Summary Report of Influenza Season 2004/2005

Report produced: 10th October 2005

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

Summary

The 2004/2005-influenza season was the fifth year of influenza surveillance using computerised sentinel general practices in Ireland. The HPSC is working in collaboration with the National Virus Reference Laboratory (NVRL), the Irish College of General Practitioners (ICGP) and the Departments of Public Health on this surveillance project.

Influenza activity was mild in Ireland for most of the 2004/2005 season, with a short peak of activity in January 2005. Influenza A (H3N2) and A (H1N1) co-circulated for the first part of the season, followed by circulation of influenza B for the last 12 weeks of the season. Influenza activity mainly affected 15 to 64 year olds, unlike the 2003/2004 season, which mainly affected 0 to 4 year olds.

The most significant global event during the 2004/2005-influenza season was the continuing spread of poultry outbreaks of avian influenza A (H5N1) in South East Asia, associated with sporadic cases and clusters of human infection and a significant proportion of human deaths. [1, 2]

Background to sentinel surveillance in Ireland

Clinical data

Thirty-six 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. Cases were those attending for the first time with these symptoms. In total, the 36 sentinel general practices, comprising 68 general practitioners, represent 2.9% of the national population. Practices were located in all HSE health areas with the number of sentinel practices in each HSE health area largely based on the population of the HSE health area (table 1).

Table 1. Number of sentinel GPs by HSE health area, percentage of total practice population and percentage of population in each HSE health area, 2004/2005 season

HSE-Health Area	Number of Practices	Number of Practitioners	Total Practice Population (%) (n=112,654)	Census population (%) (n=3,917,203*)
HSE-ER	12	19	26.0	35.8
HSE-MA	1	2	2.6	5.8
HSE-MWA	2	3	4.0	8.7
HSE-NEA	3	11	13.3	8.8
HSE-NWA	2	2	3.9	5.7
HSE-SEA	6	14	27.3	10.8
HSE-SA	7	14	17.4	14.8
HSE-WA	3	3	5.5	9.7
Total	**36**	**68**	**100.0**	**100.0**

**Source: CSO 2002 population census*

Virological data
Sentinel GPs were requested to send a combined nasal and throat swab on at least one patient per week where a clinical diagnosis of ILI was made. Swabs were sent to the NVRL for testing for influenza and respiratory syncytial virus (RSV) using immunofluorescence and PCR techniques and results were reported to HPSC. The NVRL also reported the results of respiratory specimens (predominantly paediatric), referred mainly from hospitals, on a weekly basis.

Other indicators of influenza activity
The Departments of Public Health reported an influenza activity index (no report, no activity, sporadic-, localised-, regional- or widespread activity) every week, to HPSC. The activity index is analogous to that used by the WHO global influenza surveillance system and the European Influenza Surveillance Scheme (EISS). [3, 4] The index is based on sentinel GP ILI consultation rates, laboratory-confirmed cases of influenza, and influenza/ILI outbreaks.

Each Department of Public Health also established one sentinel hospital in each HSE health area, reporting total hospital admissions, accident and emergency admissions and respiratory admissions data on a weekly basis. Sentinel primary and secondary schools were also located in each HSE health area in close proximity to the sentinel GPs, reporting absenteeism data on a weekly basis.

The Departments of Public Health also notified all cases of influenza and all influenza/ILI outbreaks to HPSC on a weekly basis (following the amendments to the infectious disease regulations (SI No. 707 of 2003)). An enhanced dataset on all hospitalised influenza cases aged between 0 and 14 years of age was also reported to HPSC by the Departments of Public Health. From January 2005, HPSC was notified of all registered deaths on a weekly basis from the General Registrar's Office, including influenza and pneumonia deaths.

Weekly report and EISS
HPSC produce a weekly influenza report, which is posted on the HPSC website www.hpsc.ie each Thursday. Results of clinical and virological data are reported, along with a map of influenza activity and a summary of influenza activity worldwide. HPSC also report the clinical and virological dataset to the European Influenza Surveillance Scheme (EISS) every Thursday.

Results

It should be noted that influenza notifications data and enhanced surveillance data for the 2004/2005 season are provisional.

Clinical data

Influenza activity in Ireland peaked later in the 2004/2005 season, compared to the 2003/2004 season. Activity was mild for most of the 2004/2005 influenza season, with a sharp peak during week one 2005, peaking at 89.0 per 100,000 population (figure 1). This was the highest peak rate since the 2000/2001 season when rates peaked at 121.0 per 100,000 during week eight. During the peak in ILI consultation rates, the majority of cases reported were aged between 15 to 64 years (figure 2). A total of 585 ILI cases were reported by sentinel GPs during the 2004/2005 season compared to 625 during the 2003/2004 season (figure 3).

