Invasive *Streptococcus pneumoniae* in Perth teaching hospitals, 1990 to 1994

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Abstract

***Streptococcus pneumoniae* causes pneumonia, otitis media and meningitis. Reports of penicillin resistance and the development of vaccines highlight the need for baseline information about pneumococcal disease in Australia. We surveyed Perth teaching hospital laboratory records for the period 1990 to 1994 for isolates of *S. pneumoniae* recovered from normally sterile sites, and obtained isolate and patient demographic information. Highest rates of invasive disease were found at the extremes of age and were associated with Aboriginality. Isolates were rarely penicillin resistant. Surveillance of invasive pneumococcal disease will be of importance in monitoring the emergence of penicillin resistance and the impact of conjugate vaccines. *Comm Dis Intell* 1997;21;73-76.**

Introduction

Streptococcus pneumoniae (S. pneumoniae) is an important infectious cause of pneumonia, otitis media and meningitis[1]. The highest incidence of invasive disease is seen at the extremes of age, especially in the under five years age group and over 65 years age group[2]. Predisposing factors that may contribute to an increased risk of disease include excessive alcohol intake, smoking, diabetes mellitus, chronic renal failure, cardiac disease, HIV infection, asplenia and malignancy[3,4,5]. A male predominance has also been reported which may reflect alcohol intake, cigarette consumption or other factors[3,6]. In paediatric populations this predominance is not so marked[6,7].

Use of pneumococcal vaccines may reduce the incidence of invasive pneumococcal disease. In 1977, a 14-valent pneumococcal vaccine was introduced to Australia, followed by the current 23-valent vaccine in 1984. The 23-valent vaccine is poorly immunogenic in children under two years of age[8]. However, a conjugate vaccine presently being developed overseas may be efficacious in this group[8]. Current pneumococcal vaccine recommendations by the National Health and Medical Research Council target at-risk

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Table. Number of invasive *S. pneumoniae* isolates per individual for Perth by year, 1990 to 1994

Type of isolate	1990	1991	1992	1993	1994	Total
Invasive[1] (%)	71(11.7)	81 (11.8)	90 (13.7)	99 (15.6)	86 (14.5)	427
Blood	66	78	78	85	80	387
CSF	8	9	9	9	6	41
Other sterile site	2	1	5	6	3	17
Non-invasive	513	585	526	516	506	264
Unknown	21	20	43	21	0	105
Total	605	686	659	636	592	317
Number of laboratories contributing	3	4	4	4	4	

1. Individuals may have had isolates from more than one sterile site.

groups, including those individuals who are asplenic or immunocompromised, Aboriginal or Torres Strait Islander people who are over 50 years of age, or patients with cerebrospinal fluid (CSF) leaks[9].

Invasive disease caused by *S. pneumoniae* is not notifiable in Western Australia and, as a consequence, epidemiological information is limited. We reviewed laboratory records from Perth teaching hospitals for the period 1990 to 1994 to determine both the site of recovery of invasive pneumococci and some characteristics of those individuals being affected.

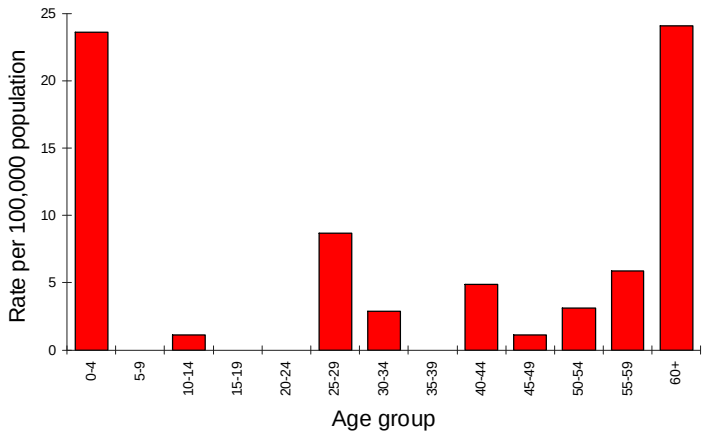
Methods

Microbiology laboratories servicing Perth teaching hospitals provided data on isolates of *S. pneumoniae* from all patients resident in Perth, for 1990 to 1994 inclusive. Hospitals included two adult hospitals (bed sizes 832 and 575) with a complete range of medical and surgical specialities except obstetrics, a children's hospital (bed size 230) and a general hospital (bed size 357). All acute admissions in the Perth area are seen at one of these four hospitals.

Isolates were considered invasive if they were recovered from sterile sites, that is blood, CSF, pleural fluid/aspirate, peritoneal/ascitic fluid, joint fluid, brain or central venous catheter (CVC) tip. Isolates from other tissues, urine and sputum, isolates where the specimen type was unknown and duplicate isolates from the same patient were not included in the analysis.

Data for the entire five year period were analysed for specimen type, date of specimen collection and antibiotic susceptibility pattern. Only 1994 data were analysed for age, sex, and Aboriginality because of incompleteness of these variables in previous years. While every effort was made to exclude non-Perth residents, postcode data were incomplete and could not be reliably analysed. Frequency distributions and chi square tests were calculated using the Epi Info version 6.02 statistical software package. Annual population denominator figures for metropolitan Perth for 1990 to 1994 were kindly provided by the Health Information Centre of the Health Department of Western Australia.

Figure 1. Age distribution of individuals with invasive isolates of *S. pneumoniae*, Perth, 1994



Results

Laboratories from all four Perth teaching hospitals participated. One laboratory was unable to provide data for 1990, but all four contributed data for the other four years.

S. pneumoniae was isolated from 3,178 individuals over the five year period. This total includes isolates from both invasive and non-invasive sites. There were 445 invasive pneumococcal isolates recovered from 427 individuals (Table 1). The proportion of invasive *S. pneumoniae* isolates increased from 11.7% in 1990 to a peak of 15.6% in 1993, followed by a slight decline.

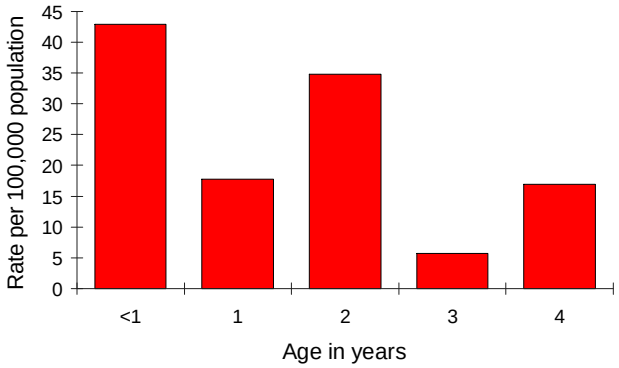
Most invasive isolates (71%) were recovered during the cooler months of April to October. Small increases were also seen in December in 1992 (10 isolates) and November in 1993 (12 isolates).

