INFLUENZA WEEKLY UPDATE

2009/26: 22-28 June 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 26 (22-28 June 2009).

IN THIS REPORT:

- There has been a continuing steady increase in consultations for influenza-like illness through sentinel surveillance in week 26 (22-28 June 2009).
- This year to date (1 January - 28 June 2009), a total of 1311 influenza viruses have been reported through sentinel and non-sentinel surveillance. Among them, 475 (36.2%) were reported in week 26 (22-28 June 2009).
- 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 were tested and all 28 viruses had the H275Y mutation which is known to confer resistance to oseltamivir. Unlike the seasonal AH1N1 viruses, six novel influenza AH1N1 09 viruses did not possess the H275Y mutation. This indicates that these novel influenza AH1N1 viruses are sensitive to oseltamivir.
- Novel influenza AH1N1 09 is a notifiable disease in New Zealand. As of 28 June 2009, there have been 594 confirmed novel AH1N1 Influenza 09 cases recorded in EpiSurv.

SENTINEL GENERAL PRACTICE SURVEILLANCE[1]

In the past week, a total of 494 consultations for influenza-like illness were reported from 81 general practices in all 24 health districts. This gives a weekly consultation rate of 137.7 per 100 000 patient population.

The graph below compares the consultation rates for influenza-like illness for each health district over the past week. South Auckland had the highest consultation rate (538.5 per 100 000, 7 cases), followed by Hutt (420.1 per 100 000, 80 cases) and Wellington (363.0 per 100 000, 80 cases).

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

Figure 1: Weekly consultation rates for influenza-like illness by health district week ending 28 June 2009

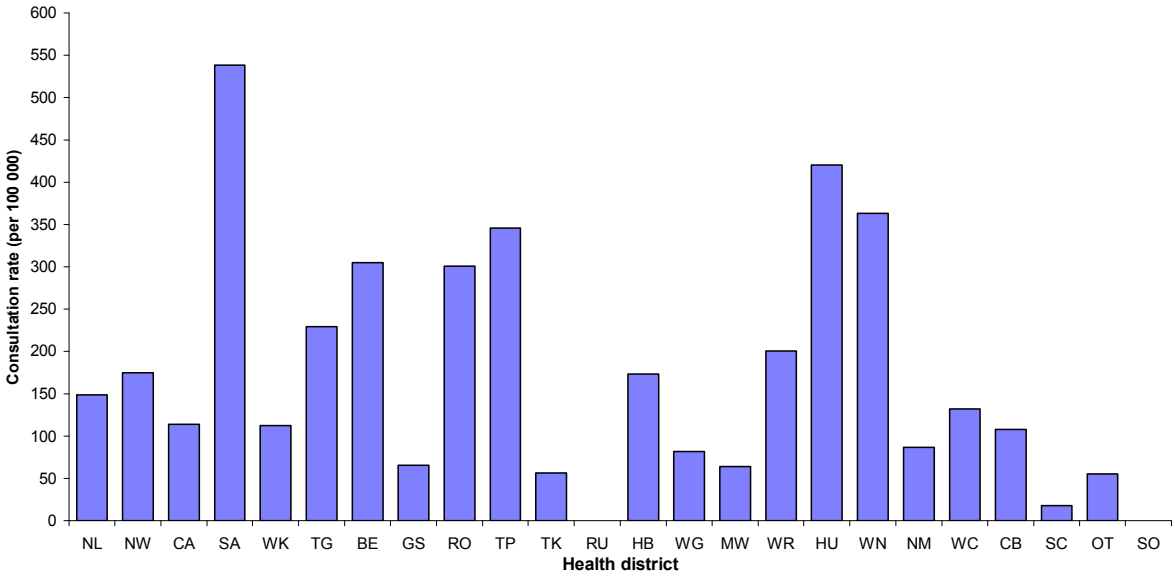


Figure 2 shows the weekly national consultation rates for 2007 and 2008 seasons, and 2009 so far. The current rate of influenza is higher than at the same time last year.

