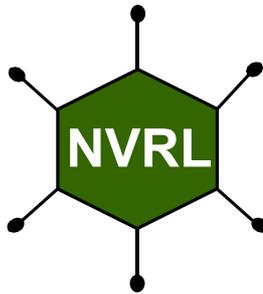


Summary Report of Influenza Season 2003/2004



Report produced: 28th September 2004

This report is produced in collaboration with the Departments of Public Health

Summary Report of Influenza Season 2003/2004

Summary

This is the fourth year of influenza surveillance using computerised sentinel general practices in Ireland. The National Disease Surveillance Centre (NDSC) is working in collaboration with the National Virus Reference Laboratory (NVRL) and the Irish College of General Practitioners (ICGP) on this sentinel surveillance scheme. Influenza activity began early in Ireland during the 2003/2004 season, peaking in mid-November 2004. A total of 625 influenza-like illness cases were reported by sentinel GPs during the 2003/2004 season, compared to 348 during the 2002/2003 season. One hundred and forty-nine of the 350 (42.6%) swabs from sentinel GPs were positive for influenza virus this season. The influenza A/Fujian/411/2002(H3N2)-like strain was the predominant circulating strain, mainly affecting younger age groups. In addition, avian influenza outbreaks were detected in East and South East Asia, Canada and the US.

Background to sentinel surveillance in Ireland

Clinical data

Thirty-five general practices were recruited to report electronically, on a weekly basis, the number of patients with influenza-like illness (ILI). ILI is defined as the sudden onset of symptoms with a temperature of 38°C or more, with two or more of the following: headache, sore throat, dry cough and myalgia. Patients were those attending for the first time with these symptoms.

In total, the 35 sentinel general practices comprise 66 general practitioners and cover an estimated total practice population size of 107,954, representing 2.8% of the population (2002 population census). Practices are located in all health boards with their location based on the population of each health board (table 1).

Table 1: Number of sentinel GPs by health board, percentage of total practice population and percentage of population in each health board, 2003/2004 season

Health Board/Authority	Number of Practices (n=35)	% of total practice population (n=107,954)	% of population (n=3,917,203*)
ERHA	12	27.1	35.8
MHB	1	2.7	5.8
MWHB	2	4.2	8.7
NEHB	3	13.9	8.8
NWHB	3	7.3	5.7
SEHB	6	28.5	10.8
SHB	6	13.1	14.8
WHB	2	3.2	9.7
Total	35	100.0	100.0

*Source: CSO 2002 population census

The influenza surveillance period runs from week 40 in October to week 20 in May, with the week running Monday to Sunday. Sentinel GPs send an electronic report to the ICGP every Tuesday. All data received is anonymous. Information recorded includes the general practitioner ID number and patient data (date of birth, gender, date seen, diagnosis, week number and health board). If there are no cases of ILI, zero reporting is required.

Virological data

Sentinel GPs were requested to send a combined nasopharyngeal and throat swab on one patient per week where a clinical diagnosis of ILI was made. All materials necessary for swabbing, including instructions, easily identifiable laboratory forms and stamped addressed envelopes complying with An Post regulations, were supplied by the NVRL at the commencement of the surveillance season. Swabs were sent to the NVRL for testing using Shell Vial and PCR techniques. The NVRL supplied results on a weekly basis on the number of swabs received from each of the practices. The date of swab receipt, sex, date of birth and positive or negative results by type and subtype are all reported.

Regional influenza activity

The Departments of Public Health send an influenza activity index (no report, no activity, sporadic-, localised-, regional- or widespread activity) every week to NDSC. The activity index is analogous to that used by the WHO global influenza surveillance system and the European Influenza Surveillance Scheme (EISS)^{1,2}. The index is based on sentinel GP ILI consultation rates, laboratory confirmed cases of influenza, sentinel hospital admissions data and/or sentinel school absenteeism levels. Sentinel hospital data are based on: total admissions, total A & E admissions and total respiratory admissions per week (the definition of respiratory illness in this instance includes upper respiratory tract infection, lower respiratory tract infection, pneumonia, asthma, chronic bronchitis and exacerbations of chronic obstructive airways disease). One sentinel hospital was located in each health board. Sentinel primary and secondary schools in each health board are located in close vicinity to the sentinel GPs. Each sentinel school reports absenteeism data on a weekly basis. The activity index by health board is included in a map of Ireland in the weekly influenza report.

