

Annual report of the National Influenza Surveillance Scheme, 1998

Linda Halliday,¹ Leslee Roberts² and Alan Hampson³ for the National Influenza Surveillance Scheme

Abstract

The National Influenza Surveillance Scheme includes data from sentinel general practice consultations for influenza-like illness, laboratory reports of influenza and absenteeism rates from a national employer. The 1998 season was dominated by an increase in influenza A in all States and Territories and low influenza B activity. All influenza A isolates were characterised as influenza A (H3N2). Peak activity in 1998 was recorded in July and August. Data are coordinated, analysed and disseminated at a national level and published in *Communicable Diseases Intelligence* during the influenza season. *Commun Dis Intell* 1999;23:185-192.

Introduction

Influenza continues to be a major threat to public health worldwide because of its ability to spread rapidly through populations, showing a greater severity in the very young, the elderly and those affected by chronic disease or immunodeficiency.

The constant development of antigenic variants through antigenic drift is the basis for seasonal epidemics. The greater the variation, the greater the capacity of the virus to escape immune

recognition and therefore the greater the epidemic potential. At irregular intervals, major 'antigenic shifts' occur resulting in a novel influenza strain of virus. In the absence of immunity to these new strains, they spread rapidly around the globe causing worldwide pandemics. In 1997 a cluster of human cases due to avian influenza virus, H5N1 occurred in Hong Kong raising concerns that this foreshadowed the beginning of a pandemic. Fortunately, the virus lacked the ability to be efficiently transmitted in human populations.

1. National Centre for Disease Control, Department of Health and Aged Care, GPO Box 9848, Canberra ACT 2601, National Centre for Epidemiology and Population Health, Australian National University
2. National Centre for Epidemiology and Population Health, Australian National University
3. World Health Organization Collaborating Centre for Influenza Reference and Research, Melbourne

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This highlights the necessity for effective surveillance to detect changes that may arise in the influenza virus. The designing of vaccines and the guidance of public health measures in the event of epidemic and pandemic influenza, are both reliant on this information. The current influenza vaccine contains three virus strains (two type A and one type B), representing the influenza viruses likely to circulate in Australia in the upcoming winter.

National surveillance in Australia consists of community based surveillance from sentinel general practices, laboratory based surveillance, and absenteeism rates from a national employer. A national approach to the coordination of data collections, analysis and dissemination of information is achieved at the National Centre for Disease Control. This is the recommended approach for surveillance for influenza in pandemic and inter-pandemic periods as outlined in the recent publication *Towards an Australian Influenza Pandemic Preparedness Plan*. The plan emphasises a timely, representative and efficient surveillance system as the cornerstone of influenza control.¹

Surveillance of influenza is conducted each year from the beginning of May to October. The aim of the surveillance is to provide timely information to public health departments, health care providers and the general public about levels of influenza activity and circulating strains. National Influenza Surveillance data are published monthly in *Communicable Diseases Intelligence (CDI)*. Data are summarised in the annual report of the National Influenza Surveillance Scheme each year.

As well as routine surveillance for influenza, an additional Australia-wide surveillance program organised by a pharmaceutical company was conducted in 1998 as part of a multi-centre drug trial conducted in the southern hemisphere. The program is continuing again in 1999. A summary of the results of the study is presented in this report.

The world trends for influenza in 1998 and their relationship to Australian trends are also included in this report.

Surveillance methods

Routine surveillance of influenza in Australia comprises three systems:

- laboratory diagnosis, particularly virus isolation, detection or serological evidence,
- consultation rates for influenza illness by sentinel general practitioners,
- absenteeism data from a national employer.

Data from the latter two sources lack the specificity of laboratory data but are useful as surrogate markers of influenza activity and provide a quantitative measure of influenza illness. Absenteeism is a useful marker of social and economic disruption.

Laboratory surveillance

Laboratory reports of influenza are sent to the *CDI* Virology and Serology Laboratory Reporting Scheme (LabVISE). The scheme consists of 21 sentinel laboratories throughout Australia.³ Although virus isolation constitutes the gold standard for influenza diagnosis and surveillance

specificity, it is reported less frequently than detection of viral antigen or serological evidence.

Criteria for a laboratory report of influenza are:

- direct detection of viral antigen, or
- isolation of the virus, or
- serological evidence of a recent infection.

