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INVASIVE MENINGOCOCCAL DISEASE IN NORTH QUEENSLAND, 1990-1994

Jeffrey Hanna[1], *Bradley McCall*[2] *and Denise Murphy*[3]

Abstract

All episodes of invasive meningococcal disease (n=69) that occurred in north Queensland over the five-year period 1990-1994 are described. Aboriginal and Torres Strait Islander people had a considerably greater annual incidence (20.2 cases per 100,000) than did all other people (1.6 per 100,000 population). All three deaths were of young Aboriginal males. The majority (70%) of the isolates were serogroup C. Five outbreaks of serogroup C disease were identified, and these outbreaks accounted for nearly half of all the cases of serogroup C disease.

Introduction

With the rapid decline in the incidence of invasive *Haemophilus influenzae* type b (Hib) disease following the introduction of conjugate Hib vaccines[1], more attention is being given to two other important invasive bacterial pathogens - *Streptococcus pneumoniae* and *Neisseria meningitidis*[2,3]. Of the two, only invasive disease caused by *N. meningitidis* (the meningococcus) is notifiable throughout Australia[3].

Meningococcal disease is usually manifest as either meningitis or septicaemia, usually occurring as sporadic cases, but on occasions as small focal clusters or outbreaks or even as large community-wide epidemics[4,5,6]. Recent attention has focussed on outbreaks of serogroup C meningococcal disease in North America, which have led some authorities to describe such outbreaks as *emergent* infectious disease phenomena[7].

There is evidence that the epidemiology of meningococcal disease in Australia has undergone change in recent years, with an apparent increase and subsequent decrease in the proportion of cases caused by serogroup C in some parts of the country[8]. A similar changing epidemiology, with the emergence of serogroup C disease often associated with local outbreaks, has also been noted in North America[7,9].

The objectives of the current study were to describe the epidemiology of invasive meningococcal disease occurring in north Queensland over a five-year period, and to describe any outbreaks of serogroup C disease that may have occurred.

Methods

Case definition

Only those cases of invasive meningococcal disease that were diagnosed in north Queensland between the beginning of 1990 and the end of 1994 were included in the study. Figure 1 shows north Queensland as defined for the purpose of the study.

A case of invasive meningococcal disease was defined as a clinically compatible illness and (1) the isolation of *N. meningitidis* from a normally sterile site, or (2) the detection of meningococcal antigen in a normally sterile fluid, or (3) the detection of Gram-negative intracellular diplococci in blood or cerebrospinal fluid (CSF)[10].

Figure 1. Map of Queensland showing north Queensland as defined for the purpose of the study

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An outbreak of invasive meningococcal disease was defined as two or more cases caused by the same serogroup, occurring in people without close contact with each other but within the same community, during a four-week period[11]. Local health personnel were consulted to ensure that household and other close-contact cases were not included in defining the occurrence of an outbreak.

Case ascertainment

Four sources of information were used to identify potential cases of invasive meningococcal disease that occurred in north Queensland during the period of this study.

(1) Notifications to Queensland Health. Invasive meningococcal disease is a laboratory-notifiable condition in Queensland, with all reports eventually being collated by the Communicable Diseases Branch, Queensland Health, Brisbane. A computerised printout of all the north Queensland meningococcal notifications from 1990 to 1994 was obtained from the Communicable Diseases Branch.

(2) A computer search was made of hospital morbidity information held by the Epidemiology and Health Information Branch, Queensland Health. The 1990 information was coded according to the International Classification of Diseases, ninth revision, with the codes relevant to invasive meningococcal disease being 036 and 3205[12]. The information for the subsequent years was coded according to the International Classification of Diseases, ninth revision, Clinical Modification, with the relevant code being 036 only[13].

(3) A computer search was made of mortality information held by the Epidemiology and Health Information Branch, Queensland Health, using the codes described above.

(4) A review was undertaken of all meningococcal isolates referred to the Laboratory of Microbiology and Pathology, Queensland Health, Brisbane, for serogrouping and other laboratory studies. Details about the serotypes and subtypes of outbreak-associated serogroup C isolates were retrieved from reports obtained from reference and research laboratories that had been sent the isolates for further characterisation.

Data collection

Hospital records of all the identified potential cases of invasive meningococcal disease were examined to determine whether they met the case definition criteria. If so, additional information about the sex, age (to the nearest half-year), pertinent clinical details, and race (either Aboriginal or Torres Strait Islander or other) were extracted from the records.

Analysis

To calculate incidence rates, population denominator data from the 1991 National Census (Australian Bureau of Statistics) were used. The total study population was 424,130, of whom 9% (38,572) were Aboriginal or Torres Strait Islanders. The differences between the proportions were tested using the X^2 test with Yates correction[14].

Results

Seventy cases of invasive meningococcal disease that occurred in north Queensland during the five-year study period were identified. A 25 year old tourist developed serogroup Y meningococcal meningitis within 24 hours of arrival in north Queensland; this case was excluded from all further analyses.

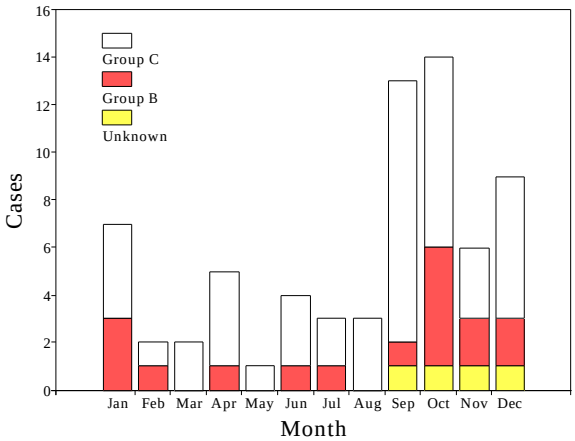
The number of cases per year ranged from 9 to 19 (median 11), with 37 cases occurring in the first two years, and 23 cases occurring in the last two years of the study ($p<0.05$). There appeared to be a seasonal variation, with a peak (39% of cases) in September and October, and a low (6% of cases) in February and March (Figure 2).

Thirty-nine (57%) of the 69 cases were male (a male:female ratio of 1.3:1), and thirty-nine (57%) of the cases were Aboriginal or Torres Strait Islanders. Eighteen (46%) of the Aboriginal and Torres Strait Islander cases were male compared with 21 (70%) in all other peoples ($p>0.05$).

