National Influenza Surveillance 1997

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Abstract

In 1997 information from several sources was combined to detect trends in influenza activity in Australia. Data was included from laboratories, general practitioners and a national employer. Laboratory surveillance documented two consecutive outbreaks, influenza B in July followed by influenza A (H_3N_2) in August. Some of the influenza A (H_3N_2) viruses isolated, represented by the A/Sydney/5/97 strain, showed significant antigenic drift from the A/Wuhan/359/95 vaccine strain. Influenza activity was also reflected in the consultation rates recorded by sentinel general practitioner reporting schemes. The peak consultation rate recorded by the Australian Sentinel Practice Research Network was higher and later than in recent years, occurring in early August. Tropical Influenza Surveillance in the Northern Territory demonstrated an early outbreak in March followed by a second rise later in the year. There was no rise in absenteeism rates recorded by a national employer.

Introduction

Influenza is a continually emerging disease and remains a major threat to public health worldwide. The ongoing antigenic variation of the influenza viruses results in outbreaks of respiratory disease throughout the world. These are usually experienced during the winter months in temperate climates but may occur throughout the year in tropical regions. Influenza epidemics lead to high rates of morbidity, excess mortality, social disruption and economic loss. Those who are particularly at risk of severe disease and death are the elderly and patients with chronic debilitating diseases such as cardiovascular disease.

An effective national surveillance system is an essential component of a program for the control of influenza. The major objectives of such a scheme include:

- early detection of epidemics thus enabling the implementation of public health measures such as the immunisation of at risk groups, and planning for the possible impact on clinical services;
- characterisation of the nature of the epidemic by the collection of morbidity and mortality data and estimation of the impact of the outbreak

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and of control measures such as vaccination campaigns; and

- isolation and antigenic characterisation of influenza virus for the formulation of the following season's vaccine.

Data from Australian laboratories has been recorded by the *CDI* Virology and Serology Laboratory Reporting Scheme, LabVISE, since 1978. Laboratory diagnosis, particularly virus isolation, constitutes the gold standard in influenza diagnosis and surveillance specificity[1]. However a laboratory diagnosis is only sought in a small proportion of cases. National surveillance also requires a quantitative measure of influenza activity[2] . In order to meet this need national surveillance was expanded in 1994 to include data from several other sources. These include consultation rates from sentinel general practitioners and absenteeism data from a national employer. The data from these sources lacks the specificity of laboratory data but are useful as surrogate markers of influenza activity.

Between May and October 1997, data from several sources were combined and published fortnightly as *National Influenza Surveillance 1997* in *Communicable Diseases Intelligence*.

This is the annual report for 1997.

Surveillance methods

Laboratory surveillance

In 1997 the *CDI* Virology and Serology Reporting Scheme's influenza reports were included in *National Influenza Surveillance.* Twenty-one sentinel laboratories throughout Australia contributed reports to LabVISE[3]. Criteria for a positive laboratory report included direct antigen detection, virus isolation or serological evidence of infection. However the method of diagnosis was not available to this scheme.

In addition the World Health Organization (WHO) Collaborating Centre for Reference and Research on Influenza contributed reports on the subtypes and antigenic analysis of influenza viruses isolated during the season in Australia. This provided information on the degree to which circulating viruses were related to current vaccine strains and strains circulating elsewhere in the world.

Sentinel general practitioner surveillance

Four sentinel general practitioner schemes recording influenza-like illness were included in *National Influenza Surveillance 1997.* These were the Australian Sentinel Practice Research Network[4] (ASPREN) which is a national network, the New South Wales Sentinel General Practice Scheme, the Victorian Sentinel General Practice Scheme and Tropical Influenza Surveillance from the Northern Territory[5].

ASPREN, Tropical Influenza Surveillance and the Victorian Scheme used the same case definition:

(a) Viral culture or serological evidence of influenza virus infection,

or

(b) influenza epidemic, plus four of the criteria in (c),

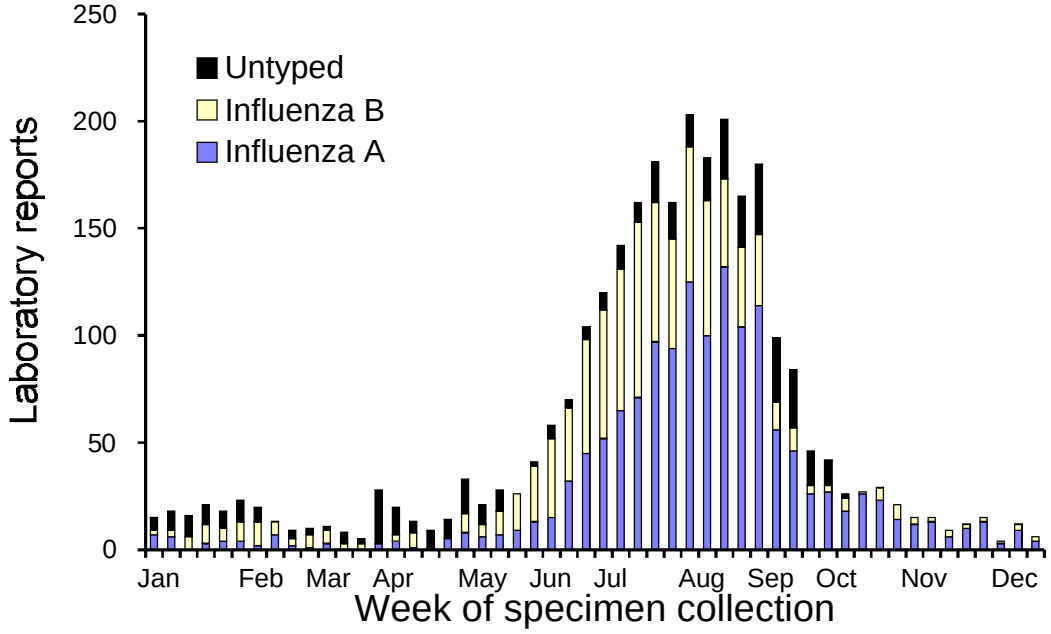
or

(c) six of the following:

- (i) sudden onset (within 12 hours)
- (ii) cough
- (iii) rigors or chills
- (iv) fever
- (v) prostration and weakness
- (vi) myalgia, widespread aches and pains
- (vii) no significant respiratory physical signs other than redness of nasal mucous membrane and throat
- (viii) influenza in close contacts.

The case definition used by the New South Wales Scheme was all of the following:

Figure 1. Influenza laboratory reports, 1997, by virus type and week of specimen collection



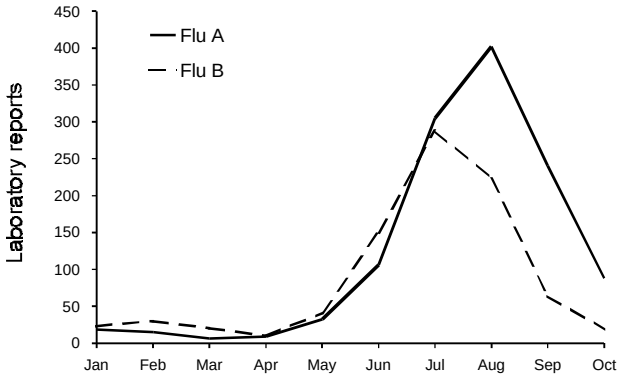
(a) Cough
(b) myalgia
(c) no abnormal respiratory physical signs other than inflammation of nasal mucous membranes and throat
(d) two of the following:
  (i) sudden onset (less than 12 hours)
  (ii) rigors, chills or fever
  (iii) prostration or weakness
  (iv influenza in close contacts.

There was a delay of approximately two weeks between the end of the reporting period and the publication of data.

Absenteeism surveillance

In 1997 Australia Post provided sick leave absenteeism data to *National Influenza Surveillance.* Absenteeism was reported as the percentage of total employees absent from work on a single day of the week.

Figure 2. Influenza A and B laboratory reports, 1997, by month of specimen collection



Results

Laboratory surveillance

***CDI* Virology and Serology Laboratory Reporting Scheme**

The LabVISE scheme reported a total of 2,797 diagnoses of influenza in 1997. Seventeen percent of reports were for untyped virus. Of those reports for which the virus type was known 61% (1,436) were influenza A and 39% (906) influenza B (Figure 1). The sub-type was known for 97 of the influenza A reports, most (96) being of the H_3N_2 sub-type. Only one report of influenza A H_1N_1 virus was recorded.

This scheme recorded two distinct peaks in influenza virus activity, an early rise in influenza B followed by a second peak due to influenza A, (Figure 2).

The number of influenza B reports peaked in July at a higher level than previously recorded by the LabVISE scheme (Figure 3). Reports peaked in July in Victoria, New South Wales and Western Australia and later, in August, in Queensland and South Australia (Figure 4). The male:female ratio was 1.1:1 and 41% of reports were for children under the age of five years (Figure 5).

