

INFLUENZA WEEKLY UPDATE

2009/27: 29 June – 5 July 2009

The national influenza surveillance system in New Zealand is an essential public health component for assessing and implementing strategies to control influenza. This report summarises the data collected from sentinel general practice (GP) surveillance and non-sentinel surveillance for week 27 (29 June – 5 July 2009).

IN THIS REPORT:

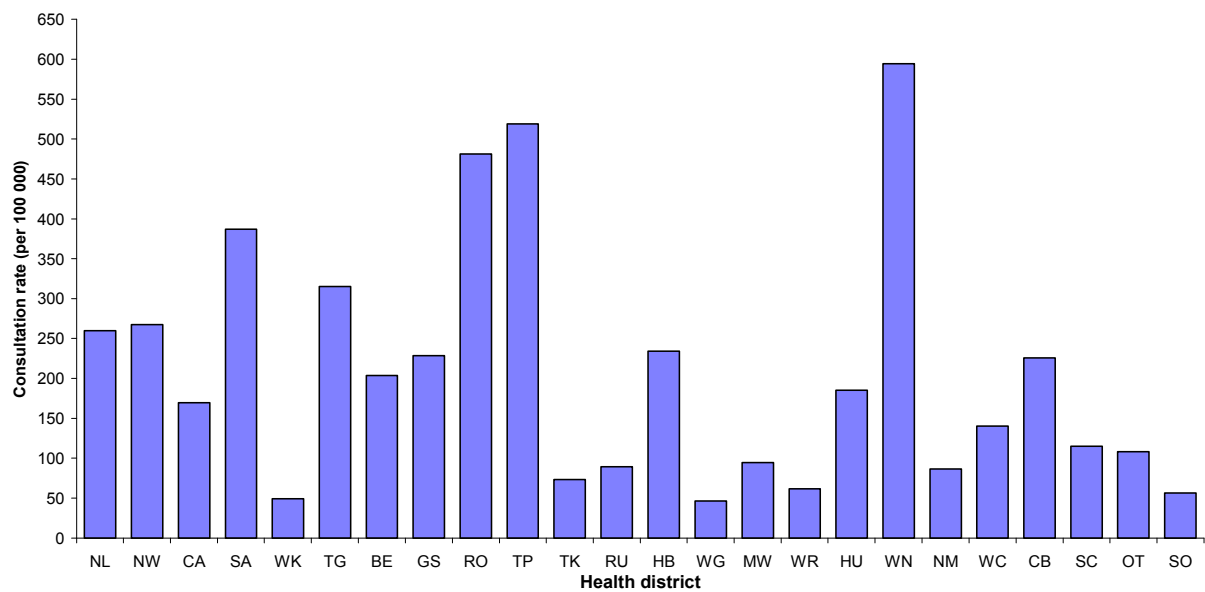
- There has been a continuing sharp increase in consultations for influenza-like illness through sentinel surveillance in week 27 (29 June – 5 July 2009). The weekly ILI consultation rate is much higher than previous years for the same week. The highest weekly ILI rates were reported from Wellington, Taupo and Rotorua health districts. So far, the highest ILI consultation rates have been reported among children and teenagers aged 0 to 19 years.
- This year to date (1 January – 5 July 2009), a total of 1927 influenza viruses have been reported through sentinel (194, 10.1%) and non-sentinel surveillance (1733, 89.9%). Among 85 influenza viruses reported from sentinel surveillance in week 27, the number of novel AH1N1 09 viruses is now greater than the number of seasonal influenza viruses. Seasonal AH1N1 strain is the predominant strain among all seasonal influenza viruses.
- Since January 2008, a global emergence and rapid spread of oseltamivir-resistant seasonal influenza AH1N1 viruses has been observed. Since 2009 in New Zealand, a total of 53 seasonal AH1N1 viruses have been tested by either a phenotypic assay or a molecular assay and all 53 viruses have been resistant to oseltamivir.
- Most of novel influenza AH1N1 09 viruses reported globally are sensitive to oseltamivir with only 3 isolated cases reported from Denmark, Japan and Hong Kong showing oseltamivir resistance. During this winter season in New Zealand, a total of 16 novel influenza AH1N1 09 viruses were tested by either a phenotypic assay or a molecular assay and all 16 viruses were sensitive to oseltamivir.
- Novel influenza AH1N1 09 is a notifiable disease in New Zealand. As of 5 July 2009, there have been 1210 cases recorded in EpiSurv. Two deaths have been reported and 162 cases have been hospitalised. Twenty-nine cases have had pneumonia and five cases acute respiratory distress syndrome. The age standardized rate for confirmed cases is 31.4 per 100 000.

SENTINEL GENERAL PRACTICE SURVEILLANCE¹

In the past week, a total of 711 consultations for influenza-like illness were reported from 88 general practices in all 24 health districts. This gives a weekly consultation rate of 183.7 per 100 000 patient population.

The graph below compares the consultation rates for influenza-like illness for each health district over the past week. Wellington had the highest consultation rate (594.4 per 100 000, 131 cases), followed by Taupo (519.0 per 100 000, 12 cases) and Rotorua (481.4 per 100 000, 8 cases).

Figure 1: Weekly consultation rates for influenza-like illness by health district week ending 5 July 2009



¹ For more details on sentinel GP surveillance, please refer to Appendix.

The weekly national consultation rates are shown in figure 2 for 2007 and 2008 seasons, and 2009 so far. The current ILI rate of influenza is higher than at the same time last year.

