Influenza in New Zealand – 2001

Darren Hunt, Sue Huang, Institute of Environmental Science and Research; Lance Jennings, Canterbury Health Laboratories; and Michael Baker, Institute of Environmental Science and Research.

During the 2001 influenza season, 4 079 consultations for influenza-like illness (ILI) were reported from a national sentinel network of 77 general practices. It is estimated that ILI resulting in a visit to a general practitioner affected over 48 000 New Zealanders during the season, compared with an estimated 25 000 in 2000. The national level of ILI in 2001 was relatively low compared with the 1990-2000 period. The highest rates were reported from the Eastern Bay of Plenty and Manawatu Health Districts. Overall, 65% of influenza isolates in 2001 were influenza A and 35% were influenza B. Influenza A(H1N1) was the dominant subtype or type, however influenza B predominated for much of the latter part of the season.

Introduction

Surveillance of influenza in New Zealand is based on sentinel general practice (GP) and laboratory-based reporting. This surveillance is used to describe the incidence and distribution of the disease and virus strains. Influenza is not a notifiable disease in New Zealand.

The purpose of influenza surveillance is:

- to improve knowledge of the incidence and distribution of influenza in the community;
- to assist with early detection of influenza epidemics within the community to help with developing and implementing public health measures; and
- to identify the predominant strains in the community to help plan for an effective influenza vaccine for the subsequent year.[1]

This report summarises the results obtained from influenza surveillance in New Zealand for 2001, including some comparisons with previous years. It also includes information on hospital admissions for influenza (obtained from NZHIS) and influenza immunisation coverage data (obtained from Health Benefits Limited).

Methods

General practice sentinel surveillance – consultation and isolate data

The sentinel surveillance system, in its current form, commenced in 1991 as part of the WHO Global Programme for Influenza Surveillance. It is operated nationally by ESR and locally by influenza surveillance co-ordinators in the public health services (PHSs).

In 2001, national influenza sentinel surveillance was undertaken from May to September (week 18 to week 39 inclusive). Local surveillance co-ordinators recruited general practices within their region to participate on a voluntary basis. Where possible, the

number of practices recruited was proportional to the size of the population in each health district covered by the PHS (approximately 1:50,000 population).

General practitioners (GPs) were required to record the number of consultations for influenza-like illness each week and the age group (current categories as per Figure 6) of each of these suspected cases on a standardised form.

Influenza-like illness (ILI) was defined by a standardised case definition, which was:
"Acute upper respiratory tract infection characterised by abrupt onset and two of the following: fever, chills, headache, and myalgia."

Each practice was also asked to collect respiratory samples (throat or nose swab) from one patient (preferably the first) seen with an ILI on Monday, Tuesday and Wednesday of each week. The swabs were sent to a regional virus diagnostic laboratory and/or ESR for viral isolation and strain identification.

Information on the number of consultations and swabs sent from each health district was forwarded to ESR by local co-ordinators each week. Likewise, virology laboratories reported to ESR all influenza viruses identified that week, as well as updated type and strain information, and the total number of swabs received from each health district. This data was collated, analysed and reported on a weekly, monthly and annual basis.

Consultation rates were calculated using the sum of the patient populations, reported by the participating practices, as the denominator. The national level of ILI activity is described using a set of threshold values.[2] A weekly rate below 50 consultations per 100 000 patient population is described as baseline activity. A weekly consultation rate of 50-249 is considered indicative of normal seasonal influenza activity. Within the normal seasonal activity, 50 to 99 is low activity, 100-149 moderate, and 150 to 249 high. A rate of 250-399 indicates higher than expected influenza activity and ≥400 indicates an epidemic level of disease.

Laboratory-based surveillance – year-round isolate data

In addition to influenza viruses (isolates) identified from sentinel surveillance, year-round laboratory surveillance of influenza (and other viruses) is carried out by the four regional virus diagnostic laboratories at Auckland, Waikato, Christchurch and Dunedin Hospitals, and by ESR's virology laboratory. Each week, all viral identifications, including influenza, largely from hospital inpatients and outpatients are reported to ESR. ESR in turn collates and reports virology surveillance data nationally. Both the ESR and Auckland Hospital laboratories are designated WHO National Influenza Centres.

The criteria for laboratory identification of influenza include the direct detection of viral antigen or isolation of the virus (by culture). Virus isolation is the gold standard for influenza diagnosis and surveillance specificity. All influenza isolates are typed and most influenza A isolates subtyped.

Hospitalisations

Hospitalisations for influenza (ICD-9CM code 487) were extracted from the New Zealand Health Information Service's National Minimum Dataset (NMDS) for the year 2001 (by admission date). Influenza-related hospitalisations were conservatively taken to include only those where influenza was the principal diagnosis. Repeat admissions were included, as repeat infections with another influenza A subtype or B virus are possible. Data from December 2001 are provisional at the time of writing.

Immunisation Coverage

In 1997 influenza vaccination was made available free to those ≥65 years of age, and in 1999 free vaccination was extended to risk groups <65 years.[3,4] The data that medical practitioners provide to Health Benefits Limited to claim reimbursement were used to estimate coverage in 2001 among persons ≥65 years of age. These data are provisional at the time of writing.

New Zealand Population

Population data for each age group obtained from the Statistics New Zealand 2001 Census of Population and Dwellings were used for calculations and figures.

Results

Sentinel Practices

In 2001, 80 sentinel practices were initially recruited from 23 out of the 24 health districts (one health district did not participate in 2001). All PHSs began reporting by the end of May 2001. Some practices did not report every week. The average number of practices participating per week was 77, with an average patient roll of 306 553.

Disease burden

From May to September 2001, a total of 4 079 sentinel consultations for influenza-like illness were reported. This gives an average national weekly consultation rate of 62.8 per 100 000 patient population. This rate is higher than the average weekly rate for 2000 of 32.5 per 100 000 but less than the 1999 rate of 112.3 per 100 000.