Overall Influenza A laboratory reports peaked in August. However the peak month of activity varied in the States and Territories. This occurred in July in New South Wales, followed by Queensland, South

Figure 3. Influenza A and B laboratory reports, 1979 to 1997, by year of specimen collection

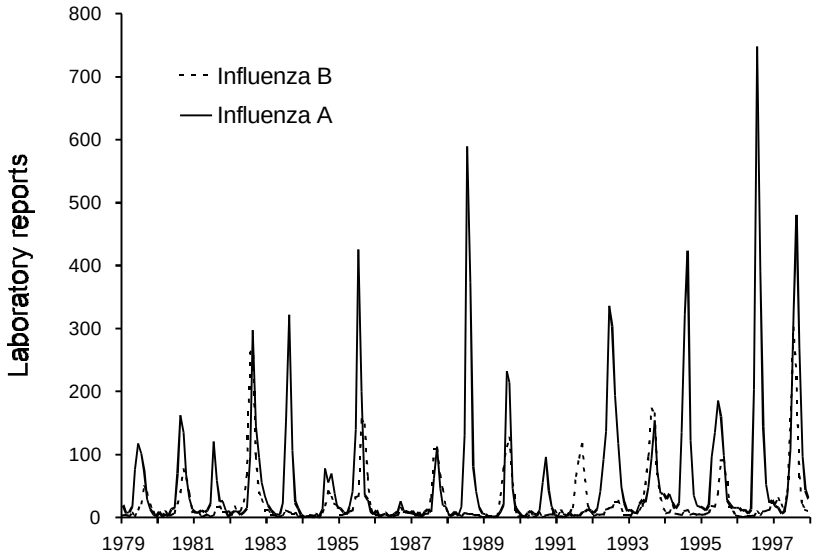


Figure 4. Influenza B laboratory reports, 1997, by State/Territory and month of specimen collection

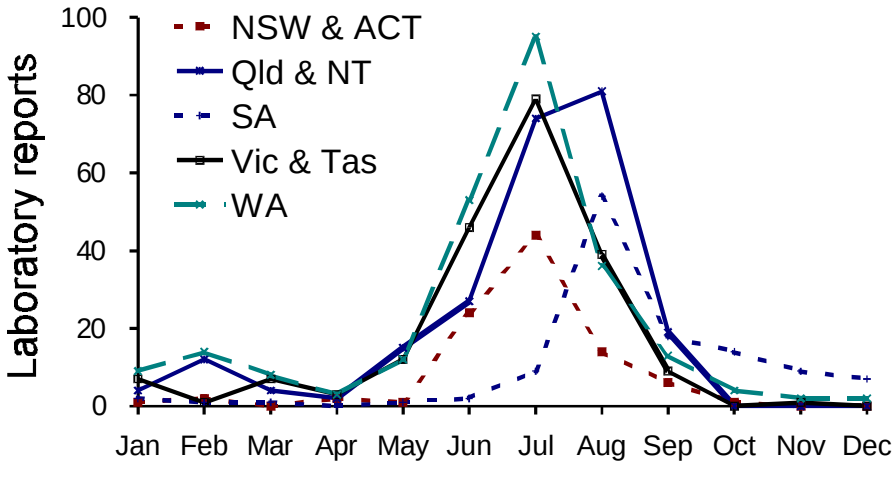
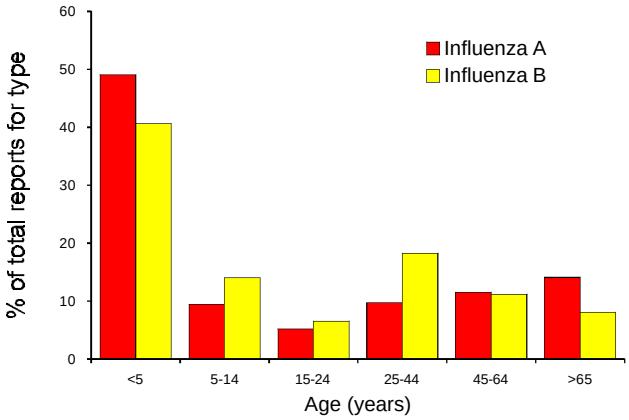


Figure 5. Influenza A and B laboratory reports, 1997, by age group



Australia and Victoria in August (Figure 6). Reports from Western Australia did not peak until September. Slightly more reports were received for males, male:female ratio 1.1:1. Forty nine per cent of patients were less than five years of age and 14% were in the over 65 years age group (Figure 5).