Blood was consistently the most common site of isolation (91%), followed by CSF. In 1994, blood isolates were more common from adults 60 years of age and above (41 isolates; 51%) than from children under five years of age (18 isolates, 23%). CSF was the source for six invasive isolates (7%), with three of these isolates recovered from children less than five years of age.

In 1994, the overall rate for reported invasive isolates from metropolitan Perth was 6.9 per 100,000 population. There was a similar distribution by sex, with rates of 6.7 per 100,000 for males and 7.2 per 100,000 for females. Highest age-specific rates were seen in children less than five years of age, 23.6 per 100,000 (22 isolates); and adults 60 years of age and over, 24.1 per 100,000 (43 isolates)(Figure 1). The rate for children less than two years of age was 30.4 per 100,000 (Figure 2). There was also a small increase in the rate for the 25 - 29 years age group to 8.7 per 100,000 population (8 isolates). Aboriginality was associated with a significantly increased rate of invasive isolates: 61.5 per 100,000 population (8 isolates) compared with non-Aborigines, 6.2 per 100,000 population (78 isolates) (relative risk = 9.9; 95% CI 4.8-20.6). Of the 10 children less than two years of age, two were Aborigines.

Only seven invasive isolates (1.6%) were resistant to penicillin in the five year period. These included six isolates from blood and one from CSF; with one recovered in 1991, three in 1992 and three in 1993. Demographic details were limited, however three of these isolates were from adult hospitals and four were from the children's hospital.

Figure 2. Distribution of individuals in the 0 - 4 years age group with invasive isolates of *S. pneumoniae*, Perth, 1994



Discussion

There is currently much interest in *S. pneumoniae* due to reports of increasing antibiotic resistance and the anticipation of a conjugate vaccine proving efficacious in children less than two years of age. Since the introduction of *Haemophilus influenzae* type b vaccines in 1992, there has been a marked decrease in the incidence of disease caused by this organism in children less than five years of age. *S. pneumoniae* may subsequently become a more prominent cause of infection[10]. Pneumococcal meningitis in children results in significant morbidity, including neurological sequelae and severe hearing loss[11,12,13]. This may be preventable with an efficacious vaccine in the paediatric group, while the incidence of otitis media commonly caused by *S. pneumoniae* may also be reduced.

We acknowledge several limitations in this study. First, the study population excluded private laboratories. However, private laboratories are less likely to see cases of invasive pneumococcal disease because they generally do not service hospitals which deal with acute admissions. In a larger retrospective study, only three isolates of invasive pneumococci were recovered from 1,189 specimens from private laboratories (Virginia McLaughlin, unpublished data) compared with 427 from 3,178 isolates from public laboratories.

Second, missing specimen type information may have resulted in misclassification. Isolates where the specimen type was unknown were classified as non-invasive, which may have resulted in an underestimate of the percentage of invasive isolates.

Third, individuals with pneumonia who only had a positive sputum specimen have been excluded from the invasive group. Although *S. pneumoniae* classically causes lobar pneumonia, expectorated sputum is an unreliable indicator because it may be contaminated by organisms normally resident in the oropharynx[14]. Patients with pneumococcal pneumonia may have positive blood cultures in only 25 to 35% of cases. Both these factors may have resulted in an underestimate of the rate of invasive disease.

Last, missing postcode information may have resulted in misclassification. It is possible that rural residents were included in the study due to transfers from remote areas of Western Australia to Perth. As transfers occur predominantly for the very unwell, they may have been more likely to have invasive disease. This would have resulted in an over-estimate of the percentage of invasive isolates and the rates that are based on Perth metropolitan figures. They may have also influenced rates associated with Aboriginality. Based on other reports which show a high incidence of disease in Aborigines[4,15], we would expect much higher rates in the north and east of Western Australia (which have a higher proportion of Aboriginal communities) in comparison with the metropolitan region. Missing postcode information may have allowed rural Aborigines to be classed as urban, thus over-estimating the rates in this group.

Numbers of *S. pneumoniae* isolated from sterile sites increased over the study period. With an increase in the number of at-risk individuals, such as an ageing population and an increasing prevalence of immunosuppressive disorders, we may see an increase in the incidence of invasive pneumococcal disease. It is specially important, therefore, to establish an appropriate surveillance system for pneumococci.

Resistance to penicillin was rarely seen in *S. pneumoniae* isolated from invasive specimens over the five year period. It is important to note that penicillin resistance was detected and would be expected to recur. This will have implications for antimicrobial therapy and management of affected individuals. Again, surveillance will assume an increasingly important role in the detection of these trends.

Although the annual number of isolates from invasive specimens was small, there was a marked seasonal variation, with increased numbers during the cooler seasons of late autumn, winter and early spring. Previous studies of invasive pneumococcal disease have also

noted this pattern[12,16,17]. Interestingly, in a previous study of respiratory tract infections at a Perth teaching hospital, no seasonal variation in the isolation of pneumococci was reported[18]. This may perhaps be explained by sputa providing the underlying carriage rate rather than the prevalence of invasive disease caused by *S. pneumoniae*.

We identified an increased risk of invasive disease in adults over 60 years of age and in Aborigines. It is possible that immunisation of these groups could reduce the rate of disease. Previous studies in America have reported underutilisation of pneumococcal vaccine in the elderly and suggest vaccination of these individuals when they attend for influenza vaccination[19]. It was also of interest to note a slight predominance of female cases and a small peak of cases in the 25 - 35 years age group. It is possible this is a reflection of maternal acquisition of *S. pneumoniae* either carried by or infecting children.

Our data outline the epidemiology of invasive pneumococcal infections in Perth, Western Australia. Additional clinical information about predisposing factors, diagnosis, concurrent health problems, treatment and outcome would allow further identification of at-risk groups. A prospective surveillance system has recently been introduced to monitor patterns of invasive disease and determine serotypes of infecting strains. This will provide invaluable information when deciding which groups should be targeted for vaccination and whether current pneumococcal vaccines will provide maximal population coverage.

Acknowledgments

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National Health and Medical Research Council recommendations on pneumococcal vaccination[1]

Pneumococcal vaccine should be given to the following:

- all individuals over the age of 65 years;
- Aboriginal and Torres Strait Islander people over 50 years of age;
- individuals with asplenia, either functional or anatomical, including sickle cell disease in persons more than two years of age; where possible, the vaccine should be given at least 14 days before splenectomy;
- immunocompromised patients at increased risk of pneumococcal disease (e.g. patients with HIV infection before the development of AIDS, nephrotic syndrome, multiple myeloma, lymphoma, Hodgkin's disease and organ transplantation);
- immunocompetent persons at increased risk of complication from pneumococcal disease because of chronic illness (e.g. chronic cardiac, renal or pulmonary disease, diabetes and alcoholism);
- patients with CSF leaks.

