Surveillance summaries

Surveillance systems reported in *Communicable Diseases Intelligence*, 2016

This article describes the surveillance schemes that are routinely reported on in *Communicable Diseases Intelligence* (CDI).

Communicable disease surveillance in Australia operates at the national, state and local levels. Primary responsibility for public health action lies with the state and territory health departments. The role of communicable disease surveillance at a national level includes:

- detecting outbreaks and identifying national trends;
- providing guidance for policy development and resource allocation at the national level;
- monitoring the need for and impact of national disease control programs;
- coordinating a response to national or multi-jurisdictional outbreaks;
- describing the epidemiology of rare diseases that occur infrequently at state and territory levels;
- meeting various international reporting requirements, such as providing disease statistics to the World Health Organization; and
- supporting quarantine activities, which are the responsibility of the Australian government.

State and territory health departments collect notifications of communicable diseases under their public health legislation. In September 2007, the *National Health Security Act 2007* (*National Health Security Act, No 174*) received royal assent. This Act provides the legislative basis for and authorises the exchange of health information, including personal information, between jurisdictions and the Commonwealth. The Act provides for the establishment of the National Notifiable Diseases List, which specifies the diseases about which personal information can be provided. The National Health Security Agreement, signed by Health Ministers in April 2008, establishes the operational arrangements to formalise and enhance existing surveillance and reporting systems, an important objective of the Act. States and territories voluntarily forward de-identified data on a nationally agreed group of communicable diseases to the Department of Health (Health) for the purposes of national communicable disease surveillance.

Surveillance has been defined by the World Health Organization as the 'continuing scrutiny of all aspects of the occurrence and spread of disease that are pertinent to effective control.' It is characterised by 'methods distinguished by their practicability, uniformity, and frequently by their rapidity, rather than complete accuracy.[1] Although some surveillance schemes aim for complete case ascertainment, others include only a proportion of all cases of the conditions under surveillance, and these samples are subject to systematic and other biases. Results generated from surveillance schemes must be interpreted with caution, particularly when comparing results between schemes, between different geographical areas or jurisdictions and over time. Surveillance data may also differ from data on communicable diseases gathered in other settings.

The major features of the surveillance schemes for which CDI publishes regular reports are described below.

Other surveillance schemes for which CDI publishes annual reports include tuberculosis notifications (*Commun Dis Intell* 2015;39(2):E217–E235), the Australian Mycobacterium Reference Laboratory Network (*Commun Dis Intell* 2014;38(4):E356–E368), and the Australian Rotavirus Surveillance Program (*Commun Dis Intell* 2015;39(3):E337–E346).

Arbovirus and malaria surveillance

The National Arbovirus and Malaria Advisory Committee (NAMAC) collates data and reports on the epidemiology of mosquito-borne diseases of public health importance in Australia by financial year (which represents the cycle of mosquito-borne disease activity in most parts of Australia). The reports include data from the National Notifiable Diseases Surveillance System (NNDSS) on notified cases of disease caused by the alphaviruses: Barmah Forest virus, chikungunya virus and Ross River virus; the flaviviruses: dengue virus, Murray Valley encephalitis virus (MVEV), the Kunjin strain of West Nile virus, Japanese encephalitis virus and yellow fever virus; and the protzoan infection, malaria. Both locally acquired and overseas acquired cases are described. Vector, climate and sentinel animal surveillance measures for arboviruses (in particular for MVEV) conducted

by states and territories, and also at the border are described. Sentinel chicken, mosquito surveillance, viral detection in mosquitoes and climate modelling are used to provide early warning of arboviral disease activity in Australia. Sentinel chicken programs for the detection of flavivirus activity are conducted in most states at risk of arboviral transmission. Other surveillance activities to detect the presence of arboviruses in mosquitoes or mosquito saliva or for surveying mosquito abundance included honey-baited trap surveillance, surveys of household containers that may provide suitable habitat for the dengue vector, *Aedes aegypti,* and carbon dioxide baited traps.

