INFECTIOUS DISEASES, NSW: JUNE 1998

TRENDS

The onset of winter heralds the arrival of the annual **influenza** season, and recent reports suggest that the A/Sydney virus may be re-emerging in NSW (cases were first identified in Sydney last season). In late autumn we received a report of a cluster of cases of **legionnaire's disease** that prompted further investigation. Winter is also a reminder that the season when **meningococcal** diseases is more common is about to begin (see Figure 3 and below).

Recent media reports have focused on the outbreak of **Ross River virus** in NSW in 1997, when 1619 cases were reported across the State. There are fewer cases this year, with 179 cases reported to the end of May 1998 in NSW. In the same period last year, 1336 cases were reported. Most cases in NSW are acquired in rural areas, but 1997 was unusual in that a small proportion of cases reportedly occurred in the bushland areas on the outskirts of Sydney. In late 1997, the State's mosquito monitoring program was extended into areas of Sydney. However, rural areas of the State continue to carry the most risk for infection.

LEGIONELLOSIS

On Friday 22 May, Northern Sydney Public Health Unit (PHU) received four reports of legionellosis, three relating to residents of northern Sydney. In response, The Unit contacted northern Sydney intensive care units, hospitals and laboratories and other PHUs seeking reports of further cases, and interviewed cases about possible exposures during the 10 days before the onset of their symptoms.

The disease

The clinical syndromes caused by bacteria of the family *Legionellaceae* are collectively called 'legionellosis'. Legionnaires' disease is the pneumonia caused by *Legionella* species.[1] Legionnaires' disease encompasses a broad spectrum of illness, from cough and slight fever to severe illness with stupor, widespread pulmonary infiltrates and multi-organ failure. Ten to fifteen per cent of hospitalised patients die. Being immunocompromised or receiving early appropriate antimicrobial therapy are major determinants of the outcome.[2] The antimicrobial treatment of legionnaires' disease has not been subject to placebo-controlled trial, although erythromycin and tetracycline appear to be effective therapies. Historically, erythromycin has been the drug of choice. However, laboratory data and case reports indicate a role for the newer macrolides (azithromycin, clarithromycin, roxithromycin) and quinolones (for example, ciprofloxacin, pefloxacin).[3]

Legionnaires' disease came to prominence in 1976 following an outbreak of pneumonia among delegates to a convention of the American Legion at a venue known only as 'hotel A' .[4] In NSW, most infections are caused by *L. pneumophila* and *L. longbeachae*. Outbreaks of *L. pneumophila* are often linked to inhalation of water in aerosol form from contaminated cooling towers or other water systems in large buildings. For *L. longbeachae*, exposure to potting mixes is thought to be a prominent risk factor.[6]

Currently, hospitals are required to notify PHUs of patients with a clinical history consistent with legionnaires' disease (see above), and laboratories are required to notify persons with evidence of recent infection with *Legionella* species (isolation of *Legionella* sp. in or detection of antigen from sputum, respiratory secretions, pleural fluid, lung tissue, blood or other normally sterile sites, or detection of a fourfold rise in immunofluorescent antibody titre to ≥1:128 against *L. pneumophila, L. longbeachae, L. micdadei, L. bozemanii*, **or** a stable titre ≥1:256 or ≥1:512 in convalescent serum).

In NSW, 415 cases of legionellosis were reported from 1992 to 1997 (105 in 1992, 69 in 1993, 60 in 1994, 76 in 1995, 74 in 1996, and 31 in 1997, an average of 69 cases per year). Of these, 229 (55 per cent) were reported to be due to *L. pneumophila* (average 38 cases per year) and 89 (21 per cent) to *L. longbeachae* (average 15 cases per year). Before 1 April, five cases of legionellosis had been reported in 1998.

Recent case investigations

Between 1 April and 1 July 1998, seven cases (four male and three female, age range 42–76 years) of *L. pneumophila* and six cases (four male and two female, age range 14–75 years) of other *Legionella* species were reported. Good laboratory evidence of disease (culture or seroconversion) was obtained for three cases of *L. pneumophila* and three cases of *L. longbeachae*. Investigation revealed no likely common source of exposure among cases.

Prevention of legionellosis

L. pneumophila colonises and survives well in water systems. NSW has strict guidelines for cooling tower operators to follow to minimise cooling tower contamination through regular disinfection.