Figure 2: Weekly consultation rates for influenza-like illness in New Zealand, 2007, 2008 and 2009

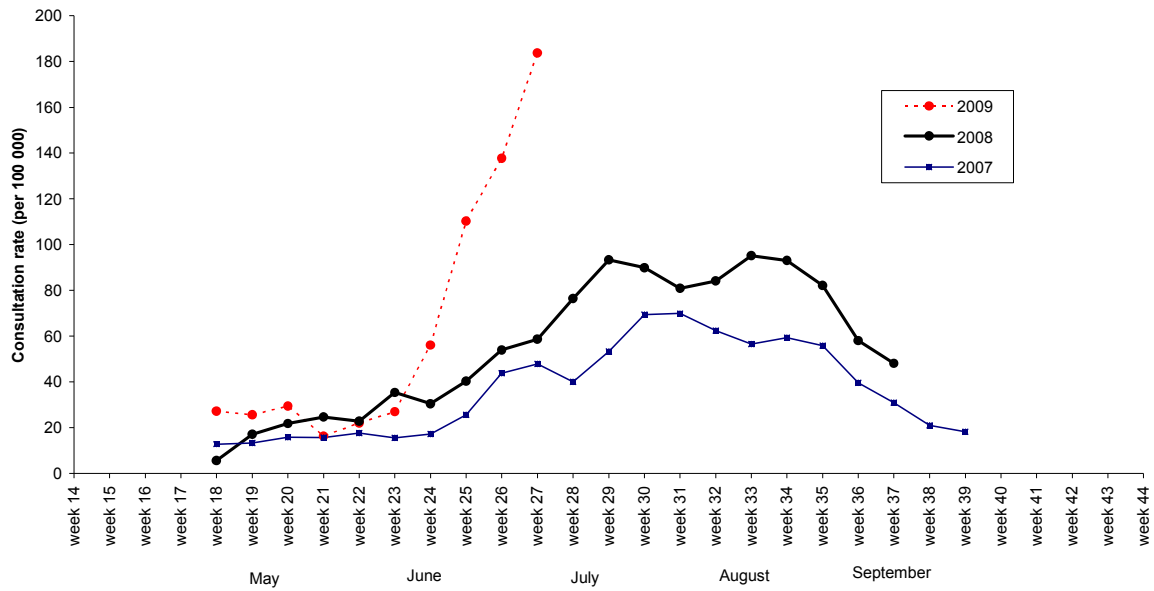
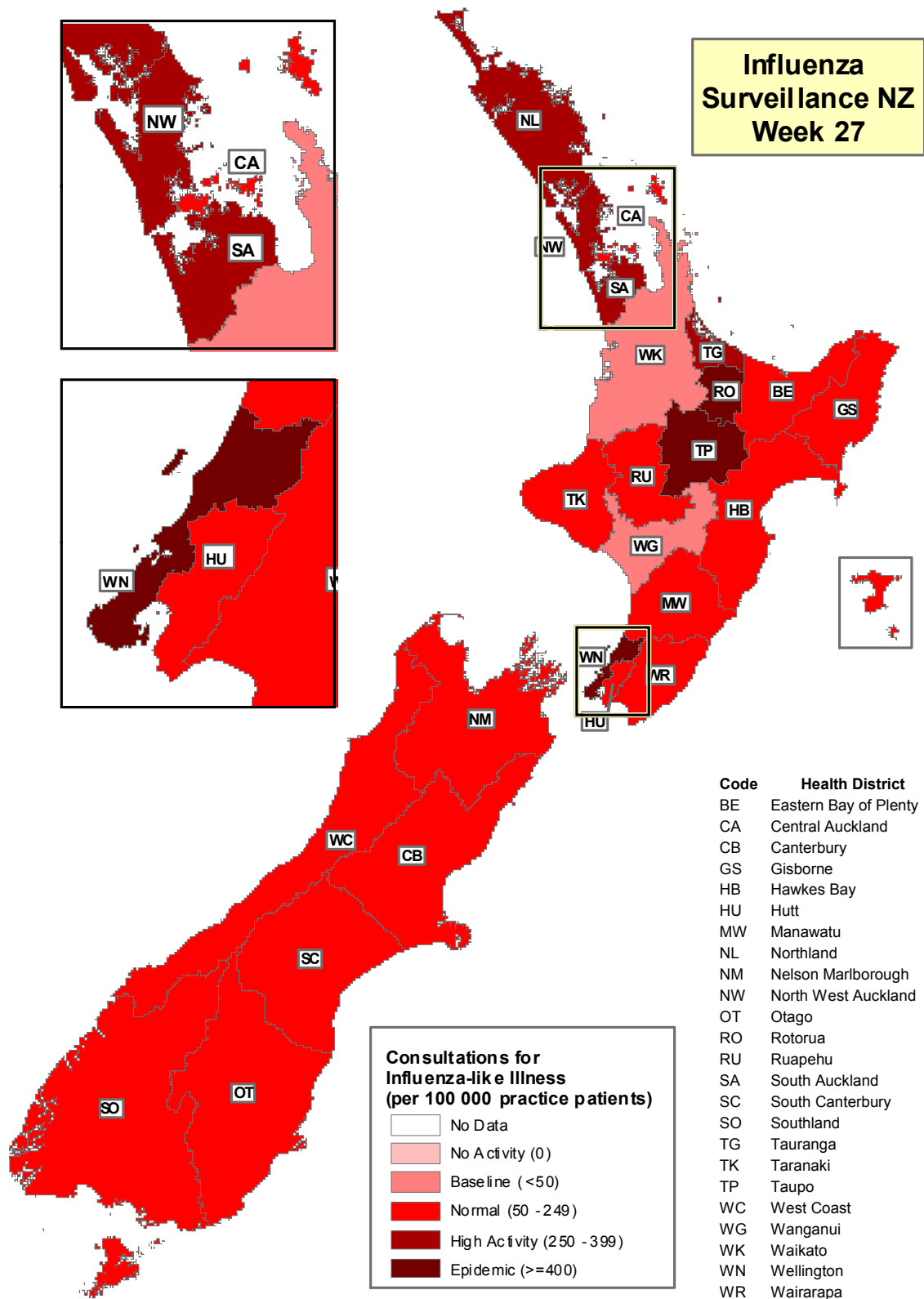


Figure 3 illustrates consultation rates for influenza-like illness mapped by health district for week 27, 2009.