Weekly influenza surveillance report

NDSC is responsible for producing a weekly influenza report, which is sent to all those involved in influenza surveillance in Ireland and also posted on the NDSC website each Thursday. Results of clinical and virological data are reported, along with a map of influenza activity and a summary of influenza activity worldwide.

Enhanced influenza surveillance

In response to the increase in ILI activity in younger age groups during the 2003/2004 season, an enhanced influenza surveillance system was implemented to capture data on all hospitalised influenza cases aged 0-14 years.

Results for the 2003/2004 influenza season

Early school outbreaks

The 2003/2004-influenza season started early, with two school outbreaks of ILI during September 2003, in the ERHA. The first outbreak occurred during the first week of September and involved 160 students and four teachers in a school in Co. Kildare. The second school outbreak was in South County Dublin and occurred during the end of the second week of September 2003 and involved 81 pupils and one staff member. Influenza A (H3N2) was identified in both outbreaks and was later antigenically characterised as the A/Fujian/411/2002(H3N2)-like strain^{3,4} Two further school ILI outbreaks were reported during the 2003/2004 season, one in the SEHB during week 42 and the other in the MHB during week 45.

Clinical data

GP consultations for influenza-like illness (ILI) were reported on a weekly basis per 100,000 population from week 40 2003 to week 20 2004 (figure 1). Influenza activity increased earlier than usually observed by sentinel GPs, with GP consultation rates for ILI peaking during week 46 at 82.3 per 100,000 population (figure 1). This is the highest peak rate since the 2000/2001 season when rates peaked at 121.0 per 100,000 during week 8. During the peak in ILI consultation rates, the majority of cases reported were aged between 0-4 and 5-14 years of age (figure 2). A total of 625 ILI cases were reported by sentinel GPs during the 2003/2004 season, compared to 348 during the 2002/2003 season, 277 during the 2001/2002 season and 671 during the 2000/2001 season.

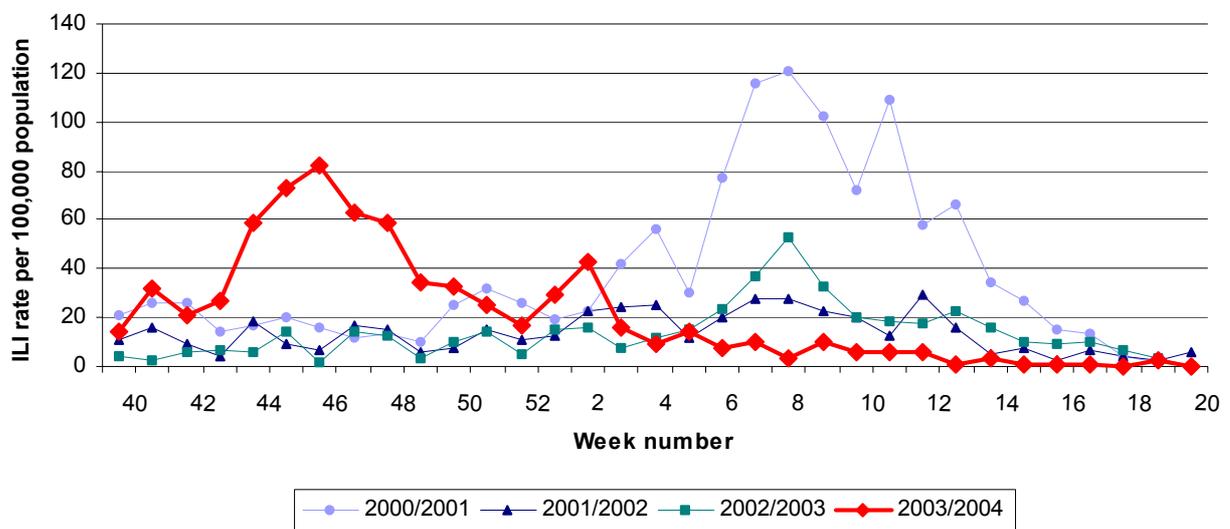


Figure 1: GP consultation rate for influenza-like illness per 100,000 population by report week, during the 2000/2001, 2001/2002, 2002/2003 and 2003/2004 influenza seasons.