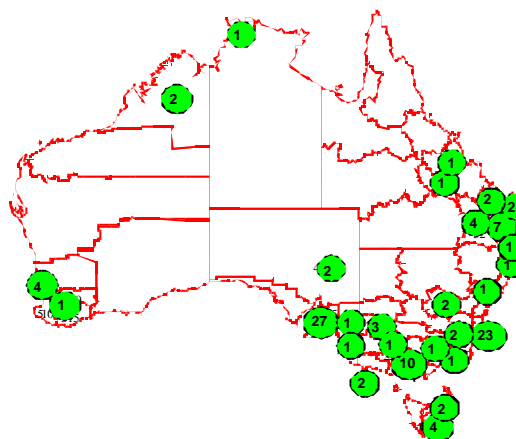
The World Health Organization (WHO) Collaborating Centre for Reference and Research on Influenza contributes reports on the subtypes and antigenic analysis of influenza viruses isolated throughout the year in Australia. This information is vital for the monitoring of influenza strains in Australia and the rest of the world, assessing the suitability of the current vaccine and determining the composition of the following year's vaccine.

Sentinel general practitioner surveillance

Sentinel general practitioner schemes that record influenza-like illness were included in the surveillance for 1998. These were: the Australian Sentinel Practice Research Network (ASPREN),⁴ the New South Wales Sentinel General Practice Scheme, the Victorian Sentinel General Practice Scheme and Tropical Influenza Surveillance from the Northern Territory (NT).⁵ The New South Wales (NSW) and the Victorian schemes report cases of influenza-like illness from the beginning of May to September each year. ASPREN and Tropical Influenza Surveillance from the NT report throughout the year.

ASPREN is currently the only national sentinel surveillance scheme that reports on cases of influenza-like illness. The current distribution of ASPREN sentinels is shown in Figure 1.

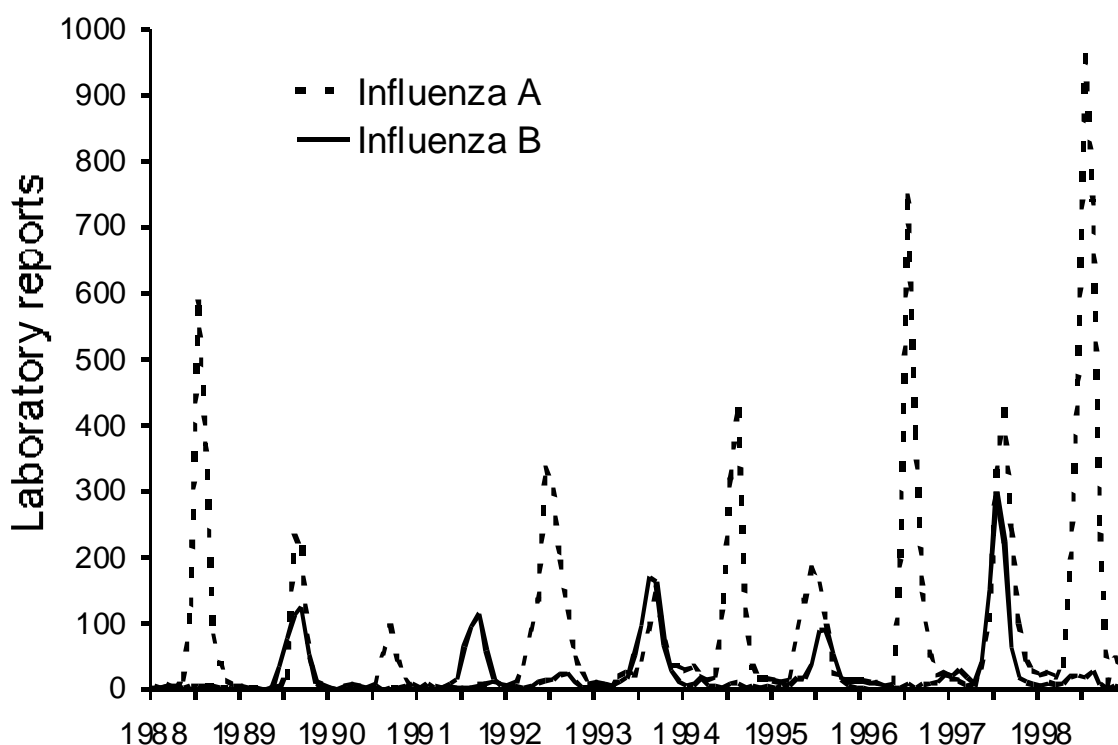
Figure 1. Geographic distribution of ASPREN sentinel sites, by number of sites and location