The overall annual incidence was 3.3 cases per 100,000 population. The annual incidence for Aboriginal and Torres Strait Islanders was 20.2 cases per 100,000, whereas for all other peoples it was 1.6 cases per 100,000 population.

Twenty-three per cent of the cases occurred in children under two years of age and 41% occurred in children under five years of age. The annual incidence rates for Aboriginal and Torres Strait Islander children were 62.3 and 60.5 cases per 100,000 children aged <2 and <5 years respectively. The corresponding rates for all other Australian children were 15.4 and 7.5 cases per 100,000 children <2 and <5 years of age respectively.

Figure 2. Invasive meningococcal disease: number of cases, by month, north Queensland, 1990-1994



Seventeen (25%) of the meningococcal isolates were serogroup B, 48 (70%) serogroup C, and the serogroup of 4 (6%) cases was not able to be determined. There were no cases identified as being caused by serogroup A. Eight (21%) and 28 (72%) of all cases in Aboriginal and Torres Strait Islander people and 9 (30%) and 20 (67%) of cases in all other people were caused by serogroup B and serogroup C meningococci respectively.

The annual incidence of serogroup B disease in Aboriginal and Torres Strait Islander people was 4.1 cases per 100,000, whereas for all other peoples it was 0.5 cases per 100,000 population. The total and age-specific serogroup C disease incidence rates are shown in Table 1.

Meningitis was the primary clinical diagnosis for 60 (87%) of the cases, and bacteraemia / meningococcaemia for nine. Two patients, both Aborigines, had pre-existing conditions that probably put them at risk of developing invasive meningococcal disease. One was a ten year old boy with a ventriculo-peritoneal shunt following cryptococcal meningitis at five years of age who developed meningococcal meningitis. The other was a 62 year old man with chronic renal failure on dialysis, who developed meningococcaemia.

There were three deaths, all of Aboriginal boys and all caused by serogroup C meningococci. A 17 month old and a 9 year old both died from meningococcaemia, and a six year old died from meningitis. The case-fatality rate for Aboriginal and Torres Strait Islanders was 8% (3 / 39), and the case-fatality rate for serogroup C disease was 6% (3 / 48).

The mean length of stay in hospital for the surviving Aboriginal and Torres Strait Islander patients (13.8 days; median 12, range 6-48 days) was no different ($p>0.05$) from the mean length of stay for the other patients (10.6 days; median 10.5, range 5-24 days). Eight of the survivors developed either significant complications, or complications with sequelae (Table 2), a complication rate of 12% (8 / 66). Six of these cases were caused by serogroup C meningococcus, giving a complication rate from this serogroup of 12.5% (6 / 48).

Table 1. The race and age-specific incidence rates of invasive serogroup C meningococcal disease, north Queensland, 1990-1994

Age group (years)	Aboriginal / Torres Strait Islander		All other people		Total population	
	n	Incidence (cases per 100,000 population)	n	Incidence (cases per 100,000 population)	n	Incidence (cases per 100,000 population)
< 2	5	44.5	4	6.9	9	12.9
0 - 4	13	46.3	5	3.4	18	10.3
5 - 9	8	32.2	3	2.1	11	6.6
10 - 19	5	11.4	4	1.4	9	2.7
≥ 20	2	2.1	8	0.6	10	0.7
Total	28	14.5	20	1.0	48	2.3

Table 2. Details of the cases of invasive meningococcal disease that developed complications and/or sequelae, north Queensland, 1990-1994

Aboriginal / Torres Strait Islander	Sex	Age (years)	Serogroup	Diagnosis	Complications / sequelae
No	M	16	B	meningitis	pericardial effusion requiring pericardotomy
Yes	M	3.5	C	meningitis	unilateral hypopion, ophthalmitis; permanent ocular sequela
No	F	72	C	meningococcaemia	septic arthritis
Yes	M	1.5	C	meningitis	hemiparesis, epilepsy
Yes	M	7	C	meningitis	acute peritonitis diagnosed at exploratory laparotomy
No	M	22.5	C	meningitis	septic arthritis, multiple joints
Yes	F	10	?	meningitis	skin necrosis requiring plastic surgery
No	F	24.5	C	meningococcaemia	septic arthritis

Table 3. Details of the recognised outbreaks of invasive serogroup C meningococcal disease, north Queensland, 1990-1994

Date	Sept 90-Apr 91	Sept-Oct 90	Sept-Oct 91	Aug-Dec 93	June-July 94
Number of patients	11	2	2	3	4
Age	21mo-10yr	6,7yrs	3,8yrs	10mo-9.5yrs	2yr-59yrs
Aboriginal and Torres Strait Islander people	Yes	Yes	No	Yes	No
Serotype: subtype	2b:p1.2	2b:p1.2	2b:p1.2	2a:p1.2	2a:p1.2, 5
Mass vaccination	Yes	Yes	Yes	Yes	No

Therefore nine of the 48 (19%) cases of serogroup C disease were either fatal or complicated.

Five outbreaks of invasive meningococcal disease, all caused by serogroup C meningococci, were recognised (Table 3). Three outbreaks occurred in Aboriginal children in isolated communities, and included two, three and 11 confirmed cases of invasive meningococcal disease. Details of two of these outbreaks have been published elsewhere[5,11]. The other two outbreaks occurred in people in predominantly non-Aboriginal suburbs of metropolitan centres and included two and four confirmed cases. Mass vaccination was implemented in response to four of the five outbreaks.

Discussion

This study has demonstrated that Aboriginal and Torres Strait Islander people in north Queensland are at an increased risk of developing invasive meningococcal disease, and that serogroup C predominated in the region during the study period. Outbreaks accounted for nearly half (46%) of all cases of serogroup C disease.

It is Aboriginal and Torres Strait Islander children in particular who are at increased risk of invasive meningococcal disease. A recent study has shown that a variety of extrinsic factors, such as passive smoking, household crowding, exposure to environmental dust and stressful life events, are all independently associated with invasive meningococcal disease in children elsewhere[15] . All of these factors are pertinent to Aboriginal and Torres Strait Islander children. If they have a cumulative effect, they may explain the increased risk experienced by these children.