Figure 1 compares the weekly consultation rates for influenza-like illness in 2001 with 2000 and 1999. Influenza consultation activity remained at the baseline level from week 18 to 23, then increased rapidly to a peak at the end of June. The highest consultation rate was reported during week 26 (25-29 June) with 140.3 per 100 000 patient population. This is the same week that had the highest consultation rate in 2000 with 41.0 per 100 000 but is two weeks later than the highest consultation week in 1999 with 190.8 per 100 000. Consultation activity then gradually declined, remaining at a low to moderate level until dropping back to baseline in week 36.

Figure 1: Weekly consultation rates for influenza-like illness in New Zealand, 1999, 2000 and 2001

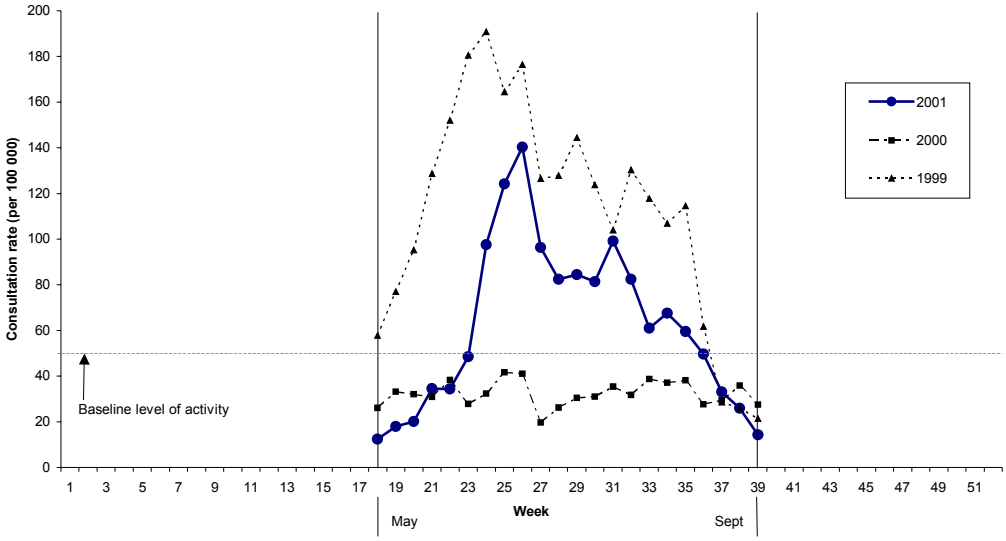


Figure 2: Total influenza isolates by surveillance type and week specimen taken, 2001

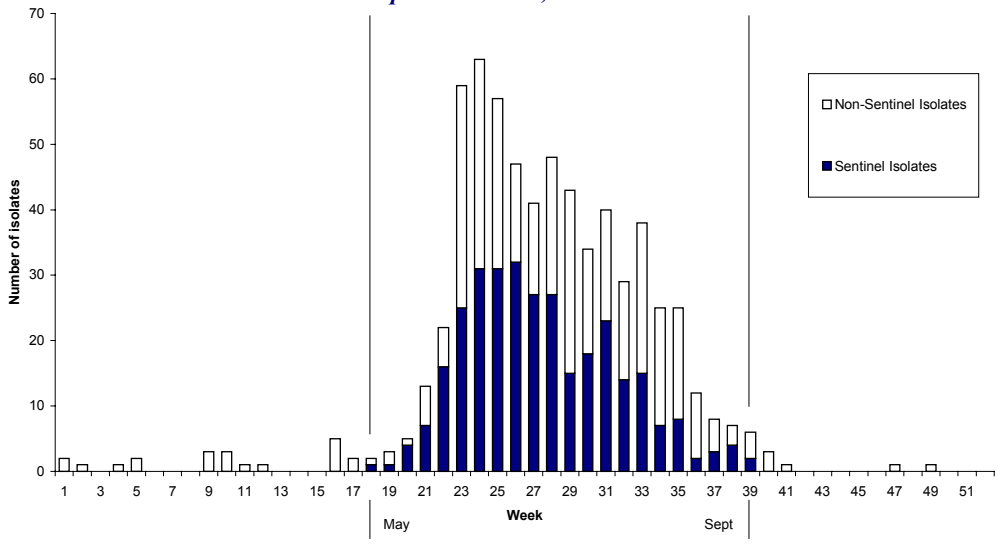
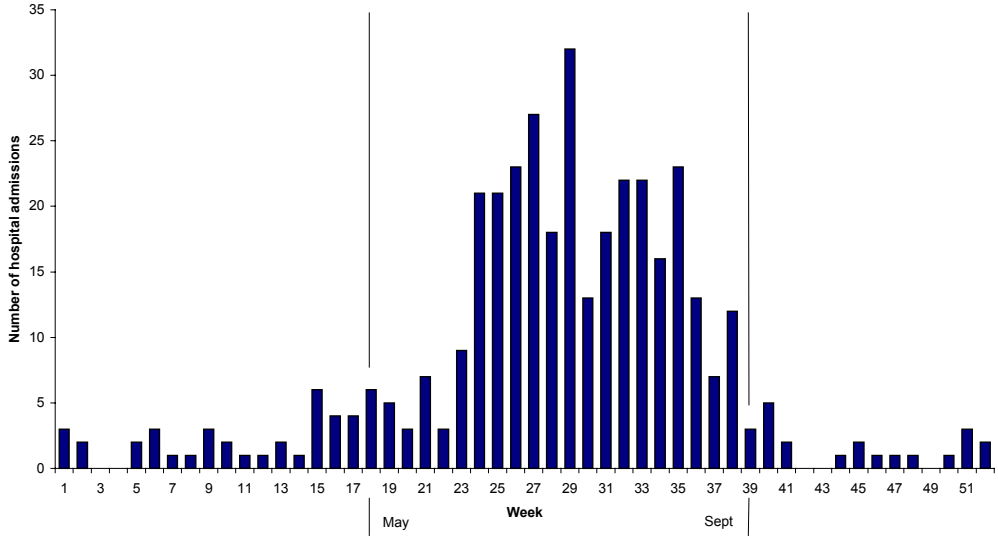


Figure 3: Influenza hospitalisations by week admitted, 2001



A total of 654 influenza isolates were identified in 2001, more than twice the 303 isolates in 2000 but less than the 816 isolates in 1999. Of the 2001 isolates, 313 came from sentinel practice surveillance during May to September. This is more than a four-fold increase from the 73 sentinel isolates identified in 2000, but lower than the 425 sentinel isolates identified in 1999. There were 341 non-sentinel isolates identified in 2001 compared to 230 in 2000 and 391 in 1999.