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

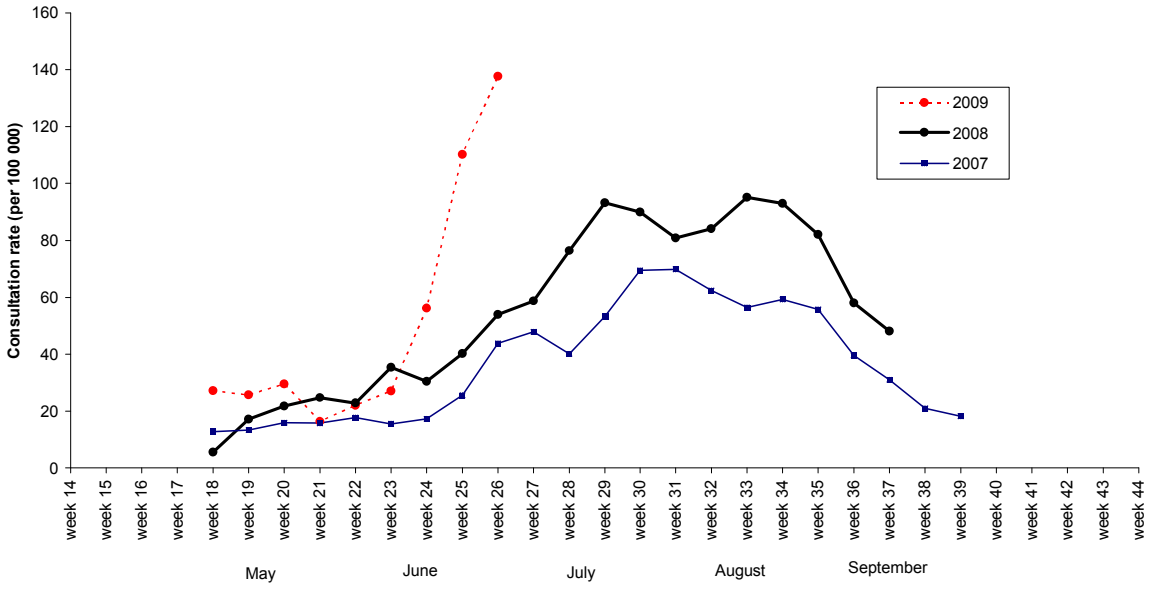
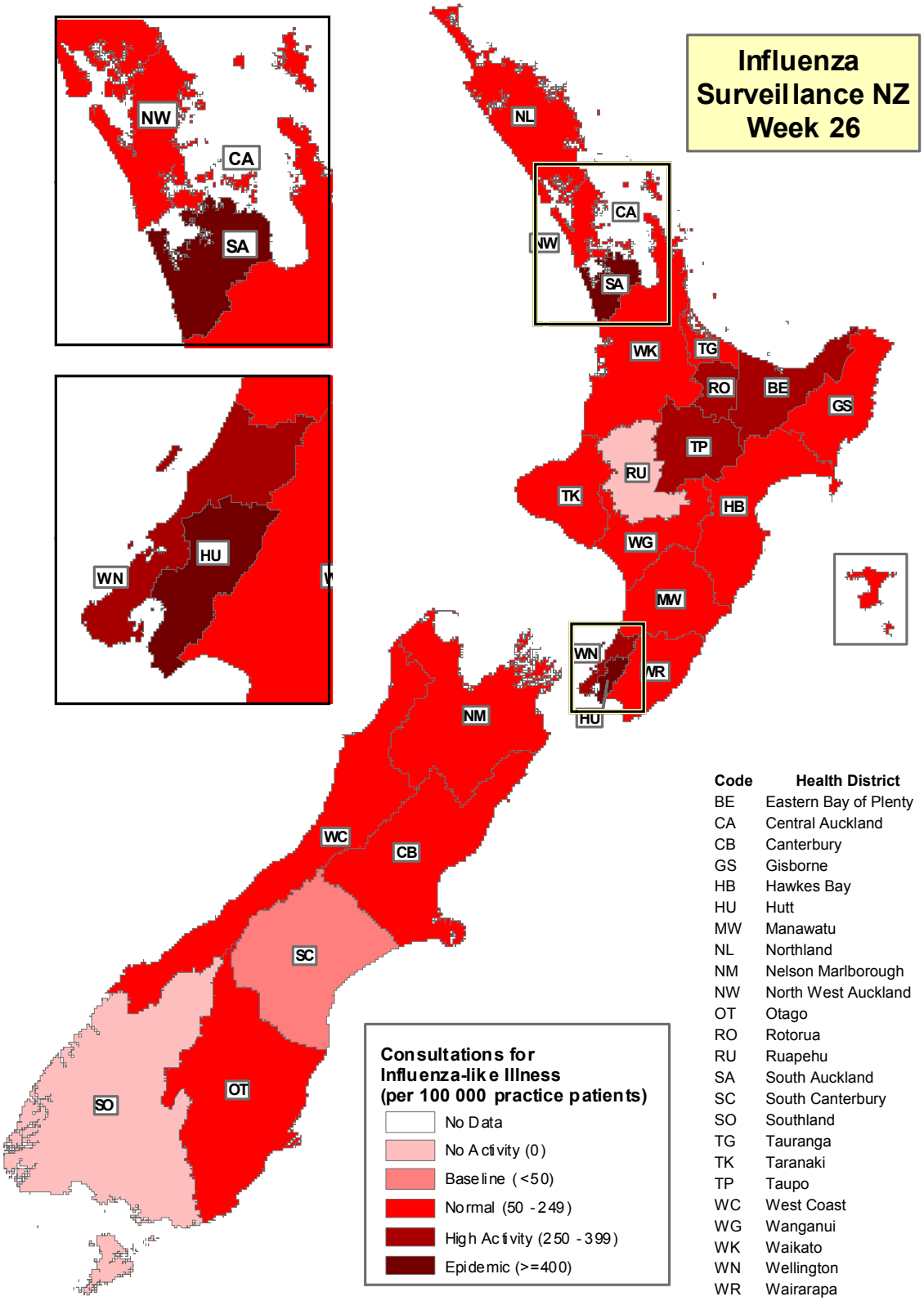