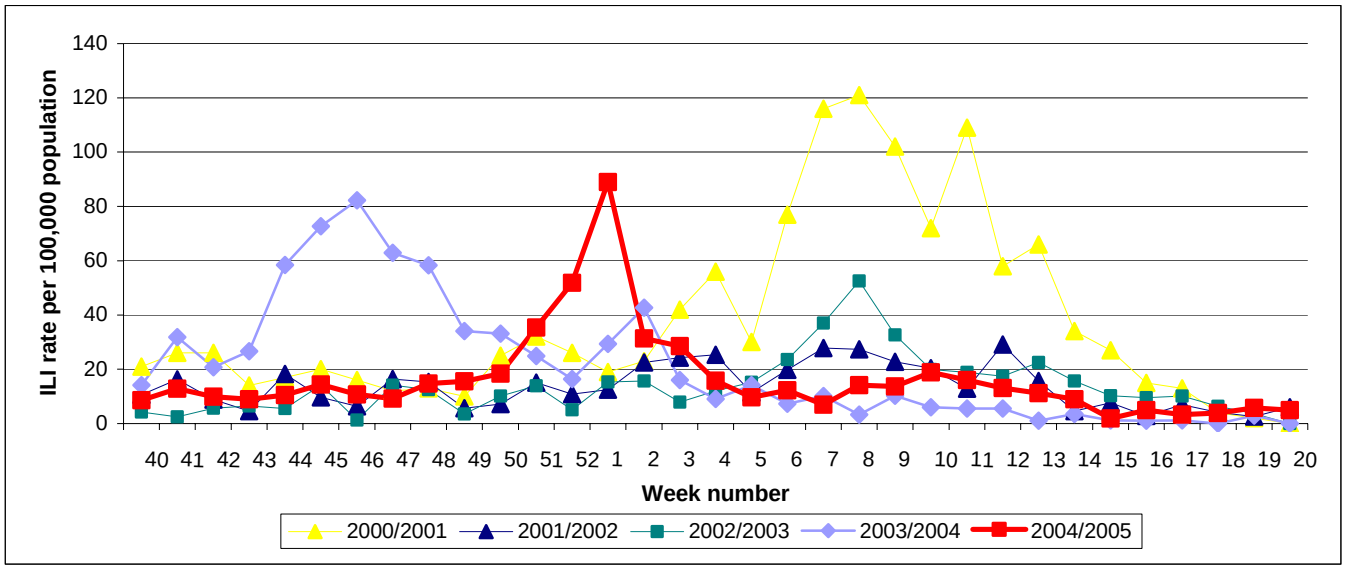

Figure 1. GP consultation rate for influenza-like illness per 100,000 population by report week, during the 2000/2001, 2001/2002, 2002/2003, 2003/2004 & 2004/2005 influenza seasons.*

**Please note that for comparison with previous years, data for week 52 2004 on this graph represents the average of weeks 52 2004 and 53 2004.*

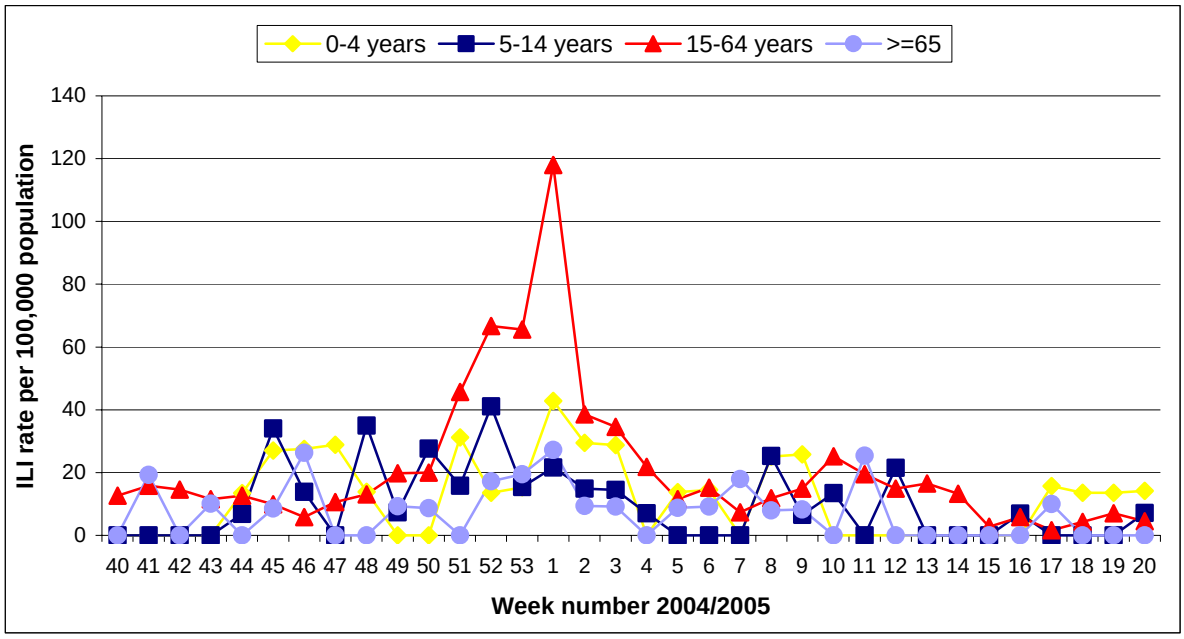

Figure 2. Age-specific GP consultation rate for ILI per 100,000 population by week for the 2004/2005-influenza season*

** Please note the denominator used in the age-specific consultation rate is from the 2002 census data; this assumes that the age distribution of the sentinel general practices is similar to the national age distribution.*

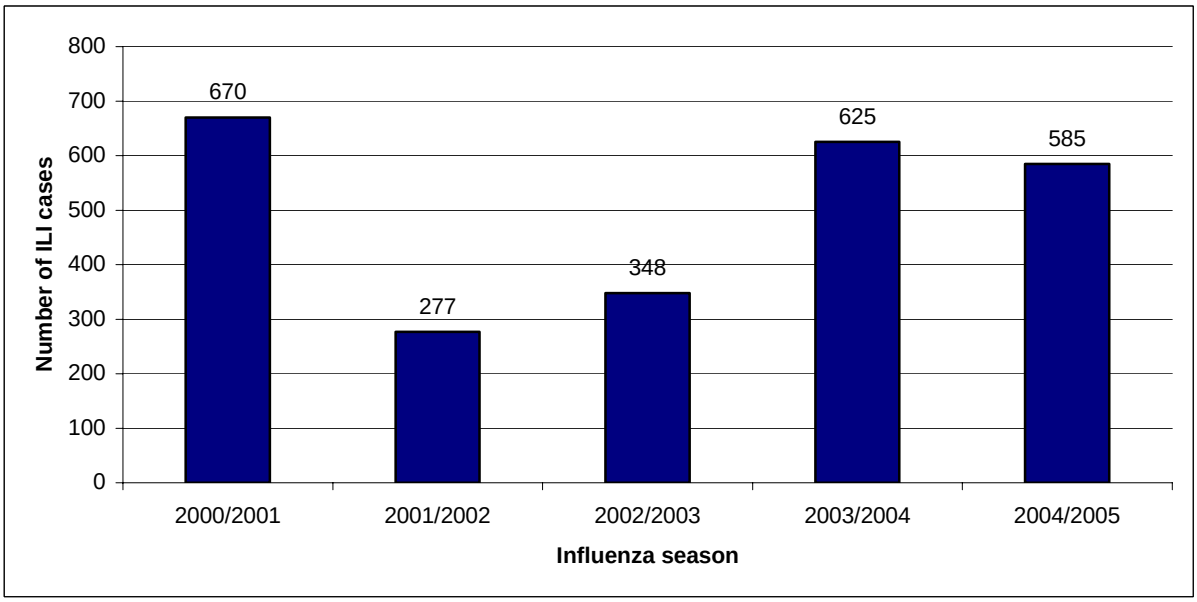

*Figure 3. ILI cases reported by sentinel GPs during the 2000/2001, 2001/2002, 2002/2003, 2003/2004 & 2004/2005 seasons.**