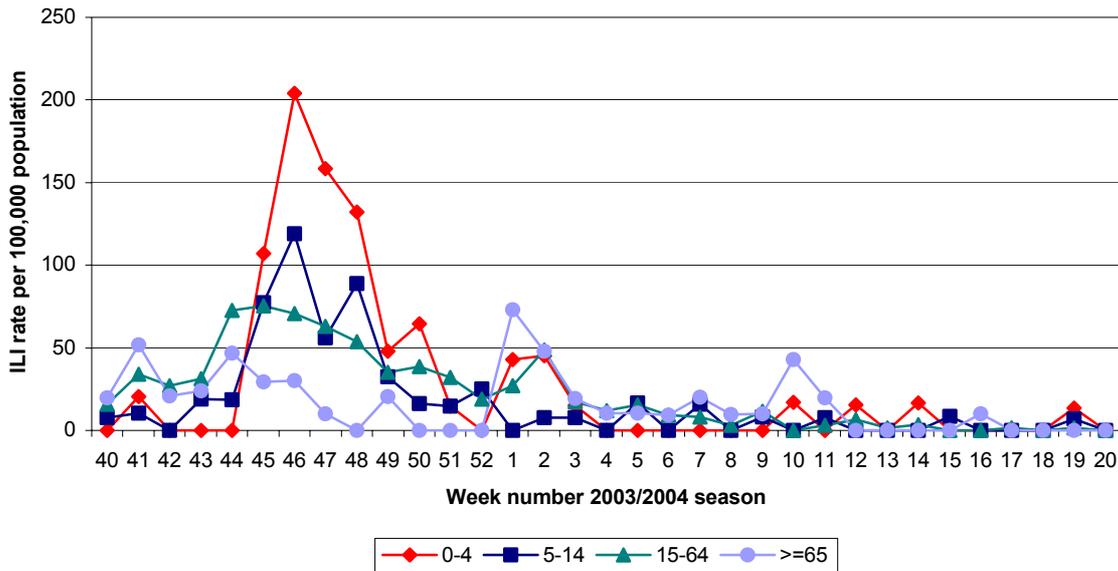


Figure 2. Age specific GP consultation rate for ILI per 100,000 population by week for the 2003/2004-influenza season

Virological data

The NVRL tested 350 sentinel specimens for influenza virus during the 2003/2004-influenza season. One hundred and forty-nine (42.6%) sentinel specimens were positive for influenza virus: 142 influenza A (140 A H3N2 and 2 A untyped) and seven influenza B (tables 2 and 3). The predominant influenza virus subtype identified through the sentinel GP scheme this season was influenza A (H3N2), accounting for 94.0% of positive specimens. The number of positive influenza specimens peaked between weeks 44 to 47 2003 (figure 3). Positive specimens in all age groups with the exception of those aged 65 years or older increased during the period of peak clinical activity. The majority of positive sentinel cases this season were in the 10-14, 15-19, 20-24, 25-29 and 30-34 year age groups (figure 4). Most of the non-sentinel cases were in the 0-4 age group.

The NVRL tested a total of 1857 non-sentinel respiratory specimens mostly from hospitals during the 2003/2004 influenza season. One hundred and twelve specimens (6.0%) were positive for influenza virus: 98 influenza A (87.5%) and 14 influenza B (12.5%). The number of influenza positive specimens peaked between weeks 47 and 49. The majority of influenza positive non-sentinel cases were 0-4 years of age (69/112; 61.6%). Six (5.4%) cases were 5-14 years of age, 32 (28.6%) cases were 15-64 years of age and one case was 65 years of age or older. Eight non-sentinel specimens (0.4%) were positive for Adenovirus, 396 (21.3%) for respiratory syncytial virus (RSV), six (0.3%) for parainfluenza virus type-1, five (0.3%) for parainfluenza virus type-2 and 38 (2.0%) for parainfluenza virus type-3. *Please note that non-sentinel specimens include all respiratory specimens referred to the NVRL; these specimens are mainly from hospitals and some GPs and may include more than one specimen from each case.*

The total number of influenza positive specimens from all sources (sentinel and non-sentinel) this season was 261: 240 influenza A and 21 influenza B. Seventy-five influenza positive cases this season were in the 0-4 year age group and 31 were in the 5-14 year age group. One

hundred and forty-five influenza positive specimens were in cases aged between 15 and 64 years of age, six cases were 65 years or older and four cases were of unknown age group.