Figure 2 shows influenza virus isolations each week throughout 2001. The highest number of sentinel isolates (32) came from specimens taken in week 26, corresponding with the peak in consultation rates. Non-sentinel influenza isolates were identified as early as January, however the vast majority (314, 92%) were from specimens taken during May to September. This is in contrast to the late activity seen in 2000, when almost half of the non-sentinel isolates (112) were identified after the sentinel period ended. Most sentinel isolates (65%) came from the first half of the sentinel period (weeks 18 to 28) and outnumbered non-sentinel isolations during this time (202 to 158). Non-sentinel isolates predominated in the latter part of the season.

In 2001, there were a total of 379 hospital admissions for influenza. This compares with 229 admissions in 2000 and 518 in 1999. Figure 3 shows these admissions by week, 85% (323) of which occurred during May to September. The highest number of admissions (32) occurred in week 29.

Geographic distribution

In addition to national activity, sentinel surveillance is able to provide an indication of the distribution of influenza-like illness and viral strains within New Zealand.

Figure 4 shows the sentinel average weekly consultation rates for each health district during May to September 2001 (square brackets denotes a health district that did not participate in sentinel surveillance). The health district reporting the highest rate was Eastern Bay of Plenty (155.6 per 100 000 patient population), followed by Manawatu (103.8 per 100 000), Tauranga (102.7 per 100 000), South Auckland (91.8 per 100 000), Waikato (88.9 per 100 000), and Wanganui (87.1 per 100 000).

Figure 5 shows the distribution of sentinel influenza isolates based on the health district from which the specimen (swab) was taken. It can be seen that most isolates came from the Auckland and Waikato area, as well as Canterbury. Both Influenza A and B were seen throughout the country. Isolates were not identified in three health districts (compared to 11 in 2000), and swabs for sentinel surveillance were not taken in one health district. The national isolation rate for 2001 was 31.6% (313 isolates from 989 swabs received), which is markedly higher than the 2000 rate of 8.5% (854 swabs), and slightly higher than the 1999 rate of 28.6% (1487 swabs).

Figure 4: Sentinel average weekly consultation rate for influenza-like illness by health district, 2001

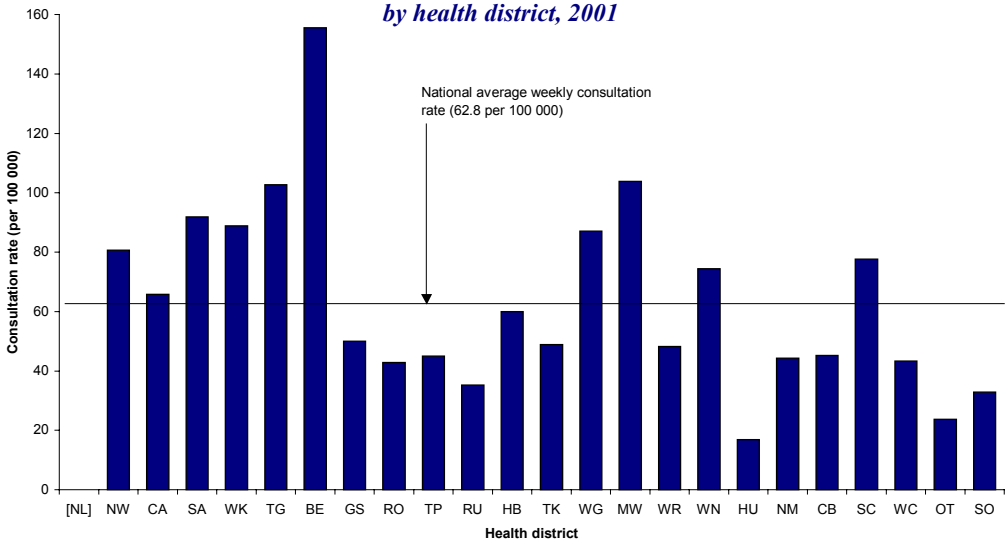


Figure 5: Sentinel surveillance influenza virus isolates by type and health district, 2001

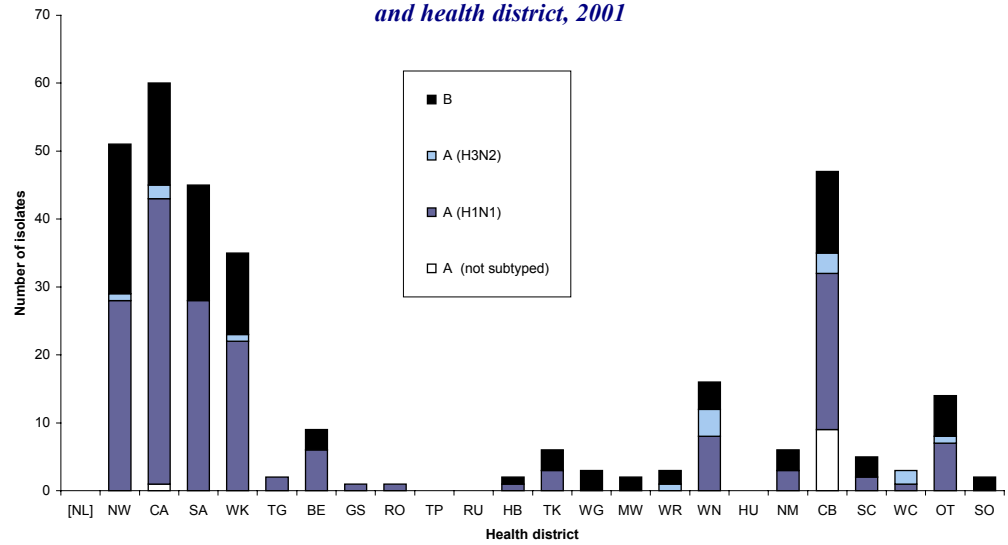
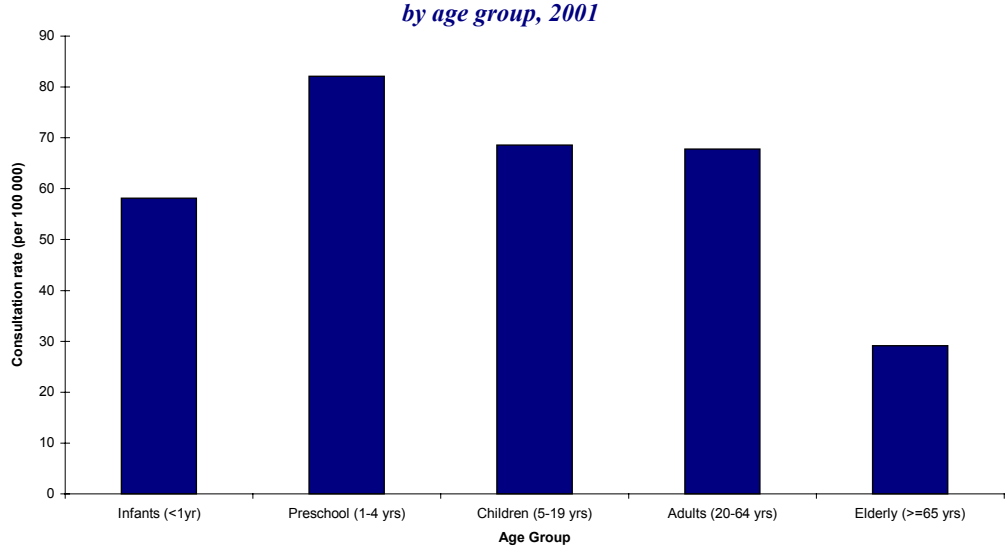