Pneumococcal vaccine is strongly recommended for Aboriginal and Torres Strait Islander adults. In some remote parts of Australia, concern about high pneumococcal attack rates in Aboriginal people has already led to the introduction of a program of pneumococcal vaccination.

The vaccine should be given as a single dose of 0.5 mL, either deep subcutaneously or intramuscularly (preferably into the deltoid muscle or lateral mid-thigh). Intravenous or intradermal injections may cause severe reactions and should be avoided.

Revaccination

Revaccination with pneumococcal vaccine is recommended for those at risk (see above). It should be noted that this recommendation is in conflict with approved product information for pneumococcal vaccine (Pneumovax 23) in Australia, which recommends against revaccination of adults with this vaccine. The product information recommendation in this case is considered to be out of date and out of step with contemporary practice.

Revaccination within three years of a previous dose is not recommended. Those at highest risk of fatal pneumococcal infection, including those with anatomical or functional asplenia, sickle cell disease, and the nephrotic syndrome of childhood, should be revaccinated every five years. Aboriginal and Torres Strait Islander adults over 50 years of age and other adults over 65 years of age should also be revaccinated every five years.

1. National Health and Medical Research Council. *The Australian Immunisation Handbook*. Sixth edition. Canberra: Australian Government Publishing Service, 1997.

New Australian immunisation guidelines

The Minister for Health and Family Services, Dr Michael Wooldridge launched the new version of the National Health and Medical Research Council (NHMRC) publication *The Australian Immunisation Handbook* (6th edition) on 28 February 1997. The purpose of the immunisation Handbook is to give practitioners clear guidance about immunisation and to provide an accessible summary of the relevant data on vaccine-preventable diseases in Australia. A major aim is to encourage practitioners to maintain the highest standard in the provision of age-appropriate immunisation services.

The sixth edition of the Handbook introduces a new Australian Standard Immunisation Schedule (see page 79) and a number of important changes to immunisation recommendations.

Changes to the standard vaccination schedule

Acellular pertussis vaccine

It is recommended that acellular pertussis vaccine (in the form of DTPa) be used for the fourth dose of pertussis at 18 months and the fifth dose at 4-5 years.

Hepatitis B vaccination

The NHMRC has recommended the introduction of universal hepatitis B vaccination for infants and pre-adolescents into the Standard Schedule. This universal program, combined with more vigorous implementation of previous recommendations for selective hepatitis B vaccination of high risk individuals, is designed to eliminate acute hepatitis B and to reduce the number of hepatitis B carriers in the community. For practical reasons, the recommendations for universal vaccination in infants will not be incorporated into the standard vaccination schedule until appropriate combination vaccines are licensed for use in infants. In the interim, parents who wish to have their infants vaccinated should be informed that the vaccine is effective and safe, and encouraged to proceed with vaccination. The program of universal pre-adolescent vaccination should be commenced in 1997.

Adult vaccination

Recommendations for adult vaccination are now included in the Standard Schedule. These include recommendations for routine influenza and pneumococcal vaccination for Aboriginal and Torres Strait Islander people over 50 years of age and other individuals over 65 years of age.

Milestones in the childhood vaccination schedule

The revised Schedule also highlights three major milestones for childhood vaccination.

- The six month milestone - which makes the completion of the primary infant schedules for diphtheria, tetanus, pertussis, Hib and oral polio vaccines.
- The 12 month milestone - which marks the completion of infant vaccination against measles, mumps and rubella.
- The 18 month milestone - which marks the completion of the important boosters for diphtheria, tetanus, pertussis and Hib.

New recommendations on vaccination procedures

The guidelines and tables of information for the general public have been extensively revised and extended. Notable additions and changes include:

- revised recommendations on obtaining valid consent, supported by a new table comparing the effects of disease and vaccines;
- extended guidelines on techniques for injection of vaccine;
- a table of guidelines on catch-up vaccination for infants and children;
- changes to the recommendations on absolute and relative contraindications for childhood vaccination;
- modified guidelines for management of adverse events following vaccination;
- a detailed table of recommended paracetamol doses to be given routinely prior to vaccination;
- guidelines for the management and further vaccination of individuals who have experienced a severe reaction to a previous vaccination;
- a new policy that allows use of open multidose oral polio vaccine vials in later sessions;
- the criterion for deferring vaccination in children with a febrile illness has been raised from 38^{o}C to 38.5^{o}C;
- modified guidelines for administration of BCG vaccine;
- clarification of guidelines for administration of poliomyelitis vaccines;
- a summary of national standards for childhood immunisation.

Handbook availability

The immunisation Handbook is being distributed by direct mail to immunisation providers. The distribution list includes general practitioners, nursing organisations, private and public sector health professionals, medical teaching institutions, health professionals working with groups with special needs and those in rural and remote areas, and Aboriginal and Torres Strait Islander communities. This list has been developed with the assistance of the Health Insurance Commission and the State and Territory health authorities. Health professionals who have not received a Handbook by this method by the end of April 1997 should ring 1800 671 811 to order a copy, or send a fax to the Publications Officer, Public Health Education Unit, fax no. (06) 289 6838.

The NHMRC Australian Standard Vaccination Schedule

(November 1996)

Age	Disease	Vaccine	Milestones
2 months	Diphtheria, tetanus, pertussis Poliomyelitis Hib	DTPw* OPV - Sabin vaccine Hib vaccine (HbOC or PRP-OMP)**	
4 months	Diphtheria, tetanus, pertussis Poliomyelitis Hib	DTPw* OPV - Sabin vaccine Hib vaccine (HbOC or PRP-OMP)**	
6 months	Diphtheria, tetanus, pertussis Poliomyelitis Hib (HbOC schedule only)	DTPw* OPV - Sabin vaccine Hib vaccine (HbOC)	first six months
12 months	Measles, mumps, rubella Hib (PRP-OMP schedule only)	MMR Hib vaccine (PRP-OMP)	second 12 months
18 months	Diphtheria, tetanus, pertussis Hib (HbOC schedule only)	DTPa or DTPw Hib vaccine (HbOC)	third 18 months
Prior to school entry: 4-5 years	Diphtheria, tetanus, pertussis Poliomyelitis	DTPa or DTPw OPV - Sabin vaccine	
10-16 years	Measles, mumps, rubella Hepatitis B (1st dose)	MMR HBV	
1 month later	Hepatitis B (2nd dose)	HBV	
6 months later	Hepatitis B (3rd dose)	HBV	
Prior to leaving school: 15-19 years	Diphtheria, tetanus Poliomyelitis	Td (ADT)*** OPV- Sabin vaccine	
Every 10 years	Diphtheria, tetanus	Td (ADT)***	
Post-partum for non-immune women	Rubella	Rubella vaccine or MMR	
Over 50 years (Aboriginal and Torres Strait Islander people)	Pneumococcal infections Influenza	Pneumococcal vaccine (every 5 years) Influenza vaccine (annual)	
Over 65 years	Pneumococcal infections Influenza	Pneumococcal vaccine (every 5 years) Influenza vaccine (annual)	

* DTP is the abbreviation for Diphtheria-Tetanus-Pertussis vaccine.