Table 2: Sentinel GP influenza results by type and season for the 2000/2001, 2001/2002, 2002/2003 & 2003/2004 influenza seasons.

Season	Total swabs	Positive swabs	% Positive	Influenza A	Influenza B
2000/2001	329	140	42.6	55	85
2001/2002	242	65	27.0	64	1
2002/2003	249	86	34.5	27	59
2003/2004	350	149	42.6	142	7
Total	1170	440	37.6	288	152

Table 3: Sentinel GP influenza results by type, subtype and report week for the 2003/2004 influenza season

Week number	Total swabs	Positive swabs	Percentage positive	Influenza A	Influenza A (H3N2)	Influenza B
40	9	0	0.0	0	0	0
41	12	4	33.3	0	4	0
42	14	7	50.0	0	7	0
43	11	5	45.5	0	5	0
44	33	23	69.7	0	22	1
45	48	24	50.0	0	22	2
46	41	19	46.3	0	19	0
47	37	20	54.1	0	20	0
48	33	17	51.5	0	16	1
49	14	6	42.9	0	4	2
50	20	5	25.0	0	5	0
51	13	7	53.8	2	4	1
52	4	2	50.0	0	2	0
1	6	2	33.3	0	2	0
2	14	3	21.4	0	3	0
3	5	1	20.0	0	1	0
4	3	0	0.0	0	0	0
5	5	2	40.0	0	2	0
6	4	1	25.0	0	1	0
7	3	1	33.3	0	1	0
8	6	0	0.0	0	0	0
9	5	0	0.0	0	0	0
10	1	0	0.0	0	0	0
11	0	0	0.0	0	0	0
12	3	0	0.0	0	0	0
13	2	0	0.0	0	0	0
14	1	0	0.0	0	0	0
15	0	0	0.0	0	0	0
16	1	0	0.0	0	0	0
17	1	0	0.0	0	0	0
18	0	0	0.0	0	0	0
19	1	0	0.0	0	0	0
20	0	0	0.0	0	0	0
Total	350	149	42.6	2	140	7

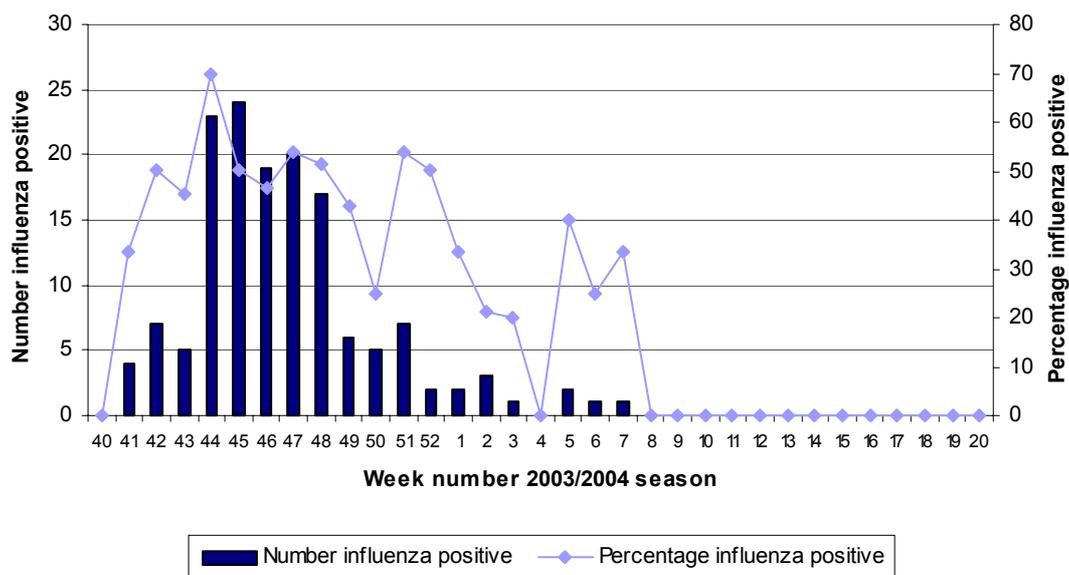


Figure 3. Number and percentage of sentinel specimens positive for influenza virus during the 2003/2004-influenza season