NAMAC provides expert technical advice on arboviruses and malaria to the Australian Health Protection Principal Committee through the Communicable Diseases Network Australia (CDNA). Members of the Committee have expertise in virus and disease surveillance, epidemiology, virology, vector ecology, vector control and quarantine, and represent agencies with a substantial interest in this area. NAMAC makes recommendations about surveillance and reporting systems, strategic approaches for disease and vector management and control, laboratory support, development of national guidelines and response plans and research priorities. NAMAC assists in the detection, management and control of real or potential outbreaks of arboviruses or malaria and provides advice on the risk of these diseases or exotic vectors being imported from overseas. NAMAC members participate in outbreak management teams as required.

Further details are provided in the NAMAC annual report (*Commun Dis Intell* 2016;40(1):E17–E47).

Australian Childhood Immunisation Register

Accurate information on the immunisation status of children is needed at the community level for program management and targeted immunisation efforts. A population-based immunisation register can fulfil this need. The Australian Childhood Immunisation Register (ACIR) commenced operation on 1 January 1996 and is now an important component of the Immunise Australia Program. It is administered and operated by Medicare Australia. The register was established by transferring data on all children under the age of 7 years enrolled with Medicare to the ACIR. This constitutes a nearly complete population register, as approximately 99% of children are registered with Medicare by 12 months of age. Children who are not enrolled in Medicare are added to the register when a recognised immunisation provider supplies details of an eligible immunisation. Immunisations are mostly notified to Medicare either by electronic means, the Internet or by paper ACIR notification forms. Immunisations recorded on the Register must have been given in accordance with the guidelines for immunisation determined by the National Health and Medical Research Council (NHMRC). From 1 January 2016, ACIR will record vaccinations for children up to 20 years of age. This change will support upcoming changes to immunisation requirements for child care payments and Family Tax Benefit Part A supplement.

From the data finally entered onto the ACIR, Medicare Australia provides regular rolling annualised quarterly coverage reports at the national and state level. Coverage for these reports is calculated using the cohort method previously described (*Commun Dis Intell* 1998;22:36–37). With this method, a cohort of children is defined by date of birth in 3-month groups. This birth cohort has the immunisation status of its members assessed at the 3 key milestones of 12 months, 24 months and 60 months of age. Analysis of coverage is undertaken 3 months after the due date for completion of each milestone, so that time is available for processing notifications and the impact on coverage estimates of delayed notification to the ACIR is minimised. Only children enrolled with Medicare are included, in order to minimise inaccuracies in coverage estimates due to duplicate records.

The ACIR coverage reports for the 3 milestones are published in CDI each quarter. Coverage estimates are provided for each state and territory and Australia as a whole and for each individual vaccine assessed at each milestone. A commentary on ACIR immunisation coverage estimates is included with the tables in each issue and a graph is used to provide trends in immunisation coverage.

An immunisation coverage report is also published in CDI on an annual basis and provides more detailed data on immunisation coverage for all recommended vaccines by age group that are funded by the Immunise Australia Program, timeliness of immunisation, small area coverage estimates and data on vaccination objection to immunisation. While vaccination is not compulsory in Australia, from 1 January 2016, objections on the basis of personal, philosophical or religious beliefs will no longer be a valid exemption from vaccination in order to receive some government family assistance payments.

Australian Gonococcal Surveillance Programme

The Australian Gonococcal Surveillance Programme (AGSP) is a continuing program to

monitor antimicrobial resistance in *Neisseria gonorrhoeae* and includes the reference laboratories in all states and territories. These laboratories report data on sensitivity to an agreed core group of antimicrobial agents on a quarterly basis and provide an expanded analysis as an annual report in CDI *(Commun Dis Intell* 2015;39(3):E347–E354). The antibiotics that are currently routinely surveyed are the penicillins, ceftriaxone, ciprofloxacin and spectinomycin, all of which are administered as single dose regimens. A major purpose of the AGSP is to help define standard protocols for antibiotic treatment of gonococcal infection. When *in vitro* resistance to a recommended agent is demonstrated in 5% or more of isolates, it is usual to reconsider the inclusion of that agent in current treatment schedules. Additional data are also provided on other antibiotics from time to time. At present, all laboratories also test isolates for the presence of high level resistance to the tetracyclines and intermittent surveys of azithromycin resistance are conducted. Comparability of data is achieved by means of a standardised system of minimal inhibitory concentration (MIC) testing and a program-specific quality assurance process.