**Please note when comparing the number of ILI cases reported per season that the number of sentinel practices has increased each season.*

Virological data

The NVRL tested 370 sentinel specimens for influenza virus during the 2004/2005 season (table 2). One hundred and forty-two (38.4%) sentinel specimens were positive for influenza: 103 influenza A (62 A H3N2, 36 A H1N1 and 5 A unsubtyped) and 39 influenza B. The predominant influenza virus subtype identified was influenza A (H3N2), accounting for 43.7% of positive specimens. The majority of positive influenza sentinel cases were in the 15 to 64 year age group (83.8%) (figure 4). Of the 370 sentinel specimens tested, six (1.6%) were positive for RSV. Four of the six RSV positive sentinel specimens were aged between 0 and 9 years, one was aged over 65 years of age and the age group was unknown for one case.

The NVRL also tested 1526 non-sentinel respiratory specimens, mainly from hospitals. Of the 1526 specimens tested, 52 (3.4%) were positive for influenza A, eight (0.5%) for influenza B and 349 (22.9%) were positive for RSV. The majority (86.1%) of influenza and RSV positive non-sentinel specimens were aged between 0 and 4 years of age. It should be noted that non-sentinel specimens are predominantly from hospitalised paediatric cases.

The number of sentinel and non-sentinel positive influenza specimens by season is shown in figure 5, compared to the ILI rate per 100,000 population. Figures 6 & 7 show the number of sentinel and non-sentinel influenza and RSV specimens by week for the 2004/2005 season.

Table 2. Number of sentinel GP swabs tested and number and percentage positive for influenza & RSV by season.

Season	Sentinel practices	Total swabs	Influenza	% Influenza	Influenza A	Influenza B	RSV	% RSV
2000/2001	20	329	140	42.6	55	85	NA	NA
2001/2002	32	242	65	27.0	64	1	NA	NA
2002/2003	34	247	84	34.0	26	58	NA	NA
2003/2004	35	350	149	42.6	142	7	NA	NA
2004/2005	36	370	142	38.4	103	39	6	1.6
Total	**-**	**1538**	**580**	**37.7**	**390**	**190**	**6**	**NA**

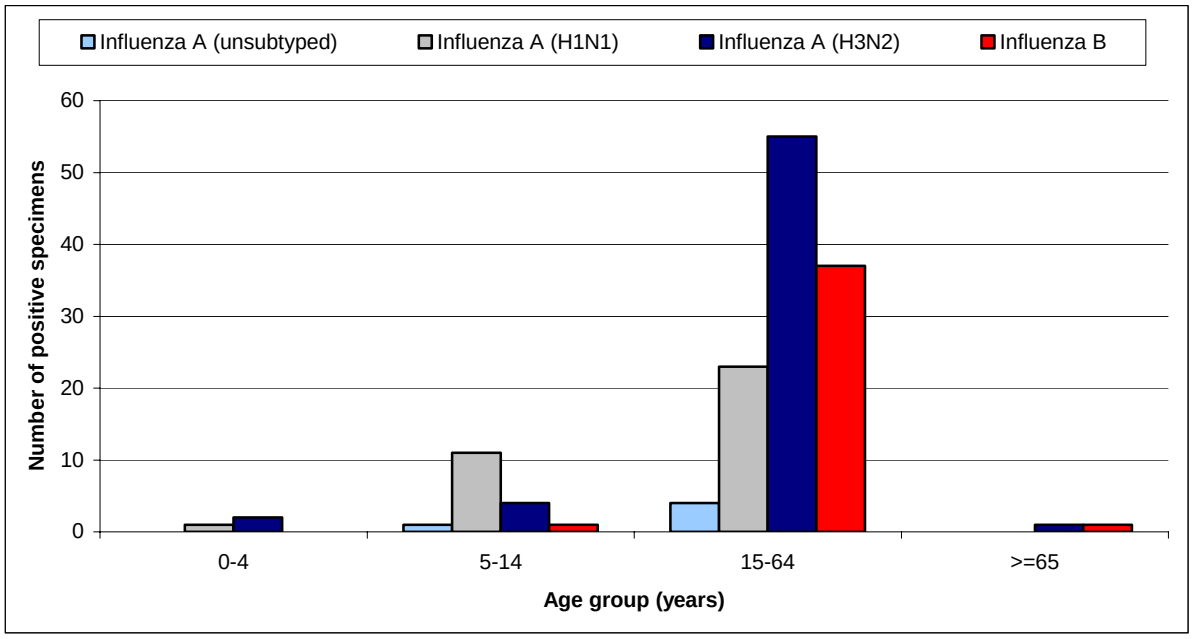

Figure 4. Number of sentinel swabs positive for influenza virus by type, subtype, and age group (years), for the 2004/2005 season.