Figure 3 illustrates consultation rates for influenza-like illness mapped by health district for week 26, 2009.



One hundred and sixty-three swabs were sent from the sentinel surveillance in the past week. One hundred and ninety-six swabs were received by the virology laboratories. Of these, 38 influenza viruses were identified: seasonal influenza A virus (19), novel influenza AH1N1 09 virus (18), and seasonal influenza AH1N1 virus (1). The distribution by health district is shown in Table 1.

Table 1: Influenza viruses from sentinel surveillance for week 26 by Health District

Antigenic Strain	NL	TG	BE	GS	RO	TP	HB	WG	MW	WR	WN	HU	NM	Total
Novel influenza AH1N1 09 virus	3	1	1	0	0	1	3	0	1	3	3	1	1	**18**
Seasonal AH1N1 virus	0	0	0	0	0	0	1	0	0	0	0	0	0	**1**
Seasonal influenza A virus	0	1	1	2	1	0	4	2	4	3	0	1	0	**19**
Total	**3**	**2**	**2**	**2**	**1**	**1**	**8**	**2**	**5**	**6**	**3**	**2**	**1**	**38**

Figure 4 shows the accumulative influenza viruses from sentinel surveillance by health district from week 18 (27 April-3 May) to week 26 (22-28 June). A total of 108 influenza viruses were identified: seasonal influenza A virus (34), seasonal influenza AH1N1 virus (30), novel influenza AH1N1 09 virus (26), 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 28 June 2009