Figure 6: Sentinel average weekly consultation rate for influenza-like illness by age group, 2001



Rates of ILI by age group were calculated for each age-band used in the sentinel surveillance system. The denominator for rate calculations was based on the knowledge that the total number of patients from the sentinel practices was 8.2% of the New Zealand population. It was assumed that this practice population collectively had the same age distribution as the New Zealand population. These rates are presented graphically in Figure 6.

The highest consultation rate for influenza-like illness was in pre-schoolers, with an average weekly consultation rate of 82.1 per 100 000 patient population. Children aged 5-19 years had a rate of 68.6 per 100 000, and adults aged 20-64 years had a slightly lower rate of 67.8 per 100 000. Infants had a rate of 58.1 per 100 000. Elderly people (aged 65 years and over) had the lowest rate of 29.1 per 100 000.

Figures 7 to 11 show the percentage of influenza consultations, hospitalisations, and isolates contributed by each age group, as well as the 2001 New Zealand resident population by the same age categories.

Figure 7: Percentage of sentinel consultations for influenza-like illness by age group, 2001

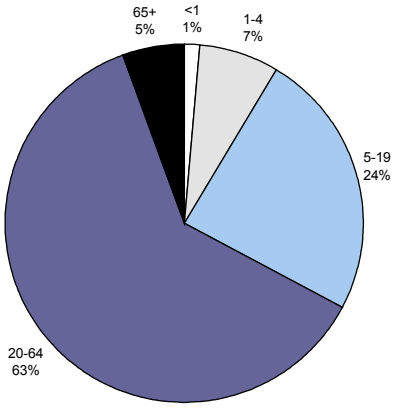


Figure 8: Percentage of influenza hospitalisations by age group, 2001

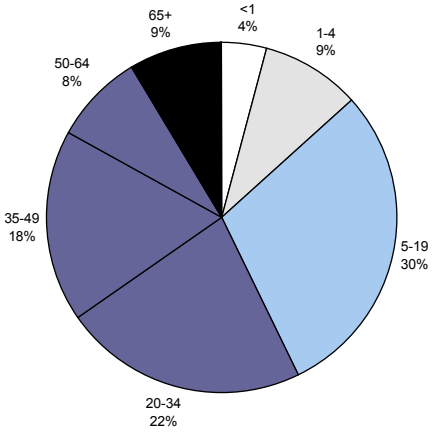


Figure 9: Percentage of sentinel influenza isolates by age group, 2001

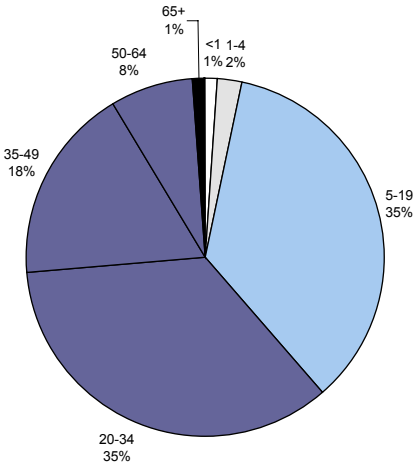


Figure 10: Percentage of non-sentinel influenza isolates by age group, 2001

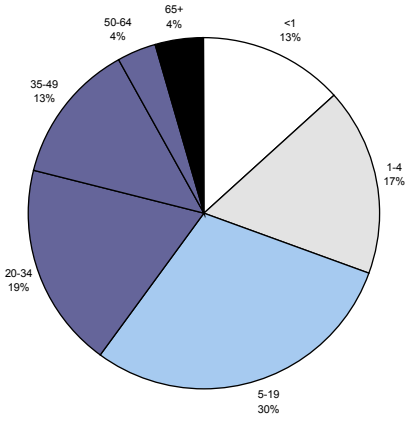
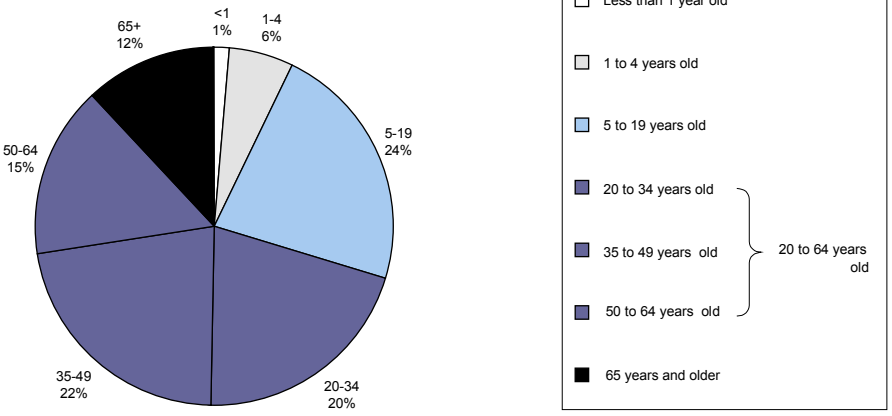


Figure 11: Percentage of NZ resident population by age group, 2001



Immunisation Coverage

The uptake of influenza vaccine in New Zealand in 2001 is shown in Table 1. Provisional data suggest that an immunisation rate of 58.2% among persons 65 years and over was achieved. No provisional data on immunisation coverage are available for at risk individuals under the age of 65 years.