The case definitions used by ASPREN, Tropical Influenza Surveillance and the Victorian Sentinel General Practice Scheme were:

- viral culture or serological evidence of influenza virus infection,
- or
- influenza epidemic, plus four of the criteria in (c),
- or

Figure 2. Influenza A and B laboratory reports by date of specimen collection, Australia, 1988-98



Source: LabVISE, Australia, 1998

- six of the following:
- sudden onset (within 12 hours),
- cough,
- rigours or chills,
- fever,
- prostration and weakness,
- myalgia, widespread aches and pains,
- no significant respiratory physical signs other than redness of nasal mucous membranes and throat, and
- influenza in close contacts.

The case definition used by the NSW Scheme was all of the following:

- cough, and
- myalgia, and
- no abnormal respiratory physical signs other than inflammation of nasal mucous membranes and throat, and
- two of the following:
 - sudden onset (less than 12 hours),
 - rigours, chills or fever,
 - prostration or weakness, or
 - influenza in close contacts.

Absenteeism surveillance

Australian Post provided sick leave absenteeism data to the National Influenza Surveillance Scheme during 1998. Absenteeism was reported as the rate per 100 employees absent for 3 or more consecutive days each week. Rates were calculated on a weekly basis. The definition for absenteeism in 1998 was different to previous years in an

attempt to improve specificity of data, and included cases of 3 or more days of absence rather than a single day.

Independently conducted influenza surveillance program

A pharmaceutical company conducted a surveillance program in Australia from April to September during 1998. Sentinel general practitioner sites and nursing home sites were selected in NSW, Queensland, Victoria, South Australia (SA) and Western Australia (WA). Nose and throat swabs were collected from individuals fitting the ASPREN clinical case definition for influenza-like illness and processed for viral isolation.

Results

Laboratory surveillance

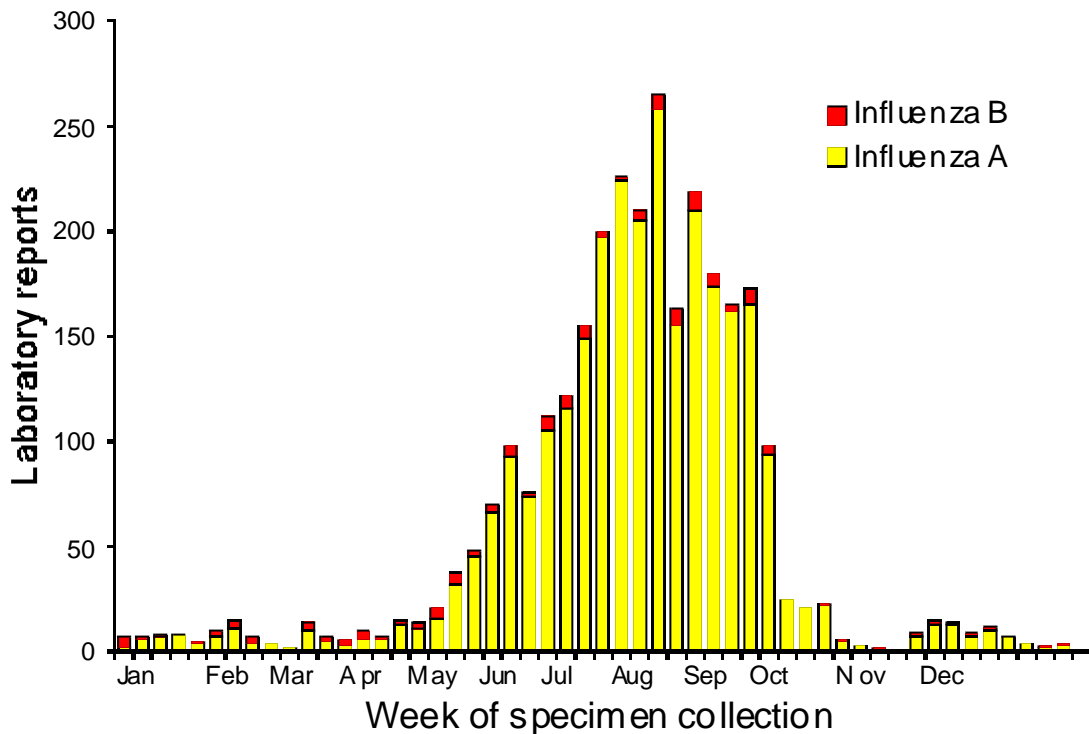
CDI Virology and Serology Laboratory Reporting Scheme