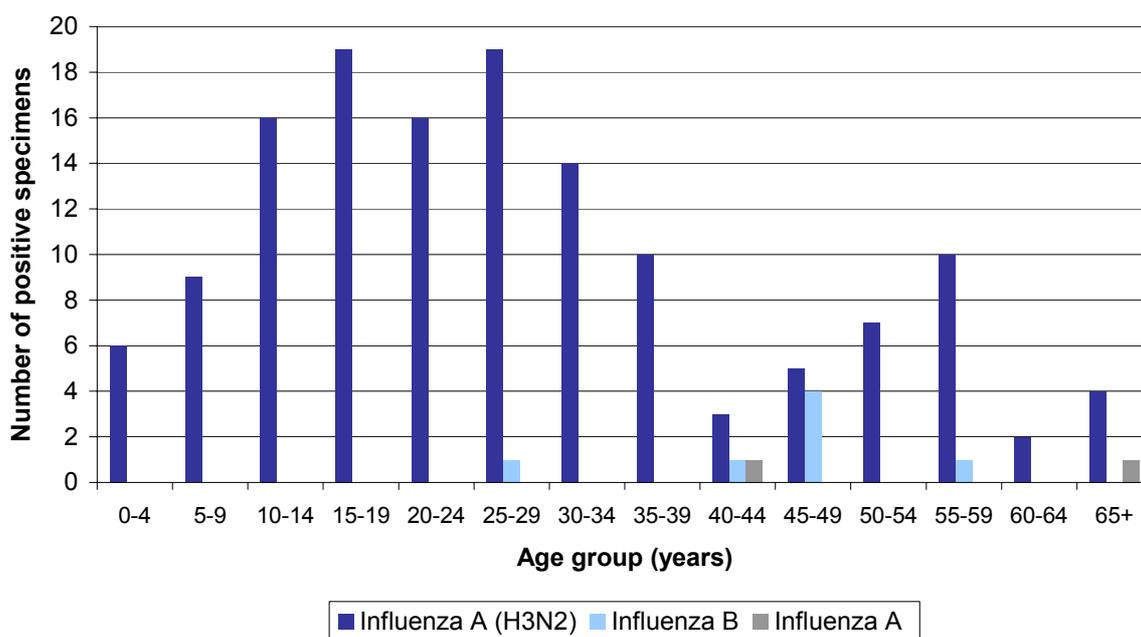


Figure 4: Number of sentinel swabs positive for influenza virus by type, subtype and age group (years), between week 40 2002 and week 20 2003.

RSV data

During the 2002/2003 and 2003/2004 seasons, the number of RSV positive detections from hospital respiratory specimens referred to the NVRL reached the highest levels on record.⁵ Three hundred and ninety-six RSV positive specimens were detected during the 2003/2004 season, peaking in January 2004 (figure 5). Prior to the 2002/2003 season, the largest

seasonal outbreak of RSV occurred during the 1998/1999 season, with 250 RSV positive specimens detected by the NVRL.