Table 1: Influenza Vaccine Coverage rates for Persons aged 65 years and over in 2001

Region	% of Population ≥65 Vaccinated
Northland	47.4
Auckland	52.3
Taranaki	68.0
Tairawhiti/Hawkes Bay	61.3
Waikato	55.1
Wanganui/Manawatu	46.3
Wellington	52.5
Nelson/Marlborough	59.6
Canterbury/West Coast	71.0
Otago/Southland	70.1
National	**58.2**

Virus strain characterisation and 2002 vaccine formulation

2001

Figure 12 shows influenza virus isolations by type and subtype for each week throughout 2001, and the total percentage contribution of each.

The majority of influenza isolates (424 or 65% of all isolates) were characterised as influenza A. There were 230 influenza B isolates identified in 2001, which represents 38% of typed and subtyped isolates (609) and 35% of all influenza isolates (654). Influenza B made up 24% of all isolates in 2000, and 20% in 1999.

As shown in Figure 13, the general pattern of influenza A isolations was a relatively rapid rise in activity, peaking in week 24 (early June), and the majority of A isolates occurred early in the season. This was largely made up of A(H1N1), which was the predominant strain of influenza isolates in 2001 overall, and the most frequently isolated subtype or type from weeks 18 to 29. There were 331 A(H1N1) isolates identified in 2001, which represents 54% of typed and subtyped isolates (609) and 51% of all influenza isolates (654). Influenza A(H3N2) only represented a small proportion of isolates in 2001 – 8% (48) of typed and subtyped isolates and 7% of all isolates.

In contrast to influenza A, influenza B activity appeared to increase more slowly throughout the winter, peaking in week 33, and was the predominant type or subtype from weeks 30 to 41. The early influenza B isolates from specimens taken in weeks 9 to 11 included an outbreak in Taranaki.

1990-2001

Figure 14 shows the number and percentage of typed and subtyped (not total) influenza isolates from 1990 to 2001. There are three noticeable changes in terms of predominant patterns:

Influenza A(H1N1)

During 1990 to 1999, influenza A(H1N1) predominated or co-dominated only in 1992 (86% of typed/subtyped isolates) and 1998 (47% of typed/subtyped isolates). However in the past two years (2001 – see above, and 2000), influenza A(H1N1) predominated consecutively, which is an unusual feature. There were 82 A(H1N1) isolates in 2000 (36% of typed/subtyped isolates).

Influenza A(H3N2)

Influenza A(H3N2) viruses have often been associated with more severe disease and with excess pneumonia and influenza mortality. For example, the highest peak of deaths at 94 in 1996 in New Zealand was recorded during an A(H3N2) epidemic.[5] During 1993 to 2000, A(H3N2) had been the predominant or co-dominant strain for each year. However in 2001, A(H3N2) constituted only 8% of typed/subtyped isolates.

Influenza B

It is well documented that influenza B predominates or co-dominates every second year. In New Zealand, influenza B predominated or co-dominated in 1991, 1993, 1995, 1997, 1999 and 2001. When influenza B was not the predominant or co-dominant strain, it consisted of a small proportion during 1990 to 1999: 16% in 1990, 11% in 1992, 1% in 1994, 1% in 1996, 1% in 1998. However, in 2000, even though influenza B was not the predominant or co-dominant strain, it consisted of 31% of typed/subtyped isolates.