There were 2,943 influenza laboratory reports recorded by the LabVISE scheme, an increase from 1997 (2,797 influenza reports). The number of influenza reports in 1998 was the highest ever recorded by the scheme since its commencement in 1978 (Figure 2). The independent influenza surveillance program contributed 248 of these laboratory reports. This highlights the necessity for careful interpretation of laboratory data as there are many factors that can influence laboratory reporting practices.

The majority of influenza reports were influenza A (2,793, 95%) and the remainder were influenza B (150, 5%).

There were no reports of untyped influenza (Figure 3). The number of reports of influenza B were low compared to 1997. This is consistent with the trend of influenza B to show increased activity in alternate years.

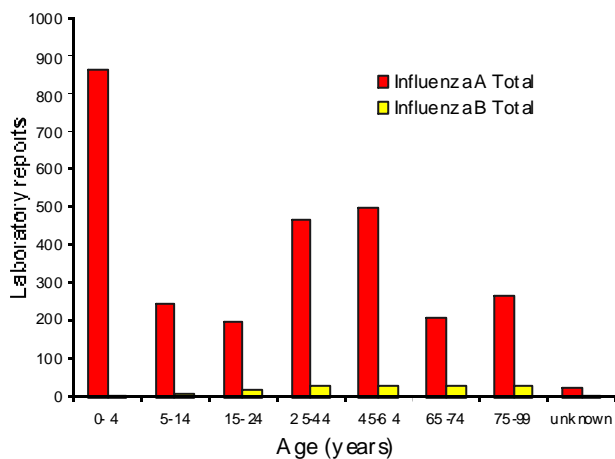
Figure 3. Influenza laboratory reports, by virus type and week of specimen collection, Australia, 1998



Source: LabVISE, Australia, 1998

The ratio of males to females for influenza was 1.3:1. Thirty-one per cent of all influenza A reports were from children aged 0-4 years. There were few reports of influenza B in the younger age groups with the majority of reports (61%) from persons over 45 year of age (Figure 4).

Figure 4. Influenza laboratory reports, by virus type and age, Australia, 1998



Source: LabVISE data, Australia, 1998

The peak of laboratory reports was in July and August (Figures 5, 6 and 7). South Australia and Victoria both showed slightly earlier peaks than other States and Territories. A slight resurgence of laboratory reporting appeared in November and was particularly noticeable in SA.

South Australian laboratories reported influenza earlier than other States and Territories, followed by WA and then NSW and Victoria. The peak in SA and Victoria reports was in mid July, approximately two weeks ahead of other States and Territories. The NT reported no early laboratory reports of influenza.

South Australia contributed more laboratory reports of influenza than other States or Territories. Seventy-three per cent of all influenza B laboratory reports and 36% of influenza A reports were received from SA. This may indicate that laboratory diagnosis was sought in a larger number of influenza cases or is indicative of increased activity in SA (Figure 8). The independent pharmaceutical study had little impact on the number of reports in SA as it

Figure 5. Influenza A laboratory reports, by week, SA and WA, 1998

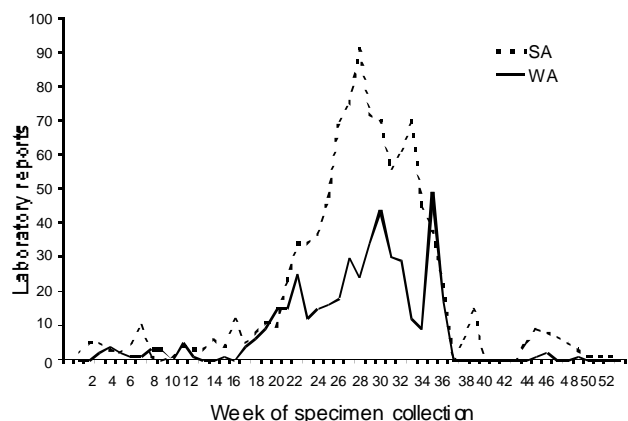


Figure 6. Influenza A laboratory reports, by week, ACT, NSW, Tasmania, and Victoria, 1998