WHO Collaborating Centre for Influenza Reference and Research

In 1997 the Centre analysed 1,178 Australian influenza isolates of which 701 (60%) were influenza A and 477(40%) influenza B. All of the Australian influenza A viruses were subtyped as H_3N_2.

While sequence analysis of the influenza B isolates showed some evidence of genetic drift in the haemagglutinin antigen, antigenically they were uniformly similar to the B/Beijing/184/93 vaccine reference strain.

The influenza A (H_3N_2) isolates fell into two groups both genetically and antigenically. The majority of isolates (74%) for the year were antigenically similar to the A/Wuhan/359/95 vaccine reference strain but with some evidence of genetic drift. The remaining 26% of isolates, characterized by the A/Sydney/5/97 strain, were antigenically and genetically distinct and represent a significant new H_3N_2 variant. A/Sydney-like viruses were unequally distributed throughout the country and occurred in highest proportion in isolates received from New South Wales and the Australian Capital Territory. The number of A/Sydney-like isolates increased as the season progressed and isolates from Northern Australia reported late in the year were A/Sydney-like. Antibody studies conducted with post-vaccination sera from recipients of vaccines containing an A/Wuhan/359/95 (H_3N_2) component showed significantly reduced responses against A/Sydney/5/97.

Figure 6. Influenza A laboratory reports, 1997, by State/Territory and month of specimen collection

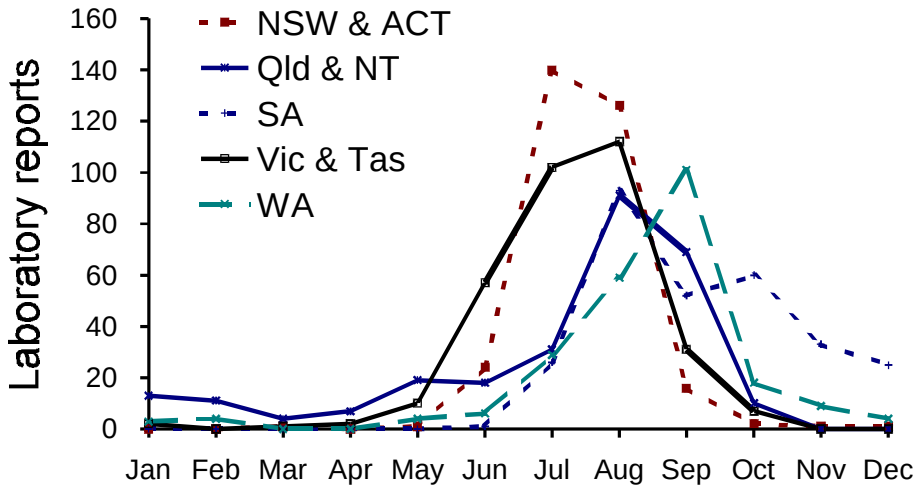
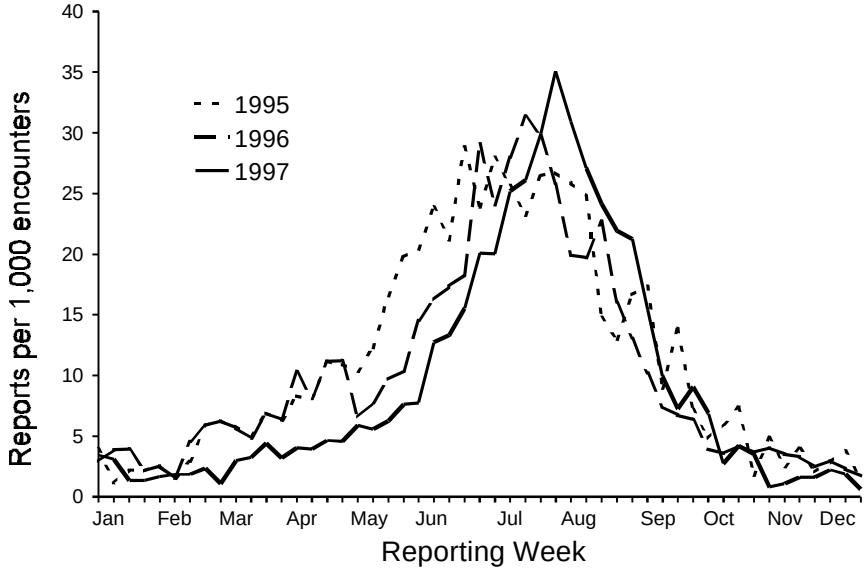