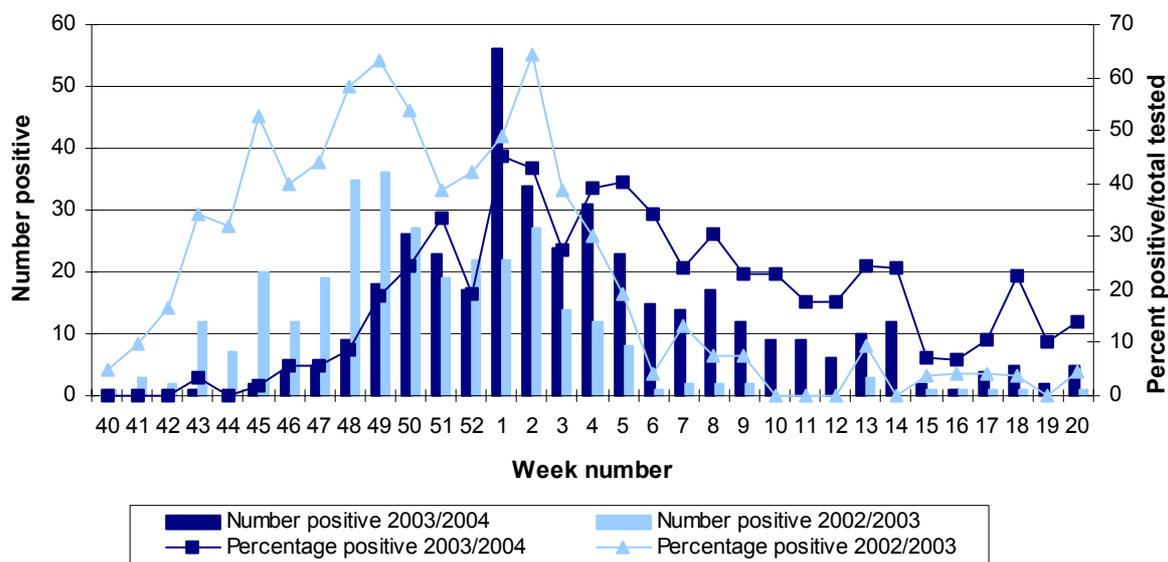


Figure 5. Number and percentage of non-sentinel RSV positive specimens detected during the 2003/2004 and 2002/2003 influenza seasons

Vaccination status & antigenic characterisation

Of the 149 positive influenza virus detections from sentinel specimens, 105 (70.5%) were not vaccinated, eight (5.4%) were vaccinated and vaccination status was unknown in 36 (24.2%) cases. Of the eight cases that were vaccinated, influenza A (H3N2) was detected in seven cases and influenza A (unsubtyped) was detected in one case (table 4).

The NVRL referred representative specimens from the initial ERHA school outbreaks and from the sentinel project to the WHO laboratory (Mill Hill) in London for antigenic characterisation. Eight influenza A (H3N2) samples were sequenced at the NVRL and phylogenetic analysis was carried out at Mill Hill laboratory. All eight samples were characterised as A/Fujian/411/2002 (H3N2)-like strains. An influenza B virus isolate was antigenically characterised as being closely related to the B/Hong Kong/330/2001-like strain.

Table 4: Influenza vaccination status of influenza virus positive cases during the 2003/2004-influenza season (n=149)

Influenza type/subtype	Unknown vaccination status	Vaccinated	Not vaccinated	Positive cases
Influenza A	0	1	1	2
Influenza A (H3N2)	33	7	100	140
Influenza B	3	0	4	7
Total	36	8	105	149

Regional influenza activity

Regional influenza activity peaked between weeks 42 and 50 2003, with localised and sporadic influenza activity reported in the ERHA and NEHB and sporadic activity reported in

the remaining health boards. In some health boards, increases in sentinel hospital total admissions, A & E admissions and respiratory admissions and increases in sentinel primary and secondary school absenteeism were reported during the period of peak clinical activity. Influenza positive specimens by health board are detailed in table 5. The number of positive specimens by health board is influenced by the number of sentinel GPs in each health board and also the number of respiratory specimens that regional and local laboratories refer to the NVRL.

Table 5. Total number of sentinel & non-sentinel* influenza A and B positive specimens by health board for the 2003/2004 season

	Sentinel			Non-Sentinel			Sentinel & Non-Sentinel		
	Flu A	Flu B	Total	Flu A	Flu B	Total	Flu A	Flu B	Total
ERHA	63	2	65	55	7	62	118	9	127
MHB	3	0	3	6	2	8	9	2	11
MWHB	19	1	20	3	0	3	22	1	23
NEHB	20	2	22	15	1	16	35	3	38
NWHB	5	0	5	11	0	11	16	0	16
SEHB	15	1	16	5	2	7	20	3	23
SHB	10	0	10	1	0	1	11	0	11
WHB	7	1	8	2	2	4	9	3	12
Total	142	7	149	98	14	112	240	21	261

* Please note that non-sentinel specimens include all specimens referred to the NVRL; these specimens are mainly from hospitals and some GPs and may include more than one specimen from each case.