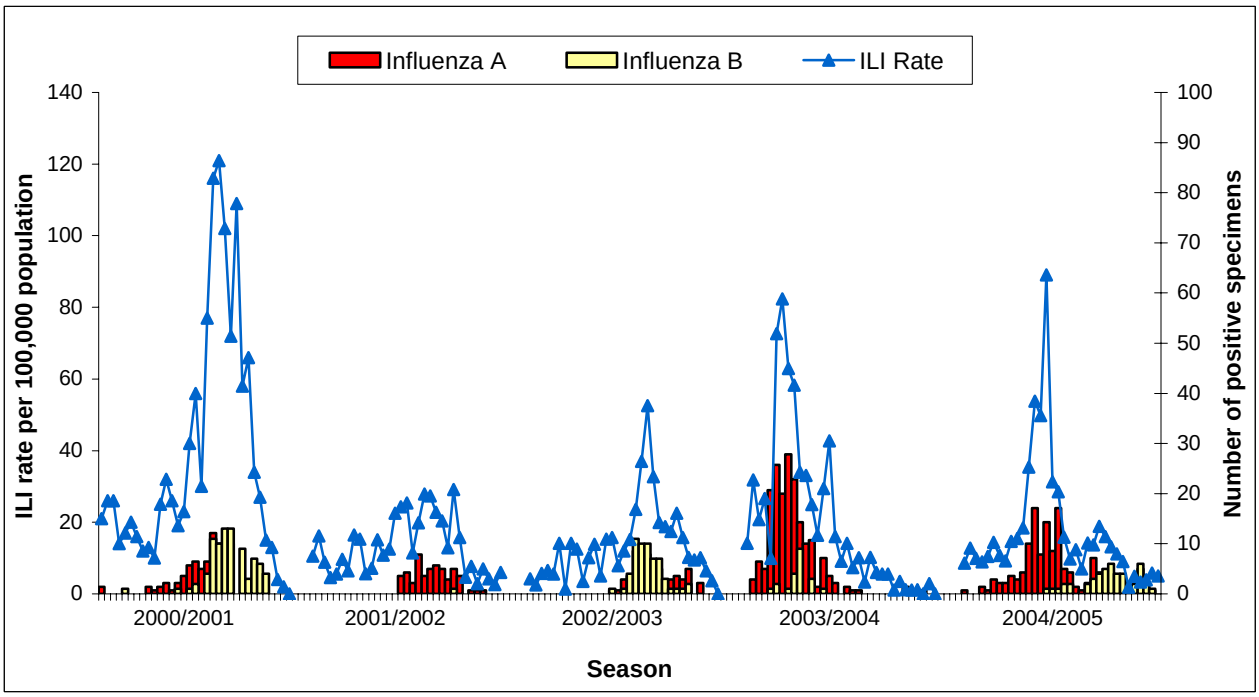

Figure 5. ILI rate per 100,000 population and the number of positive influenza specimens (sentinel & non-sentinel) detected by the NVRL during the 2000/2001, 2001/2002, 2002/2003, 2003/2004 & 2004/2005 seasons.

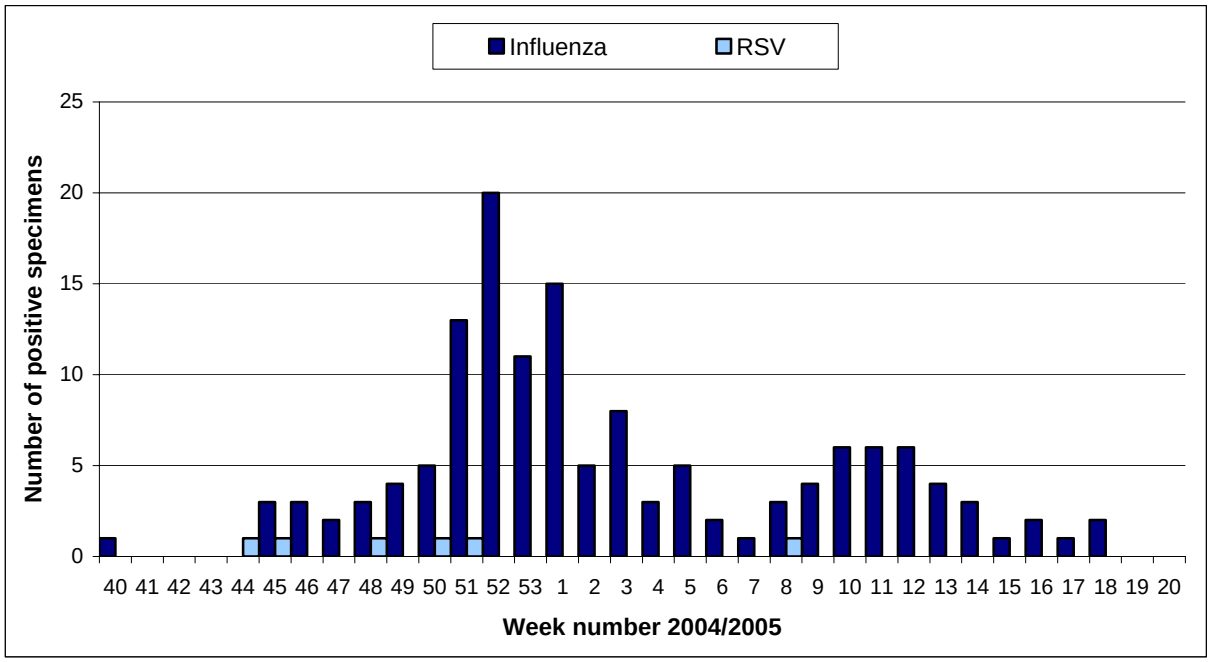

Figure 6. Number of influenza and RSV positive sentinel specimens detected during the 2004/2005 season.