The study identified five outbreaks of serogroup C meningococcal disease that occurred during the five-year study period. Because we do not have earlier data, we cannot determine whether or not these outbreaks have been a recent 'emergent' phenomena in north Queensland. Nevertheless there is a general consensus that there has been a recent increase in serogroup C disease in Australia[8].

The recent increase in serogroup C outbreaks in North America have been ascribed to clonal strains that are of increased virulence when compared with serogroup C isolates that cause sporadic disease[7,9]. Much of the increase in serogroup C disease that has occurred in Canada since 1988 has been caused by serotype 2a strains belonging to a single clonal complex[16]. Based upon the typing results, it is tempting to speculate that the north Queensland outbreaks were caused by two, perhaps three, clones of increased virulence, but this could only be determined by comparing the genotypes of outbreak-related isolates with those causing sporadic disease using sophisticated molecular techniques[16, 17].

In one review, serogroup C outbreaks in the United States of America were classified according to the population affected as either school / institutional or community outbreaks[7]. The school / institutional outbreaks were characterised by high attack rates, a short interval between cases, a readily apparent association between cases and prompt implementation of vaccination. Community outbreaks on the other hand were characterised by cases spanning a longer time interval, with a correspondingly longer time before the commencement of vaccination[7].

Perhaps the three outbreaks that occurred in isolated Aboriginal communities were classifiable as institutional, as the associations were obvious, and vaccination was instituted promptly. The outbreak that occurred in September-October 1991 in a geographically discrete suburb of Cairns was also readily identifiable. However the suburban outbreak in mid-1994 was only recognised when the typing details of the isolates subsequently become available; the cases were diffusely scattered through coastal suburbs in the south of the study region. Even if the outbreak had been recognised promptly, defining a manageable target population for vaccination would have been extremely difficult given that the cases were so widely scattered. This was undoubtedly classifiable as a community outbreak[7].

In one affected Aboriginal community, cases subsequently occurred in vaccinated children, leading to the suggestion that 'mass chemoprophylaxis and two doses of vaccine for children should be used in similar outbreaks'[5]. However, no further cases occurred in two other Aboriginal communities after the administration of a single dose of meningococcal vaccine[11]. Regardless, there should be a very low threshold in deciding when to commence vaccination when apparent outbreaks of either serogroup C or serogroup A meningococcal disease occur in Aboriginal or Torres Strait Islander communities[6].

Meningococcal vaccines that are protective against serogroup B and serogroup C in early childhood will be required if meningococcal disease is to be adequately controlled. Immunogenicity trials of new conjugate serogroup A and C vaccines, and of experimental vaccines against serogroup B, are in progress in England where such vaccines are considered to be a high priority[18,19]. Surveillance of meningococcal disease in Australia should be improved so that the need for new meningococcal vaccines in Australia can be better understood[3]. In particular, the nationally collated annual data should include the proportion of cases that occur in Aboriginal and Torres Strait Islander people, as well as comprehensive serogroup information and the overall mortality from invasive meningococcal disease.

Acknowledgments

We wish to thank all clinical, laboratory and clerical personnel who either cared for the patients or who assisted us with the study. Particular thanks are extended to Ms Christine Smerdon for generating the computerised list of all cases of meningococcal disease that had been notified to the Communicable Diseases Branch, and to the staff of the Epidemiology and Health Information Branch for carrying out computer searches of the hospital morbidity and mortality information.

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HUMAN HEALTH ASPECTS OF A POSSIBLE *LYSSAVIRUS* IN A BLACK FLYING FOX

Scott Crerar[1,2], Helen Longbottom[1], *John Rooney*[3] *and Peter Thornber*[4]

Introduction

On 24 May 1996 a black flying fox displaying neurological signs was found in Ballina, New South Wales and submitted to the New South Wales Agriculture Wollongbar regional veterinary laboratory for autopsy examination. Histopathologic examination of the brain revealed severe non-suppurative encephalitis. Tissues were examined for evidence of equine morbillivirus (EMV) infection at the Animal Research Institute, Brisbane. Additional fixed tissues were sent to the Australian Animal Health Laboratory (AAHL) at Geelong for EMV and rabies testing. Results were negative for EMV. However, immunoperoxidase testing on fixed brain tissue was positive for *lyssavirus* antigen and was subsequently confirmed by immunofluorescence testing. Viral particles consistent with Rhabdovirus morphology were seen on electron microscopic examination of brain tissue. Cytoplasmic inclusions and tubular membranous structures suggestive of Rhabdovirus replication were also visible under electron microscopy in formalin-fixed brain samples. AAHL is currently attempting to isolate the virus using a range of cell cultures and mice inoculations.

The genus *lyssavirus*, family Rhabdovirus, includes classic rabies virus and five other rabies-like serotypes. The latter are Lagos bat virus, Mokola virus, Duvenhage virus and the European bat *lyssaviruses* (EBLV) 1 and 2. These viruses are all antigenically related but distinct. Rabies occurs in numerous countries in Europe, Africa, Asia, North America, Central America and South America, but the other rabies-like *lyssaviruses* have been recorded only in Africa and Europe. Australia is currently considered rabies free and no other rabies-like *lyssavirus* infections have been documented in animals or humans.

With the exception of rabies virus, human infections with members of the *lyssavirus* genus are rare. All members of the group however, except Lagos bat virus, have been shown to infect humans. Duvenhage and EBLV1 and EBLV2 have not been shown to occur in mammals other than bats and humans and are not thought to have a significant role in the spread of rabies-like disease to terrestrial mammals, including wildlife. This is in contrast to the situation in North America, Central America and South America, where the type of rabies found both in bats and in the main terrestrial carriers, racoons and foxes, is sylvatic classic rabies.

Public health implications of *lyssaviruses* in Australia

In the absence of an isolated virus, investigations to date have indicated that the present *lyssavirus* is not classic rabies, serotype 1, and Australia's rabies-free status is not compromised by this finding. The extremely low health risk posed by rabies-like *lyssaviruses* combined with the probable isolated nature of this incident in Australia indicates there is not a need to change current public health advice. It is recommended that if people are bitten or scratched by flying foxes or bats, they should immediately clean the wound thoroughly with soap and water. People who are concerned about the wound should seek medical advice.