Figure 12: Total influenza isolates by type and week specimen taken, 2001

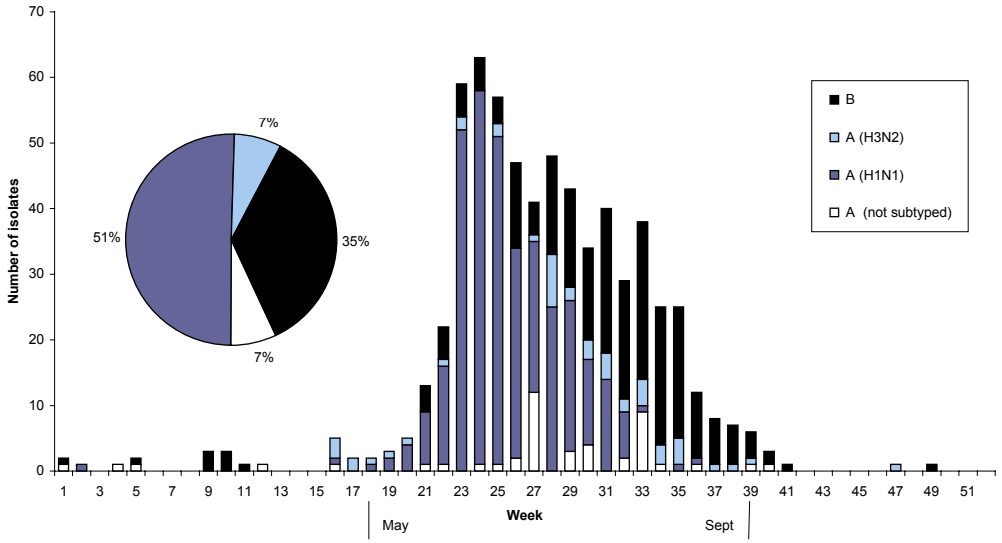


Figure 13: Total influenza virus isolates by type and week specimen taken, 2001

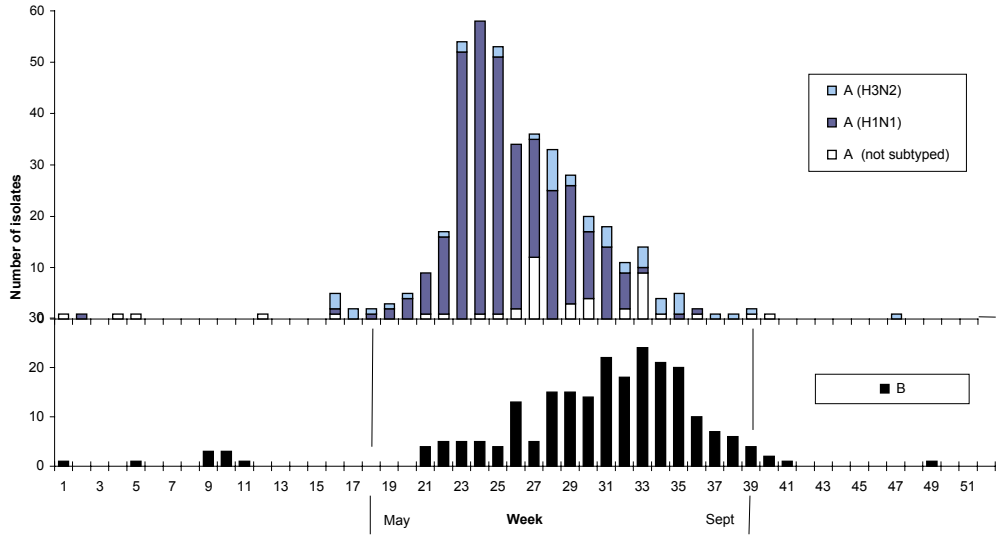
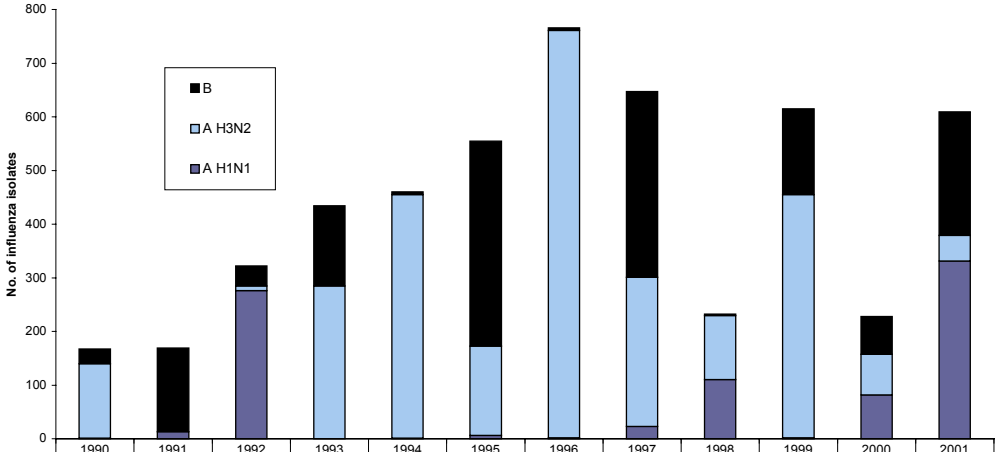


Figure 14: Influenza isolates by type, 1990-2001



	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
B	16%	92%	11%	34%	1%	69%	1%	53%	1%	26%	31%	38%
A H3N2	83%	0%	3%	66%	99%	30%	99%	43%	52%	74%	33%	8%
A H1N1	1%	8%	86%	0%	0%	1%	0%	4%	47%	0%	36%	54%

Southern Hemisphere Trends

In October 2001, the Australian Influenza Vaccine Committee (AIVC), with a New Zealand representative, met to decide on the composition of the influenza vaccine for the 2002 winter season. During these discussions, the following trends were noted:

Influenza A(H1N1)

Influenza A(H1N1) subtype viruses, which re-emerged in 1977, closely resemble strains that circulated until 1956. Because of this, they initially had little impact in the older population. With further antigenic drift in the subtype, there has been evidence of increasing impact in the elderly. Two antigenically distinct lines of influenza A(H1N1) have circulated in recent years and these are A/New Caledonia/20/99 and A/Bayern/7/95. Influenza A(H1N1) viruses predominated in most regions worldwide during the previous 12 months. Viruses of the A/New Calendonia/20/99 lineage have continued to progressively replace A/Bayern/7/99-like strains.

The Australian WHO Collaborating Centre showed that most A(H1N1) isolates from the Southern Hemisphere in 2001, including New Zealand, were A/New Caledonia/20/99. Based on the global data, the WHO Consultative Group concluded that there was no need to change the vaccine strain from an A/New Caledonia/20/99-like virus. Two factors still remain true for the recommendation of A/New Caledonia/20/99-like virus for the year 2002 vaccine formulation:

- Increasing incidence of viruses of this type, and
- The demonstration that, in humans, vaccines containing viruses of this lineage induce similar antibody responses against both the homologous virus and A/Bayern-like strains whereas the converse was not true.

Influenza A(H3N2)

Influenza A(H3N2) has been frequently associated with severe disease and excess mortality in high-risk groups. This subtype has also shown the greatest tendency for antigenic drift as illustrated by the frequency of vaccine formulation changes recommended by the WHO and the AIVC. Influenza A(H3N2) viruses around the world were less prominent than influenza A(H1N1) or influenza B during the previous 12 months. The circulating viruses in this subtype fall into a single lineage, however, a degree of antigenic heterogeneity is often observed.

The Australian WHO Collaborating Centre showed that most A(H3N2) isolates from the Southern Hemisphere including New Zealand remain closely related to the A/Moscow/10/99 reference strain and A/Panama/2007/99 vaccine virus. There is evidence of antigenic heterogeneity among the isolates with no single evolutionary lineage at this time. Based on the global data, the WHO Consultative Group concluded that there was currently no pressing need to change from a recommendation for an A/Moscow/10/99-like virus as the A(H3N2) vaccine component for 2002 and there is no obvious new candidate reference strain.