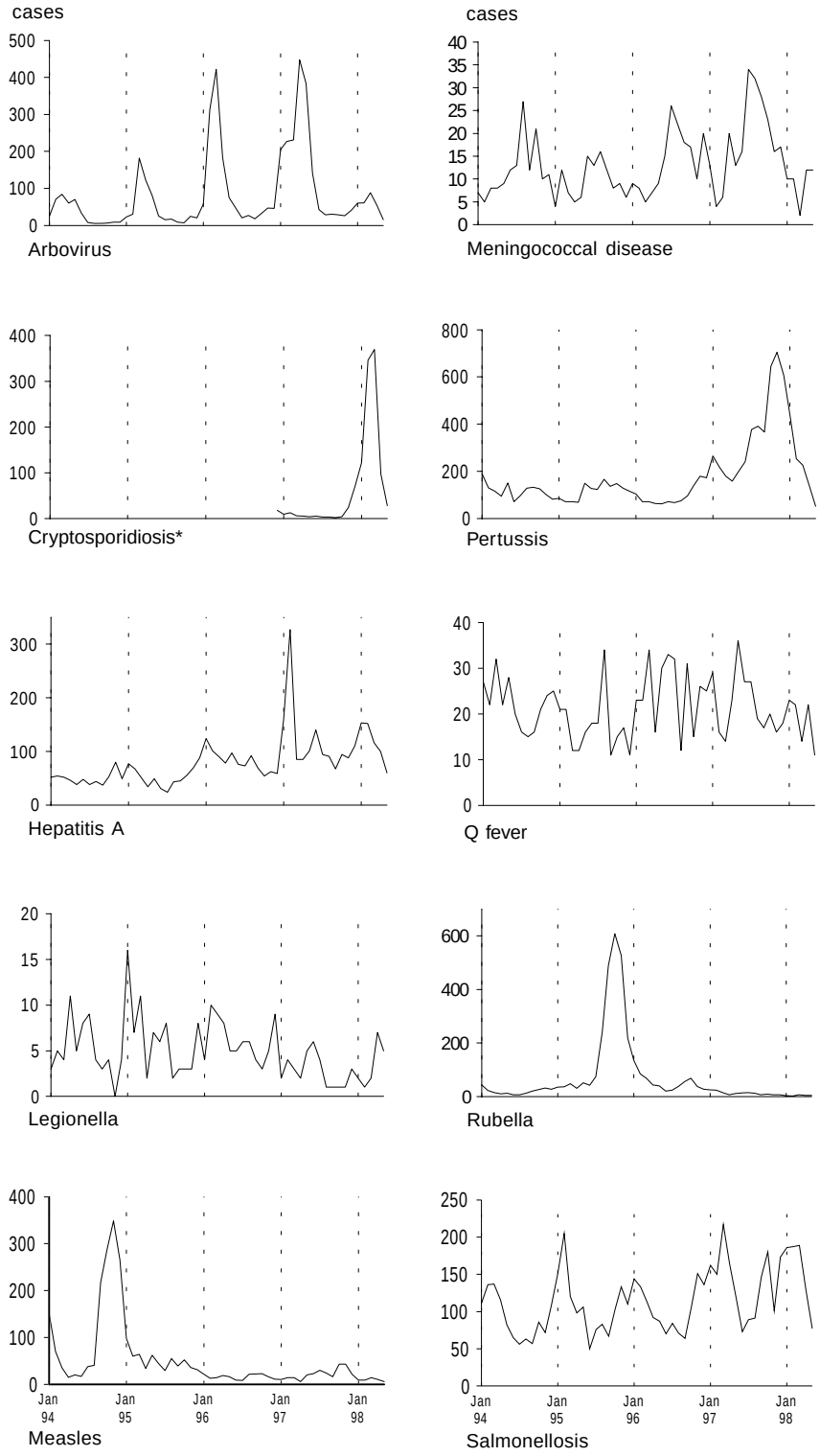
L. longbeachae is common in the soil and has been isolated from potting mix.[7] Persons wishing to reduce their risk of infection (especially the elderly and immuno-compromised) are advised to:

- avoid breathing in potting mix dust when opening bags or working with potting mix
- moisten potting mix before use to minimise dust
- wear dust masks while handling potting mix
- avoid the use of high pressure water streams on areas where potting mix has been used (drip watering systems are considered less likely to create an aerosol)
- wash their hands thoroughly after gardening.

FIGURE 3

REPORTS OF SELECTED INFECTIOUS DISEASES, NSW, JANUARY 1994 TO MAY 1998, BY MONTH OF ONSET

These are preliminary data: case counts in recent months may increase because of reporting delays



* not reportable before December 1996

Major manufacturers of potting mix voluntarily include warning labels on their bags.

Doctors are encouraged to report cases of legionellosis to their local PHU upon provisional diagnosis to expedite the investigation of risk factors. For more information, contact your local PHU.

MENINGOCOCCAL DISEASE SEASON APPROACHING?

Meningococcal disease is an uncommon illness caused by infection with *Neisseria meningitides* bacteria. In 1997 there was increased public concern about this disease, prompted in part by the death of a young woman rower in Western Australia. Since cases tend to peak in late winter and early spring, the NSW Health Department released a reminder to the public through the media about the disease and the importance of early diagnosis and treatment.

The disease

Symptoms of meningococcal disease may include sudden onset of fever, headache, stiff neck, nausea, weakness, drowsiness and rash. The disease is spread directly from person to person by droplets or discharges from the nose or throat of a person carrying the bacteria. The bacteria can be carried by some people (perhaps 20 per cent) in the throat without causing illness. The illness is treated effectively with antibiotics in hospital. Death occurs in 7 to 10 per cent of cases. Complications include neurological sequelae and, rarely, gangrene (and amputation) of the limbs, fingers or toes. The number of cases of meningococcal disease generally increases each year in late winter and spring. Young children and young adults are at highest risk, although persons of any age can be infected. Close contacts of cases are also at increased risk of disease.

Public health action

Hospitals and laboratories are required to report all cases to their local PHUs for investigation and follow-up. Follow-up includes interviewing cases about close contacts (household members and others, such as close friends, who may have shared saliva or nasopharyngeal secretions), administering prophylactic antibiotics (usually rifampicin) to close contacts to eradicate pharyngeal carriage of the meningococcus and, because this does not always prevent further transmission, advising close contacts about the disease and the need for early treatment. Vaccination is useful only in special circumstances: for example, for persons travelling to endemic countries, persons without a functioning spleen or with inherited defects of properdin or complement and persons living in a defined community in which cases of disease due to a preventable strain (serogroups A, C, W135 or Y) are continuing at a high rate despite chemoprophylaxis for close contacts.

Recent activity in NSW

To mid-June 1998, 56 cases of meningococcal disease had been reported in NSW for the year. In 1997, 222 cases were reported, compared with 165 in 1996, 113 in 1995, 143 in 1994, 153 in 1993, 124 in 1992 and 136 in 1991. While the increase in cases in 1997 is consistent with expected year-to-year variations in the incidence of this disease (Figure 3), some data suggest that the epidemiology of meningococcal disease in NSW appears to be changing (Figure 4). The number of cases reported in the school-aged (5–14 years) population has increased recently, as have (to a lesser degree) cases in the age groups 0–4 and 15–24 years.