One hundred and sixty-seven swabs were sent from the sentinel surveillance in the past week. Two hundred and ten swabs were received by the virology laboratories. Of these, 85 influenza viruses were identified: novel influenza AH1N1 09 virus (68), seasonal influenza A virus (13), and seasonal influenza AH1N1 virus (4). The distribution by health district is shown in Table 1.

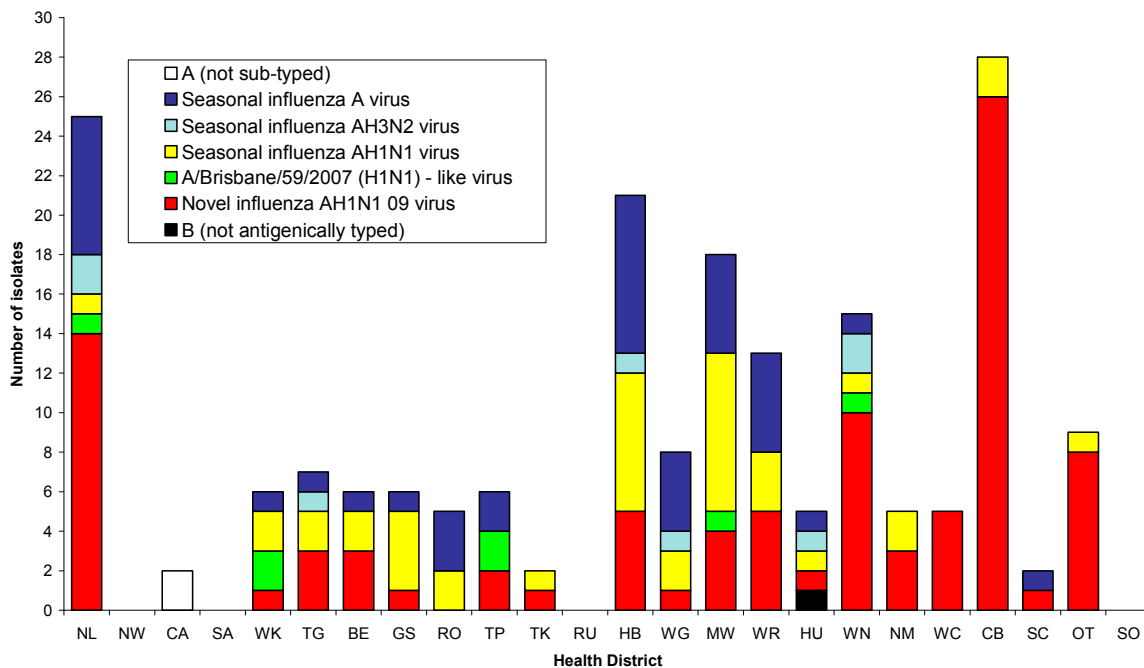
Table 1: Influenza viruses from sentinel surveillance for week 27 by Health District

Antigenic Strain	NL	WK	TG	BE	RO	TP	TK	HB	WG	MW	WR	WN	NM	WC	CB	SC	OT	Total
Novel influenza AH1N1 09 virus	9	1	1	1	0	1	1	2	0	3	2	5	2	5	26	1	8	68
Seasonal AH1N1 virus	0	0	0	0	1	0	0	0	1	1	0	0	0	0	1	0	0	4
Seasonal influenza A virus	6	0	0	0	1	2	0	1	1	0	0	1	0	0	0	1	0	13
Total	15	1	1	1	2	3	1	3	2	4	2	6	2	5	27	2	8	85

Data received from 4/5 virology laboratories.