Influenza B

Two distinct lines of influenza B have been observed during recent years. This dates back to 1990 when the B/Panama/45/90 variant of influenza B arose whilst strains of the previous B/Victoria /2/87-like viruses continued to circulate in Asia. Further variation of the B/Panama line gave rise to the B/Beijing/184/93-like viruses. Meanwhile in Asia,

independent antigenic evolution of the B/Victoria/2/87-like virus continued and gave rise to the B/Shangdong/7/97-like strains that were prominent in a number of parts of Asia during 1998-9. During the previous 12 months, influenza B viruses co-circulated with influenza A in most parts of the world although levels have been variable. Viruses of the B/Sichuan/379/99 lineage have predominated with only small numbers of isolates from the B/Shangdong/7/97 lineage. For the first time, however, B/Shangdong/7/97 lineage viruses have spread beyond Asia with a number of isolates in Hawaii.

The Australian WHO Collaborating Centre showed that all viruses from the Southern Hemisphere in 2001 including New Zealand were B/Sichuan/379/99 lineage viruses, with the exception of a single B/Shangdong/7/97 lineage virus received from Taiwan. Based on the global data, the WHO consultation group concluded that vaccines containing a B/Sichuan/379/99-like strain remained appropriate. These vaccines would be expected to offer little protection against current viruses of the B/Shangdong lineage, however, these are neither sufficiently numerous nor widespread at the moment to consider inclusion of a strain of this type in the vaccine.

In summary, the AIVC agreed to adopt the recommendations made by the WHO consultation group as per the box below.

The recommended influenza vaccine formulation for New Zealand in 2002 is:

- **A(H1N1)** **an A/New Caledonia/20/99-like strain**
- **A(H3N2)** **an A/Moscow/10/99-like strain**
- **B** **a B/Sichuan/379/99-like strain**

This is the same composition as the 2001 formulation.

Discussion

Based on sentinel consultation data using a set of threshold values, influenza activity in 2001 is described as low to moderate. When weekly consultation rates for influenza-like illness from 1992 to 2001 are compared, 2001 has the third lowest level of influenza activity, with 2000 and 1998 first and second lowest respectively.

It is estimated that influenza-like illness resulting in a visit to a general practitioner affected over 48 000 New Zealanders in 2001 or about 1.3% of the population. The number of cases reported through the sentinel network is likely to be a considerable underestimate of the true number, as many people do not consult a general practitioner when they have an influenza-like illness.

When the overall pattern for sentinel consultation rates, isolations and influenza hospitalisations are compared for 2001 (Figures 1-3), they follow a very similar pattern, peaking in June to mid August and then declining to the baseline level in September. In contrast, influenza activity in 2000 peaked very late in September, almost at the end of the sentinel period, and a large number of isolates were identified after sentinel surveillance ended. Since influenza seasonality is variable, there is a need for sentinel surveillance to extend beyond the current May to September period, ideally to year-round surveillance.

Consultation rates varied greatly among health districts. The use of a common case definition for the purposes of surveillance should minimise regional differences in the criteria for diagnosis of influenza. However, in health districts where only a single practice or a small number of practices participate, consultation rates are more likely to be subject to variations in individual diagnostic practices.

One of the strengths of the sentinel surveillance system in New Zealand is the combination of disease surveillance (influenza-like illness) and strain surveillance (virological identification). A definitive diagnosis of influenza requires laboratory confirmation, since clinical diagnosis on the basis of clinical symptoms is not highly specific. Consequently, an important part of the sentinel system is for GPs to take throat and/or nose swabs from patients presenting with an influenza-like illness on Monday, Tuesday and Wednesday of each week. During the 2001 season, some health districts had a small number of swabs or no swabs taken at all.

Some health districts had an influenza virus isolation rate lower than the national average of 32%. Many factors could contribute to low isolation rates, including sampling techniques. Sampling of the respiratory tract for clinical viral isolation should maximise the harvest of virally infected epithelial cells. Ideally, nasopharyneal washes or aspirates would be the best specimens since they contain a higher cellular content than nasopharyneal swabs.[6] By comparison, throat swabs or throat washings are of limited use in the diagnosis of influenza since the majority of cells captured by this technique are squamous epithelia. However, a combined nose (ie. nasophrayngeal) and throat swab can be a useful specimen for influenza virus isolation and it is selected for influenza surveillance because of its convenience. Nasopharyngeal swabs should be cotton-, rayon- or dacron-tipped, plastic-coated swabs. The swab should be inserted deeply into the nasopharynx, rotated vigorously to collect columnar epithelia cells, removed, replaced into viral transport medium (VTM), and couriered to the virology laboratory chilled without delay.

Pre-schoolers (1-4 years) were most likely to be seen by a general practitioner for an influenza-like illness in 2001. The higher consultation rate for this age group is probably due, in part, to children under five being most likely to be seen by a general practitioner when they are suffering from an influenza-like illness. However, the rate among infants was lower than for older children and adults (in 2000 the infant rate was the highest and in 1999 second highest). As in previous years, those aged over 65 years reported the lowest consultation rate. This may be due to relatively higher vaccination rates among the elderly. The mortality rate is markedly higher in those aged over 65 years (this age group accounted for 94.1% of deaths from influenza recorded for the 1990-98 period),[5] however data on the number of deaths from influenza in 2001 were not yet available.

Looking at the influenza age group data from sentinel surveillance and hospitalisations (Figures 7 and 8), it is interesting to note that there were more hospital admissions for under 5 year olds and ≥ 65 year olds relative to other age groups when compared to the pattern seen for sentinel consultations. Possible explanations include a greater severity of illness in the very young and elderly populations, leading to higher hospitalisation rates, and/or less specific symptoms in these groups, increasing the difficulty of making a clinical diagnosis in general practice.[5]

Comparing age data for positive influenza virus isolates from sentinel and non-sentinel surveillance (Figures 9 and 10), the sentinel system tends to detect less influenza viruses in the under 5's and ≥65 year olds relative to other age groups than its non-sentinel – laboratory-based, mainly hospital – counterpart. This may reflect a greater reluctance among sentinel GP's to take swabs from very young children and frail elderly. Overall, these data indicate that sentinel and hospital surveillance compliment each other, providing a better description on influenza disease burden for different age groups.