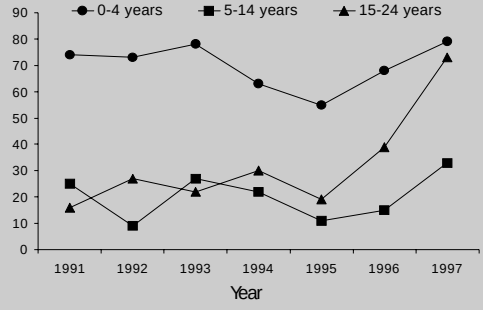
The NSW Neisseria Reference Laboratories at the South Eastern Area Laboratory Service, Prince of Wales Hospital, and at the South Western Area Pathology Service, Liverpool Hospital, are part of the Australian Meningococcal Surveillance Programme (AMSP). They receive isolates of invasive *Neisseria meningitides* disease for capsular serogrouping and outer-membrane protein monoclonal antibody serotyping and serosubtyping. In 1997, laboratories of the Programme received 151 isolates from NSW (representing 68 per cent of the 222 reported cases).[8] Serotyping and serosubtyping showed that serogroup B strains predominated in the age group 0–4 years (32 of the 51 isolates tested) and in the age group 5–14 years (12 of 21 isolates tested), while serogroup C strains predominated in the age group 15–24 years (30 of 50 isolates tested). The most frequently encountered phenotype was serogroup C:2a:P1.5, which caused 25 per cent of cases from which an isolate was tested.

With the meningococcal disease season approaching, clinicians are encouraged to:

- heighten suspicion of cases
- notify suspected cases to the PHU by telephone
- treat suspected cases immediately (even before transfer to hospital)
- if possible, take specimens for culture from suspected cases.

FIGURE 4

MENINGOCOCCAL DISEASE, NSW, 1991 TO 1997, BY SELECTED AGE GROUPS



INFLUENZA ACTIVITY

New South Wales

The number of cases of influenza during the last reporting period (week ending 20 June) was still low but increasing. Reports of influenza-like illness from the NSW Sentinel General Practice Surveillance Scheme appeared to be increasing at a rate similar to that in recent years (Figure 5). The six major public laboratories in NSW that test for influenza reported 10 diagnoses of influenza A and none of influenza B. In the corresponding week last year there were five reports of influenza A and three of influenza B (Figure 6).

FIGURE 5

INFLUENZA-LIKE ILLNESS, BY WEEK OF CONSULTATION FROM APRIL TO JUNE 1998, WITH HISTORICAL COMPARISONS, FROM NSW GENERAL PRACTICE SENTINEL SURVEILLANCE

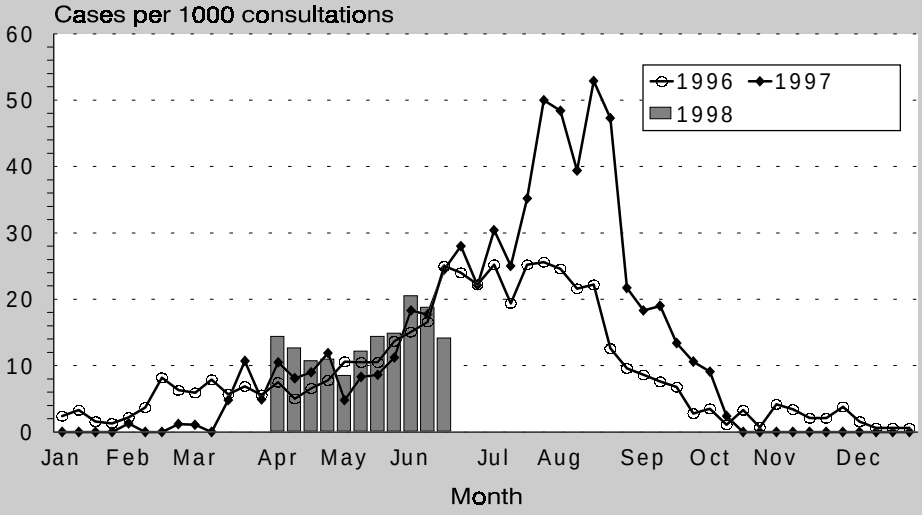
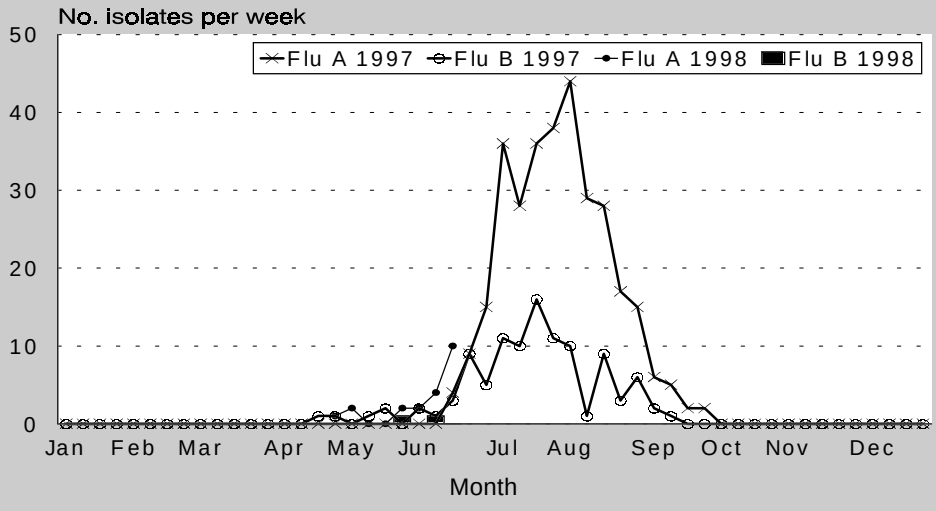


FIGURE 6

INFLUENZA VIRUS ISOLATIONS, NSW, 1997 AND APRIL TO JUNE 1998

Note: Four laboratories reported in 1997, six in 1998.