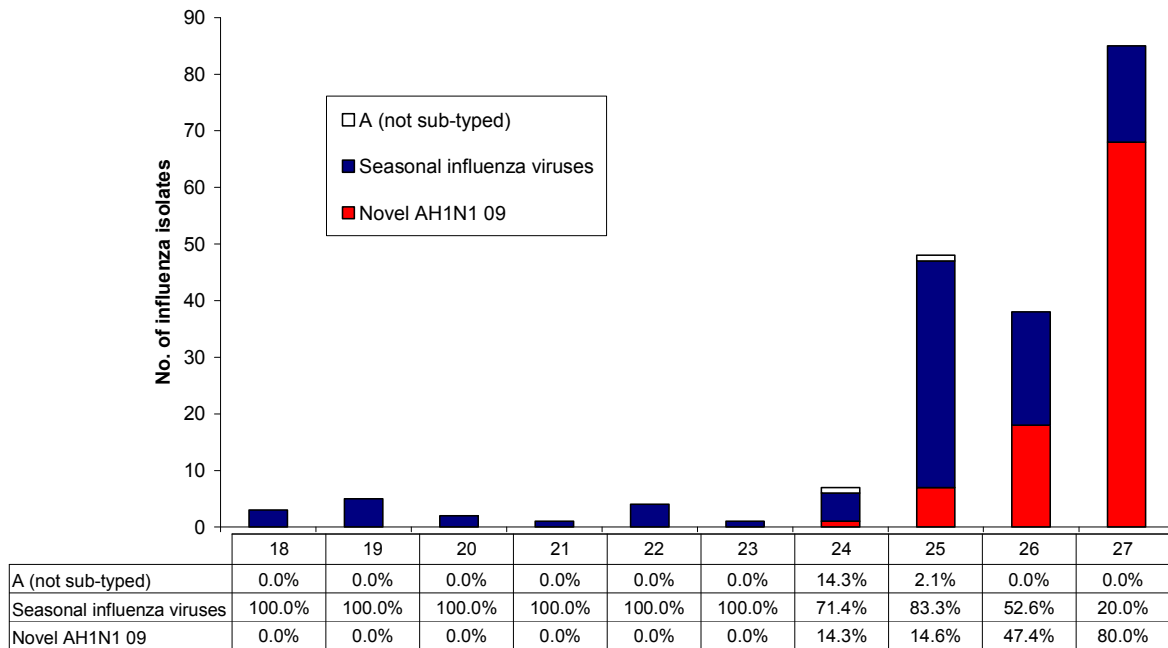
The accumulative influenza viruses are shown in figure 4 for sentinel surveillance by health district from week 18 (27 April-3 May) to week 27 (5 July). A total of 194 influenza viruses were identified: novel influenza AH1N1 09 virus (94), seasonal influenza A virus (41), seasonal influenza AH1N1 virus (41), seasonal influenza AH3N2 virus (8), A/Brisbane/59/2007 (H1N1)-like virus (7), influenza A (not sub-typed) (2), and B (not typed) (1).

Figure 4: Accumulative influenza viruses from sentinel surveillance by health district to 5 July 2009



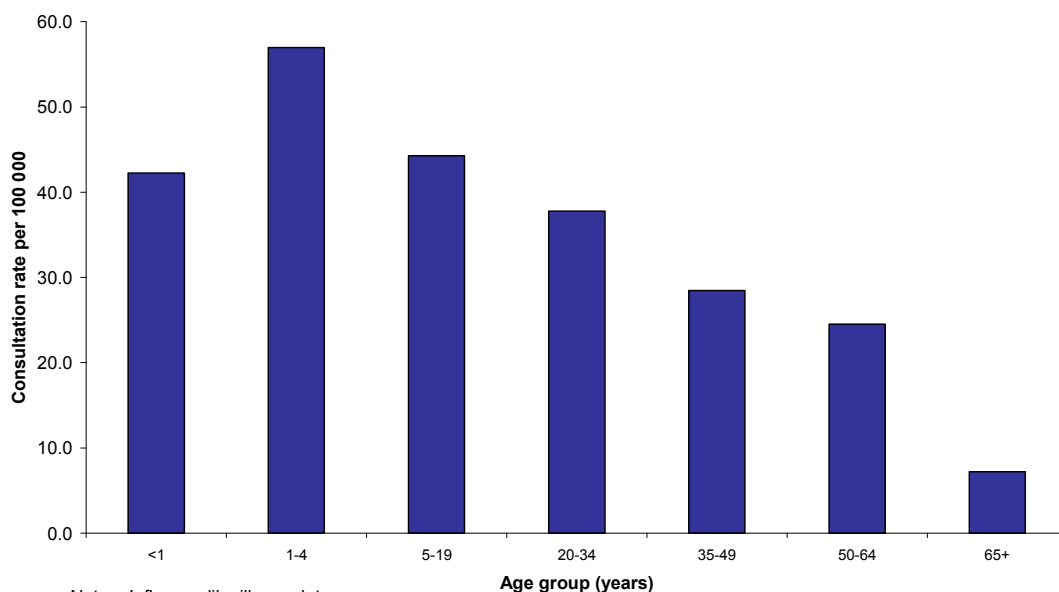
The temporal distribution of influenza viruses is shown in graph below for sentinel surveillance from week 18 (27 April-3 May) to week 27 (5 July). Among 85 influenza viruses reported from sentinel surveillance in week 27, the number of novel AH1N1 09 viruses is now greater than the number of seasonal influenza viruses.

Figure 5: Total influenza viruses from sentinel surveillance by type and week reported to 5 July 2009



The age distribution for influenza-like illness (ILI) consultation rates for weeks 18-27 is shown in figure 6. The highest ILI consultation rate was in children aged 1-4 years (57.0 per 100 000) followed by those 5-19 years (44.3 per 100 000) and <1 year (42.3 per 100 000).

Figure 6: Sentinel consultation rate for influenza-like illness by age group for weeks 18-27, 2009



Note: Influenza like illness data (weeks 18-27 2009)

NON-SENTINEL SURVEILLANCE²

In addition, 531 influenza viruses were reported this week from the laboratory-based (non-sentinel) surveillance: novel influenza AH1N1 09 virus (344), influenza A (not sub-typed) (127), seasonal influenza A virus (34), seasonal influenza AH1N1 virus (24), seasonal influenza AH3N2 (1), and B (not typed) (1). The distribution by health district is shown in Table 2.