** Abbreviation for Hib vaccines - HbOC is 'HibTITER'; PRP-OMP is 'PedvaxHIB'. HbOC (HibTITER) is given at 2, 4, 6 and 18 months. PRP-OMP (PedvaxHIB) is given at 2, 4 and 12 months.

*** Td is combined Diphtheria-Tetanus vaccine. The DT formulation for children is often referred to by the trade name 'CDT'. The Td formulation for adults is often referred to by the trade name 'ADT'.

Hepatitis B schedule for adolescents - give the 1st dose at the same time as MMR (10-16 yrs), the 2nd dose about 1 month later, and the 3rd dose 6 months after the 1st dose.

All of the vaccines in the Standard Schedule, except OPV, are given by intramuscular injection. MMR can also be given by deep subcutaneous injection. OPV is given orally. OPV must never be injected.

Interim hepatitis B schedule for infants

The NHMRC has endorsed the use of hepatitis B vaccine (HBV) for all infants. HBV should be administered at birth, 1 month, and 6-12 months of age. Hepatitis B vaccine has not yet been included in the standard infant schedule because it is only available as an additional injection. Parents who express an interest in infant HBV should be encouraged to have their children vaccinated, as long as compliance with schedule vaccines is not jeopardised.

The NHMRC strongly recommends that HBV be offered to all infants born to HbsAg+ mothers and to all infants and young children from groups with a hepatitis B carrier rate of over 2%.

Salmonellosis

Salmonellae are widely dispersed in nature, being found in the gastrointestinal tracts of domesticated and wild animals, reptiles, birds and insects. Some *Salmonella* serotypes, such as *S.* Typhi and *S.* Paratyphi, are highly adapted to humans and have no other known natural hosts. Other organisms, such as *S.* Typhimurium, have a broad host range and can infect a wide variety of animal hosts and humans.

Sources of non-typhoidal *Salmonella* for human infection are largely contaminated food products, with person-to-person transmission not considered an important route of transmission. The incidence of non-typhoidal salmonellosis has steadily risen in the United States of America, United Kingdom and many other European countries since the early 1980s, with much of this increase attributed to *S.* Enteritidis infection. *S.* Enteritidis can be passed transovarially from chickens to eggs, with infection acquired by consuming raw or partially cooked eggs. However, the organism is not endemic in layer flocks in Australia, and widespread outbreaks caused by *S.* Enteritidis have not been seen here. Prior to the 1980s, *S.* Typhimurium was considered the main cause of food-borne infections throughout the developed world and remains the most commonly reported *Salmonella* serovar causing human infection in Australia.

Non-typhoidal salmonellosis is usually characterised by fever, chills and diarrhoea. Nausea, vomiting and abdominal cramping are frequently present. Bloody diarrhoea may occur but is uncommon. The illness is most often self-limited, with the resolution of fever within two days and the disappearance of diarrhoea within one week. The treatment of uncomplicated non-typhoidal salmonellosis consists of supportive care, including rehydration and electrolyte replacement. Antibiotics are rarely warranted except in infants under two months of age, the elderly and immunosuppressed patients.

Although infection with *Salmonella* is endemic in Australia, notifications usually peak in summer, possibly because warm weather allows *Salmonella* to multiply more easily. In 1996, the National Notifiable Diseases Surveillance System (NNDSS) recorded a gradual increase in notifications starting in September and peaking in January 1997 (Figure 1).

Historical data show that notification rates for non-typhoidal salmonellosis have increased gradually since the 1950s, and more markedly since the late 1980s (Figure 2). Rates vary throughout Australia, and in 1995, the Northern Territory had the highest rate for notifications (212/100,000 population), followed by Queensland (48/100,000), South Australia (44/100,000) and Western Australia (41/100,000). Reports received by the NNDSS from 1991 to 1996 show the highest number of notifications were for the 0 - 4 years age group (47% of notifications), followed by the 5 - 9 (8%) and 20 - 24 (7%) years age groups (Figure 3). The high number of notifications for the younger age groups may reflect a reporting bias due to children being more likely to receive medical care and testing.

Figure 1. Salmonellosis notifications by month of onset, 1995 to February 1997

Figure 2. Notification rate for Salmonellosis, 1952-1995

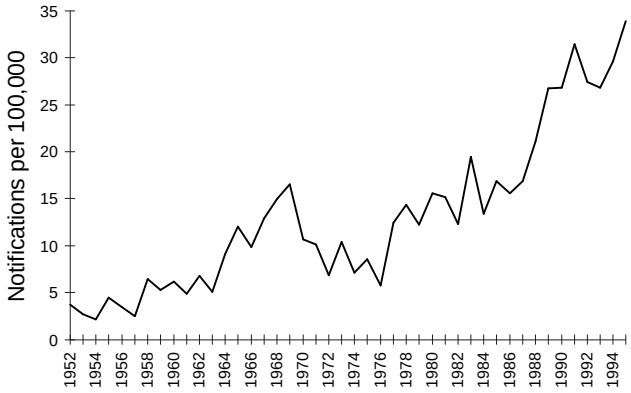
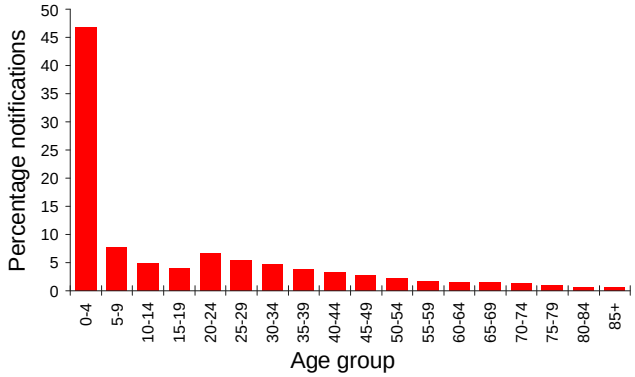


Figure 3. Percentage of Salmonellosis notifications by age group, 1991 to 1996



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 more than 40 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 legislations. De-identified core unit data are supplied fortnightly for collation, analysis and dissemination. For further information, see CDI 1997;21:5.

Reporting period 19 February to 4 March 1997

There were 3,029 notifications received for this two-week period (Tables 1, 2 and 3). The numbers of reports for selected diseases have been compared with average data for this period in the previous three years (Figure 4).