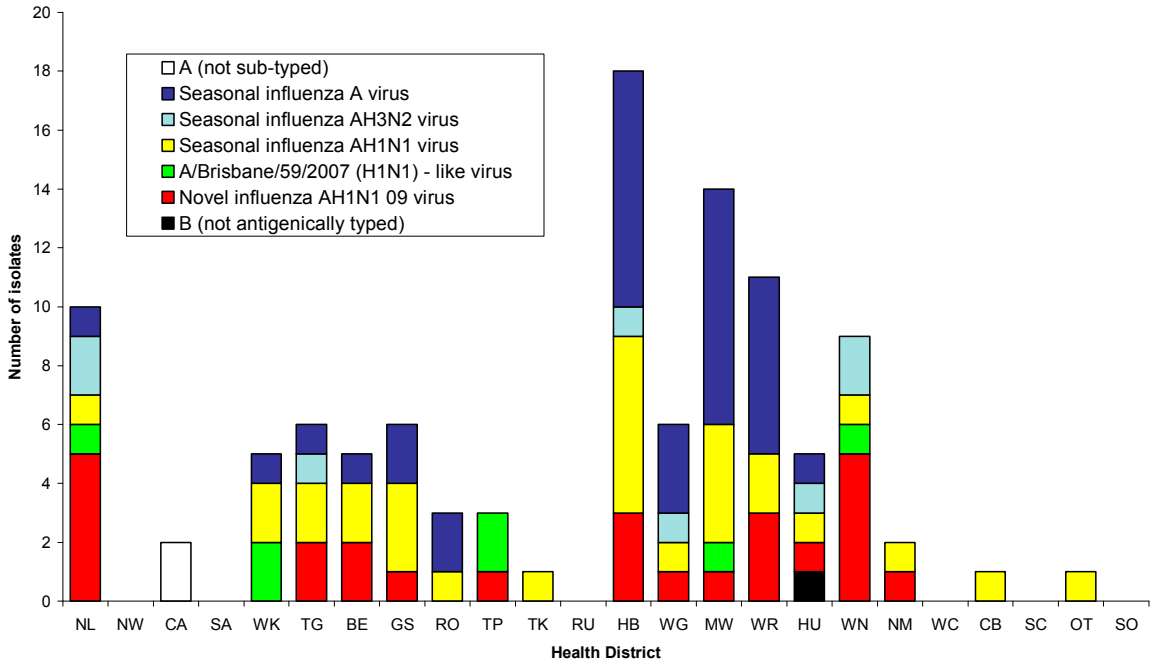
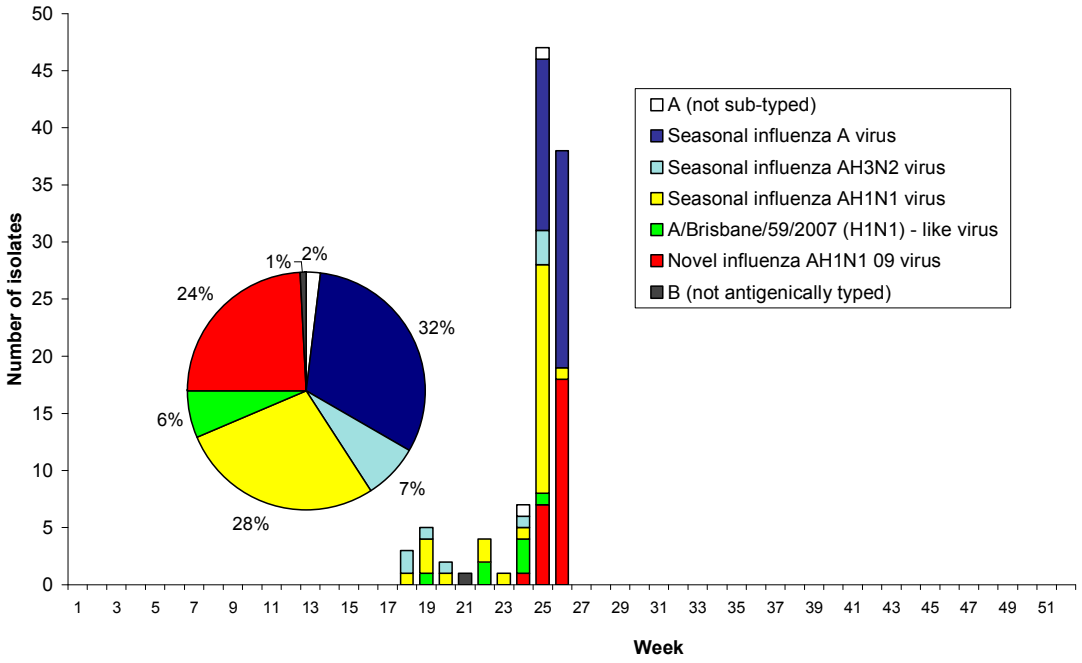