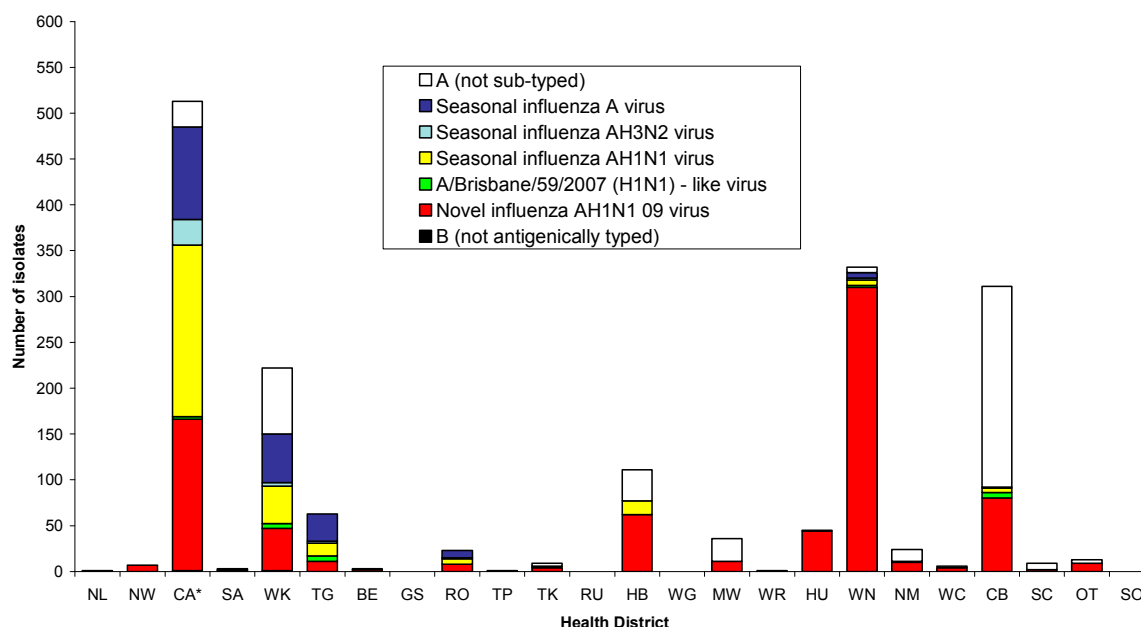
Table 2: Influenza viruses from non-sentinel surveillance for week 27 by Health District

Antigenic Strain	CA	WK	BE	RO	TK	HB	MW	WN	HU	NM	WC	CB	SC	OT	Total
A (not sub-typed)	1	32	0	0	0	21	5	0	0	2	0	66	0	0	127
B (not typed)	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
Novel influenza AH1N1 09 virus	18	24	2	1	3	61	11	160	1	10	4	38	2	9	344
Seasonal AH1N1 virus	0	2	0	0	2	15	0	3	0	1	0	1	0	0	24
Seasonal AH3N2 virus	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1
Seasonal influenza A virus	21	11	0	2	0	0	0	0	0	0	0	0	0	0	34
Total	40	70	2	3	5	97	16	164	1	13	4	105	2	9	531

Data received from 4/5 virology laboratories.

The accumulative influenza viruses are shown in figure 7 for non-sentinel surveillance by health district from week 1 (1-4 Jan) to week 27 (5 July). A total of 1733 influenza viruses were identified: novel influenza AH1N1 09 virus (776), influenza A (not sub-typed) (415), seasonal influenza AH1N1 virus (281), seasonal influenza A virus (200), seasonal influenza AH3N2 virus (37), A/Brisbane/59/2007 (H1N1)-like virus (22), and B (not typed) (2).

Figure 7: Accumulative influenza viruses from non-sentinel surveillance by health district to 5 July 2009

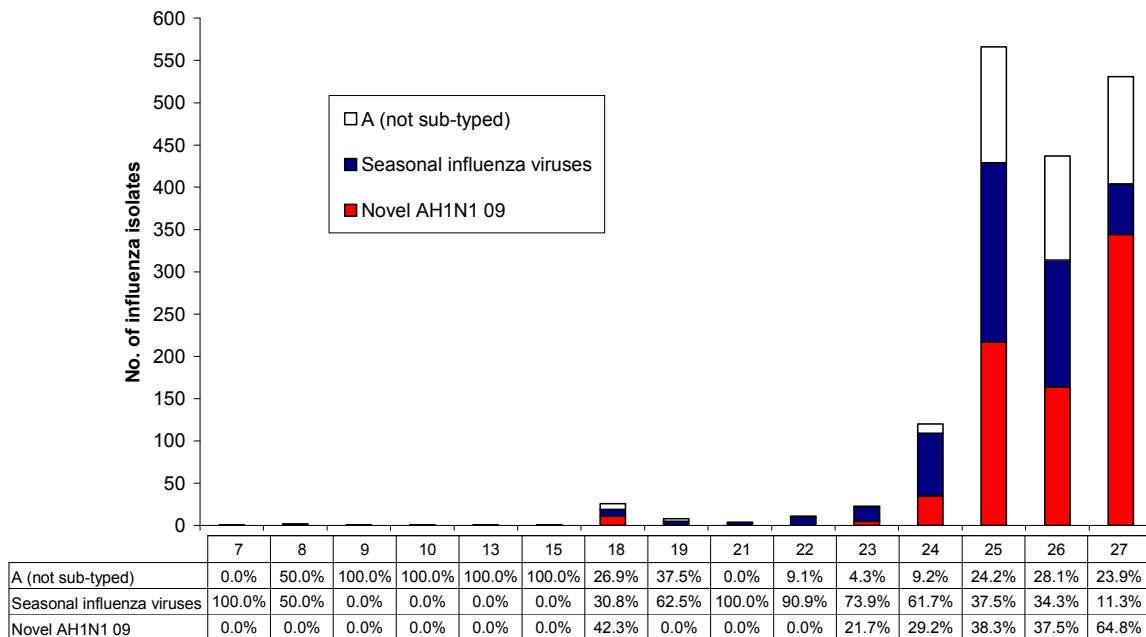


Note: Viruses from Auckland without health district codes have been temporarily assigned to Central Auckland (CA).