Figure 7. ASPREN consultation rates, 1995 to 1997, by week

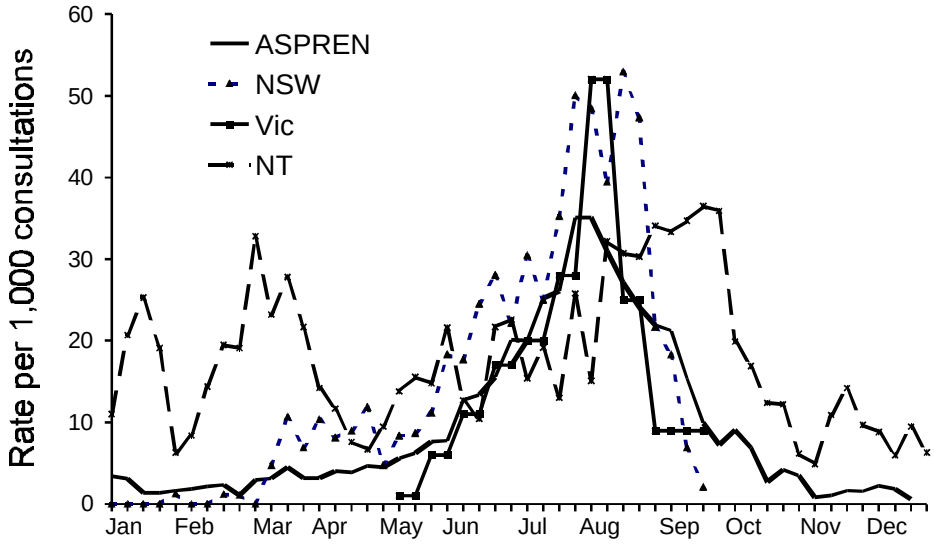


Sentinel general practitioner surveillance

The consultation rate for influenza-like illness reported to the ASPREN scheme rose throughout the winter months of 1997, peaking at 35 consultations per 1,000 encounters in early August (Figure 7). This rate was higher than that recorded in recent years and occurred later, coinciding with the

weekly peak in total laboratory reports in late July/early August (Figure 1). The Victorian scheme showed a similar seasonal distribution to the ASPREN scheme but peaked at a higher rate of approximately 50 consultations per 1,000 encounters (Figure 8). The New South Wales scheme showed a similarly high rate but with two distinct peaks several weeks apart. Tropical Influenza Surveillance from the Northern Territory demonstrated an early peak in March, followed by a second rise in August and September.

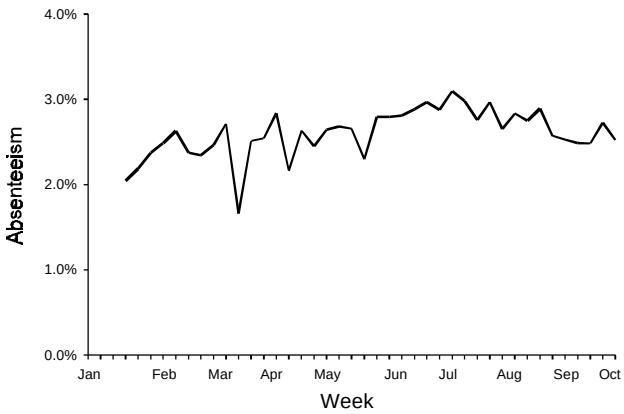
Figure 8. Sentinel general practitioner consultation rates 1997, by week and scheme



Absenteeism surveillance

National absenteeism rates reported by Australia Post showed little variation throughout the winter months (Figure 9). There was no apparent trend which could be attributed to increased influenza activity.

Figure 9. Australia Post absenteeism rates, by week



Discussion

In Australia two sequential epidemics of influenza were documented in 1997. Following sporadic influenza B activity in the preceding summer, particularly in the North, there was an early outbreak of influenza B throughout the country. This was followed by a second outbreak due to influenza A (H_3N_2).

Outbreaks of influenza B in Australia have been recorded in alternate years, the most recent previous epidemic year being 1995[6]. Whilst the number of laboratory reports of influenza B was higher than previously recorded it is uncertain whether this was due to the severity of the epidemic attributable to this virus type or whether increased laboratory surveillance may have contributed.