Mortality data

Two influenza A associated deaths were reported to NDSC during the 2003/2004 season. Both deaths occurred in 0-4 year olds in the SEHB, one during week 47 and the other during week 48 2003.

Enhanced influenza surveillance

Seven influenza cases were reported to NDSC, through the enhanced influenza surveillance system, during December 2003 and January 2004. The cases ranged in age from six weeks to 13 years, with four cases aged 0-4 years and three cases aged 5-14 years. Influenza A was detected in three of the seven cases, influenza B in one case and three cases were of unknown influenza type. The cases were all hospitalised for a period ranging from 2-11 days.

Complications associated with these cases included: primary influenzal viral pneumonia, secondary bacterial pneumonia and bronchitis. Two of the cases were at risk of influenza related complications and therefore had been vaccinated. The remaining five cases were unvaccinated.

Six cases of influenza pneumonia were notified to NDSC in 2003 through the weekly infectious disease notification system, all six cases were notified during November and December 2003. Four of the six cases were 0-4 years of age, one was in the 5-14 year age group and one case was in the 15-24 year age group. Please note that these cases may have also been reported through the sentinel surveillance system or the enhanced influenza surveillance system.

Influenza activity worldwide

During the 2003/2004 season, influenza activity began early in Europe, with an initial surge of activity in Western Europe beginning in Ireland, the UK, Spain and Portugal and followed

by Norway, France and Belgium, with incidence rates highest amongst 0-4 year olds. A second wave of activity was concentrated in Central and Eastern European countries. The vast majority of characterised influenza strains in Europe during the 2003/2004 season were influenza A/Fujian/411/2002(H3N2)-like. A small percentage of influenza B viruses were characterised, the majority of which were B/Shanghai/361/002-like.¹

In the US, an early increase in influenza activity was reported with activity levels above baseline level from week 45 2003. The influenza A/Fujian/411/2002(H3N2)-like strain was the predominant strain detected.⁶ Early influenza activity was also reported in Canada, with the A/Fujian/411/2002(H3N2)-like strain predominating mainly amongst younger age groups.⁷

Influenza activity in Africa and Oceania also began earlier than usual and was more severe than the preceding three years. Influenza A (H3N2) viruses predominated in most countries worldwide and were responsible for the majority of outbreaks. Influenza A (H1) circulated at low levels in most parts of the world, with outbreaks occurring in Iceland and the Ukraine. Influenza B also circulated at low levels in most parts of the world.⁸

The most significant influenza event globally during the 2003/2004 season was the widespread epidemic in East and Southeast Asia of highly pathogenic avian influenza (HPAI), caused by influenza A (H5N1) in animal populations, particularly domestic fowl and a variety of other birds. These outbreaks posed a considerable potential human public health risk and resulted in 23 human deaths in Vietnam and Thailand and mass poultry culls in Asia. Low pathogenic avian influenza detections (caused by influenza A H7N2 & A H2N2) were reported in the eastern US, and HPAI (caused by influenza A H5N2) was reported in Texas during the 2003/2004 season (each of these viruses was different from the HPAI strain in Asia). Avian influenza poultry outbreaks were also reported in Canada, associated with influenza A (H7N3). Two human cases of avian influenza A (H7) were reported in poultry workers in Canada, both cases recovered.⁹

Discussion

Influenza activity peaked early in Ireland during the 2003/2004-influenza season; with higher levels of activity reported than in the previous two seasons, when low influenza activity levels were observed.¹⁰ This early influenza activity was also reflected throughout most of Western Europe, the US and Canada.¹ The ERHA school outbreaks were among the first influenza cases of the 2003/2004 season reported in Europe.^{3,4}

During the 2003/2004 season, some antigenic drift was detected in the A (H3N2) strains circulating in Europe, America, Australia and New Zealand. The A/Fujian-like strains are related to the A/Panama-like strain included in the 2003/2004 vaccine and antibodies induced against this vaccine strain cross-react with A/Fujian-like strains, but generally at a reduced level. The 2003/2004 influenza vaccine offered good protection against the virus strains in the vaccine, and a degree of cross protection against the A/Fujian-like strain.¹ The 2003/2004-influenza vaccine offered the best protection for those aged 65 years and over and those in at risk groups. The WHO published its recommendations on the composition of the influenza vaccine for use in the 2004/2005 Northern Hemisphere influenza season on the 27th February 2004. The vaccine will include the following strains: A/New