In 1986 the World Health Organization (WHO) issued general guidelines on bats and rabies which are documented in the eighth report of the WHO Expert Committee on rabies, TRS 824, WHO Geneva, 1992. Recommendations were that persons exposed to a non-rabies *lyssavirus* infected bat should receive the standard post-exposure rabies treatment recommended by WHO. The same applies to pre-exposure treatment of groups of people at risk of exposure to bats in countries where rabies or *lyssaviruses* are endemic in bat populations. In these countries, no differences are made in post-exposure treatment according to the type of *lyssavirus* involved. At present, there is no indication for specific *lyssavirus* treatment in people bitten or scratched by flying foxes or bats in Australia. The exception would be if the flying fox or bat was known to be infected with a *lyssavirus*.

Additional work is underway at AAHL in an attempt to characterise the specific *lyssavirus* involved. Isolation studies, if successful, will take up to one month to complete. It is unclear at the moment whether *lyssaviruses* are endemic in Australian flying fox colonies, although it is considered unlikely. Nevertheless, a surveillance system to investigate the presence of both EMV and *lyssaviruses* in sick and dead flying foxes is to be established by animal health authorities.

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OUTBREAK

Human salmonellosis and peanut butter

Victoria: Sally Ng[1], Graham Rouch[1], Rodney Dedman[1], Bronwen Harries[2], Andrew Boyden[1], Lyn McLennan[1], Sheila Beaton[1], Agnes Tan[3], Selena Heaton[3], Dianne Lightfoot[3], Mary Vulcanis[3], Geoff Hogg[3].
South Australia: Wendy Scheil[4,5], Scott Cameron[4], Martyn Kirk[4,5], Jenny Feldheim[4], Rosalind Holland[4], Chris Murray[6], Nick Rose[7], Phil Eckert[7].

To date this year 36 cases of salmonellosis caused by *Salmonella* Mbandaka have been reported in Victoria and 18 cases in South Australia. Cases were identified between 24 February and 24 June 1996. This outbreak has been linked to peanut butter contaminated with *Salmonella* Mbandaka.

Salmonella Mbandaka, a type C1 serovar, is a relatively uncommon cause of gastroenteritis in Australia. Up until 1993, locally acquired *S.* Mbandaka was rare, with four to 17 cases per year reported Australia wide. From 1994, the number of cases of salmonellosis attributed to this serovar had increased and by 1995, there were 88 cases reported to the National Salmonella Surveillance Scheme (NSSS), comprising several clusters in Sydney and Canberra[1]. This increased incidence was, however, not observed in Victoria. South Australia recorded nine cases in 1995 and one in 1994, Victoria recorded nine cases in 1995 and four in 1994.

In April 1996, State-based laboratory surveillance systems to monitor *Salmonella* species alerted authorities to an apparent outbreak of *S.* Mbandaka. Having noted the clustering of *S.* Mbandaka cases in Victoria and South Australia, public health authorities initiated an investigation.

Victoria reported 36 cases with isolation dates between 5 March 1996 and 20 June 1996. South Australia reported 18 cases with isolation dates between 4 April and 24 June 1996. Over the same time period New South Wales reported only three cases and no activity was reported from other States.

Food histories together with information (from NSSS) of *S.* Mbandaka in food, both past and recent, were reviewed. These suggested chicken as a possible source of the bacterium but these suspicions were not confirmed by laboratory tests. South Australia and Victoria instituted a combined approach to discover a possible cause, under the auspices of the Communicable Diseases Network Australia New Zealand (CDNANZ). Extensive food histories were collected to generate hypotheses about possible food or animal sources of the organism. Initial interviews suggested that generic brands of peanut butter were frequently consumed by cases.

On 20 June 1996, *Salmonella* C1 was identified in two open jars from the same brand of peanut butter in Victoria. The recall, initiated on 23 June 1996, was based on ELISA tests on unopened samples of peanut butter held by the company. Results of testing by Australian Standard microbiological methods were only available the following day, on 24 June 1996.

S. Senftenberg was also isolated during subsequent testing of peanut butter. This serovar is rarely observed as a cause of human disease in Australia. Five cases were reported in Victoria between January and June 1996 compared with two per year in 1994 and 1995. There has been one recent case in South Australia possibly attributed to the consumption of peanut butter.

Investigations into the source of the contamination are continuing.

The *Salmonella* Mbandaka outbreak - an Australian overview

Graeme Oliver, Department of Health and Family Services

Salmonella Mbandaka was first isolated in May 1948 in Mbandaka (formerly Coquilhatville), Zaire. The first human isolate in Australia was recorded in 1978 from Victoria[1].

Apart from the 54 isolations of *S.* Mbandaka reported in the article above, a further 49 positive isolations have been recorded elsewhere in Australia this year (13 cases for New South Wales, 7 for the Northern Territory, 22 for Queensland and 7 for Western Australia). Of these, 43 cases have onset dates within the time scale of the current outbreak. More than half of the cases have been in children under five years of age.

In Western Australia, a link to peanut butter consumption has been established in three cases (two children and one adult) by the isolation of *S.* Mbandaka from peanut butter samples recovered from their homes. At this stage, no definite links have been established between the cases in other States and Territories and the current outbreak.

1. National Salmonella Surveillance Scheme (NSSS) human fourth quarter report 1995. Issue no. 3/96 Melbourne: Microbiological Diagnostic Unit, University of Melbourne.

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OVERSEAS BRIEFS

Influenza in New Zealand

During May, influenza-like illness was reported in the northern part of the South Island in New Zealand with some schools having up to 50% of their students affected and consultation rates reaching 1,800 per 100,000. Since the third week of May, influenza A(H3N2) virus has been isolated from 4 cases in this region. Sporadic cases of influenza A(H3N2) and influenza B have been confirmed elsewhere in the country since the fourth week of May.