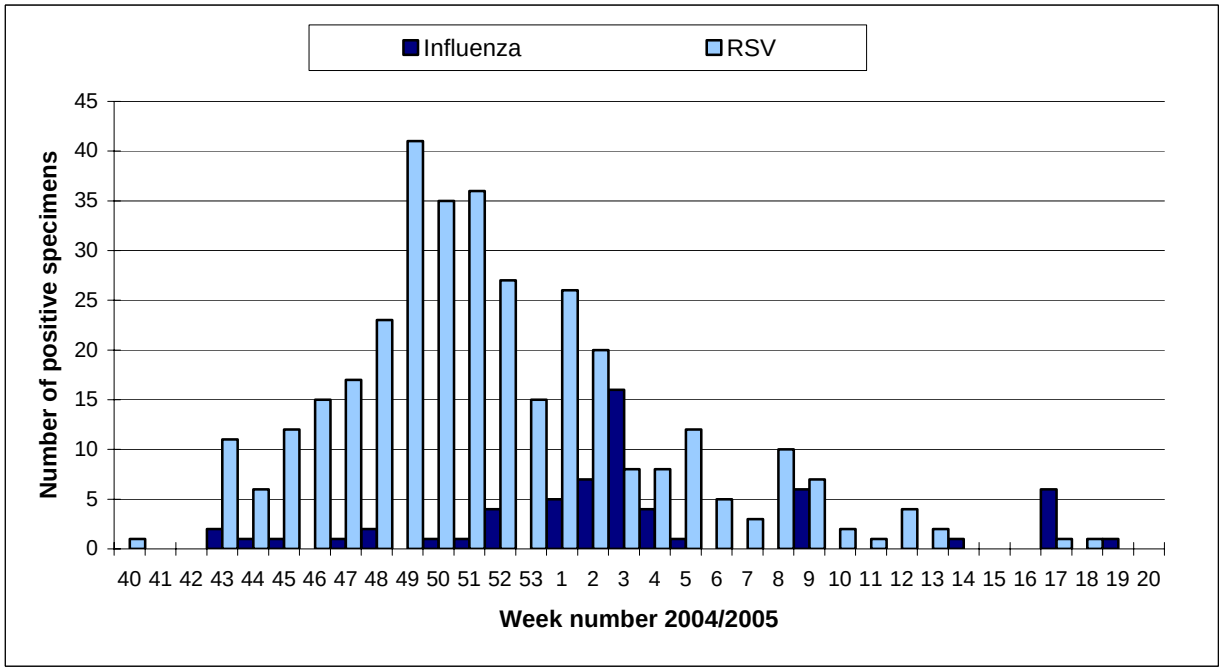

Figure 7. Number of influenza and RSV positive non-sentinel specimens detected during the 2004/2005 season.

Vaccination status

Of the 142 positive influenza virus detections from sentinel specimens, 107 (75.3%) were unvaccinated, four (2.8%) were vaccinated and vaccination status was unknown in 31 (21.8%) cases. Of the four cases that were vaccinated, influenza A (H3N2) was detected in two cases, influenza A (H1N1) in one case and influenza B in one case.

Table 3. Influenza vaccination status of influenza virus positive cases during the 2003/2004-influenza season (n=142)

Influenza type/subtype	Vaccinated	Not Vaccinated	Unknown vaccination status	Positive cases
Influenza A (unsubtyped)	0	3	2	5
Influenza A (H1N1)	1	31	4	36
Influenza A (H3N2)	2	44	16	62
Influenza B	1	29	9	39
Total	**4**	**107**	**31**	**142**

Antigenic characterisation

Three influenza specimens were sequenced at the NVRL and phylogenetic analysis was undertaken at WHO laboratory (Mill Hill) in London. One influenza A (H1N1) isolate was antigenically characterised as A/New Caledonia/20/99-like, which was included in the 2004/2005 vaccine. One influenza A (H3N2) isolate was found to be closest in antigenic character to the reference viruses A/Shantou/1219/04 and A/Oslo/807/04. A/Shantou/1219/04-like strains have been found to be closely related to the newer reference strain A/California/7/04 (H3N2). The A/California/7/04(H3N2)-like isolates have reduced titres to the A/Fujian/411/02-like antisera (included in the 2004/2005 vaccine), but the H3N2 component of the 2004/2005 vaccine was expected to provide some protection against this new variant. One influenza B isolate was antigenically characterised as being closely related to B/Jiangsu/10/03. B/Jiangsu/10/2003 was included in the 2004/2005 vaccine (as a B/Shanghai/361/2002-like virus).

Regional influenza activity

Influenza A and B were detected in all HSE health areas during the 2004/2005 season. Influenza A was the predominant influenza type detected in all areas, except for HSE-MA, where influenza A and B co-circulated in equal numbers (table 4). Influenza activity peaked during week one 2005, with HSE-ER and HSE-SEA both reporting regional influenza activity (figure 8). Overall, influenza activity was most intense in HSE-ER and HSE-SEA during the 2004/2005 season (figure 9).

Table 4. Total number of sentinel and non-sentinel influenza A and B positive specimens by HSE area for the 2004/2005 season to date*

HSE-Health Areas	Sentinel			Non-Sentinel			Total		
	Flu A	Flu B	Total	Flu A	Flu B	Total	Flu A	Flu B	Total
HSE-ER	23	21	44	39	0	39	62	21	83
HSE-MA	5	1	6	1	5	6	6	6	12
HSE-MWA	14	2	16	0	0	0	14	2	16
HSE-NEA	9	2	11	0	1	1	9	3	12
HSE-NWA	1	1	2	9	0	9	10	1	11
HSE-SEA	23	6	29	3	2	5	26	8	34
HSE-SA	11	2	13	0	0	0	11	2	13
HSE-WA	17	4	21	0	0	0	17	4	21
Total	**103**	**39**	**142**	**52**	**8**	**60**	**155**	**47**	**202**