Australian Meningococcal Surveillance Programme

The reference laboratories of the Australian Meningococcal Surveillance Programme report data on laboratory-confirmed cases confirmed either by culture or by non-culture techniques. Culture-positive cases where *Neisseria meningitidis* is grown from a normally sterile site or skin, and non-culture based diagnoses, derived from the results of nucleic acid amplification assays and serological techniques are defined as invasive meningococcal disease (IMD) according to the Public Health Laboratory Network definitions.

Data are reported annually and quarterly in CDI. Data in the quarterly reports are restricted to a description of the number of cases per jurisdiction, and serogroup where known. A full analysis of laboratory-confirmed cases of IMD, including phenotyping and antibiotic susceptibility data are published annually (*Commun Dis Intell* 2015;39(3):E347–E354).

Australian National Creutzfeldt-Jakob Disease Registry

Surveillance for Creutzfeldt-Jakob disease (CJD) in Australia is conducted through the Australian National Creutzfeldt-Jakob Disease Registry (ANCJDR). CJD is listed as a notifiable disease in all Australian states and territories. The ANCJDR is under contract to the Commonwealth to identify and investigate all suspect cases of transmissible spongiform encephalopathy in Australia. An annual update is published in CDI *(Commun Dis Intell* 2014;38(4):E348–E355).

Australian Paediatric Surveillance Unit

The Australian Paediatric Surveillance Unit (APSU) is an active surveillance mechanism for prospective, national identification and study of children aged <15 years, newly diagnosed with uncommon conditions including rare infectious and vaccine preventable diseases, genetic disorders, child mental health problems, rare injuries and other rare chronic childhood conditions. Up to 16 different conditions are studied simultaneously. The APSU relies on monthly reporting by ~1,400 paediatricians and other child health clinicians and over 85% of clinicians respond via e-mail. Clinicians reporting cases are asked to provide details about demographics, diagnosis, treatments and short-term outcomes. All negative and positive reports are logged into a database and the report card return rate has been maintained at over 90% for the last 20 years. The APSU, together with the National Centre for Immunisation Research and Surveillance jointly provide coordination for the Paediatric Active Enhanced Disease Surveillance (PAEDS). PAEDS is currently operational in 5 paediatric referral centres in 5 states and collects detailed information on relevant admitted cases (www.paeds.edu.au).

Communicable diseases currently under surveillance include: acute flaccid paralysis (to identify potential cases of poliovirus infection); 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 juvenile onset recurrent respiratory papillomatosis. After demonstrating feasibility in 2007, the APSU has conducted seasonal surveillance for severe complications of influenza each year. In 2009 APSU contributed to the national surveillance effort during the influenza A(H1N1) pdm09 pandemic.

The activities of the APSU are funded in part by the Australian Government Department of Health, and the NHMRC Practitioner Fellowship No: 1021480 (E Elliott). The Faculty of Medicine, The University of Sydney, and the Royal Australasian College of Physicians, Division of Paediatrics and Child Health, and the Kids Research Institute, Sydney Children's Hospitals Network provide in-kind support. APSU publishes an annual report *(Commun Dis Intell* 2014;38(4):E343–E347). For further information please contact the APSU Director, Professor Elizabeth Elliott on telephone:

+61 2 9845 3005, facsimile +61 2 9845 3082 or email: apsu@chw.edu.au; Internet: http://www.apsu.org.au

Australian Sentinel Practice Research Network

The Discipline of General Practice at the University of Adelaide operates the Australian Sentinel Practice Research Network (ASPREN). ASPREN is a national network of general practitioners who report presentations of defined medical conditions each week. The main aims of ASPREN are to provide an indicator of disease burden and distribution in the community and to be an early indicator of pandemic influenza.

The list of conditions is reviewed annually by the ASPREN management committee and an annual report is published. In 2016, 4 conditions are being monitored; all of which are related to communicable diseases. These are influenza like illness (ILI), gastroenteritis, chickenpox and shingles.

Laboratory testing of ILI cases was implemented in 2010, allowing for viral testing of 25% of ILI patients for a range of respiratory viruses including influenza A, influenza B and A(H1N1)pdm09.