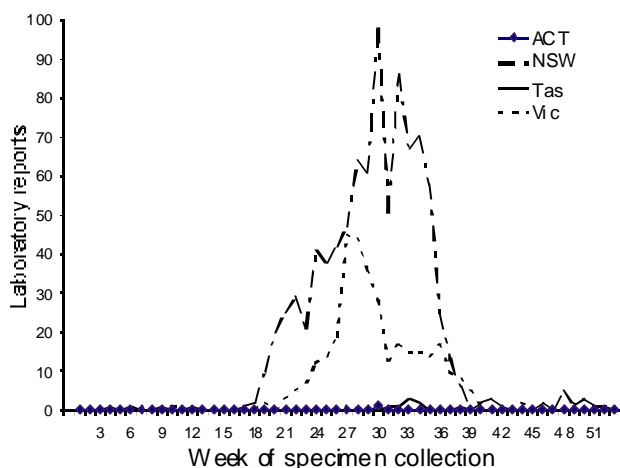


Figure 7. Influenza A laboratory reports, by week, NT and Queensland, 1998

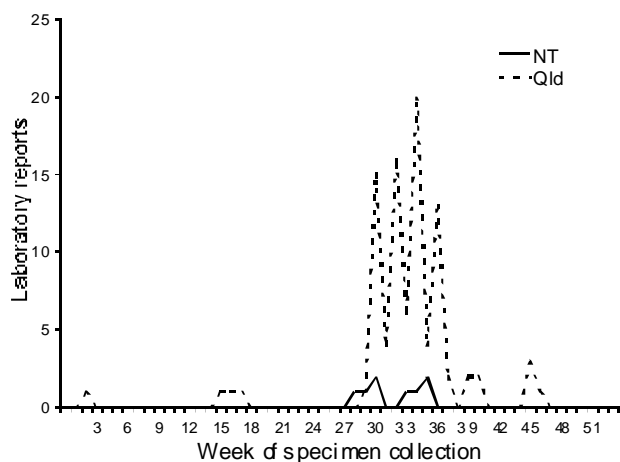
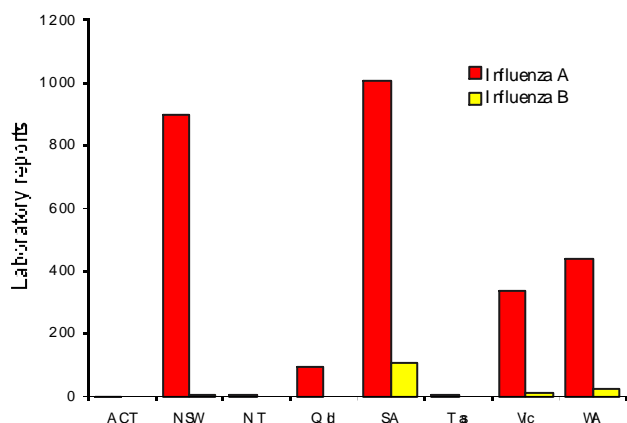


Figure 8. Influenza laboratory reports by virus type and State and Territory, 1998



Source: LabVISE, Australia, 1998

only contributed 17 laboratory reports to the overall number.

WHO Collaborating Centre for Influenza Reference and Research

Although LabVISE figures indicated that approximately 5% of laboratory diagnosed influenza in Australia during 1998 was due to influenza B, only one isolate of 1,127 viable isolates received at the WHO Collaborating Centre was identified as an influenza B virus. The remaining isolates were all characterised as influenza A (H3N2) viruses. The influenza B strain was closely related to B/Beijing/184/93 vaccine strain. All of the influenza A (H3N2) isolates were antigenically related to the A/Sydney/5/97 vaccine strain. Approximately 30% of the influenza A isolates showed some reduction in their reaction with the reference antisera (including reaction to the A/Sydney/5/97 strain). Antisera against these low-reacting strains had a similar reactivity profile to the reference antiserum and did not indicate significant antigenic drift.