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 19 February to 4 March 1997

Disease[1,2]	ACT	NSW	NT	Qld	SA	Tas	Vic	WA	This period 1997	This period 1996	Year to date 1997	Year to date 1996
Diphtheria	0	0	0	0	0	0	0	0	0	0	0	0
Haemophilus influenzae type B	0	0	0	2	0	0	0	0	2	4	14	13
Measles	0	9	5	2	0	2	1	0	19	19	82	101
Mumps	0	0	1	NN	0	0	0	2	3	6	23	23
Pertussis	7	91	5	49	72	10	61	26	321	144	1574	681
Rubella	0	3	1	25	15	1	10	3	58	102	350	649
Tetanus	0	0	0	0	0	0	0	0	0	0	1	1

NN Not Notifiable.

1. No notifications of poliomyelitis have been reported since 1986.
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.

Table 2. Notifications of other diseases received by State and Territory health authorities in the period 19 February to 4 March 1997

Disease[1,2]	ACT	NSW	NT	Qld	SA	Tas	Vic	WA	This period 1997	This period 1996	Year to date 1997	Year to date 1996
Arbovirus Infection (NEC)[3,4]	0	3	3	0	0	0	8	2	16	11	62	27
Barmah Forest virus infection	0	9	0	27	0	0	3	-	39	58	129	146
Campylobacteriosis[5]	5	-	11	166	99	6	58	56	401	589	2144	2285
Chlamydial infection (NEC)[6]	5	NN	64	153	0	2	96	46	366	315	1408	1252
Dengue	0	0	3	5	0	0	0	1	9	7	93	14
Donovanosis	0	NN	1	0	NN	0	0	0	1	5	2	14
Gonococcal infection[7]	0	9	71	53	0	0	26	21	180	167	659	620
Hepatitis A	9	131	4	92	8	0	58	10	312	112	917	510
Hepatitis B incident	0	1	2	4	0	0	0	8	15	12	45	48
Hepatitis C incident	0	0	0	-	0	0	-	-	0	3	2	10
Hepatitis C unspecified	7	NN	15	127	NN	1	17	33	200	413	1291	1631
Hepatitis (NEC)	0	0	0	0	0	0	0	NN	0	1	5	6
Legionellosis	0	1	0	0	1	0	2	0	4	10	28	36
Leptospirosis	0	3	0	2	0	0	1	0	6	14	26	45
Listeriosis	0	0	0	1	0	0	1	0	2	2	17	10
Malaria	0	4	8	0	2	0	6	0	20	21	107	117
Meningococcal infection	0	1	1	1	1	0	2	0	6	10	51	47
Ornithosis	0	NN	0	0	1	0	1	0	2	6	16	17
Q Fever	0	4	0	14	0	0	0	0	18	28	115	84
Ross River virus infection	1	87	9	210	53	0	73	24	457	1050	1579	1917
Salmonellosis (NEC)	6	52	12	95	32	7	45	24	273	327	1381	1375
Shigellosis[5]	0	-	14	11	5	2	0	11	43	39	182	136
Syphilis	0	14	18	17	0	0	0	0	49	66	195	237
Tuberculosis	0	7	2	1	0	1	28	1	40	42	158	203
Typhoid[8]	0	0	0	0	0	0	0	0	0	2	14	29
Yersiniosis (NEC)[5]	0	-	0	8	1	0	0	0	9	18	70	64

1. For HIV and AIDS, see Tables 4 and 5. 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. NT, Vic and WA: 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.

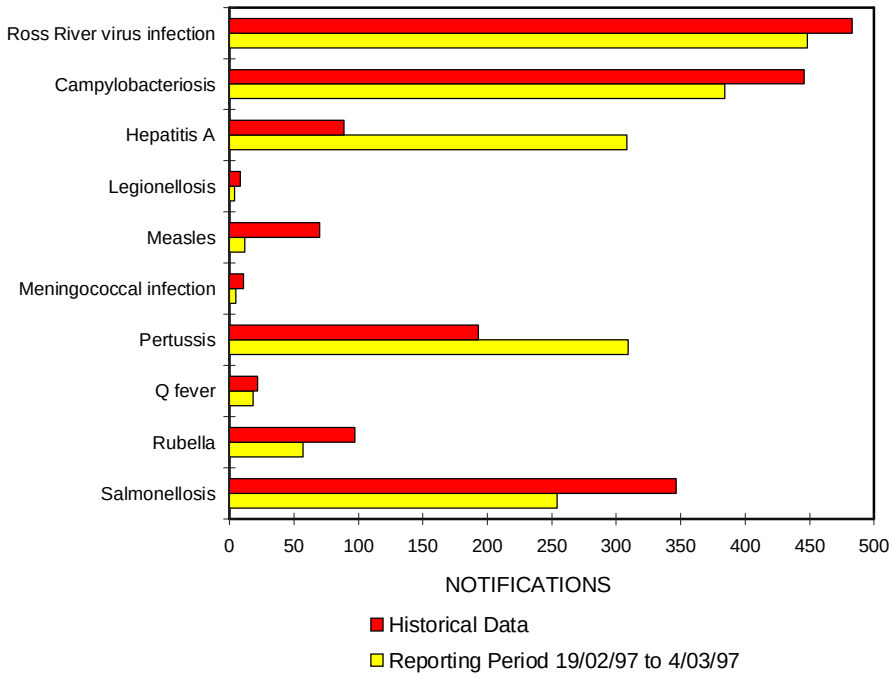
- Elsewhere Classified.

Table 3. Notifications of rare[1] diseases received by State and Territory health authorities in the period 19 February to 4 March 1997

Disease[2]	Total this period	Reporting States or Territories	Total notifications 1997
Brucellosis			10
Chancroid	1	WA	1
Cholera			1
Hydatid infection	1	WA	3
Leprosy			3

1. Fewer than 60 cases of each of these diseases were notified each year during the period 1988 to 1995.
2. No notifications were received during 1997 for the following rare diseases: botulism; lymphogranuloma venereum; plague; rabies; yellow fever; or other viral haemorrhagic fevers.

Figure 4. 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.