World Health Organization

COMMUNICABLE DISEASES SURVEILLANCE

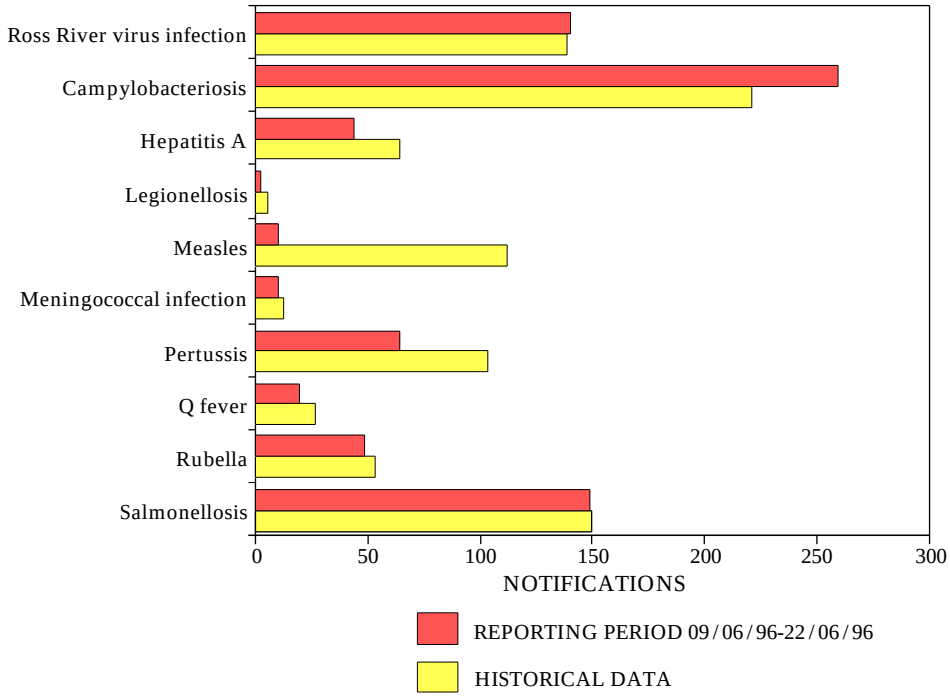
National Notifiable Diseases Surveillance System

The NNDSS is conducted under the auspices of the Communicable Diseases Network Australia-New Zealand. The system coordinates the national surveillance of 41 communicable diseases or disease groups endorsed by the National Health and Medical Research Council (NHMRC). Notifications of these diseases are made to State and Territory health authorities under the provisions of their respective public health legislation. De-identified core unit data are supplied fortnightly for collation, analysis and dissemination. For further information, see CDI 1996;20:9-10.

Reporting period 9 to 22 June 1996

There were 1,546 notifications received for this two-week period (Tables 1, 2 and 3). No reports were received from Victoria for the current period. Reports for selected diseases have been compared with averaged data for this time of year in the previous three years (Figure 1).

Figure 1. Selected National Notifiable Diseases Surveillance System reports, and historical data[1]



1. The historical data are the averages of the number of notifications in 9 previous 2-week reporting periods: the corresponding periods of the last 3 years and the periods immediately preceding and following those.
2. No data from Victoria are included in this figure.

Figure 2. Gonococcal infection notifications 1991 to 1996, by month of onset

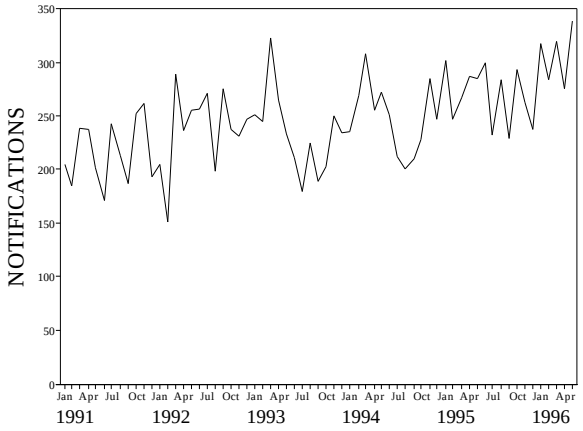
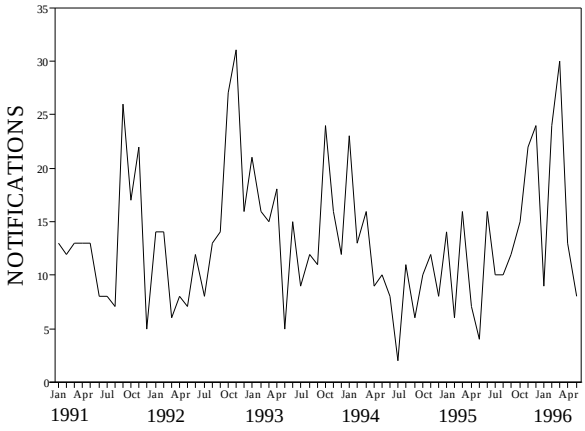


Figure 3. Leptospirosis notifications 1991 to 1996, by month of onset



The number of notifications of **Ross River virus infection** has continued to decline. Some activity is continuing in the coastal regions of Queensland and northern New South Wales.

There were 113 notifications of **gonococcal infection** received for the current period. Notifications have shown an upward trend in recent years (Figure 2). The total of 3167 cases notified in 1995 was the highest since 1988. However, notifications remain significantly lower than the numbers of cases reported throughout the 1970s and early 1980s. The recent increases in notifications have been confined to the Northern Territory, Queensland and Western Australia. It is not clear whether the increases in notifications are due to increased incidence or more complete case detection. Some evidence for better case detection is shown by a consistently declining male:female ratio, from 2.66:1 in 1992 and 1993 to 2.25:1 in 1995 and 2.12:1 this year. The age spectrum of cases has not altered significantly. Each year between 75 and 80% of cases in females were in the age range 15 to 29 years; similar percentages of male cases were aged in the range 15-34 years.

Twelve cases of **leptospirosis** were received for the current period, all from Queensland. All cases but one were males. Most cases were aged in the range 20-39 years. Notifications received over the last 5 years have shown a definite seasonal pattern (Figure 3), with increased numbers of cases from September to April and lower numbers in the winter months. Each year between 90% and 95% of cases were in males; more than half of all cases reported were in males 20-39 years. Of 882 cases reported since January 1991, 35% have been notified from Queensland and 43% from Victoria.

A further ten notifications of **meningococcal infection** were received during the current period. Three cases were in children under ten years, and the remainder in adults ranging in age from 18 to 80 years. The reports were received from six Statistical Divisions in four States.