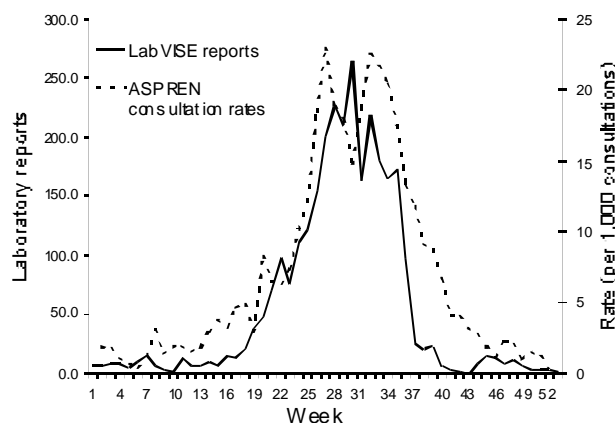
Furthermore, when viruses from specimens yielding low reactive strains were isolated directly in embryonated eggs, as would be required for vaccine production, they showed similar reactivity as the reference strain with antisera. Genetic analysis of the low-reacting strains also demonstrated only minor changes from the A/Sydney reference strain.

Sentinel general practitioner surveillance

The ASPREN scheme recorded low consultation rates for influenza-like illness in the early part of the year and two distinct peaks in July and August. This is the same peak time as laboratory surveillance reports (Figure 9).

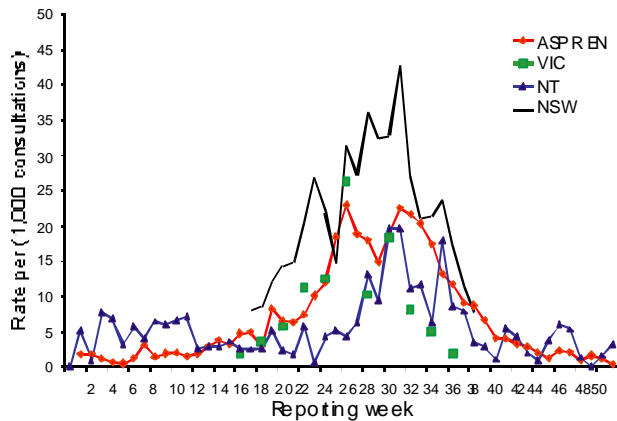
Consultation rates for ASPREN peaked at 25 per 1,000 consultations in 1998; lower than the peak of 35 in 1997. Analysis of the ASPREN data by State reveals the peak in SA and Victoria occurred around week 27 while that in NSW and Queensland occurred around week 32. These four States supply the bulk of the reports to ASPREN. The peak rate was much higher in SA than any other State.

Figure 9. Influenza laboratory reports by week of specimen collection and ASPREN consultation rates, by week of consultation, 1998



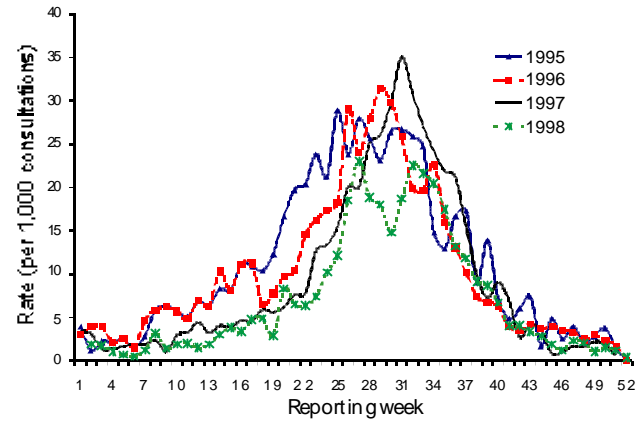
Source: LabVISE scheme, ASPREN scheme, Australia, 1998

Figure 10. Sentinel general practitioner consultation rates, influenza-like illness, by week and scheme, 1998



Source: ASPREN, NSW Sentinel General Practice Scheme, Victorian Sentinel General Practice Scheme, Tropical Influenza Surveillance, 1998

Figure 11. ASPREN consultation rates, influenza-like illness, by week, 1995-98



Source: Australian Sentinel Practice Research Network, 1995-98

The Victorian Sentinel General Practitioner Scheme demonstrated similar consultation rates. The NSW General Practitioner Surveillance Scheme had the highest rates of all schemes. In this State the peak rate of 43 reports of influenza-like illness per 1,000 consultations occurred in August. The NT Tropical Influenza Surveillance Scheme showed a higher rate than the ASPREN scheme during the first 3 months of the year, but peaked later than other States in August and September (Figure 10). This pattern is typical of the NT and other tropical regions.^{5,7,8} The Victorian and the NSW General Practitioner Surveillance Schemes are unable to detect early or late influenza activity as they only record influenza activity from the beginning of May until September.