Caledonia/20/99(H1N1)-like virus, A/Fujian/411/2002(H3N2)-like virus and B/Shanghai/361/2002-like virus.⁸

A/Fujian-like strains were first detected in very low numbers during the 2002/2003-influenza season in Europe and also in viruses circulating in Australia and New Zealand during July and August 2003.¹ The A/Fujian-like strains identified during the 2003/2004 season in Ireland resulted in higher incidence rates of influenza in 0-4 year olds and are likely to have been the cause of some clinically severe cases (identified through the enhanced influenza surveillance system) and of two influenza associated deaths in this age group. Detection of higher incidence rates of influenza in younger age groups was not unexpected as there has been very little influenza in circulation for the last few seasons; therefore the opportunity for development of immunity particularly amongst younger age groups has been limited.

Recurring outbreaks of HPAI, caused by influenza A (H5N1), have posed a significant threat to human health in 2004. In a number of outbreaks since the beginning of 2004 in Asia, the virus has jumped from infected chickens or ducks directly to humans. These direct human infections have produced severe and sometimes fatal outcomes. The risk of virus transmission to humans from infected poultry will continue as long as outbreaks are occurring in poultry. Of greatest concern is the risk that continuing transmission of the virus to humans will give avian and human influenza viruses an opportunity to exchange genes (reassortment), thereby acquiring the ability to transmit easily from human to human and thus triggering a pandemic.⁹

In light of the threat posed to human health from avian influenza outbreaks, a number of additional measures have been put in place in Ireland to strengthen and expand surveillance of ILI. Work is in progress to increase the number of sentinel GPs, thereby improving their geographical and population representation. Sentinel GPs are also working towards monitoring influenza on a year round basis. The NVRL will begin testing sentinel specimens for RSV, as well as influenza, in October 2004. In addition, influenza became a notifiable disease in Ireland on January 1st 2004. This information will in turn inform continuing progress on the Irish national influenza pandemic preparedness plan.

Acknowledgements

Special thanks are due to the sentinel GPs, the Departments of Public Health, sentinel schools and hospitals that provide data throughout the influenza season.

References

1. European Influenza Surveillance Scheme. Available at <http://www.eiss.org/index.cgi>
2. WHO global influenza surveillance programme. Available at <http://www.who.int/csr/disease/influenza/en/>
3. Fitzgerald M. Ireland's influenza season 2003/2004 begins with outbreak in Dublin. *Eurosurveillance Weekly*. 2003; 7 (40). Available at <http://www.eurosurveillance.org/ew/2003/031002.asp>
4. Fitzgerald M, Danis C, Conlon M, Connell J. Outbreak of influenza A H3N2 in another Dublin school predates previously reported outbreak in Ireland. *Eurosurveillance Weekly*. 2003; 7 (43). Available at <http://www.eurosurveillance.org/ew/2003/031023.asp#3>

5. Domegan L., Cotter S., O’Kelly E., Coughlan S., Condon B., O’Reilly P. Surveillance of respiratory syncytial virus in Ireland. *EPI-insight*. 2004; **5** (7): 2-3.
6. CDC. 2003/2004 U.S. Influenza season summary. Available at <http://www.cdc.gov/flu/weekly/weeklyarchives2003-2004/03-04summary.htm>
7. Health Canada. Flu Watch Canada. Available at <http://www.hc-sc.gc.ca/pphb-dgspsp/fluwatch/index.html>
8. WHO. Recommended composition of influenza virus vaccines for use in the 2004/2005 influenza season. *WER*. 2004; **9** (79): 88-92.
9. WHO Avian Influenza. Available at http://www.who.int/csr/disease/avian_influenza/en/
10. Domegan, L. Summary report of 2002/2003-influenza season. Available at <http://www.ndsc.ie/Publications/InfluenzaWeeklySurveillanceReport/>

This report was produced by Dr. Lisa Domegan, NDSC.