Whilst the number of laboratory reports of influenza A in Australia was markedly lower than in 1996, they remained high compared to other years. The predominating sub-type was H_3N_2, as was the case in 1994 and 1996[8]. This sub-type has also been reported in large numbers in the United States in the 1997-98 winter period[9]. Influenza H_3N_2 also caused widespread influenza in Japan recently. However in other parts of the Northern Hemisphere, notably Europe, influenza outbreaks were small and scattered and attributed to both H_3N_2 and H_1N_1 strains although there have been some late outbreaks in a number of European countries[10]. Only a single isolate of H_1N_1 was recorded in Australia in 1997. The last major outbreak due to this virus was in 1995[6].

New Zealand also recorded a late peak in influenza activity in 1997, this being due to an outbreak of influenza B followed by a second outbreak of influenza A (H_3N_2)[7]. However 62% of isolates were influenza B and only 38% influenza A which is in contrast to Australia were most laboratory reports were for the type A virus. A further difference is that the sentinel general practitioner consultation rate recorded in New Zealand was lower than recorded in 1996, whilst those recorded in Australia were higher than usual. The epidemiology of influenza frequently differs between Australia and New Zealand. In 1996 New Zealand experienced one of its most severe epidemics in recent years due to A/Wuhan/359/95 and this may have contributed a substantial population immunity to H_3N_2 viruses. The great majority (86%) of 1997 H_3N_2 isolates examined from New Zealand were A/Sydney/5/97-like.

A/Sydney-like viruses predominated during the Northern hemisphere winter and accounted for over 80% of isolates in the United States of America. Outbreak investigations conducted in the United States of America suggested that the A/Wuhan/359/95-like vaccine strain afforded low protection against infection with A/Sydney-like viruses but appeared to reduce death rates[11].

Data from sentinel general practitioners is a sensitive and timely but non-specific indicator of influenza activity[12]. Overall, other than for the Northern Territory, the

consultation rates were higher than recorded in previous years, indicating that the impact of influenza on morbidity was more severe in 1997 than in previous recent years [6,7,13]. This is supported by the laboratory data. The late peak in activity recorded by the ASPREN scheme was probably associated with illness due to both the type A and the type B virus. In the absence of laboratory confirmation it is not possible to accurately estimate the true extent to which consultations were for influenza, and not other respiratory viruses, and to determine the impact of each virus type.

The consultation rates recorded by the different sentinel general practitioner schemes are usually similar[6,7,13], other than for the Northern Territory where the epidemiology of influenza is known to be different[5]. The higher rates of consultation recorded by the New South Wales and Victorian schemes this year, compared to ASPREN, probably reflects large localised outbreaks.

The Northern Territory documented two outbreaks of influenza, an early small peak which preceded the winter epidemic elsewhere in Australia, followed by a second larger peak later in the year. This is similar to 1996[7] and is consistent with data from other tropical regions which also record a bimodal pattern of disease[14]. The initial peak was due to influenza B whereas the later peak was caused by A/Sydney-like H_3N_2 viruses.

In Western Australia the influenza B outbreak occurred in July and influenza A much later in September. By contrast other States and Territories experienced concurrent peaks in the laboratory diagnoses of the two virus types. Western Australia, Queensland and the Northern Territory demonstrated a slight rise in influenza B diagnoses in February. This may have been due to the continuing circulation of this virus following the outbreak of influenza B reported on an oil rig off the coast of the Northern Territory in December 1996[15].

At its meeting in October 1997 the Australian Influenza Vaccine Committee recommended the inclusion of an A/Sydney/5/97-like virus in the Australian vaccine for 1998[16]. At that time viruses of this type had been found in few locations and in relatively small numbers. In the intervening 6 months A/Sydney-like viruses have become widespread and the predominant H_3N_2 variant. This rapid evolution of viruses of the H_3N_2 subtype, their association with severe disease and excess mortality, and the US experience of low protection by vaccines containing the preceding variant serve to emphasise the value of surveillance and regular updating of influenza vaccines.

National absenteeism rates reported by Australia Post remained between 2% and 3% throughout the winter months. In order to improve the sensitivity of this source of data in 1998, absenteeism data will be recorded in cases of 3 or more consecutive days of absence rather than for a single day as previously.

National Influenza Surveillance will continue in the winter of 1998. Laboratory data will remain as the qualitative measure of activity whilst sentinel general practitioner data and absenteeism data will be recorded to provide a quantitative measure.

Acknowledgements

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