The ASPREN scheme is a national scheme reflecting overall activity of influenza in Australia. Consultation rates reported in 1998 were the lowest since 1995,

characterised by a bimodal distribution which is a result of the different reporting peaks by States (Figure 11).

Fifty-five per cent of reports of influenza-like illness from the ASPREN scheme were from persons in the 15-44 year age group (Figure 12).

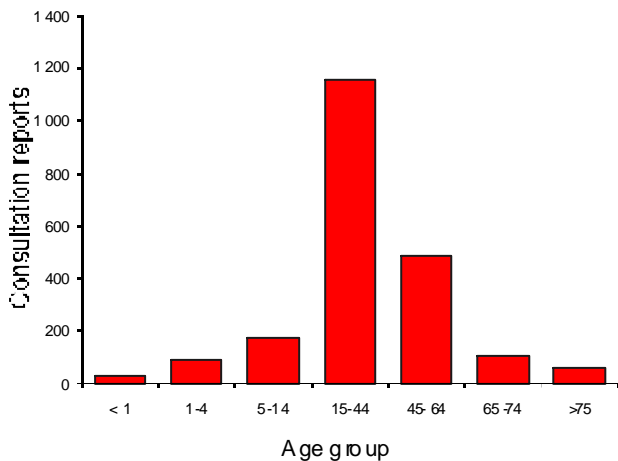
Absenteeism surveillance

The rate of national absenteeism of 3 days per week reported by Australian Post remained between 0.2 (per 100 employees) and 0.35 over the winter months with peak activity in July. Absenteeism declined to half the peak winter rate in early spring (Figure 13).

Independently conducted influenza surveillance program

As shown in the LabVISE data, influenza peaked earlier in WA and SA than in the eastern States. All influenza A isolates were typed as A Sydney 5/97 H3N2-like viruses.

Figure 12. ASPREN reports of influenza-like illness, by age group, Australia, 1998

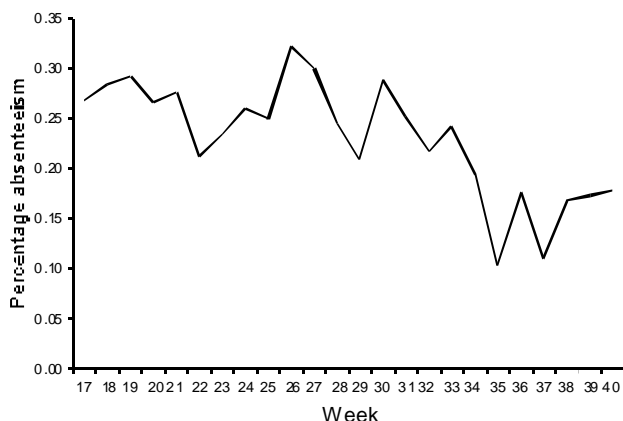


Source: Australian Sentinel Practice Research Network, 1998

Table 1. Independent surveillance program, influenza isolates from specimens, by State, 1998

State	Number of specimens	Number of influenza isolates	Per cent
NSW	435	73	17%
Queensland	162	50	31%
Victoria	110	25	23%
SA	215	17	8%
WA	386	83	22%
Total	1,308	248	19%

Figure 13. Absenteeism rates in Australian Post, May to September, by week of the year, 1998



Source: Australia Post

Only one specimen yielded influenza B. The number of influenza isolates from each State is shown in Table 1.

World Trends

The pattern of influenza in New Zealand was similar to Australia. New Zealand consultation rates for influenza-type illness remained low during May and June and started to increase in July. Rates showed a peak in July and again in August. Influenza A predominated in 1998, only 2% of cases were influenza B. Unlike Australia, where no influenza A (H1N1) was detected, influenza A (H1N1) similar to A/Johannesburg/82/96 accounted for 53% of total isolates. This strain circulated exclusively in the North Island. Influenza A (H3N2) similar to A/Sydney/5/97 accounted for 20% of isolates and this strain spread throughout most of New Zealand. Overall influenza activity in New Zealand 1998 occurred at a low to moderate level compared to 1996 and 1997 seasons.