**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.*

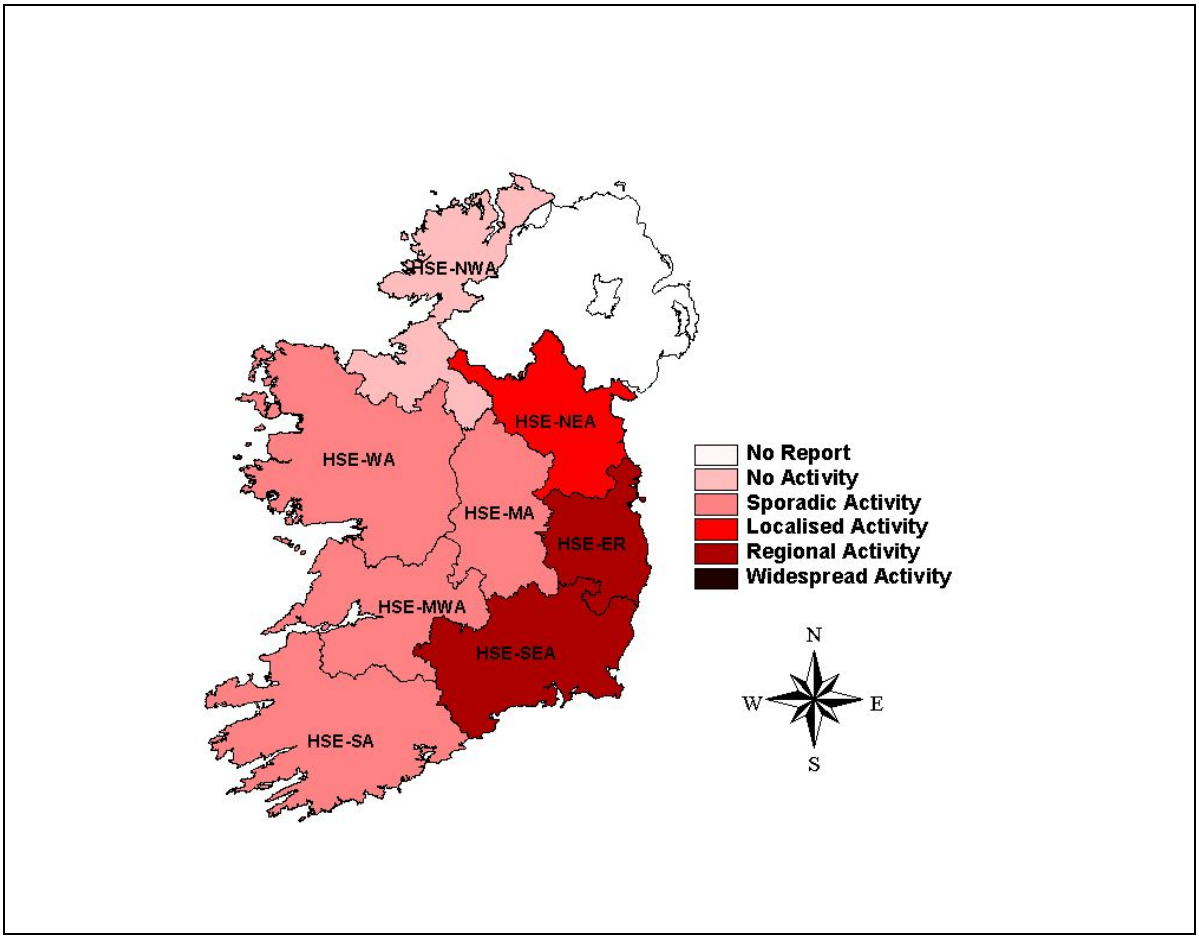

Figure 8. Map of influenza activity by HSE health area during the 2004/2005 season peak of influenza activity, week 1 2005.

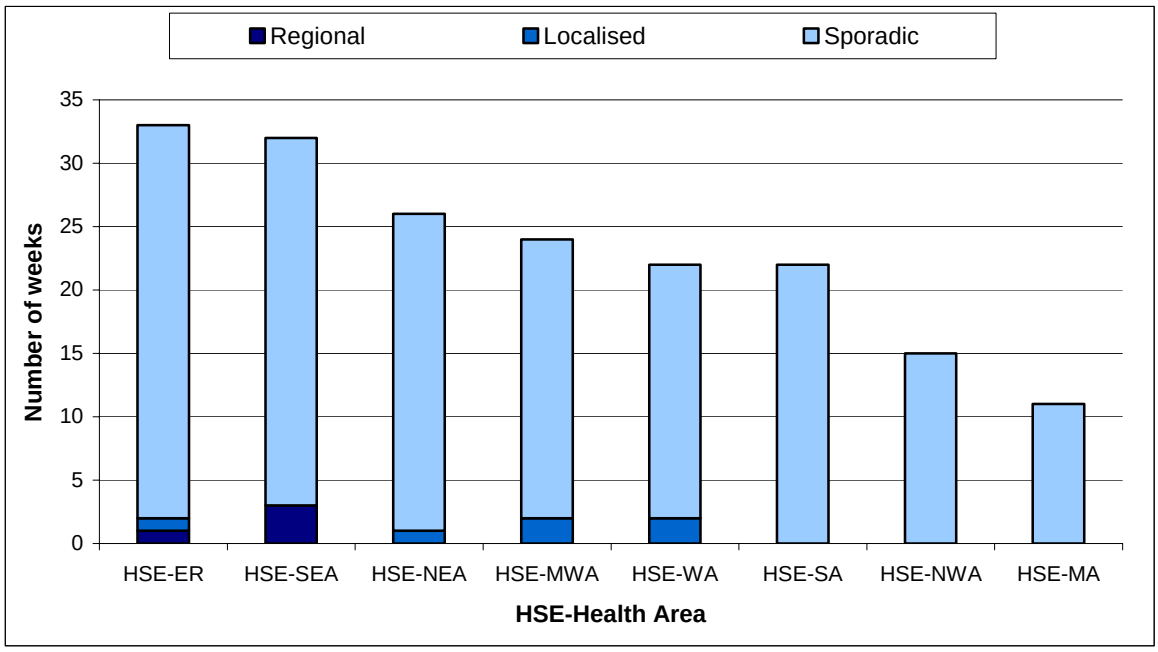

Figure 9. Number of weeks during the 2004/2005 season that each HSE health area reported influenza activity.

Outbreaks

Three influenza outbreaks were reported to HPSC during the 2004/2005 season. A school outbreak of ILI in a sentinel school occurred during week 48 in HSE-MWA. A total of 32 pupils were reported ill. There were no hospitalisations. Influenza A (unsubtyped) was isolated from two cases. An outbreak of influenza A (H3N2) in a long-stay care facility for the elderly was reported by HSE-ER during week three. Thirty-seven patients and 19 staff members were affected, corresponding to an attack rate of 33.4%. A school outbreak of ILI occurred during week 16 in HSE-MA. A total of 32 out of 35 pupils (91.4%) were reported ill. Seven throat swabs were taken and influenza B was isolated from five of these. All patients made a full recovery.