Australia

The National Centre for Disease Control has reported that up to the week ending 27 May, influenza activity remained low, with general practitioners reporting fewer than nine cases per 1000 consultations. The World Health Organization collaborating centre in Melbourne has reported 36 isolates of influenza A to late May (they were all A/Sydney/5/97-like strain, which is covered by the current vaccine) and six of influenza B. Analysis of the B strains is pending.

International

The World Health Organization reported that influenza activity in all Northern Hemisphere countries had returned to preseason levels by the end of April. The predominant strain isolated during the northern winter was A/H3N2. In the Southern Hemisphere, South Africa reported widespread outbreaks, predominantly of H3N2, in the period 10 May to 11 June, earlier in the season than in previous years. Brazil has reported regional outbreaks. In New Zealand, levels of influenza-like illness have begun to increase but no virological diagnoses have yet been made.

MEETINGS

The **Infectious Diseases Advisory Committee** (IDAC) advises the Department on infectious disease matters related to the *Public Health Act 1991* and Regulations. Highlights from its meeting on 20 April 1998 include:

- Giardiasis should become notifiable by laboratories, once a system for electronic notification is established.
- Donovanosis, chancroid and lymphogranuloma venereum should become notifiable by laboratories as soon as possible.
- The NSW Health Department should write to laboratories requesting that isolates from cases of conjunctival meningococcal be notified.

The **Tuberculosis Advisory Committee** (TBAC) meets quarterly to advise the Chief Health Officer on the priorities in relation to tuberculosis control, to set goals, targets and implementation indicators in relation to tuberculosis and to develop strategies to meet these goals and targets.

The Committee is in the process of reviewing State tuberculosis policies and developing guidelines for the management of multi-drug-resistant tuberculosis, and has recommended that a panel be formed to review all cases of multi-drug-resistant tuberculosis identified in NSW.

An index of NSW physicians who currently manage patients with tuberculosis is being compiled with the aim of unifying and supporting such physicians by improving communication, providing rapid access to peer advice and circulating up-to-date information on tuberculosis.

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continued from p. 89

INFLUENZA IN 1919

particularly that it caused the highest death rates among young adults, contrast starkly with those of the strains of more recent years. Figures 10 and 11 (p. 89) show the hospitalisation and death rates for the influenza season of 1995, illustrating how young adults tend to have the lowest complication rates during non-pandemic years.

The 1919 pandemic serves as an unpleasant reminder of just how serious influenza can be. More recent developments, of surveillance systems and of effective vaccines, will, we hope, put NSW in a better position to cope should another pandemic arise.

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TABLE 5

INFECTIOUS DISEASE NOTIFICATIONS RECEIVED IN MAY 1998, BY AREA HEALTH SERVICES

Condition	Area Health Service (1998)																	Total for May* to date**	
	CSA	NSA	WSA	WEN	SWS	CCA	HUN	ILL	SES	NRA	MNC	NEA	MAC	MWA	FWA	GMA	SA		
Blood-borne and sexually transmitted																			
AIDS	–	–	–	–	–	1	–	–	4	1	–	–	–	–	–	–	–	6	46
HIV infection*	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	114
Hepatitis B: acute viral*	–	–	–	1	–	–	–	–	1	1	–	–	–	–	–	–	–	3	24
Hepatitis B: other*	59	17	21	9	22	4	3	5	39	1	–	2	–	1	2	5	–	190	1512
Hepatitis C: acute viral*	–	–	–	1	–	–	–	–	–	1	–	–	–	–	–	–	–	2	19
Hepatitis C: other*	66	27	80	41	57	47	40	17	112	29	4	18	7	19	–	16	13	593	3890
Hepatitis D: unspecified*	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	1	1
Hepatitis: acute viral (not otherwise specified)	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	2
Gonorrhoea*	11	2	1	–	–	–	1	1	33	–	2	1	–	1	1	1	–	55	383
Syphilis	7	3	5	–	1	–	3	–	4	2	–	5	–	1	1	–	–	32	226
Vector-borne																			
Arboviral infection*	–	–	1	1	–	–	4	1	1	3	4	2	–	–	–	2	–	19	284
Malaria*	1	2	–	–	–	2	2	–	3	1	–	–	–	–	–	–	1	12	71
Zoonoses																			
Brucellosis*	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Leptospirosis*	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–	–	1	11
Q fever*	–	–	–	–	–	–	1	–	–	–	–	2	7	1	–	–	1	12	96
Respiratory and other																			
Blood lead level	10	1	5	–	–	1	13	–	–	2	2	–	1	1	–	–	–	36	356
Legionnaires' disease	1	2	–	–	1	–	1	–	–	–	–	–	–	–	–	–	–	5	17
Leprosy	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–	–	–	1	1
Meningococcal (invasive) infection	–	1	2	2	1	1	–	–	2	2	–	–	–	1	–	1	–	13	48
Mycobacterial tuberculosis	–	1	–	–	3	1	–	1	3	–	1	–	–	–	–	–	–	10	116
Mycobacteria other than TB	5	2	–	–	–	–	1	–	1	–	–	–	–	–	–	–	1	10	86
Vaccine–preventable																			
Adverse event after immunisation	–	–	–	–	3	–	–	–	1	–	1	3	–	1	–	–	–	9	98
H. influenzae b (invasive) infection	–	–	–	–	1	–	–	–	–	1	–	–	–	–	–	–	–	2	5
Measles	1	–	1	–	–	–	–	2	–	–	–	–	1	2	–	–	1	8	52
Mumps*	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	18
Pertussis	3	2	3	11	5	2	6	12	6	–	5	–	–	1	1	2	–	59	1156
Rubella*	–	2	–	–	–	–	–	–	1	–	1	–	–	–	–	–	1	5	22
Tetanus	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1
Faecal–oral																			
Botulism	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Cholera*	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1
Cryptosporidiosis	4	1	2	2	–	–	2	–	9	5	3	1	–	–	–	2	–	31	1023
Food-borne illness (not otherwise specified)	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	1	10
Gastroenteritis (in an institution)	–	–	–	–	–	–	5	–	–	–	–	–	–	–	–	–	–	5	129
Haemolytic uraemic syndrome	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	2
Hepatitis A	11	2	2	9	6	6	2	2	9	3	5	6	1	2	1	–	2	69	606
Hepatitis E	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	4
Listeriosis*	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	16
Salmonellosis (not otherwise specified)*	10	18	–	–	9	6	9	1	10	6	5	3	–	2	1	5	–	85	805
Typhoid and paratyphoid*	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	–	1	16
Verotoxin-producting *E. coli*	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1