Figure 5 . Hepatitis A infection notifications, 1995 to February 1997, by month of onset

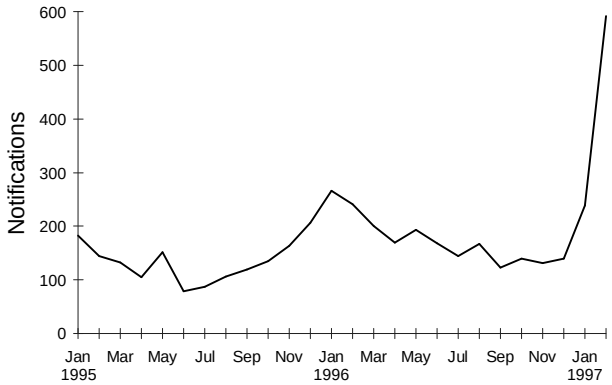
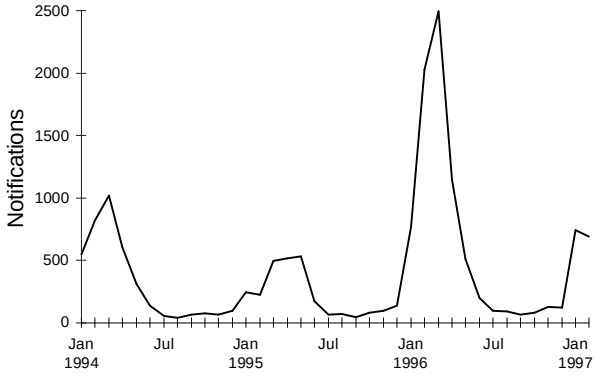


Figure 6. Ross River virus infection notifications, 1994 to February 1997, by month of onset



There was a large increase in notifications of hepatitis A infection received this period, with a total of 312 reports (Figure 5). The increase in reports with onset dates in January and February has been attributed to large outbreaks in several States associated with the consumption of oysters from Wallis Lake, New South Wales (see *CDI* 1997;21:46). One hundred and thirty-one reports were from New South Wales, 92 from Queensland and 58 from Victoria. Reports were evenly distributed throughout the 15 - 59 years age range. The male:female ratio was 1.4:1.

The number of Ross River virus infection notifications continues to be high, with 743 and 690 reports received with onset dates of January and February respectively (Figure 6). The majority of notifications were reported from Queensland (210), New South Wales (87) and Victoria (73). Forty-six per cent of reports were for the 25 - 44 years age range.

HIV and AIDS Surveillance

National surveillance for HIV disease is coordinated by the National Centre in HIV Epidemiology and Clinical Research (NCHECR), in collaboration with State and Territory health authorities and the Commonwealth of Australia. Cases of HIV infection are notified to the National HIV Database on the first occasion of diagnosis in Australia, by either the diagnosing laboratory (ACT, New South Wales, Tasmania, Victoria) or by a combination of laboratory and doctor sources (Northern Territory, Queensland, South Australia, Western Australia). Cases of AIDS are notified through the State and Territory health authorities to the National AIDS Registry. Diagnoses of both HIV infection and AIDS are notified with the person's date of birth and name code, to minimise duplicate notifications while maintaining confidentiality.

Tabulations of diagnoses of HIV infection and AIDS are based on data available three months after the end of the reporting interval indicated, to allow for reporting delay and to incorporate newly available information. More detailed information on diagnoses of HIV infection and AIDS is published in the quarterly Australian HIV Surveillance Report, available from the National Centre in HIV Epidemiology and Clinical Research, 376 Victoria Street, Darlinghurst NSW 2010. Telephone: (02) 332 4648 Facsimile: (02) 332 1837.

HIV and AIDS diagnoses and deaths following AIDS reported for October 1996, as reported to 31 January 1997, are included in this issue of *CDI* (Tables 4 and 5).

Table 4. New diagnoses of HIV infection, new diagnoses of AIDS and deaths following AIDS occurring in the period 1 to 31 October 1996, by sex and State or Territory of diagnosis

										Totals for Australia			
		ACT	NSW	NT	Qld	SA	Tas	Vic	WA	This period 1996	This period 1995	Year to date 1996	Year to date 1995
HIV diagnoses	Female	0	2	0	0	0	0	0	1	3	1	58	64
	Male	0	29	1	11	5	0	18	4	68	70	661	658
	Sex not reported	0	1	0	0	0	0	0	0	1	0	5	8
	Total[1]	0	32	1	11	5	0	18	5	72	71	725	732
AIDS diagnoses	Female	0	1	0	0	0	0	0	0	1	2	18	27
	Male	0	7	0	1	1	0	0	2	11	59	344	602
	Total[1]	0	8	0	1	1	0	0	2	12	61	362	630
AIDS deaths	Female	0	0	0	0	0	0	0	0	0	6	14	35
	Male	0	6	1	0	0	0	1	2	10	45	318	494
	Total[1]	0	6	1	0	0	0	1	2	10	51	332	530

1. Persons whose sex was reported as transsexual are included in the totals.

Table 5. Cumulative diagnoses of HIV infection, AIDS and deaths following AIDS since the introduction of HIV antibody testing to 31 October, by sex and State or Territory

		ACT	NSW	NT	Qld	SA	Tas	Vic	WA	Australia
HIV diagnoses	Female	15	531	3	102	45	4	169	78	947
	Male	174	10237	85	1679	592	76	3466	794	17103
	Sex not reported	0	2049	0	0	0	0	42	0	2091
	Total[1]	189	12831	88	1786	637	80	3686	875	20172
AIDS diagnoses	Female	7	143	0	30	18	2	48	18	266
	Male	76	4001	26	670	285	32	1373	303	6766
	Total[1]	83	4154	26	702	303	34	1428	323	7053
AIDS deaths	Female	2	106	0	24	13	2	37	11	195
	Male	50	2849	22	470	197	21	1087	224	4920
	Total[1]	52	2961	22	496	210	23	1130	236	5130

1. Persons whose sex was reported as transsexual are included in the totals.

Serious Adverse Events Following Vaccination Surveillance Scheme

The Serious Adverse Events Following Vaccination Surveillance Scheme is a national surveillance scheme which monitors the serious adverse events that occur rarely following vaccination. More details of the scheme were published in CDI 1995:19; 273-274.

Acceptance of a report does not imply a causal relationship between administration of the vaccine and the medical outcome, or that the report has been verified as to the accuracy of its contents.

It is estimated that 250,000 doses of vaccines are administered every month to Australian children under the age of six years.

Results for the reporting period 24 November 1996 to 4 March 1997

There were 65 reports of serious adverse events following vaccination for this reporting period. Onset dates ranged from 1989 to 1997, with the majority (66%) in 1996. Reports were received from the Australian Capital Territory (7), the Northern Territory (6), Queensland (5), South Australia (41) and Victoria (6).

The 65 reports included cases of persistent screaming, hypotonic/hyporesponsive episodes, temperature of 40.5^{o}C or more, convulsions, anaphylaxis and 17 'other' events (Table 6). The 'other' events included acute urticarial rash (9), severe local reactions (4), collapse (1), persistent drowsiness following HepB/BCG (1), Bell's palsy following ADT/OPV (1) and leg pain and oedema following rabies immunoglobulin (1).

Fourteen cases were hospitalised. All cases recovered.