Sentinel hospitals & sentinel schools

Hospital respiratory admissions peaked or were at elevated levels in the two weeks preceding and/or during the peak of influenza activity (week 1 2005), in HSE-ER, -NEA, -SEA, –SA and -WA. The percentage of respiratory admissions over total admissions in seven sentinel hospitals compared to ILI consultation rates are shown in figure 10. Total hospital admissions and/or total accident and emergency admissions were also at elevated levels either prior to or during the peak of clinical influenza activity in HSE-MW, -NE, -NW, -SE, and -WA.

As the peak in clinical influenza activity occurred over the Christmas holiday period, schools were closed and sentinel school absenteeism levels could not be used as an indicator of influenza activity in the weeks preceding the peak in influenza activity.

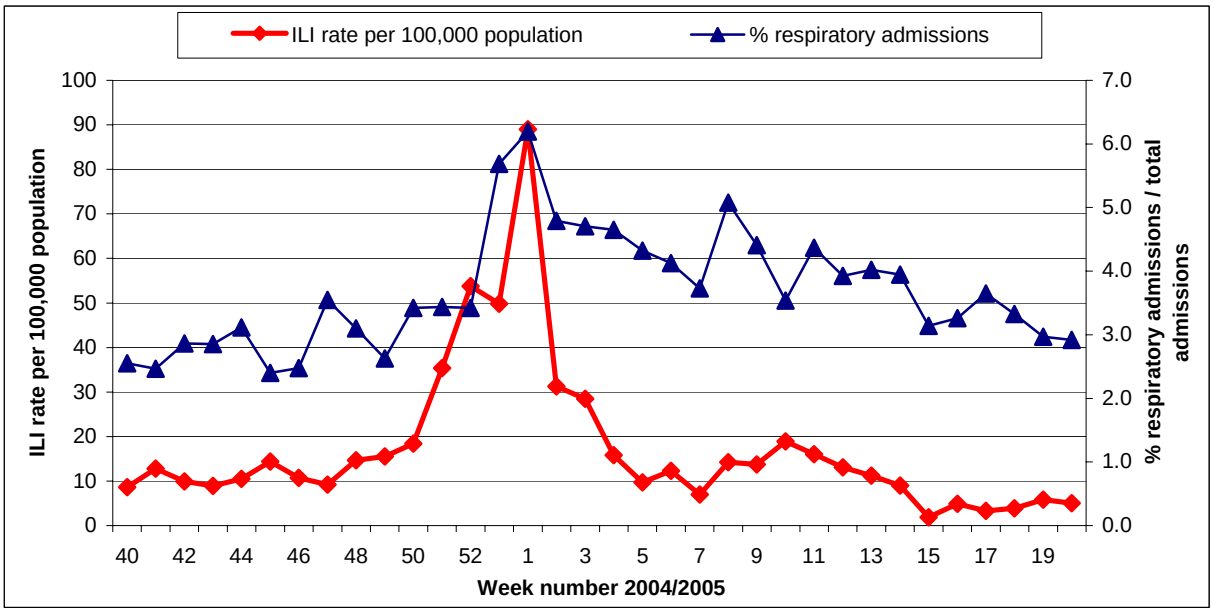

Figure 10. Respiratory admissions as a percentage of total hospital admissions in seven sentinel hospitals and ILI rates per 100,000 population by week for the 2004/2005-influenza season.

Enhanced influenza surveillance

A total of 13 cases aged between 0 and 14 years were reported through the enhanced influenza surveillance system during the 2004/2005 season. All 13 cases were notified from HSE-ER. All cases were hospitalised and were positive for influenza A. Five

cases were aged less than one year, seven were aged between 1 and 2 years and one case was 13 years of age. One case was vaccinated, four were not vaccinated and the vaccination status was unknown for eight cases. The number of days in hospital ranged from one to 62 days. Two cases were in at risk categories for influenza, one of whom was not vaccinated and the vaccination status was unknown for the second case.

Mortality data

Two deaths attributed to influenza were reported to HPSC during the 2004/2005 season. Both deaths were registered during week one 2005, one in a child in the 5 to 14 age group with an underlying chronic medical condition who died in early December 2004 and the second in an adult aged over 64 years who died in early January 2005.

Influenza notifications data

A total of 213 influenza notifications were reported to HPSC during the 2004/2005 influenza season. The majority (46.5%) of cases were aged between 15 and 64 years of age. The later peak observed with influenza notifications during week 5 2005 (figure 11), was possibly due to changes in reporting behaviour as a result of the amendment to the Infectious Diseases Regulations 2003 (SI No. 707 of 2003). The peak in influenza notifications during week 17 2005, was due to a school outbreak of influenza B that occurred during week 16 in HSE-MA. It should be noted that notification data for the 2004/2005 season are provisional.