Figure 5 shows temporal distribution of influenza viruses reported by type and subtype for each week from sentinel surveillance from week 18 (27 April-3 May) to week 26 (22-28 June).

Figure 5: Total influenza viruses from sentinel surveillance by type and week reported to 28 June 2009



NON-SENTINEL SURVEILLANCE[2]

In addition, 437 influenza viruses were reported this week from the laboratory-based (non-sentinel) surveillance: novel influenza AH1N1 09 virus (159), influenza A (not sub-typed) (138), seasonal influenza A virus (114), seasonal influenza AH1N1 virus (19), A/Brisbane/59/2007 (H1N1)-like virus (5), and seasonal influenza AH3N2 (2). The distribution by health district is shown in Table 2.

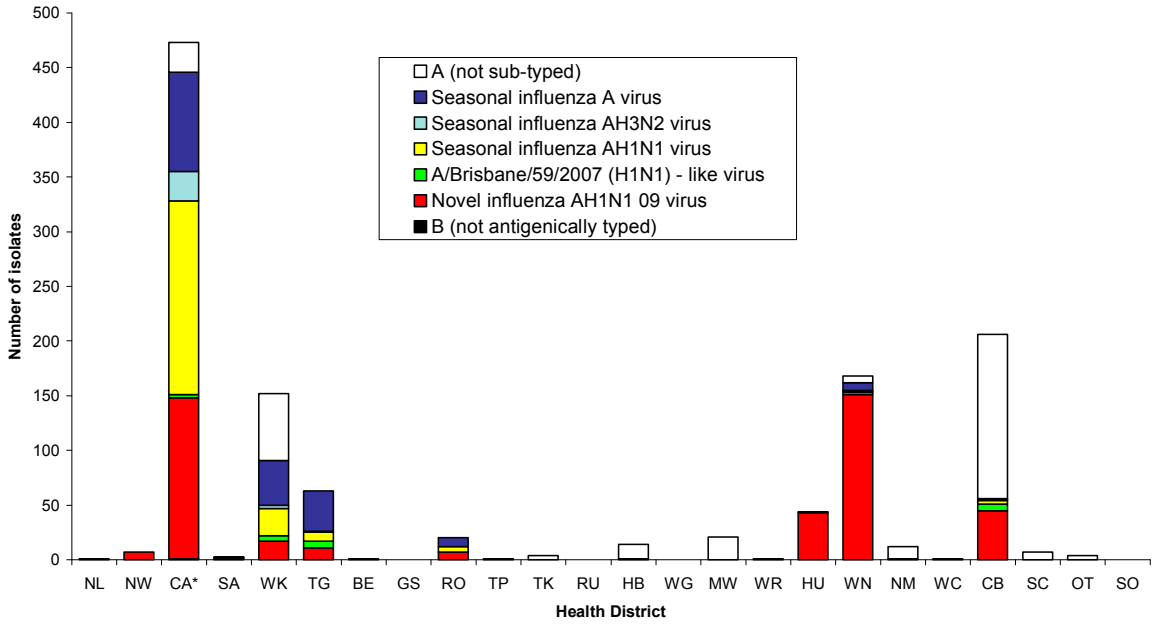
Table 2: Influenza viruses from non-sentinel surveillance for week 26 by Health District