* lab–confirmed cases only ** includes cases with unknown postcode

CSA = Central Sydney Area
NSA = Northern Sydney Area
WSA = Western Sydney Area
WEN = Wentworth Area
SWS = South Western Sydney Area
CCA = Central Coast Area
HUN = Hunter Area
ILL = Illawarra Area
SES = South Eastern Sydney Area
NRA = Northern Rivers Area
MNC = North Coast Area
NEA = New England Area
MAC = Macquarie Area
MWA = Mid Western Area
FWA = Far West Area
GMA = Greater Murray Area
SA = Southern Area

INFECTIOUS DISEASES, NSW: JULY 1998

TRENDS

Reports of most notifiable infectious diseases through to June are largely on the decline, in line with seasonal expectations (Figure 7).

INFLUENZA SURVEILLANCE ACTIVITY UPDATE

Influenza activity during July continued to increase, as for this period in previous years.

Clinical activity

Reports of influenza-like illness from the NSW Sentinel General Practitioner Surveillance Scheme were received through four Public Health Units (PHUs) from approximately 30 general practitioners (GPs). Influenza-like illness activity has been variable but generally increasing to levels similar to those for the same period in previous years (25 to 30 cases per 1000 consultations).

Virological activity

Laboratory reports of influenza also continued to increase. In the third week of July there were 42 reported diagnoses of influenza A and one of influenza B. The number of influenza A diagnoses reported per week increased to the highest recorded during last year; however, there are more laboratories reporting this year (six compared with four). Diagnoses of respiratory syncytial virus appear to have peaked, with 159 in the in the third week of July compared with 181 the week before.

Directed virological surveillance

Directed virological surveillance, in which GPs each week submit swabs from up to five patients who are suffering from influenza-like illness, commenced early in July. Fifteen participating GPs submitted 108 swabs during this month from people with influenza-like illness. Eighteen (17 per cent) were positive for influenza A, none for influenza B and three for respiratory syncytial virus. Samples were received from patients with a wide range of ages. Children under five years of age had a higher rate of positive results for influenza A (32 per cent). No subtyping information is available yet.

Australian surveillance

The following data have been reported by the National Centre for Disease Control. Influenza-like illness activity reported by sentinel general practices peaked in July for the ASPREN scheme (Australian Sentinel Practice Research Network) at 21 per 1000 consultations, a rate considerably lower than the 1997 peak of 50. Results under the Victorian Department of Health's sentinel general practice network also peaked in July at 26 per 1000. However, the number of whole-of-Australia laboratory reports of influenza A this year was higher than in recent years (as was the case for NSW). There may be higher rates of testing or reporting of laboratory results this year. Eight per cent of laboratory-reported influenza cases this year were influenza B and 92 per cent influenza A. All influenza A isolates typed this year by the World Health Organization reference laboratory in Melbourne were H3N2.

International surveillance

Reports are being received by few countries at this time of year, as it is summer in the northern hemisphere and therefore it is a low period for influenza activity in many countries. South Africa reported only local outbreaks in early July following widespread outbreaks in May. Chile reported sporadic activity in early July. All virological reports of influenza to the World Health Organization worldwide since mid-June have been for influenza A; there have been none for influenza B.

INFLUENZA IN 1919

> On 3 May [1919], Mr EAB, a 30-year-old man, became ill with pains in the head and back. He was admitted to the City Road Emergency Hospital in Sydney on 9 May, and on examination his doctors found that he had a high fever (104 deg F), a rapid pulse (112 beats per minute), and rapid breathing (32 breaths per minute). He was cyanosed (blue from lack of oxygen) with rhonchi all over his chest and crepitations at the left base indicating lung infection. He deteriorated and died on 13 May. At autopsy the same day, his left lung was plum-coloured, with petechial haemorrhages throughout. Blood stained fluid filled the air sacs of the lower lobe rendering it solid.
>
> The next day, DO, a 15½-year-old-girl was admitted with a week's history of illness. Examination found that she also had a high fever (103 deg F), a rapid pulse (128) and rapid breathing (40). Her sputum was rusty, and rales and crepitations were heard throughout her lungs. On May 12, the doctors caring for her noted that she had developed air hunger and water logging, and she died. At autopsy, her lungs were found to have had a similar pathology to those of Mr EAB.