There are currently 210 general practitioners registered with the network from all jurisdictions. Fifty-eight per cent of these are in metropolitan areas, 32% in rural and 10% in remote areas of Australia. Approximately 15,000 consultations are recorded by these general practitioners each week.

Data for communicable diseases are published in CDI each quarter. Data are presented in graphical format with the rate reported as the number of conditions per 1,000 consultations per week. The conditions are defined as:

Influenza-like illness – record once only per patient

Must have the following: fever, cough and fatigue.

Gastroenteritis – record once only per patient

Three or more loose stools, and/or 2 vomits in a 24 hour period excluding cases who have a known cause, for example bowel disease, alcohol, pregnancy.

Chickenpox – record once only per patient

An acute, generalised viral disease with a sudden onset of slight fever, mild constitutional symptoms and a skin eruption which is maculopapular for a few hours, vesicular for three to 4 days and leaves a granular scab.

Shingles – record once only per patient

Recurrence, recrudescence or re-activation of chickenpox infection. Vesicles with any erythematous base restricted to skin areas supplied by sensory nerves of a single or associated group of dorsal root ganglia. Lesions may appear in crops in irregular fashion along nerve pathways, are usually unilateral, deeper seated and more closely aggregated than those of chickenpox.

Note: Those conditions which show 'record once only per patient' are to have each occurrence of the condition recorded on 1 occasion no matter how many patient contacts are made for this episode of illness. If the condition recurs at a later date it can be recorded/counted again.

HIV surveillance

National surveillance for newly diagnosed HIV infection is coordinated by the Kirby Institute for Infection and Immunity in Society, in collaboration with state and territory health authorities, the Australian Government Department of Health, the Australian Institute of Health and Welfare and other collaborating networks in surveillance for HIV, viral hepatitis and sexually transmissible infections.

Cases of HIV infection are notified to the National HIV Registry on the first occasion of diagnosis in Australia, either by the diagnosing laboratory (Australian Capital Territory and Tasmania), by doctor notification (Western Australia) or by a combination of laboratory and doctor sources (New South Wales, Northern Territory, Queensland, South Australia and Victoria). Diagnoses of HIV infection are notified with the person's date of birth and name code, to minimise duplicate notifications while maintaining confidentiality.

Currently, 2 tables presenting the number of new diagnoses of HIV infection in Australia in the most recent quarter and cumulatively are published in CDI. The tabulations are based on data available 3 months after the end of the reporting period, to allow for reporting delay and to incorporate newly available information.

An annual surveillance report, *HIV, Viral Hepatitis and Sexually Transmissible Infections in Australia Annual Surveillance Report* has been published by the Kirby Institute since 1997. The Annual Surveillance Report, available through http://www.kirby.unsw.edu.au, provides a comprehen-

sive analysis and interpretation of surveillance data on HIV, viral hepatitis and sexually transmissible infections in Australia. The report *Bloodborne viral and sexually transmitted infections in Aboriginal and Torres Strait Islander people: Surveillance and Evaluation Report* has been published from 2007, as an accompanying document to the annual surveillance report. The Surveillance and Evaluation Report provides detailed analysis and interpretation of the occurrence of these infections in Aboriginal and Torres Strait Islander communities in Australia.

Invasive Pneumococcal Disease Surveillance Program

The Commonwealth has developed the Invasive Pneumococcal Disease (IPD) Surveillance Program as part of the NNDSS. The objectives and outcomes of the IPD Surveillance Program are to:

- record every case of IPD occurring in Australia;
- collect detailed information on each case of IPD as set out in the NNDSS Invasive Pneumococcal Infection Enhanced Surveillance Form;
- collate nationally this information in the NNDSS dataset for enhanced IPD surveillance;
- measure the impact of conjugate pneumococcal vaccination on the rates and types of pneumococcal disease, the prevalence of circulating pneumococcal serotypes and levels of antibiotic resistance; and
- assess whether cases or deaths in children under 5 years and adults over 65 years are due to IPD vaccine failure or antibiotic resistance.

The Commonwealth funds 4 laboratories to perform the laboratory component of enhanced surveillance of IPD, which consists of the serotyping all isolates of *Streptococcus pneumoniae* from cases of IPD.