² For more details on non-sentinel surveillance, please refer to Appendix.

The temporal distribution is shown in figure 8 for influenza viruses reported by type and subtype for each week from non-sentinel surveillance from week 7 (9-15 February) to week 27 (5 July). Again, the number of novel AH1N1 09 viruses is now greater than the number of seasonal influenza viruses.

Figure 8: Total influenza viruses from non-sentinel surveillance by type and week reported to 5 July 2009



ANTIVIRAL SUSCEPTIBILITY MONITORING³

Since January 2008, a global emergence and rapid spread of oseltamivir-resistant seasonal influenza AH1N1 viruses has been observed. During this winter season in New Zealand, a total of 28 seasonal AH1N1 viruses have been tested for the H275Y mutation (histidine-to-tyrosine mutation at the codon of 275 in N1 numbering) which is known to confer resistance to oseltamivir. All 28 viruses had the H275Y mutation. In addition, a total of 25 seasonal AH1N1 viruses were tested using a phenotypic assay called fluorometric neuraminidase inhibition assay. The results of the fluorometric neuraminidase inhibition assay indicated that these viruses had highly reduced sensitivity to oseltamivir with IC₅₀ values in the range of 305-7912 nM, typical of the recently global emerging oseltamivir-resistant A(H1N1) viruses. (Table 3).

Unlike the seasonal AH1N1 viruses, six novel influenza AH1N1 09 viruses were sequenced to see whether they possess the H275Y mutation. Among these viruses, three were from samples collected on 9-June, 22-June and 23-June 2009 and another three viruses were from samples collected in late April 2009. All six viruses did not possess the H275Y mutation. This indicates that these novel influenza AH1N1 viruses are sensitive to oseltamivir. In addition, a total of 10 novel influenza AH1N1 09 viruses were tested using the phenotypic assay and all 10 viruses were sensitive to oseltamivir with IC₅₀ values in the range of 0.3 to 0.7 nM (Table 3).

³ For more details on non-sentinel surveillance, please refer to Appendix.

Table 3: Antiviral susceptibility to oseltamivir for influenza AH1N1 viruses in New Zealand from 2006 to 2009.

<i>Influenza type/subtype</i>	<i>Seasonal AH1N1</i>				<i>Novel AH1N1</i>
Year	2006	2007	2008	2009	2009
Number of viruses	17	138	4	25	10
Mean IC50*	1.84	0.83	728	1399	0.441
Std. dev.	0.71	0.63	136	1990	0.169
Min IC50	0.25	0.01	547	305	0.274
Max IC50	3.099	4.219	870	7912	0.745

*IC50: Concentration of oseltamivir (nM) at which there is 50% inhibition of neuraminidase activity.

NOVEL INFLUENZA A H1N1 09 VIRUS UPDATE IN NEW ZEALAND

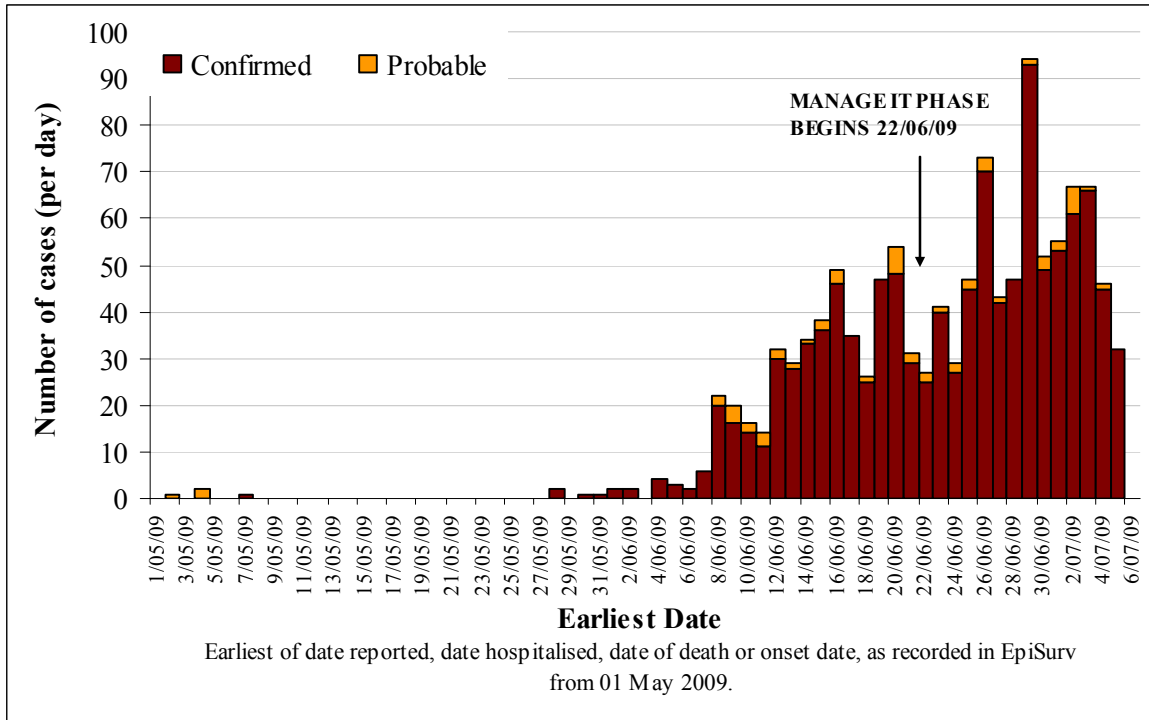
Novel influenza AH1N1 09 is a notifiable disease in New Zealand.