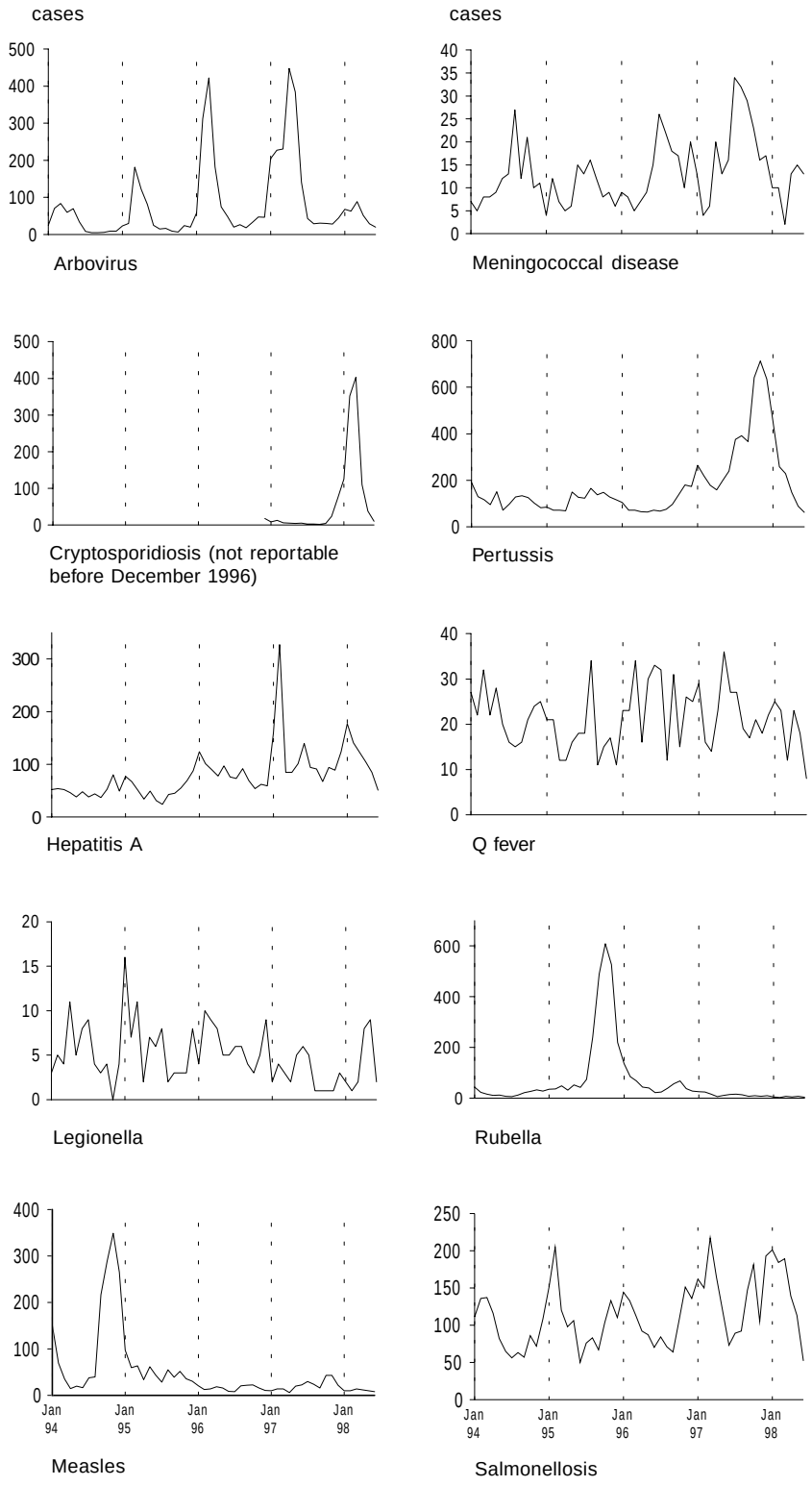
These are just two of the 130 case reports listed in the NSW Department of Public Health's report on the influenza epidemic in 1919.[1] Here we present some highlights of their report, which provide a rather chilling account of just how devastating this tragedy was to the people of NSW.

Having received reports of a pandemic of influenza raging in Europe and North America, in his 1918 annual report, Robert T. Paton, NSW Director-General of Public Health, outlined precautionary and preventive measures that might prevent influenza from taking hold in the State. These measures included opening 2500 extra hospital beds, closing and converting country schools into emergency hospitals, diversion of the Civil Ambulance and Transport Brigade for influenza activities, installation of inhalation sprays, recommending the wearing of masks, preparation of vaccine, and establishing depots from which to vaccinate the population. For three months the government imposed a sea quarantine that for a while seemed destined to save the State.

FIGURE 7

REPORTS OF SELECTED INFECTIOUS DISEASES, NSW, JANUARY 1994 TO JUNE 1998, BY MONTH OF ONSET

These are preliminary data: case counts in recent months may increase because of reporting delays



Then, on 24 January 1919, the Randwick Military Hospital reported 'a suspicious case of illness' in a man who had arrived in Sydney after travelling overland from Melbourne. The illness soon showed all the hallmarks of pneumonic influenza.

Over the next few days, several more cases of influenza were reported in others who had travelled from Melbourne, and the disease began to spread through the city in two 10-week waves (Figure 8).

Dr W.G. Armstrong, the Deputy Director-General of Public Health, described the syndrome thus:

> The onset was sudden, sometimes fulminant in its character. Instances occurred in which individuals were suddenly attacked by giddiness, muscular weakness, and severe headache while walking in the street, and frequently patients stated that they had gone to bed feeling perfectly well, and a few hours later had awakened in a state of miserable illness.[1]

Other reported symptoms included chills, coryza, a flushed face, conjunctival injection, sore throat, bleeding nose, chest pain, headache, nausea, sweating and high temperature. Among the 12 786 hospitalised cases, 61 per cent were complicated by pneumonia, sometimes right from the very first influenzal attack, but more usually on the third or fourth days. Doctors were struck by the lilac or lavender hue that patients took on because of cyanosis.

In all, the 1919 flu epidemic infected an estimated 36 per cent of Sydney's population. In a single week in mid-June, 1315 patients were hospitalised with influenza. In country areas, ambulance officers sometimes resorted to carrying patients on foot through the bush or over sand for over a mile. The first wave from 19 March to 27 May killed 1892 people; the second more severe wave, from 28 May to 25 August, killed 2989 people. The epidemic killed at least 6387 NSW residents (or 24 per cent of all deaths that year), including several health workers, one of whom was the principal medical officer with the Education Department, Dr C.S. Willis. The age-specific death rate showed highly unusual characteristics: fatalities were highest among young adults (Figure 9), and in 1919, it was the second wave that proved most deadly (Figure 8).