Between March and September 1998 epidemic or widespread influenza activity was reported from a number of southern hemisphere countries. Influenza A viruses were predominantly of the A (H3N2) subtype antigenically related to A/Sydney/5/97; no new antigenically distinct variant was defined. In many countries influenza A (H1N1) viruses were also isolated, the majority of these isolates were antigenically similar to A/Bayern/7/95 while A/Beijing/262/95-like strains were isolated sporadically. Relatively few laboratory confirmed cases of influenza B were reported. B/Beijing/184/93-like strains were generally distributed throughout the world; cocirculation with B/Beijing/243/97-like strains were limited to Asia.⁹

In the northern hemisphere reports of influenza began in October 1998. Influenza A (H3N2) antigenically related to A/Sydney/5/97 predominated, although influenza B circulated widely and predominated in some countries. The majority of influenza B was antigenically related to B/Beijing/184/93-like strains. However, in Asia this strain cocirculated with B/Victoria/2/87-like viruses. Few laboratory confirmed cases of influenza A (H1N1) were reported, the majority of these were antigenically related to A/Beijing/262/95 vaccine strain.¹⁰

Viruses of the A/Sydney/5/97-type, which was first identified in Australia (June 1997) have established around the world becoming the predominant strain in most regions. This strain circulated almost exclusively in Australia in 1998.

Discussion

The 1998 influenza season in Australia was dominated by influenza A and very little illness from influenza B. The low level of influenza B was predicted as outbreaks tend to occur in alternate years, and 1997 had been a year of increased activity.⁶ All influenza A isolates were characterised as influenza A (H3N2) antigenically related to the A/Sydney/5/97 vaccine strain used in the 1998 vaccine.

The measure of influenza illness in the community was lower in 1998 than in the years 1995 to 1997 according to general practitioner surveillance.^{6,11,12} This appears contradictory to the higher number of laboratory reports recorded. The numbers of laboratory reports are likely to be inflated as a result of increased laboratory testing from an independent multi-center drug trial conducted in 1998. However, this alone does not explain the increase in laboratory reports of influenza from some States. This highlights the necessity for careful interpretation of laboratory data.

Influenza-like illness peaked throughout the winter months with one peak occurring in July and another four weeks later in August. As in previous years, the earliest reports of influenza-like illness were from the NT, heralding the beginning of the influenza season. Early reports of influenza-like illness were also received from SA. Laboratory reports of influenza showed much the same time distribution as influenza-like illness recorded in ASPREN data, except the first peak of laboratory reports in July was two weeks later. This minor delay between onset of general practitioner reports and laboratory reports may reflect a delay in laboratory testing and reporting. A late resurgence of influenza A (H3N2) occurred in November and was detected in both the laboratory and sentinel general practitioner schemes.

The morbidity from influenza in the elderly population is not reflected in the surveillance data. Thirty per cent of all laboratory reports originated from children in the 0-5 year age group and the peak age distribution of reports of influenza-like illness to ASPREN, was 15-44 years. The laboratory reports in young children may reflect increased incidence as well as increased testing practices for children. The general practitioner reports of influenza-like illness probably indicate the age distribution of persons presenting to general practitioners.

National absenteeism rates reported by Australian Post added little information to the other surveillance systems and remained relatively insensitive to the low levels of influenza circulating in 1998, despite changes to improve the specificity of the system. These data may prove more valuable in a year of high incidence of influenza.

The composition of the influenza vaccine for 1999 was determined on the basis of the strains in circulation during 1998 in Australia and the rest of the world. The Australian Influenza Vaccine Committee (AIVC) made the following

recommendations for the 1999 influenza vaccine based on the recommendations of the World Health Organization:

- H1N1 an A/Beijing/262/95-like strain
- H3N2 an A/Sydney/5/97-like strain
- Ba B/Beijing/184/93-like strain.¹³

This differs from the 1998 vaccine by the replacement of A/Bayern/7/95-like strain with A/Beijing/262/95-like strain which induces antibodies to both viruses.¹²

Vaccination against influenza is the most effective method of reducing the effect of influenza. Awareness among health care providers of current influenza activity and circulating strains is necessary for reducing the impact of influenza and related complications. As an integral part of control of influenza, the National Influenza Surveillance Scheme will continue conducting surveillance in the winter of 1999.

Acknowledgements

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