Antigenic Strain	CA	WK	TG	RO	TK	HB	MW	WN	HU	NM	CB	SC	OT	Total
A (not sub-typed)	4	18	0	0	2	10	11	0	0	10	73	7	3	**138**
A/Brisbane/59/2007 (H1N1)-like virus	0	0	4	0	0	0	0	0	0	0	1	0	0	**5**
Novel influenza AH1N1 09 virus	59	13	5	2	0	0	0	60	18	0	2	0	0	**159**
Seasonal A H1N1	19	0	0	0	0	0	0	0	0	0	0	0	0	**19**
Seasonal A H3N2	2	0	0	0	0	0	0	0	0	0	0	0	0	**2**
Seasonal influenza A virus	57	27	21	3	0	0	0	5	1	0	0	0	0	**114**
Total	**141**	**58**	**30**	**5**	**2**	**10**	**11**	**65**	**19**	**10**	**76**	**7**	**3**	**437**

Figure 6 shows the accumulative influenza viruses from non-sentinel surveillance by health district from week 1 (1-4 Jan) to week 26 (22-28 June). A total of 1203 influenza viruses were identified: novel influenza AH1N1 09 virus (430), influenza A (not sub-typed) (307), seasonal influenza AH1N1 virus (223), seasonal influenza A virus (187), seasonal influenza AH3N2 virus (33), A/Brisbane/59/2007 (H1N1)-like virus (22), and B (not typed) (1).

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

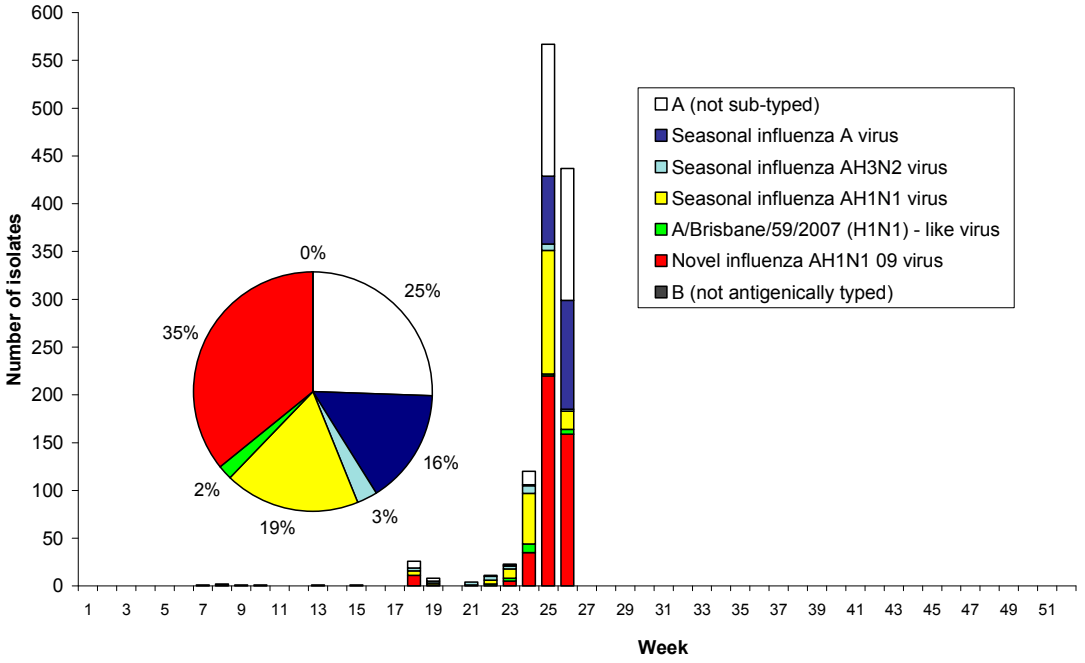
Figure 6: Accumulative influenza viruses from non-sentinel surveillance by health district to 28 June 2009



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

Figure 7 shows temporal distribution of influenza viruses reported by type and subtype for each week from non-sentinel surveillance from week 18 (27 April-3 May) to week 26 (22-28 June).

Figure 7: Total influenza viruses from non-sentinel surveillance by type and week reported to 28 June 2009



ANTIVIRAL SUSCEPTIBILITY MONITORING[3]

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.

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.