FIGURE 8

INFLUENZA-RELATED ADMISSIONS TO METROPOLITAN HOSPITALS, AND DEATHS IN NSW, 1919

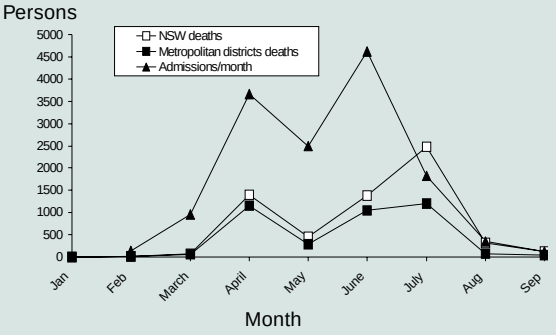
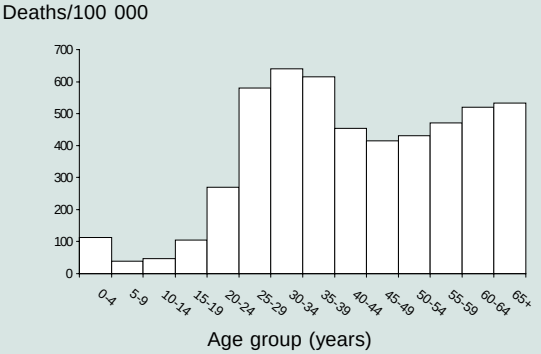


FIGURE 9

INFLUENZA-RELATED DEATH RATES, NSW, 1919, BY AGE GROUP



The Public Health Department responds

In desperation, authorities first restricted travel from Victoria, and then travel from Sydney to country areas. At first, all land traffic was prohibited, and later, quarantine detention camps were set up on the Victorian border, requiring prospective travellers from Victoria to undergo at first seven, and later, four days of quarantine. Ships from Victoria were quarantined for four days after leaving the infected port, after which crew and passengers were medically inspected. Influenza was made a notifiable disease, and patients and contacts were placed in compulsory isolation. Schools and churches were closed and public meetings restricted, and authorities ordered the wearing of masks by the population. Early in the outbreak, persons exposed to the infection were invited to enter one of several chambers set up across the city for a 120-minute disinfection session, in which a mist containing sulphate of zinc was inhaled for 10 minutes. Portable versions of these machines were used early in the epidemic to disinfect houses occupied by influenza victims.

Vaccination

In November 1918 the Department of Public Health began developing a vaccine to protect people against the complications of influenza (rather than the infection itself). Vaccines were prepared using as many strains as possible of pneumococci, streptoccocci, *Staphylococcus aureus*, Pfeiffer's influenza bacilli and other organisms believed at the time to be associated with the disease, derived from postmortem material from two fatal cases at the North Head Quarantine Station and over 100 other sources. A course

FIGURE 10

INFLUENZA-RELATED (ICD9 480–487[2]) HOSPITAL SEPARATION RATES, NSW, 1995, BY AGE GROUP

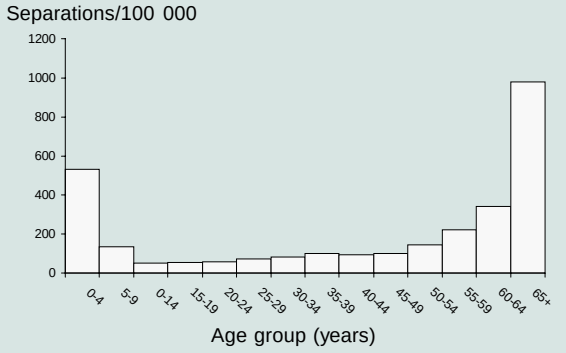
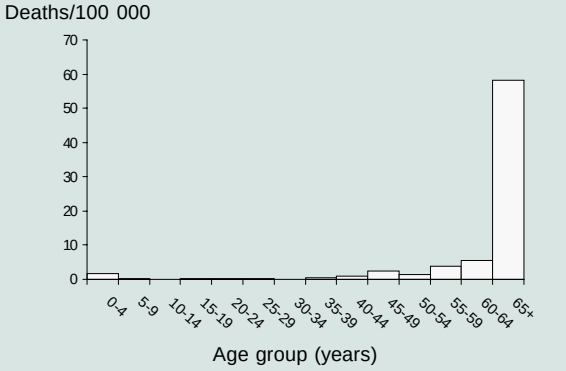


FIGURE 11

INFLUENZA-RELATED (ICD9 480–487[2]) DEATH RATES, NSW, 1995, BY AGE GROUP



of two or three doses over two to three weeks was recommended. Free inoculations were offered from November 1918 to May 1919, from 1265 depots open day and night throughout Sydney and others in most country towns. Over 819 000 inoculations were given, with many depots rushed when news of the first cases began to appear, especially by people believing it helped unrelated conditions such as rheumatic disease and catarrh (some of whom submitted themselves to regular injections at two- to three-week intervals).

Health outcomes?

The Health Department realised fairly early on that many of these interventions were of dubious value, especially once the epidemic was in full swing, although at the time it was felt that restricting assembly and the use of masks in confined spaces might have been useful.

To evaluate the effect of vaccination, the Department asked several Sydney hospitals to provide cards on each patient admitted with influenza. These cards gathered information on name, age, sex, date of inoculation (as reported by the patient), dates of onset and admission, severity of disease, complications, outcome, and postmortem results. The vaccination status of patients treated at Sydney hospitals is shown in Table 6.

While there was little evidence that vaccinations actually prevented influenza infection, health authorities did think that vaccines were able to prevent serious complications. The data in Table 6 indicate that persons who had received vaccine were significantly less likely to die from influenza than those who did not receive vaccine (odds ratio 0.60, 95 per cent confidence interval 0.53-0.68). There are doubtless many provisos to these conclusions: selection and information biases and possible confounding factors could have resulted in a false association. Nonetheless, these data are tantalisingly suggestive that perhaps something in the vaccine (possibly pneumococcal antigens) afforded some protection against serious complications of influenza.