LabVISE

The Virology and Serology Laboratory 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 1997;21:8-9.

There were 1,684 reports received in the *CDI* Virology and Serology Reporting Scheme this period (Tables 7 and 8).

Rubella was reported for 46 patients this fortnight, all diagnosed by IgM detection. Included were 9 females in the 15 - 44 years age group. The number of reports received with specimen collection dates in January remained high.

A total of 34 reports of influenza B with specimen collection dates in 1997 have been received. Forty-four per cent of reports were for children under the age of 5 years. Epidemics of this virus have been recorded by this scheme in alternate years. The last epidemic year for influenza B was 1995 (Figure 7). Only 8 reports of influenza A have been received with specimen collection dates in 1997.

One hundred and eighty-two reports of pertussis were received this fortnight. The male:female ratio was 1:1.2 and 36% of reports were for the 5 - 14 years age group. The number of reports received remained high through January (Figure 8).

Ross River virus infection was reported for 229 patients in the LabVISE scheme this period. The male:female ratio was 1.3:1 and 84% of patients were in the 25 - 64 years age group. Diagnosis was by IgM detection (212) and four-fold rise in titre (17). There has been a rise in the number of reports received for January and February (Figure 9).

Table 6. Adverse events following vaccination for the period 24 November 1996 to 4 March 1997

	Vaccines								
Event	DTP	DTP/Hib	DTP/OPV/Hib	DTP/OPV	DTP/Hib/Hep B	MMR	Other[1]	Reporting States or Territories	Total reports for this period
Persistent screaming	9		13					ACT, NT, Qld, SA, Vic	22
Hypotonic/hyporesponsive episode	7		9					ACT, NT, Qld, SA, Vic	16
Temperature of 40.5°C or more	2		2					ACT, SA	4
Convulsions	1	1			2			SA, Vic	4
Anaphylaxis	2							NT, SA	2
Other	3	4	3	1		1	5	ACT, NT, Qld, SA, Vic	17
TOTAL	24	5	27	1	2	1	5		65

1. Includes Hepatitis B vaccine, ADT, BCG, pneumococcal vaccine and rabies immunoglobulin

Figure 7. Influenza B laboratory reports, 1995 to 1997, by month of specimen collection

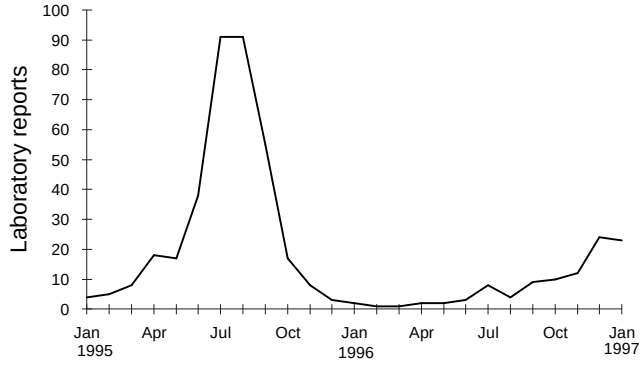
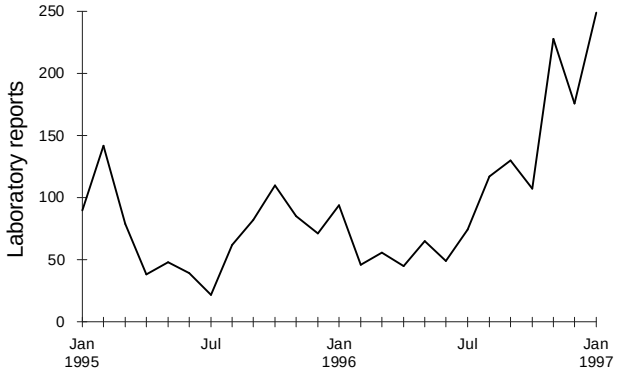


Figure 8. Pertussis laboratory reports 1995 to 1997, by month of specimen collection



The LabVISE scheme received 132 reports of hepatitis A this fortnight. The male:female ratio was 1.4:1 and 49% of patients were in the 25 - 44 years age group. The number of reports rose markedly in February, reflecting the outbreak associated with oysters (Figure 10).

Figure 9. Ross River virus laboratory reports, 1994 to 1997, by month of specimen collection

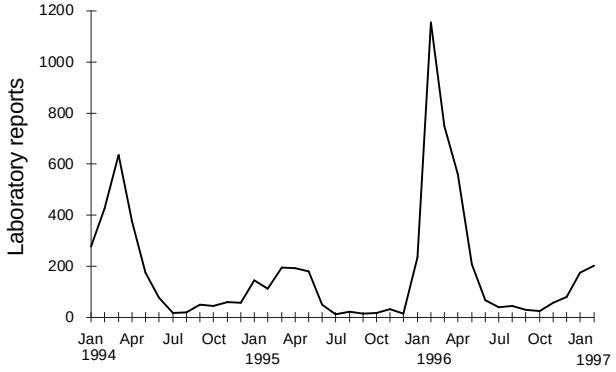


Figure 10. Hepatitis A laboratory reports, 1995 to 1997, by month of specimen collection

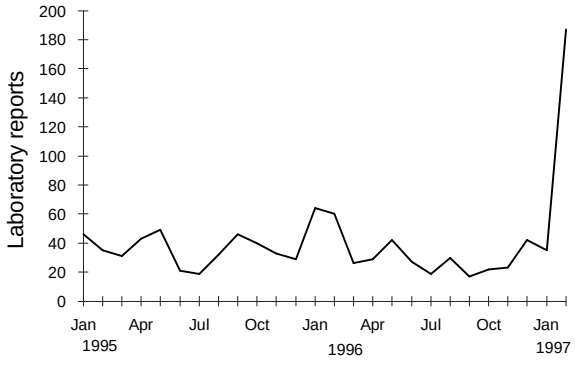


Table 7. Virology and serology laboratory reports by State or Territory[1] for the reporting period 13 February to 26 February 1997, historical data[2], and total reports for the year