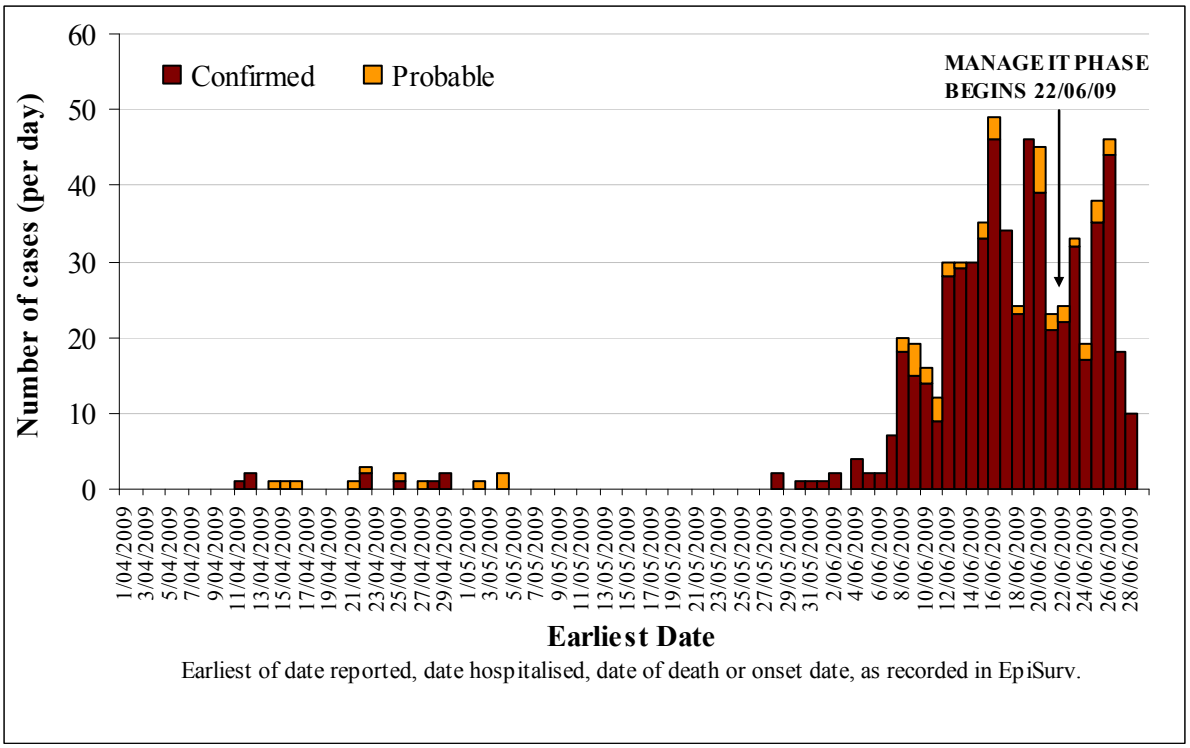
NOVEL INFLUENZA A H1N1 09 VIRUS UPDATE IN NEW ZEALAND

Novel influenza AH1N1 09 is a notifiable disease in New Zealand. Five hundred and ninety-four cases of novel influenza AH1N1 09 viruses have been confirmed in New Zealand. A further 48 probable cases are awaiting confirmation. No deaths were reported.

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

Figure 8: Novel influenza A H1N1 09 epidemic curve using earliest date entered in EpiSurv up to 28th June 2009.

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



For further information please refer to the Ministry of Health's website http://www.moh.govt.nz/influenza-a-h1n1

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.