Back to the future

Some 80 years later, mystery still surrounds the exact nature of the influenza virus that caused the devastating pandemic, of which the NSW experience was just a part. In 1998, researchers are attempting to recover remnants of the 1919 pandemic virus that may have persisted in six young Norwegian miners who died in October 1918 and were buried in the permafrost of Longyearbyen, north of the Arctic circle. Some features of that virus noted above,

continued on p. 84

TABLE 6

VACCINATION STATUS PRIOR TO ADMISSION TO HOSPITAL AND TYPE OF DISEASE (OR DEATH) OF 11 972 PATIENTS TREATED FOR INFLUENZA IN 25 SYDNEY HOSPITALS, 27 JANUARY TO 30 SEPTEMBER 1919

Patient's vaccination status	Simple		Mild or severe		Dead		Total
	n	%	n	%	n	%	n
Vaccinated	1740	42	1973	48	442	11	4 155
Not vaccinated	2130	34	3086	49	1033	17	6 249
Unknown	534	34	617	39	417	27	1 568
Total	4404	37	5676	47	1892	16	11 972

TABLE 7

INFECTIOUS DISEASE NOTIFICATIONS RECEIVED IN JUNE 1998 BY AREA HEALTH SERVICES

Condition	Area Health Service (1998) CSA	NSA	WSA	WEN	SWS	CCA	HUN	ILL	SES	NRA	MNC	NEA	MAC	MWA	FWA	GMA	SA	Total for Jun**	Total to date**
Blood-borne and sexually transmitted																			
AIDS	–	–	1	–	–	–	–	–	6	1	1	–	–	–	–	–	–	9	81
HIV infection*	HIV data provided on alternate months																		169
Hepatitis B: acute viral*	–	–	–	–	–	–	–	–	2	1	–	–	–	–	–	–	–	4	31
Hepatitis B: other*	22	33	103	3	74	2	6	7	73	5	2	5	1	1	3	2	1	350	2051
Hepatitis C: acute viral*	–	–	–	–	–	–	1	–	1	–	–	–	–	1	–	–	–	3	34
Hepatitis C: other*	29	38	147	37	121	74	56	23	135	37	23	20	9	25	1	14	23	819	4985
Hepatitis D: unspecified*	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	1	2
Hepatitis: acute viral (not otherwise specified)	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	2
Gonorrhoea*	5	3	6	–	–	2	1	–	42	1	2	1	–	–	–	2	3	69	463
Syphilis	2	3	5	–	–	1	–	–	13	1	1	1	3	1	5	–	–	39	281
Vector-borne																			
Arboviral infection*	–	2	–	1	1	–	1	2	2	6	6	2	1	–	3	2	1	30	354
Malaria*	–	2	1	–	1	–	2	–	2	3	3	–	–	–	–	–	–	14	94
Zoonoses																			
Brucellosis*	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Leptospirosis*	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	12
Q fever*	–	–	–	1	–	–	1	–	1	2	3	2	6	–	–	–	1	17	113
Respiratory and other																			
Blood lead level	3	1	12	9	15	3	6	1	1	1	1	1	2	2	–	–	–	58	539
Legionnaires' disease	–	–	–	–	–	–	2	–	–	–	–	–	–	–	–	–	–	2	23
Leprosy	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1
Meningococcal (invasive) infection	–	–	3	1	1	2	3	–	2	1	–	–	–	1	–	–	–	14	63
Mycobacterial tuberculosis	2	3	6	–	5	–	–	4	7	–	–	–	–	–	–	–	–	27	205
Mycobacteria other than TB	1	10	–	–	–	–	2	–	4	–	1	–	–	–	–	–	–	18	143
Vaccine-preventable																			
Adverse event after immunisation	1	1	1	1	–	–	–	2	–	–	3	–	1	–	1	1	12	135	
H. influenzae b (invasive) infection	–	1	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	2	6
Measles	–	–	–	–	1	–	2	4	–	–	2	–	1	1	–	–	–	11	66
Mumps*	–	–	1	–	–	–	1	–	1	–	–	–	–	–	–	–	–	3	21
Pertussis	1	2	1	9	7	1	16	7	12	4	1	2	2	3	5	3	3	79	1654
Rubella*	–	1	–	–	–	–	1	–	1	1	1	–	–	1	–	–	–	6	31
Tetanus	1	–	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	2	4
Faecal–oral																			
Botulism	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Cholera*	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1
Cryptosporidiosis	3	5	4	1	2	4	5	1	6	3	6	2	–	–	1	3	1	47	1070
Food-borne illness (not otherwise specified)	–	–	–	–	–	–	–	–	–	–	1	–	–	–	1	–	–	2	13
Gastroenteritis (in institution)	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	1	132
Haemolytic uraemic syndrome	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	2
Hepatitis A	3	1	1	6	12	6	1	6	9	16	6	–	–	–	–	–	1	68	711
Hepatitis E	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	4
Listeriosis*	–	–	–	–	–	–	1	1	–	–	–	–	–	–	–	–	–	2	20
Salmonella (not otherwise specified)*	4	13	–	–	8	3	5	5	10	9	2	5	1	2	–	2	–	70	970
Typhoid and paratyphoid*	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	22
Verotoxin-producing *E. coli*	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1

* lab-confirmed cases only ** includes cases with unknown postcode

CSA = Central Sydney Area
NSA = Northern Sydney Area
WSA = Western Sydney Area
WEN = Wentworth Area
SWS = South Western Sydney Area
CCA = Central Coast Area
HUN = Hunter Area
ILL = Illawarra Area
SES = South Eastern Sydney Area
NRA = Northern Rivers Area
MNC = North Coast Area
NEA = New England Area
MAC = Macquarie Area
MWA = Mid Western Area
FWA = Far West Area
GMA = Greater Murray Area
SA = Southern Area