	State or Territory[1]								Total this fortnight	Historical data[2]	Total reported in *CDI* in 1997
	ACT	NSW	NT	Qld	SA	Tas	Vic	WA			
Measles, Mumps, Rubella											
Measles virus							1	4	5	12.5	17
Mumps virus								3	3	2.5	10
Rubella virus		1		43				2	46	31.0	309
Hepatitis Viruses											
Hepatitis A virus	2	6	8	95			6	15	132	27.0	290
Hepatitis D virus				1					1	0.2	7
Hepatitis E virus				1					1	0.0	2
Arboviruses											
Ross River virus		8	22	58	2		15	124	229	279.0	510
Barmah Forest virus			4	8				8	20	19.0	72
Dengue not typed			3					10	13	1.0	28
Flavivirus (unspecified)				1					1	1.8	8
Adenoviruses											
Adenovirus type 2							1		1	0.8	13
Adenovirus type 4							1		1	0.0	2
Adenovirus type 37							1		1	0.0	1
Adenovirus not typed/pending				3			2	11	16	39.7	252
Herpes Viruses											
Herpes virus type 6								1	1	0.0	1
Cytomegalovirus	2	3	1	46		1	3	17	73	64.0	322
Varicella-zoster virus	4	6	1	48			8	28	95	56.5	429
Epstein-Barr virus		11	5	121			8	53	198	99.7	858
Other Dna Viruses											
Parvovirus		1					13	1	15	5.7	117
Picorna Virus Family											
Coxsackievirus B5		1							1	0.0	4
Echovirus type 7						1			1	0.2	15
Poliovirus type 2 (uncharacterised)		1				1			2	0.2	5
Rhinovirus (all types)		4		3			2	12	21	16.3	167
Enterovirus not typed/pending				11				31	42	31.5	183
Ortho/Paramyxoviruses											
Influenza A virus	1		1					1	3	6.8	118
Influenza B virus		1	1	3			1	13	19	1.8	76
Parainfluenza virus type 1					1			10	11	2.3	29
Parainfluenza virus type 2							1		1	2.2	11
Parainfluenza virus type 3	1			1			6	14	22	16.5	303
Respiratory syncytial virus	30	8		3			5	2	48	22.5	192
Other RNA Viruses											
HTLV-1			1					3	4	0.2	6
Rotavirus						1	1	4	6	17.0	237
Norwalk agent							2		2	0.0	38

Table 7. Virology and serology laboratory reports by State or Territory[1] for the reporting period 13 February to 26 February 1997, historical data[2], and total reports for the year, continued

	State or Territory [1]								Total this fortnight	Historical data [2]	Total reported in *CDI* in 1997
	ACT	NSW	NT	Qld	SA	Tas	Vic	WA			
Other											
Chlamydia trachomatis not typed	45	9	21	142		1	19	109	346	125.7	1,292
Chlamydia psittaci	1							2	3	4.5	29
Chlamydia species				2					2	7.3	10
Mycoplasma pneumoniae	10	12	2	43			11	25	103	20.0	516
Coxiella burnetii (Q fever)		1		4					5	6.2	73
Rickettsia australis						1	1		2	0.2	8
Rickettsia tsutsugamushi				1					1	0.2	2
Rickettsia spp - other			1					1	2	0.2	3
Bordetella pertussis		3	1	38		1	94	45	182	29.5	687
Legionella longbeachae								2	2	0.8	10
Cryptococcus species								1	1	0.8	4
TOTAL	96	76	72	676	3	7	202	552	1,684	953.2	7,266

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 8. Virology and serology laboratory reports by contributing laboratories for the reporting period 13 February to 26 February 1997

State or Territory	Laboratory	Reports
Australian Capital Territory	Woden Valley Hospital, Canberra	101
New South Wales	Institute of Clinical Pathology & Medical Research, Westmead	22
	Royal Alexandra Hospital for Children, Camperdown	13
Queensland	Queensland Medical Laboratory, West End	730
	State Health Laboratory, Brisbane	20
South Australia	Institute of Medical and Veterinary Science, Adelaide	1
Tasmania	Northern Tasmanian Pathology Service, Launceston	5
	Royal Hobart Hospital, Hobart	1
Victoria	Microbiological Diagnostic Unit, University of Melbourne	18
	Monash Medical Centre, Melbourne	23
	Royal Children's Hospital, Melbourne	104
	Victorian Infectious Diseases Reference Laboratory, Fairfield	62
Western Australia	PathCentre Virology, Perth	523
	Royal Perth Hospital	10
	Western Diagnostic Pathology	51
TOTAL		1684

Overseas briefs

Source: World Health Organization (WHO)

Ebola haemorrhagic fever, Gabon outbreak over

No further cases of Ebola haemorrhagic fever were detected in Gabon during the 42 days of intensive surveillance and monitoring of contacts since the last patient died on 18 January 1997. As this represents more than twice the maximum incubation period of the disease, the Gabonese health authorities have now declared the outbreak over. A total of 60 cases and 45 deaths (case fatality rate 75%) were recorded between 13 July 1996 when the first fatal case occurred and 18 January 1997.

Meningitis

Ghana. From November 1996 to 22 February 1997, 1,659 cases of cerebrospinal meningitis with 281 deaths (case fatality rate 17%) were reported in Ghana, most of which (70%) occurred in February 1997. The outbreak started in East Mamprusi district and Bawku East and then spread to four other districts in the Upper West Region. The population at greatest risk is estimated at around 1.7 million but the entire population at risk in the Upper East and Northern Regions is close to 3 million. Reports indicate that the number of cases is increasing rapidly in other districts of the Upper East, Northern, Upper West and Brong Ahafo Regions. The total population exposed in these Regions is near 5.5 million. The Ministry of Health has mobilised funds to purchase at least 3,395,000 doses of vaccine with needles and syringes.

Outbreaks have also been reported in **Burkina Faso, Mali, Niger** and **Togo**, continuing the epidemic cycle which started in West Africa in 1996. The presence of serogroup A *Neisseria meningitidis* has been confirmed.

Yellow fever, Bolivia

During 1996, outbreaks of yellow fever caused 30 cases and 21 deaths in Bolivia. Cases occurred in endemic zones of three provinces of Cochabamba Department and one province of La Paz Department. All the cases occurred in rural areas. At the end of the year a further outbreak occurred and continued into January and February 1997, in Cochabamba Department (12 cases, 10 deaths), Beni Department (4 cases, 2 deaths) and Santa Cruz Department (1 case under study). Support for a vaccination campaign was requested and donations of vaccine totaling 180,000 doses were received from Brazil, Colombia and Venezuela.

O'nyong-nyong fever, Uganda

In June 1996, health officials in Rakai district in south western Uganda noticed an increased number of cases of an acute febrile illness with crippling arthritis, skin rash, and lymphadenopathies. The disease spread into the neighboring Mbarara and Masaka districts of Uganda. No fatal cases were reported. Testing at the Centers for Disease Control and Prevention (CDC) confirmed O'nyong-nyong virus. A joint team from CDC, the Uganda Virus Research Institute, the Ugandan Ministry of Health, the Kenya Medical Research Institute, Makarere University, and WHO conducted an epidemiological survey from January to February 1997 and confirmed continuing transmission of O'nyong-nyong fever in south western Uganda. An epidemic of O'nyong-nyong fever was last reported in Uganda during 1959 to 1962. The epidemic started in the northern part of the country and spread south and east into Kenya, Tanzania, and Zambia affecting an estimated 2 million people.

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