Table 1. Notifications of diseases preventable by vaccines recommended by the NHMRC for routine childhood immunisation, received by State and Territory health authorities in the period 9 to 22 June 1996

DISEASE	ACT	NSW	NT	Qld	SA	Tas	WA	TOTALS FOR AUSTRALIA[1] This period 1996	This period 1995	Year to date 1996	Year to date 1995
Diphtheria	0	0	0	0	0	0	0	0	0	0	0
Haemophilus influenzae B infection	1	0	0	0	2	0	0	3	6	31	43
Measles	0	3	0	2	0	0	5	10	36	220	840
Mumps	0	1	0	NN	0	0	1	2	8	52	69
Pertussis	0	17	0	24	22	0	1	64	152	1392	2093
Poliomyelitis	0	0	0	0	0	0	0	0	0	0	0
Rubella	0	7	0	35	3	3	1	49	73	1262	1181
Tetanus	0	0	0	0	0	0	0	0	0	1	2

1. Totals comprise data from all States and Territories. Cumulative figures are subject to retrospective revision, so there may be discrepancies between the number of new notifications and the increment in the cumulative figure from the previous period.

NN Not Notifiable.

Table 2. Notifications of other diseases[1] received by State and Territory health authorities in the period 9 to 22 June 1996

DISEASE	ACT	NSW	NT	Qld	SA	Tas	WA	TOTALS FOR AUSTRALIA[2] This period 1996	This period 1995	Year to date 1996	Year to date 1995
Arbovirus Infection (NEC)[3,4]	0	0	2	0	0	0	0	2	25	108	348
Barmah Forest virus infection	0	10	-	20	0	0	-	30	43	552	271
Ross River virus infection	0	27	4	100	1	-	8	140	207	6977	2030
Dengue	0	0	0	0	0	-	0	0	1	22	14
Campylobacteriosis[5]	2	-	8	110	81	15	43	259	396	5091	4977
Chlamydial infection (NEC)[6]	4	NN	24	132	0	9	48	217	284	3323	3123
Donovanosis	0	NN	0	0	NN	0	1	1	7	26	46
Gonococcal infection[7]	0	13	24	51	0	0	25	113	135	1763	1482
Hepatitis A	0	24	3	15	2	0	0	44	53	1135	833
Hepatitis B incident	0	3	0	2	0	0	0	5	14	98	174
Hepatitis B unspecified	6	0	0	33	0	1	10	50	69	709	853
Hepatitis C incident	0	0	0	-	0	-	-	0	6	14	48
Hepatitis C unspecified	9	NN	17	160	NN	12	29	227	288	3693	3941
Hepatitis (NEC)	0	0	0	0	0	0	NN	0	0	10	14
Legionellosis	0	1	0	0	1	0	0	2	9	82	109
Leptospirosis	0	0	0	12	0	0	0	12	2	119	57
Listeriosis	2	0	0	0	0	0	0	2	2	26	38
Malaria	0	9	1	16	0	0	5	31	50	374	341
Meningococcal infection	0	4	0	3	2	1	0	10	17	122	163
Ornithosis	0	NN	0	0	0	0	0	0	4	39	68
Q fever	0	12	0	7	0	0	0	19	20	230	211
Salmonellosis (NEC)	5	17	8	86	10	2	21	149	237	3195	3723
Shigellosis[5]	0	-	5	13	7	0	2	27	32	324	424
Syphilis	0	14	9	9	0	0	9	41	83	694	967
Tuberculosis	1	12	0	5	0	1	1	20	47	481	542
Typhoid[8]	0	1	0	0	0	0	0	1	2	44	38
Yersiniosis (NEC)[5]	0	-	0	9	4	0	0	13	19	128	193

1. For HIV and AIDS, see *CDI* 1996;20:289. For rarely notified diseases, see Table 3 .
2. Totals comprise data from all States and Territories. Cumulative figures are subject to retrospective revision so there may be discrepancies between the number of new notifications and the increment in the cumulative figure from the previous period.
3. Tas: includes Ross River virus and dengue.
4. WA, NT and Vic: includes Barmah Forest virus.
5. NSW: only as 'foodborne disease' or 'gastroenteritis in an institution'.
6. WA: genital only.
7. NT, Qld, SA and Vic: includes gonococcal neonatal ophthalmia.
8. NSW, Vic: includes paratyphoid.

NN Not Notifiable.

NEC Not Elsewhere Classified.

- Elsewhere Classified.

Table 3. Notifications of rare[1] diseases received by State and Territory health authorities in the period 9 to 22 June 1996

DISEASES	Total this period	Reporting States or Territories	Year to date 1996
Botulism	0		0
Brucellosis	1	Qld	14
Chancroid	0		1
Cholera	1	Qld	4
Hydatid infection	1	Qld	20
Leprosy	0		7
Lymphogranuloma venereum	0		0
Plague	0		0
Rabies	0		0
Yellow fever	0		0
Other viral haemorrhagic fevers	0		0

1. Fewer than 60 cases of each of these diseases were notified each year during the period 1988 to 1995.

National Influenza Surveillance

Australian Sentinel Practice Research Network; Communicable Diseases Intelligence Virology and Serology Reporting Scheme Contributing Laboratories, New South Wales Department of Health; Victorian Department of Health; World Health Organisation Collaborating Centre for Influenza Reference and Research.

National Influenza Surveillance is conducted from May to September each year. Data are combined from a number of sources to provide an indication of influenza activity. Included are sentinel general practitioner surveillance, absenteeism data from a national employer, and laboratory data from LabVISE and the World Health Organization Collaborating Centre for Influenza Reference and Research. For further information, see CDI 1996;20:9-12.

The consultation rate for influenza-like illness recorded by ASPREN has continued to rise this fortnight. Consultations increased in early June in New South Wales and in mid-June in the Northern Territory (Figure 4). The absenteeism rate for Australia Post has risen slightly (Figure 5).

The number of laboratory reports of influenza A has increased but remains low compared with previous years. Seventeen reports were received this fortnight (Figure 6). One report was diagnosed by single high titre, the remainder by antigen detection (13) and virus isolation (3). Seventy-two reports of influenza A have been received so far this year. Of these 24% were for children under five years of age and 11% were for adults over 65 years of age.

One report of influenza B was received this fortnight, diagnosed by a fourfold rise in titre. Only eight reports have been received so far this year (Figure 7).

