of communication between jurisdictional experts by regular email contact and members meet frequently by teleconference. These established procedures facilitate timely escalation of meetings and communications for emergency management of communicable diseases. The importance of routine operational communication with all relevant experts, professions and sectors is critical to ensure scalability and impact in the setting of a large event.

More can always be learned about effective communication in an environment of national threat, rapid change and multiple players, particularly with respect to the need to convey factual, up-to-date information both to the public and to healthcare professionals. Developing clear communication guidelines for all public health events, not just pandemics, should be a
national priority. Up to date communication guidelines would consider all available modes of communication, including social media.

For national health emergencies, crisis response communications would need to be managed through same channels as whole-of-government crisis communications, coordinated by the Australian Government Crisis Coordination Centre.

**Scientific communication**

Credible sources of routine scientific communication for communicable disease control in Australia are varied. Well-known examples are the Australian Immunisation Handbook that contains detailed, up to date technical guidance on all aspects of immunisation for providers; and the Medline listed national journal, *Communicable Diseases Intelligence*.

There is further need, however, to efficiently communicate scientific and technical information to the range of professional audiences within communicable disease control. Information products such as risk or threat assessments, clinical guidelines, disease fact sheets, health intelligence, laboratory testing policies, and surveillance case definitions should be easily available in a single portal, with clear branding from a credible source. Currently each jurisdiction maintains separate communicable disease control websites with variable numbers of products but often duplicated common products such as fact sheets for clinicians. Attempts to reduce duplication include CDNA’s Series of National Guidelines project aiming to develop single, nationally agreed protocols for responding to notifiable diseases.

At the national level, the Office of Health Protection website is part of the Department of Health website and reflects bureaucratic organisational structure rather than public health objectives. The limited scientific information that exists on the national website is not easy to find. The fact there are only limited technical products creates a misleading impression of limited technical capacity at the national level. Although this capacity could be improved, there is considerable work that goes largely unnoticed as communication is not considered a priority. But communication should be an integral part of all scientific and technical work, with established target groups and communication objectives, and is important to raise the profile of national communicable disease control.

Developing a national communicable disease control website, consolidating all scientific communication products and maintaining links to jurisdiction websites for specific operational purposes would greatly enhance the presentation of scientific and technical output of national communicable disease control activities.

A national website should be part of an overall communication strategy with health communication objectives, challenges, target audiences, key activities and mechanisms for evaluation of communication activities. Health communication objectives could include: raising awareness of issues related to communicable diseases among specific target audiences; and establishing a national reputation as the national expert authority in the field. Activities to achieve objectives might include provision of: timely, evidence-based,
authoritative information and guidance needed for public health action; educational information for the general public; accurate and timely background information for media partners; and/or compilations of latest evidence from communication science and effective health communication practice from jurisdictions.

Health education and literacy
Health education aims to influence knowledge, attitudes and behaviours connected to health in a protective and positive way. This is important in the setting of outbreaks but also for routine health education about key preventive activities including immunisation, safe sexual practices, hand hygiene and food handling.

Public perception and acceptance of risk varies by subject and by population group, and communicable disease control authorities need appropriate health communication strategies to ensure messages are delivered as clearly and effectively as possible. This depends on health education and literacy. While public reaction to adverse events from vaccination are usually disproportionate to risk, other events such as pandemic (H1N1) 2009 demonstrated the public had a higher tolerance for infection risk (and may even have perceived it to be a low risk event) than anticipated.

Health literacy has been defined as the degree to which individuals have the capacity to obtain, process and understand the basic health information and services needed to make appropriate health decisions (110). The latest available data show that 41% of Australians aged 15–74 had a level of health literacy that was adequate or above. But people living in more disadvantaged areas and areas outside Major cities, and people with poorer self-assessed health status, were more likely to have lower health literacy (1). Inadequate health literacy limits the ability to access and use health information and act on public health alerts, and is associated with worse health outcomes (111).

Health literacy interventions include written health information, alternative format interventions using computers, audio or videos, low literacy initiatives targeting specific populations, and targeted mass media campaigns designed around specific health behaviours (111). A recent review of interventions to improve health literacy conducted by the ECDC found there to be considerable gaps in the evidence reviewed concerning which interventions are most effective in improving health literacy, particularly with regard to communicable diseases and studies conducted in Europe (112). The review recommended further research was needed on the impact of health literacy interventions in the public health field, paying particular attention to evaluating communication about communicable diseases, and determining the most effective strategies for meeting the needs of population groups with low literacy levels, and those who are vulnerable, disadvantaged and hard to reach.
Health risk communication is an emerging discipline within public health, requiring greater attention to evidence-based strategies and evaluation of existing ways that government communicates with the public. It is a two-way channel that requires government to listen and evaluate knowledge and understanding of public health information, rather than rely on standard modes of communication such as fact sheets or advertising campaigns.
8. Suggested priority areas for action

The findings from the system overview present multiple opportunities to act and improve Australia’s system of communicable disease control. The CDNA working group responsible for proposing a national framework for communicable disease control have identified capability gaps common to most disease groups that could inform priority areas for action.

Six of the ten core functions and enablers have been identified as priority areas for action:

1. Governance and Leadership,
2. Surveillance,
3. Laboratory services,
4. National policy and programs,
5. Preparedness and acute response, and
6. Workforce and training.

In the Discussion Paper, *Towards a Communicable Disease Control Framework*, the issues affecting these suggested priority areas of action and possible ways to address them are explored.
9. References


10. Acknowledgements

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