- A total of 1210 confirmed and probable cases of novel influenza A H1N1 have been reported in New Zealand since 1 April 2009.
- The age standardised rate for cases in New Zealand is 31.4 per 100 000 (95% confidence interval 29.7 to 33.1 per 100 000).
- Fifty nine cases are recorded in EpiSurv as being health care workers.
- Highest notified and hospitalisation rates are now being seen in the under 1 year age group.
- Two deaths have been reported in EpiSurv⁴. There have been 162 cases hospitalised. Twenty nine cases have had pneumonia and five cases acute respiratory distress syndrome (ARDS). For current information on deaths visit the Ministry of Health website <http://www.moh.govt.nz/moh.nsf/indexmh/influenza-a-h1n1-update-ninety-nine-080709>

⁴ Deaths reported in EpiSurv do not state novel influenza A H1N1 as the primary cause of death for these cases.

Figure 9: Novel influenza A H1N1 09 epidemic curve using earliest date entered in EpiSurv up to 5 July 2009.

Epidemic curve for novel influenza A H1N1 09 has been created using the earliest date recorded in EpiSurv (report, onset, or hospitalised date).



APPENDIX

BACKGROUND ON SENTINEL GP SURVEILLANCE

The sentinel GP surveillance system was established in 1991 as part of the World Health Organisation (WHO) global programme for influenza surveillance. It is operated nationally by the Institute of Environmental Science and Research (ESR) and locally by surveillance coordinators within the public health units in 24 health districts. The system operates in the winter usually from May to September each year. It is based on a network of volunteer sentinel GPs distributed on a population density basis of about 1 per 50 000, covering roughly 10% of the New Zealand population. Each sentinel practice records the daily number of consultations for influenza-like illness (ILI), along with the patient's age group, on a standardised reporting form. The case definition used for ILI is an acute respiratory tract infection characterised by an abrupt onset of at least two of the following: fever, chills, headache and myalgia. These data are collected by the local co-ordinator by email, phone or fax each Friday. The consultation rates were calculated using the sum of the patient populations, reported by the participating practices, as the denominator. Because the age-specific patient population data were not provided by the participating practices, the denominator for the age-specific ILI consultation rate calculation was based on the New Zealand census data with the assumption that age distribution of the GP patient population was the same as the New Zealand population. In addition, each sentinel practice also collects three respiratory samples (nasopharyngeal or throat swab) from the first patient seen with an ILI on Monday, Tuesday and Wednesday of each week. These samples are forwarded to the WHO National Influenza Centre at ESR or one of three hospital laboratories in Auckland, Waikato and Christchurch for virus isolation and identification. The criteria for a laboratory identification of influenza are the molecular detection by PCR, isolation of the virus or direct detection of viral antigen. Influenza isolates are typed as being types A and B and influenza A isolates are further subtyped as being seasonal AH1N1 and seasonal AH3N2 and novel AH1N1 09. The virus identification data are forwarded by hospital laboratories to ESR each Monday. ESR reports the national information on epidemiological and virological surveillance of influenza weekly, monthly and annually to relevant national and international levels including the WHO.

BACKGROUND ON NON-SENTINEL SURVEILLANCE

The National Influenza Centre (NIC) at ESR and four hospital laboratories at Auckland (also a NIC), Waikato, Wellington and Christchurch form a laboratory network. ESR collates all-year-round laboratory testing information on influenza nationally from mainly hospital in-patient and outpatients during routine viral diagnosis. In addition, this laboratory network conducts novel influenza AH1N1 09 related public health surveillance. This forms the basis of non-sentinel surveillance. The majority of influenza viruses are forwarded to the WHO Collaborating Centre in Melbourne and CDC-Atlanta for further characterization.

BACKGROUND ON ANTIVIRAL SUSCEPTIBILITY MONITORING

The WHO National Influenza Centre at ESR has established a phenotypic method (fluorometric neuraminidase inhibition assay) for the surveillance of anti-viral drug resistance in influenza viruses. In addition, NIC at ESR has developed a molecular method (PCR and sequencing) to monitor the H275Y mutation (histidine-to-tyrosine mutation at the codon of 275 in N1 numbering) which is known to confer resistance to oseltamivir.