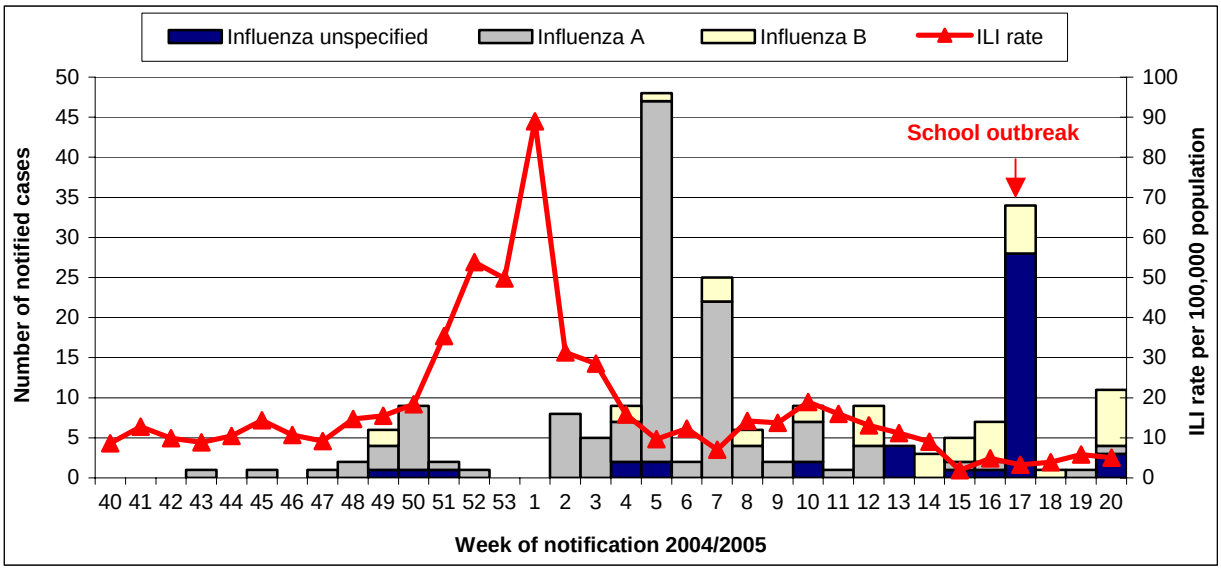

Figure 11. Number of notifications of influenza (possible & confirmed) by type and by week of notification compared to ILI rates per 100,000 population during the 2004/2005 influenza season.*

**Please note that notification data are provisional and were extracted from CIDR on 27/09/2005.*

Influenza activity worldwide

In the United Kingdom, low levels of influenza activity were experienced throughout the 2004/2005 season, peaking late in the season (January to March). Virological activity also remained at low levels, with influenza A/Wellington/1/2004 (H3N2)-like viruses identified as the dominant circulating strain. [5]

Influenza activity in other European countries also started later than in the 2003/2004 season, with spatial analysis indicating both a west to east and south to north spread of influenza across Europe. Based on subtyping data of all influenza virus detections reported to EISS up to week 16 2005, 47% were A (unsubtyped), 32% were A(H3), 5% were A(H1) and 17% were B. A total of 4083 viruses (29% of all isolates) have been antigenically and/or genetically characterised: 1263 A/California/7/2004 (H3N2)-like viruses, 1226 A/Wellington/1/2004 (H3N2)-like viruses, 112 A/Fujian/411/2002 (H3N2)-like viruses, two A/Panama/2007/99 (H3N2)-like viruses, 765 A/New Caledonia/20/99 (H1N1)-like viruses, 401 B/Jiangsu/10/2003-like viruses and 314 B/Hong Kong/330/2001-like viruses. [3]

In Canada and the US, influenza activity also started later than the 2003/2004 season, with clinical activity peaking in February 2005. Influenza A (H3N2) was the predominant subtype identified, with the majority of strains identified as A/Fujian/411/2002 (H3N2)-like and A/California/7/2004 (H3N2)-like viruses. [6, 7]

The most significant global influenza event during the 2004/2005 season was the continuing poultry outbreaks of avian influenza A (H5N1) in Asia. Avian influenza (H5N1) outbreaks spread rapidly and widely across Asia and resulted in mass poultry culls, and were associated with cases/clusters of human infections and a number of human deaths. [1, 2]

The WHO announced its recommendations for the composition of the influenza vaccine for the northern hemisphere for 2005/2006 on February 10th 2005. The members of the WHO Collaborating Centres on Influenza recommended that influenza vaccines contain the following strains: A/New Caledonia/20/99(H1N1)-like virus, A/California/7/2004(H3N2)-like virus and B/Shanghai/361/2002-like virus. [8]

Discussion

Influenza activity peaked late in Ireland during the 2004/2005-influenza season with influenza A (H3N2) being the predominant circulating virus, occurring mostly in 15 to 64 year olds. Influenza activity also started later in most of Europe, Canada and the US, with lower levels of activity reported than the previous season. [3, 5, 6, 7]

Surveillance of hospital admissions data and school absenteeism data plays a significant role in the early detection of influenza epidemics. [9] This was demonstrated during the 2004/2005 season, with increased levels of admissions reported from sentinel hospitals detected prior to the peak in influenza activity. The value of collating school absenteeism data as an indicator of influenza activity was also highlighted with the detection of an ILI outbreak in a sentinel school.

The small number of influenza associated deaths reported to HPSC for the 2004/2005 season is not unexpected. Excess deaths due to influenza are often not registered as

influenza deaths. The overall impact of influenza on mortality is estimated to be greater than registered influenza mortality. Monitoring influenza and pneumonia deaths is one method of identifying these influenza-non-attributed deaths, and from this estimating the mortality burden caused by influenza each season. [10]

Avian outbreaks of influenza A (H5N1) have posed a significant threat to human health since 2003. In a number of outbreaks 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 influenza viruses an opportunity to exchange genes (reassortment), thereby acquiring the ability to transmit easily from human-to-human and thus triggering a pandemic.[1, 2]

In July 2005, avian outbreaks of influenza A (H5N1) spread westwards to Russian bird populations, posing an ever-greater threat of pandemic in Europe. EU Member States are strengthening their preparedness for a potential human influenza pandemic.[11] As a result of the threat posed to human health, a number of additional measures have been put in place in Ireland to improve surveillance of ILI/influenza. Work is in progress to increase the number of sentinel GPs, thereby improving geographical and population representation. Sentinel GPs are also currently monitoring ILI on a year round basis. In addition, influenza and all ILI/influenza outbreaks became notifiable in Ireland on January 1st 2004. Good reporting of such events is critical to early detection of influenza activity. An enhanced influenza surveillance system was set up to detect all hospitalised influenza cases aged between 0 and 14 years of age, in response to the circulation of the Fujian strain of influenza, particularly amongst younger age groups, during the 2003/2004 season. Other activities that are in progress to improve the surveillance of influenza include, weekly surveillance of influenza and pneumonia registered deaths, monthly surveillance of influenza vaccine uptake data in those aged 65 years and older, an evaluation of sentinel hospital admissions and school absenteeism data, and the construction of baseline and epidemic threshold levels for influenza activity in Ireland. This information will in turn inform continuing progress on the Irish national influenza pandemic preparedness plan.

Further information on influenza is available on the HPSC website
http://www.hpsc.ie/A-Z/Respiratory/Influenza/

Acknowledgements
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