IPD data are reported annually (*Commun Dis Intell* 2015;39(2):E265–E279) and quarterly in CDI. These reports include analysis notification and laboratory data collected through the NNDSS.

IPD surveillance is overseen by the Enhanced Invasive Pneumococcal Disease Surveillance Working Group (EIPDSWG), a subcommittee of the CDNA. The EIPDSWG assists in developing and implementing a nationally standardised approach to the enhanced surveillance of IPD in Australia.

National Influenza Surveillance Scheme

Australian influenza activity and severity in the community are monitored using a number of indicators and surveillance schemes:

- Notifications of laboratory-confirmed influenza are reported from all Australian states and territories and included in the NNDSS.
- Community level ILI is monitored through two sentinel systems, Flutracking, a weekly online survey integrating syndromic information with participant influenza immunity status; and data from the National Health Call Centre Network.
- Reports on general practice ILI consultations are provided through ASPREN and the Victorian Sentinel General Practice Scheme. Additionally, data on ILI presentations to hospital emergency departments are collected from sentinel hospital sites in Western Australia and New South Wales.
- Hospitalised cases of laboratory-confirmed influenza are reported through the Influenza Complications Alert Network (FluCAN); and severe complications in children are monitored by the APSU.
- Information on influenza subtypes and positivity are provided by sentinel laboratories, including the national influenza centre laboratories and some state public health laboratories. Additional virology and antiviral resistance data are also provided from the World Health Organization Collaborating Centre for Reference and Research on Influenza in Melbourne.

During the influenza season, data from each of these surveillance systems are compiled and published fortnightly in the Australian influenza surveillance report, which is generally available 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.

Annual reports on the National Influenza Surveillance Scheme are published in the CDI each year (*Commun Dis Intell* 2010;34(1):8–22).

National Notifiable Diseases Surveillance System

National compilations of notifiable diseases have been published intermittently in a number of publications since 1917.[2] The NNDSS was established in 1990 under the auspices of CDNA.

More than 60 communicable diseases agreed upon nationally are reported to NNDSS, although not

all are notifiable in each jurisdiction. Data are sent electronically from states and territories daily (business days only in some jurisdictions). The system is complemented by other surveillance systems, which provide information on various diseases, including three that are not reported to NNDSS (HIV, and the classical and variant forms of CJD).

The NNDSS core dataset includes data fields for a unique record reference number; notifying state or territory, disease code, age, sex, Indigenous status, postcode of residence, date of onset of the disease, death, date of report to the state or territory health department and outbreak reference (to identify cases linked to an outbreak). Where relevant, information on the species, serogroups/subtypes and phage types of organisms isolated, and on the vaccination status of the case is collected. Data quality is monitored by Health and the National Surveillance Committee and there is a continual process of improving the national consistency of communicable disease surveillance.

While not included in the core national dataset, enhanced surveillance information for some diseases (hepatitis B [newly acquired], hepatitis C [newly acquired], invasive pneumococcal disease, donovanosis, gonococcal infection, syphilis < 2 years duration and tuberculosis) is obtained from states and territories.

Aggregated data are presented on the department's internet site under *Communicable Diseases Surveillance* and updated daily (http://www.health.gov.au/nndssdata). A summary report and data table are also published on the Internet each fortnight (http://www.health.gov.au/cdnareport).

Data are published in CDI each quarter and in an annual report. The reports include numbers of notifications for each disease by state and territory, and totals for Australia for the current period, the year to date, and for the corresponding period of the previous year. The national total for each disease is compared with the average number of notifications over the previous 5 years in the same period. A commentary on the notification data is included with the tables in each issue of CDI and graphs are used to illustrate important aspects of the data.

OzFoodNet: enhanced foodborne disease surveillance

The Australian Government Department of Health established the OzFoodNet network in 2000 with epidemiologists in every Australian State and Territory to collaborate nationally in the investigation of foodborne disease. OzFoodNet conducts studies on the burden of illness and coordinates national investigations into outbreaks of foodborne disease.

OzFoodNet reports quarterly on investigations of outbreaks and clusters of gastroenteritis potentially related to food. Annual reports have been produced and published in CDI since 2001 with the most recent being the 2010 annual report (*Commun Dis Intell* 2015;39(3):E236–E264). Data are reported from all Australian jurisdictions.

References

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