Figure 4. Sentinel general practitioner influenza consultation rates per 1,000 encounters, 1996, by week

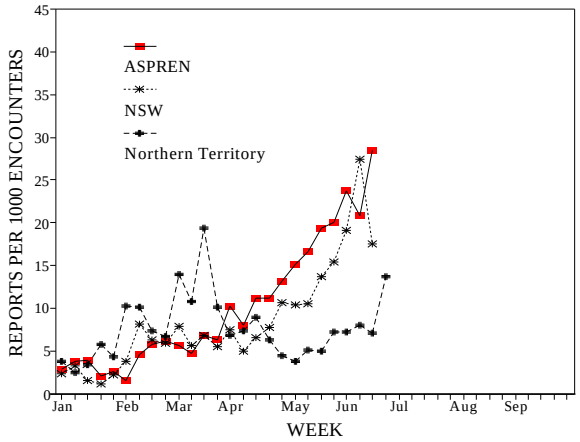


Figure 5. Australia Post absenteeism, 1996, by week

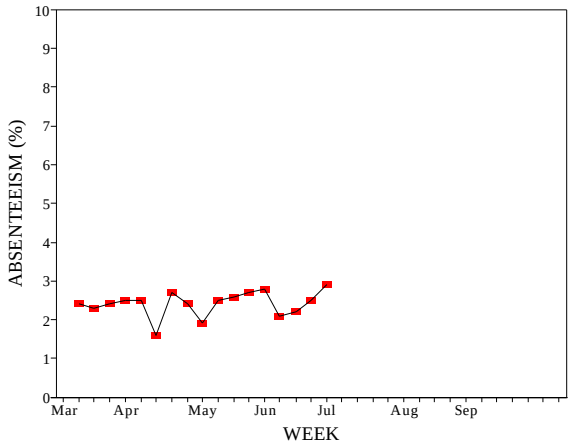


Figure 6. Influenza A laboratory reports, 1996, by method of diagnosis and week of specimen collection

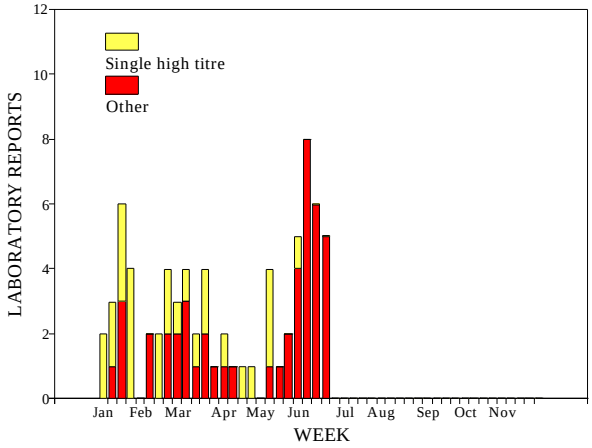
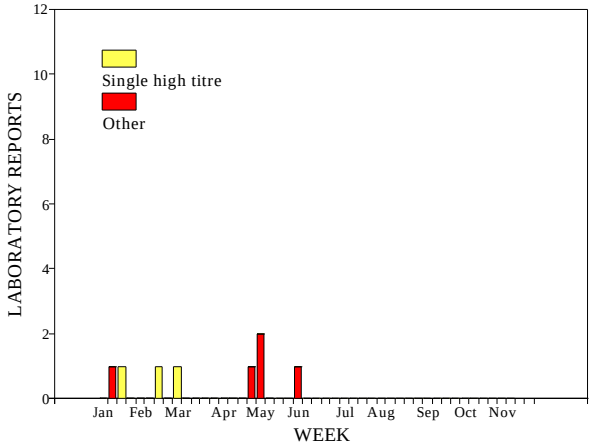


Figure 7. Influenza B laboratory reports, 1996, by method of diagnosis and week of specimen collection



Australian Sentinel Practice Research Network

The Australian Sentinel Practice Research Network (ASPREN) comprises 99 sentinel general practitioners from throughout the country. A total of approximately 9,000 consultations are recorded each week for 12 conditions. Of these, CDI reports the consultation rate for influenza, rubella, measles, pertussis and gastroenteritis. For further information including case definitions see CDI 1996;20:98-99.

Reports for weeks 24 and 25 ending 16 and 23 June respectively are included in Table 4. The 9 cases of pertussis is the highest weekly total since a similar number was reported in week 10 (ending 10 March). The rates of reporting of rubella, measles, chickenpox and gastroenteritis continue at low levels.

Table 4. Australian Sentinel Practice Research Network reports, weeks 24 and 25, 1996

	Week 24, to 16 June 1996		Week 25, to 23 June 1996	
Condition	Reports	Rate per 1000 encounters	Reports	Rate per 1000 encounters
Influenza	161	20.9	243	28.5
Rubella	0	0	2	0.2
Measles	0	0	1	0.1
Chickenpox	12	1.6	11	1.3
Pertussis	0	0	9	1.1
Gastroenteritis	77	10.0	93	10.9

LabVISE

The Virology and Serology Reporting Scheme, LabVISE, is a sentinel reporting scheme. Twenty-one laboratories contribute data on the laboratory identification of viruses and other organisms. Data are collated and published in Communicable Diseases Intelligence each fortnight. These data should be interpreted with caution as the number and type of reports received is subject to a number of biases. For further information, see CDI 1996;20:9-12.

There were 1,235 reports received by the *CDI* Virology and Serology Reporting Scheme this period (Tables 5 and 6).

Reports of **respiratory syncytial virus** have increased as expected for this time of year. In previous years, the greatest number of reports occurred over the June to August period. A total of 168 reports was received in the last fortnight. Diagnosis was by antigen detection (132), virus isolation (35) and single high titre (1). One hundred and sixty-three reports (97%) were for children under five years of age and 112 of these (69%) were under one year of age. Forty-seven per cent of reports were from New South Wales.

Rotavirus reports are expected to increase as reports usually peak in August (Figure 8). Fifty reports were received this period, 47 (94%) were for children under five years of age and 14 of these (30%) were under one year of age.

Reports of ***Mycoplasma pneumoniae*** have remained moderate throughout the last 18 months compared with 1992-93 (Figure 9). Forty-two reports were received in the last fortnight. Diagnosis was by IgM detection (30), single high titre (7), total antibody (3) and fourfold rise in titre (2).