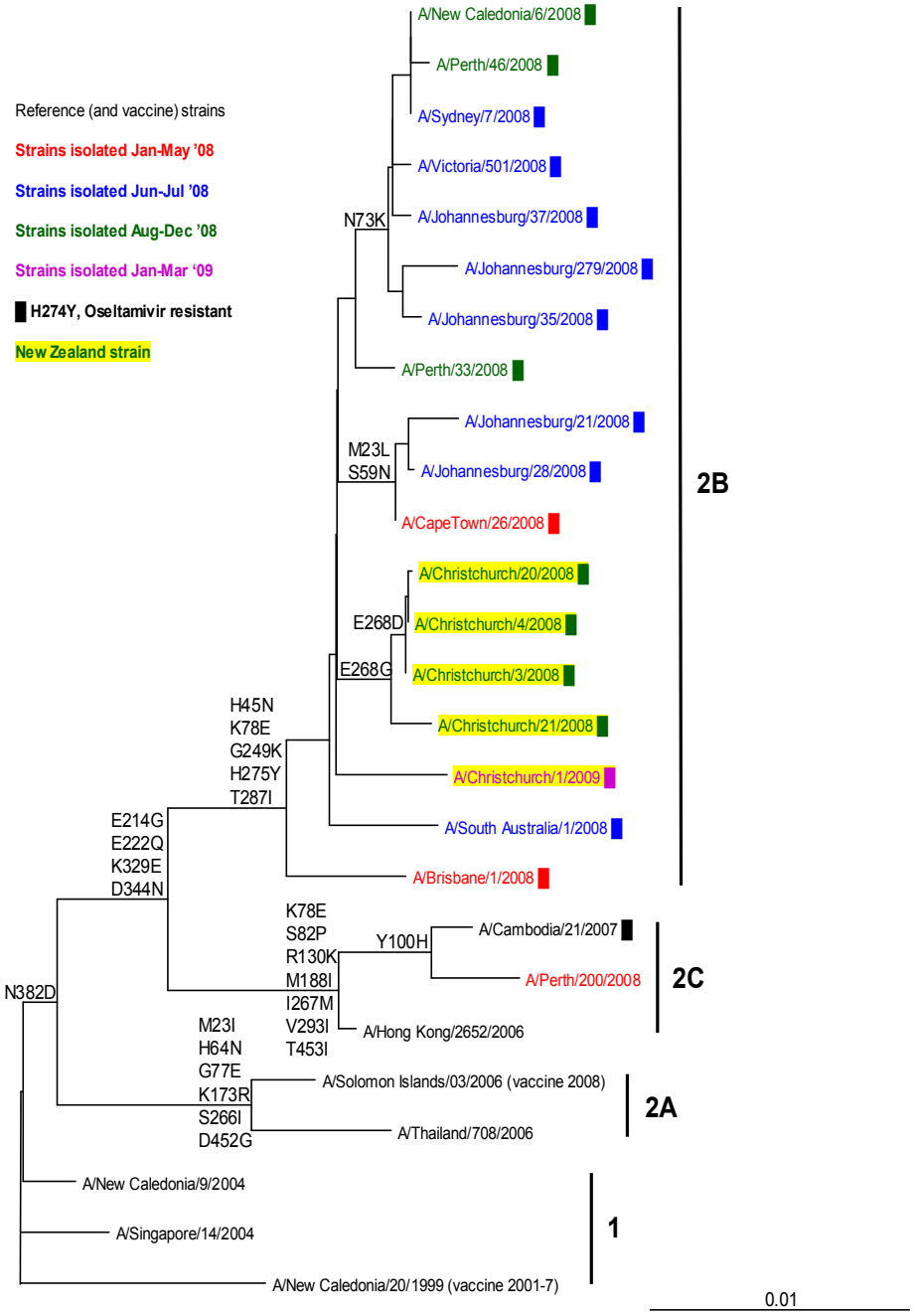
Influenza viruses detected from sentinel and non-sentinel surveillance from a period of 2006 to Jan 2009 have been tested for oseltamivir resistance. Viral isolates from the New Zealand population, collected in 2006 (n=212) and 2007 (n=312) and 2008 (n=245) from the national surveillance program were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

Table 3: Antiviral susceptibility to oseltamivir during 2006 to Jan 2009 in New Zealand

Influenza type/subtype (neuraminidase)	***Seasonal AH1N1***			***Seasonal AH3N2***			***Influenza B***		
Year	2006	2007	2008-2009 Jan	2006	2007	2008	2006	2007	2008
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	**572.5**	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 9. Phylogentic 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.

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