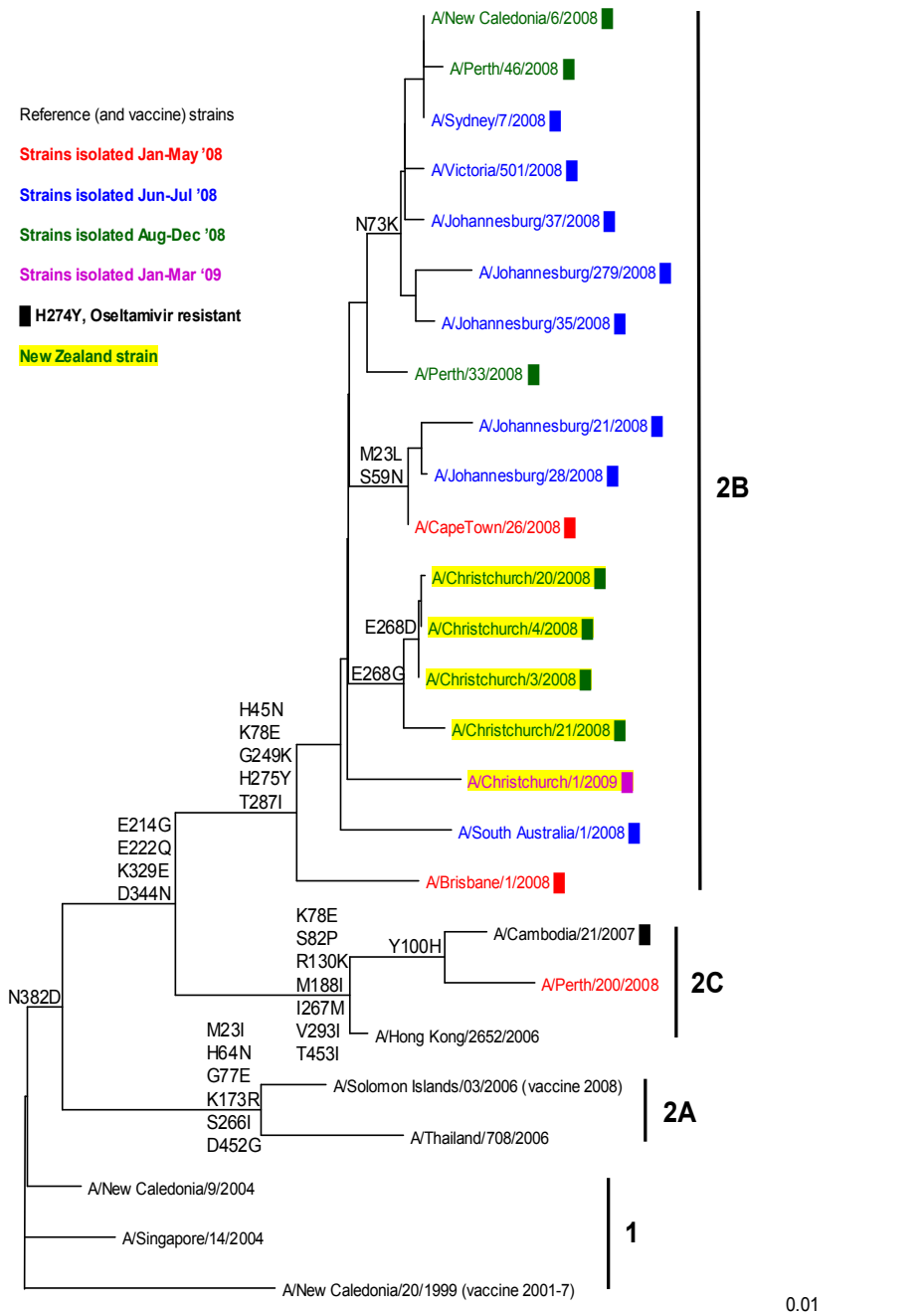
Influenza viruses detected from sentinel and non-sentinel surveillance from a period of 2006 to Jan 2009 have been tested for oseltamivir resistance. Viral isolates from the New Zealand population, collected in 2006 (n=212) and 2007 (n=312) and 2008 (n=245) from the national surveillance program were assayed for susceptibility to oseltamivir (see Table 4).

Table 4: Antiviral susceptibility to oseltamivir during 2006 to Jan 2009 in New Zealand

Influenza type/subtype (neuraminidase)	Seasonal AH1N1			Seasonal AH3N2			Influenza B		
	2006	2007	2008-2009 Jan	2006	2007	2008	2006	2007	2008
Year									
Number of viruses	17	138	5	193	45	107	2	129	134
Mean IC50	1.839	0.8298	*	0.68	0.43	0.3	34.2	33.97	32.9
Std. dev.	0.7136	0.6295	*	0.23	0.31	0.3	11.41	16.42	20.2
Min IC50	0.2538	0.0054	547	0.22	0.07	0.0	26.13	0.898	0.2
Max IC50	3.099	4.219	946	1.36	1.59	2.3	42.27	71.04	104.6
Max Fold Increase	1.7	5.1	1140	2.0	3.7	7.1	1.2	2.1	3.2

(*Note: insufficient data for seasonal AH1N1 in 2008-9 to derive a mean and standard deviation value and the 2007 mean was used to give an indication.)

During 2006-2007, all influenza viruses tested were sensitive to oseltamivir. In 2008, only six seasonal A(H1N1) viruses (0.8%) were detected, of which, only four were available for antiviral susceptibility testing and were all resistant to oseltamivir. The results of the fluorometric neuraminidase inhibition assay indicated that the four viruses had highly reduced sensitivity to oseltamivir with IC50 values in the range of 500-1700 nM, typical of the recently global emerging oseltamivir-resistant A(H1N1) viruses. Genetic analysis of the neuraminidase gene confirmed that the four viruses had the H275Y mutation (histidine-to-tyrosine at codon 275 in N1 nomenclature), conferring resistance to oseltamivir (Figure 9). These four viruses were isolated from patients aged 2-month-old male infant (1), 15-year-old female (1) and 49-year-old female (2). None of the patients or their close contacts had received Tamiflu prior to sample collection. In January 2009, one seasonal A(H1N1) virus resistant to oseltamivir was identified from a 48 year old male on 22 Jan 2009. The WHO National Influenza Centre at ESR has reported the findings to the WHO.



Appendix--Figure 10. Phylogenetic relationships among influenza A (H1) NA genes for 2008 to early 2009. Scale is represented as substitutions per site. Clades are indicated to the left in bold.