Figure 8. Rotavirus laboratory reports, 1994 to 1996, by month of specimen collection

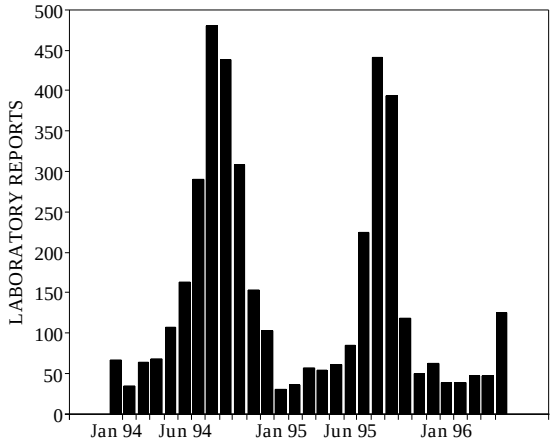


Figure 9. *Mycoplasma pneumoniae* laboratory reports, 1992 to 1996, by month of specimen collection

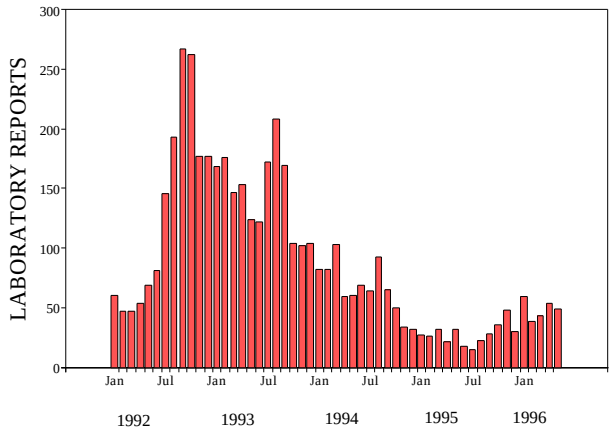


Table 5. Virology and serology laboratory reports by State or Territory[1] for the reporting period 13 to 26 June 1996, historical data[2], and total reports for the year

	State or Territory[1]								Total this fortnight	Historical data[2]	Total reported this year
	ACT	NSW	NT	Qld	SA	Tas	Vic	WA			
MEASLES, MUMPS, RUBELLA											
Mumps virus			1	2				2	5	3.0	25
Rubella virus		2		18			1	2	23	8.3	290
HEPATITIS VIRUSES											
Hepatitis A virus		1	4	9				3	17	14.7	265
ARBOVIRUSES											
Ross River virus		6	6	132				16	160	31.3	2,951
Barmah Forest virus		1	1	12				1	15	7.5	144
Flavivirus (unspecified)		1							1	.8	22
ADENOVIRUSES											
Adenovirus type 3							1		1	3.0	57
Adenovirus type 35							1		1	.0	1
Adenovirus type 40								1	1	.0	17
Adenovirus not typed / pending		4		4			10	12	30	36.2	734
HERPES VIRUSES											
Cytomegalovirus	1	11	5	31		1	10	19	78	57.7	903
Varicella-zoster virus		5		25			11	14	55	36.8	659
Epstein-Barr virus		20	3	91			5	42	161	46.7	1,097
OTHER DNA VIRUSES											
Contagious pustular dermatitis (Orf virus)								1	1	.0	2
Parvovirus		1		3			2	3	9	4.3	76
PICORNA VIRUS FAMILY											
Echovirus type 14		1							1	.5	25
Echovirus type 30							1		1	4.7	2
Poliovirus type 1 (uncharacterised)							1		1	.8	9
Poliovirus type 2 (uncharacterised)		1					2		3	1.0	9
Rhinovirus (all types)		1		3			1	3	8	29.5	354
Enterovirus not typed / pending		1		2			5	20	28	43.3	471
ORTHO / PARAMYXOVIRUSES											
Influenza A virus		1		1			11	4	17	55.2	111
Influenza B virus							1		1	7.5	28
Parainfluenza virus type 1		5		3			6		14	28.3	184
Parainfluenza virus type 3		4		1			2		7	19.0	296
Respiratory syncytial virus		78	1	14		3	44	28	168	320.2	1,211
Paramyxovirus (unspecified)							5		5	.2	10
OTHER RNA VIRUSES											
HTLV-1			1						1	.0	3
Rotavirus		3	3				22	22	50	56.5	548
Norwalk agent							1		1	.3	29
Small virus (like) particle							3		3	1.0	10

Table 5. Virology and serology laboratory reports by State or Territory[1] for the reporting period 13 to 26 June 1996, historical data[2], and total reports for the year, continued

	State or Territory[1]								Total this fortnight	Historical data[2]	Total reported this year
	ACT	NSW	NT	Qld	SA	Tas	Vic	WA			
OTHER											
Chlamydia trachomatis not typed		13	50	105		2	7	85	262	84.5	2,027
Chlamydia psittaci							1	1	2	2.8	64
Chlamydia spp typing pending				1					1	.3	1
Mycoplasma pneumoniae		7		23			6	6	42	18.8	310
Coxiella burnetii (Q fever)		5		4			4	3	16	6.7	94
Rickettsia spp - other								2	2	.3	4
Bordetella pertussis							9	5	14	27.2	272
Bordetella species		1		11					12	2.5	149
Legionella longbeachae								1	1	1.3	11
Leptospira species		1		3					4	.3	29
Schistosoma species							3	9	12	4.5	176
TOTAL	1	174	75	498		6	176	305	1,235	967.7	13,680

1. State or Territory of postcode, if reported, otherwise State or Territory of reporting laboratory.
2. The historical data are the averages of the numbers of reports in 6 previous 2 week reporting periods: the corresponding periods of the last 2 years and the periods immediately preceding and following those.

Table 6. Virology and serology laboratory reports by contributing laboratories for the reporting period 13 to 26 June 1996

STATE OR TERRITORY	LABORATORY	REPORTS
New South Wales	Institute of Clinical Pathology & Medical Research, Westmead	85
	Royal North Shore Hospital, St Leonards	46
	Royal Prince Alfred Hospital, Camperdown	14
Northern Territory	Alice Springs Hospital	4
Queensland	Queensland Medical Laboratory, West End	542
Tasmania	Northern Tasmanian Pathology Service, Launceston	3
	Royal Hobart Hospital, Hobart	3
Victoria	Microbiological Diagnostic Unit, University of Melbourne	6
	Royal Children's Hospital, Melbourne	109
	Unipath Laboratories	8
	Victorian Infectious Diseases Reference Laboratory, Fairfield Hospital	62
Western Australia	PathCentre Virology, Perth	162
	Princess Margaret Hospital, Perth	50
	Royal Perth Hospital	10
	Western Diagnostic Pathology	131
TOTAL		1235