Comparing the predominant strains in New Zealand during the past 12 years (Figure 14), it is interesting to note some recent changes. Influenza A(H1N1) has become the predominant strain in the past two years, which is unusual, since A(H1N1) was the least frequent predominant strain during 1990 to 1999. Influenza B has also become more prominent. In addition to the recent pattern of predominating or co-dominating every second year, including 2001 and 1999, influenza B also consisted of a large proportion of isolates in 2000 (even though it was not the predominant or co-dominant strain). Lastly, influenza A(H3N2) in 2001 constituted a small proportion (8%) of typed/subtyped isolates.

Overall, the sentinel surveillance system is very useful in measuring disease burden in the community. However, the results of sentinel surveillance need to be interpreted with caution. For example, sentinel data cannot be extrapolated precisely to the rest of the population since the sentinel practices are not representative. Practices are not randomly selected and consist of GPs who participate through goodwill, usually due to an interest in influenza surveillance. In addition, consultation rates use the number of patients in the practice as the denominator. These data are provided at the beginning of the season and do not take into account the number of patients entering or leaving the practice during that time. GPs may also see "casual" patients who are not part of the practice population. Despite these problems, the system is useful in meeting the purposes of influenza surveillance, namely:

1. to provide information on trends, comparisons with previous years, and between health districts,

2. to assist with the early detection of influenza epidemics, and
3. to provide specimens for identifying the predominant strains circulating in the community.

As the impact of influenza can be reduced by annual immunisation, this information is particularly important in raising awareness of the disease amongst health professionals and the public, and planning vaccine formulation and delivery. Influenza vaccines are recommended for persons at risk of developing complications following infection because of their age or because of some underlying chronic condition.[7]

New Zealand's influenza immunisation target for 2000 was 75% for those in the ≥65 year risk group. In 2001 a coverage level of 58.2% (provisional) was achieved, approximately the same as for 2000 (59%). Considering New Zealand has government-funded immunisation for this risk group, an essential factor for increasing vaccine coverage,[4,5] continued improvement should have been made. Possible reasons for the static national coverage levels may relate to the 2001 Influenza Awareness Program following both Northern and Southern hemisphere influenza seasons of low influenza activity. This may have led to complacency, with many New Zealanders having little interest in protecting themselves against influenza and healthcare provider commitment also being compromised. It is well documented that health professional enthusiasm and support for immunisation is the single most important predictor of a patient being immunised against influenza.[8] Media interest in influenza did increase late in June, when images of people suffering from influenza prompted some people to get vaccinated. Good data through continuing surveillance is essential in adding weight to such messages, and ensuring the provision of effective vaccines to reduce the burden of influenza in New Zealand.

The influenza sentinel surveillance system is possibly New Zealand's only ongoing syndromic surveillance system. Most other surveillance systems are based on collecting data on diagnosed disease. Syndromic surveillance is increasingly being developed as an approach to detecting new emerging pathogens that may initially present as non-specific infectious diseases.[9] It is also being promoted as a strategy to improve the early detection of bioterrorism attacks.[10] Improving influenza surveillance is also a key strategy for improving New Zealand's preparedness for pandemic influenza.[11] There is a good case for reviewing New Zealand's existing influenza surveillance system and considering extensions to it.

Recommendations

1. That the sentinel influenza surveillance system be reviewed using standard surveillance system criteria and benchmarked against international best practice. This review should include consideration of:
   - The case definition for ILI
   - The methods of specimen collection from cases
   - Extending the system to operate all year
   - Greater use of electronic approaches to data collection and dissemination

2. That the sentinel influenza surveillance system be reviewed in terms of its potential for surveillance of other diseases and syndromes of public health importance.

Acknowledgements

We would like to thank the general practitioners and their staff, the local surveillance coordinators, regional virology laboratories, and medical officers of health involved in influenza surveillance for their time and cooperation. We would also like to acknowledge the Virology Laboratory at ESR for the provision of laboratory data, as well as Heather Sutherland and Ingrid Kristament for their role as ESR influenza coordinator during 2001, and Nick Garrett for his assistance in preparing this report. A special thanks to Chris Lewis for providing influenza hospitalisation data for 2001.

References

[1] Report of the WHO/GEIG Informal Consultation on the Standardization and Improvement of Influenza Surveillance, Monaco, September 1991.

[2] Dedman DJ, Joseph CA, Zambon M, et al. Influenza surveillance in England and Wales: October 1996 to June 1997. CDR Rev 1997; 13: R212-9.

[3] Influenza vaccine. [Circular letter] to health professionals. Wellington: Ministry of Health, 1996.

[4] Jennings LC, Baker S. Government policy change in 1997 was essential for the implementation of an influenza vaccination strategy for New Zealand. In: Osterhaus ADME, et al, editors. Options for the control of influenza IV. Proceedings of the Fourth International Conference on Options for the Control of Influenza; 2000 Sep 23-28; Hersonissos, Greece. Amsterdam: Elsevier, 2001.

[5] Jennings L, Huang QS, Baker M, et al. Influenza surveillance and immunisation in New Zealand, 1990-1999. NZ Public Health Report 2001; 8: 9-12.

[6] Zambon M. Chapter 22: Laboratory Diagnosis of Influenza. In: Nicholson KG, Webster RG, Hay AJ, eds. Textbook of Influenza. London: Blackwell Science Ltd, 1998.

[7] Ministry of Health. Immunisation Handbook. Wellington: Ministry of Health, 1996.

[8] Hampson AW. Vaccination of the older adult: the Australian experience. Vaccine 1999; 17: S63-S66.

[9] Rana A, Hajjeh D, Relman P, et al. Surveillance for unexplained deaths and critical illnesses due to possibly infectious causes, United States, 1995–1998. Emerg Infect Dis 2002; 8: 145-53.

[10] Polyak CS, Elbert Y, Pavlin JA, et al. The Electronic Surveillance System for the Early Notification of Community-based Epidemics (ESSENCE): GIS Modeling in an Early Detection Surveillance System for Bioterrorist and Natural Disease Threats. International Conference on Emerging Infectious Diseases. Atlanta 24-27 March 2002.

[11] WHO. Influenza Pandemic Preparedness Plan: The role of WHO and guidelines for national and regional planning. WHO/CDS/CSR/EDC/99.1. Geneva: WHO, April 1999.